

# Harrisburg University Of Science and Technology

## Undergraduate Catalog

2018-2019

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## **CONTACT INFORMATION**

Harrisburg University of Science & Technology  
326 Market Street  
Harrisburg, PA 17101  
[www.HarrisburgU.edu](http://www.HarrisburgU.edu)  
717.901.5100  
717.901.5150 (fax)

Additional Location:  
111 S. Independence Mall East, Suite 300  
Philadelphia, PA 19106  
  
215.717.7402  
215.574.9800

Admissions  
717.901.5101  
[Admissions@HarrisburgU.edu](mailto:Admissions@HarrisburgU.edu)

Library  
717.901.5188  
[Library@HarrisburgU.edu](mailto:Library@HarrisburgU.edu)

Advancement Office  
717.901.5103  
[Connect@HarrisburgU.edu](mailto:Connect@HarrisburgU.edu)

Office of the President  
717.901.5104  
[President@HarrisburgU.edu](mailto:President@HarrisburgU.edu)

Finance & Administration  
717.901.5105  
[BusinessOffice@HarrisburgU.edu](mailto:BusinessOffice@HarrisburgU.edu)

Professional Development  
717.901.5190  
[ProfessionalEd@HarrisburgU.edu](mailto:ProfessionalEd@HarrisburgU.edu)

Financial Aid  
717.901.5115  
[FinancialAid@HarrisburgU.edu](mailto:FinancialAid@HarrisburgU.edu)

Records and Registration  
717.901.5136  
[Registrar@HarrisburgU.edu](mailto:Registrar@HarrisburgU.edu)

Information Technology  
717.901.5106  
[HelpDesk@HarrisburgU.edu](mailto:HelpDesk@HarrisburgU.edu)

Student Services  
717.901.5173  
[StudentServices@HarrisburgU.edu](mailto:StudentServices@HarrisburgU.edu)

## **ABOUT THE CATALOG**

This University Catalog is updated annually and made available in electronic form on the Harrisburg University website (<http://harrisburgu.edu/records-registration/>). The University website also contains updated lists of courses, course descriptions, textbook adoptions, and other important information.

Harrisburg University has made every effort to make this catalog accurate; however, all policies, procedures or charges are subject to change at any time by appropriate action of the faculty, administration, or Board of Trustees. Each edition of the University's catalog is archived in the library.

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**2018 – 2019 ACADEMIC CALENDAR****UNDERGRADUATE DIVISION**

<b>2018 FALL SEMESTER (FA 2018 – 2019)</b> <i>August 25, 2018 – December 12, 2018</i>	
<b>2018</b>	
August 24	Move In Day
August 25 – 26	Welcome Weekend
<b>August 27</b>	<b>First Day of Classes</b> Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
September 3	Labor Day Holiday (No Classes, University Closed)
September 4	Add/Drop Period Ends Census Date Last Day to Withdraw with a 75% Tuition Refund
September 10	Last Day to Withdraw with a 50% Tuition Refund
September 17	Last Day to Withdraw with a 25% Tuition Refund
October 1	Early Warning Notices Due to Registration Office
November 9	Last Day to Withdraw from a Course with a “W”
November 14	Spring 2019 Registration Opens
November 21 – 25	Thanksgiving Holiday (No Classes; University Closed 11/22 – 11/25)
December 7	Classes End
December 10 – 12	Final Exams
December 17	Final Grades Due to Registration Office by 8:00 a.m.

**SUBTERM A**

<b>S U B T E R M A</b>	August 27	Subterm A Begins Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
	August 31	Add/Drop Period Ends Last Date to Withdraw with a 75% Tuition Refund
	September 3	Labor Day Holiday (No Classes, University Closed)
	September 4	Last Date to Withdraw with a 50 % Tuition Refund
	September 7	Last Date to Withdraw with a 25% Tuition Refund
	September 28	Last Day to Withdraw from a Course with a “W”
	October 13	Subterm A Ends
	October 15	Final Grades Due to Registration Office by 8:00 a.m.

**SUBTERM B**

<b>S U B T E R M B</b>	October 15	Subterm B Begins Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
	October 19	Add/Drop Period Ends Last Day to Withdraw with a 75% Tuition Refund
	October 22	Last Day to Withdraw with a 50% Tuition Refund
	October 25	Last Day to Withdraw with a 25% Tuition Refund
	November 16	Last Day to Withdraw from a Course with a “W”
	November 21 – 25	Thanksgiving Holiday (No Classes; University Closed 11/22 – 11/25)
	December 7	Subterm B Ends
	December 17	Final Grades Due to Registration Office by 8:00 a.m.

<b>2019 SPRING SEMESTER (SP 2018 – 2019)</b> <i>January 5, 2019 – April 25, 2019</i>	
<b>2019</b>	
January 4	Move In Day
January 5 – 6	Welcome Weekend
<b>January 7</b>	<b>First Day of Classes</b> Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
January 14	Add/Drop Period Ends Census Date Last Day to Withdraw with a 75% Tuition Refund
January 21	Martin Luther King, Jr. Day (No Classes; University Closed)
January 22	Last Day to Withdraw with a 50% Tuition Refund
January 28	Last Day to Withdraw with a 25% Tuition Refund
February 11	Early Warning Notices Due to Registration Office
March 4 – 10	Spring Recess
March 29	Last Day to Withdraw from a Course with a “W”
April 3	Registration Opens for Summer & Fall 2019
April 22	Classes End
April 23 – 25	Final Exams
April 29	Final Grades Due to Registration Office by 8:00 a.m.
May 9	Commencement

**SUBTERM A**

<b>S U B T E R M A</b>	January 7	Subterm A Begins Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
	January 11	Add/Drop Period Ends Last Day to Withdraw with a 75% Tuition Refund
	January 14	Last Day to Withdraw with a 50% Tuition Refund
	January 17	Last Day to Withdraw with a 25% Tuition Refund
	January 21	Martin Luther King, Jr. Day (No Classes; University Closed)
	February 8	Last Day to Withdraw from a Course with a “W”
	February 23	Subterm A Ends
	February 25	Final Grades Due to Registration Office by 8:00 a.m.

**SUBTERM B**

<b>S U B T E R M B</b>	February 25	Subterm B Begins Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
	March 3	Add/Drop Period Ends Last Day to Withdraw with a 75% Tuition Refund
	March 4 – 10	Spring Recess
	March 11	Last Day to Withdraw with a 50% Tuition Refund
	March 14	Last Day to Withdraw with a 25% Tuition Refund
	April 5	Last Day to Withdraw from a Course with a “W”
	April 22	Subterm B Ends
	April 29	Final Grades Due to Registration Office by 8:00 a.m.

<b>2019 SUMMER SEMESTER (SU 2018 – 2019)</b> <i>May 4, 2019 – August 17, 2019</i>		
<b>2019</b>		
May 3		New Student Orientation
<b>May 6</b>		<b>First Day of Classes</b> Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
May 9		No Classes Due to Commencement Ceremony
May 13		Add/Drop Period Ends Census Date Last Day to Withdraw with a 75% Tuition Refund
May 20		Last Day to Withdraw with a 50% Tuition Refund
May 27		Memorial Day Holiday (No Classes; University Closed)
May 28		Last Day to Withdraw with 25% Tuition Refund
June 10		Early Warning Notices Due to Registration Office
July 4 - 7		Independence Day Holiday (No Classes; University Closed on 7/4)
July 19		Last Day to Withdraw from a Course with a “W”
August 14		Classes End
August 15 – 16		Final Exams
August 19		Final Grades Due to Registration Office 8:00 a.m.
<b>SUBTERM A</b>		
S U B T E R M A	May 6	Subterm A Begins Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
	May 10	Add/Drop Period Ends Last Day to Withdraw with a 75% Tuition Refund
	May 13	Last Day to Withdraw with a 50% Tuition Refund
	May 16	Last Day to Withdraw with a 25% Tuition Refund
	May 27	Memorial Day Holiday (No Classes; University Closed)
	June 7	Last Day to Withdraw from a Course with a “W”
	June 22	Subterm A Ends
	June 24	Final Grades Due to Registration Office 8:00 a.m.
<b>SUBTERM B</b>		
S U B T E R M B	June 24	Subterm B Begins Add/Drop Period Begins Learning Contract Submission Deadline for Internship, Project I, and Project II
	June 28	Add/Drop Period Ends Last Day to Withdraw with a 75% Tuition Refund
	July 1	Last Day to Withdraw with a 50% Tuition Refund
	July 4 - 7	Independence Day Holiday (No Classes; University Closed on 7/4)
	July 5	Last Day to Withdraw with a 25% Tuition Refund
	July 31	Last Day to Withdraw from a Course with a “W”
	August 14	Subterm B Ends
	August 19	Final Grades Due to Registration Office 8:00 a.m.

## **THE UNIVERSITY**

### **HISTORY**

The University was incorporated in the Commonwealth of Pennsylvania on December 12, 2001, making it the first science- and technology-focused, non-profit, comprehensive university to be established in Pennsylvania in more than 100 years. Founded to address the Capital Region's need for increased educational opportunities in science, technology, engineering and mathematics (STEM) careers, Harrisburg University represents a major step to attract, educate, and retain Pennsylvania's diverse 21st century knowledge-based workforce. A grand concept that was championed by business leaders, government officials, and the regional news media, Harrisburg University was built from concept to reality in less than a decade. The Pennsylvania Department of Education granted the University its charter in 2005.

An independent institution, the University offers academic and research programs designed to meet the needs of the region's youth, workforce and businesses. The University serves as a catalyst for creating, attracting an expanding economic development and opportunities in Central Pennsylvania by aligning traditional undergraduate, graduate, and doctorate degrees with science and technology-based experiential learning.

### **MISSION STATEMENT**

The Harrisburg University of Science and Technology offers innovative academic and research programs in science and technology that respond to local and global needs. The institution fosters a diverse community of learners, provides access and support to students who want to pursue a career in science and technology, and supports business creation and economic development.  
*Approved by the Board of Trustees on September 17, 2015.*

### **VISION**

Founded to address the need of Pennsylvania's Capital Region for increased educational opportunities in applied science and technology-related fields, the vision of Harrisburg University of Science and Technology is to provide academic programs at undergraduate and graduate levels for a diversity of learners, using student-centered, technologically advanced, and experiential learning designs that emphasize student success, with a sharp focus on specific interdisciplinary competencies and strong linkages to career development. The desired outcome is the emergence of well-qualified, technically expert graduates whose understanding of applied science and technology-related fields is honed by direct industry experience and rounded by a sound, cross-disciplinary liberal education.

### **ACCREDITATION AND APPROVALS**

Harrisburg University of Science and Technology was re-accredited on March 3, 2016 by the Middle States Commission on Higher Education, 3624 Market Street, Philadelphia, PA 19104, (267) 284-5000. The Middle States Commission on Higher Education is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Council for Higher Education Accreditation. The Doctor's Research Scholarship degree program (Ph.D. in Data Sciences) was granted by Middle States on January 4, 2017.

Program offerings are authorized by the Pennsylvania Department of Education, Division of Higher and Career Education, 333 Market Street, Harrisburg, PA 17126.



Approved to participate in the federal Title IV, HEA student assistance programs by the U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202.

Approved by the Pennsylvania Department of Education for veterans and eligible dependents to obtain education benefits through the Veteran's Administration (VA).

Approved by the Veterans Administration to participate in the "Yellow Ribbon" program. Authorized under federal law by the Department of Homeland Security – U.S. Immigration and Customs Enforcement (DHS-USCIS-SEVP) as an eligible institution for the Student and Exchange Visitor Information System (SEVIS) to enroll non-immigrant students.

An articulation agreement with another institution of higher education permits students enrolled in certain associate degree programs to transfer credits into specific degree programs at the University.

The University has an articulation agreement with the following institutions of higher education:

Alvernia University  
Community College of Baltimore County  
Community College of Philadelphia  
Harrisburg Area Community College  
Hussian College, School of Art  
Lehigh Carbon Community College

Harrisburg University also has course articulation agreements with the following secondary schools:

Beaver County Career & Technology Center	Fayette County Career & Technical Institute
Berks Career & Technology Center	Greater Johnstown Career & Technology Center
Bethlehem Area Vocational-Technical School	Hunterdon Co. Polytech Career & Technical School
Bucks Count Technical High School	Lancaster County Career & Technology Center
Central Montco Technical High School	Lebanon County Career & Technology Center
Chester County Technical College High School	Lehigh Career & Technical Institute
Cumberland Perry Area Vocational Tech. School	McKeesport Area High School
Dauphin County Technical School	Middlesex County Vocational & Technical Schools
Delaware County Technical High School	Middle Bucks Institute of Technology
Dover Area School District	Mon Valley Career & Technical Center
Murrell Dobbins Career & Technical Education High School	
Northern Westmoreland Career & Technology Center	
Reading Muhlenberg Career & Technology Center	
York County School of Technology	

A consortium agreement with another institution of higher education allows a student to remain enrolled at the University while also taking credits at the visiting institution. The University has a consortium agreement for certain nanobiotechnology courses with the following institution:

The Pennsylvania State University – University Park Campus

and, the University has a consortium agreement for certain computer science courses with the following institution:

Saint Francis University

## **STUDENT RESPONSIBILITY STATEMENT**

A student has the responsibility to engage fully in assigned work, make connections, communicate with other members of the University community, and develop professional competencies. The University is new in both thought and ideas. The student should be a partner in this endeavor, now and in the future. It is the student's responsibility to become engaged in the University's community of learners and develop a strong professional and ethical foundation as an individual. Each student is bound by the Student Code of Conduct, which is contained in the Student Handbook.

## **STATEMENT OF COMMUNITY VALUES**

Underlying the University's mission are the following basic values:

- the importance of personal integrity, honesty, and ethical decision making;
- the right of every individual to be treated with respect and dignity as a member of a learning organization;
- freedom of intellectual inquiry in the pursuit of truth, even if it defies commonly understood theories;
- acceptance and appreciation of human diversity regarding race, gender, religion, sexual orientation, age, ability, ethnicity, and political views;
- freedom from violence or harassment that would interfere with or disrupt university activities; and
- recognition that civic engagement is a component of the intellectual development of a student and provides a path for knowledge and personal development in the service of the community.

## **UNDERGRADUATE EDUCATION**

### **ADMISSION**

The University has a centralized Admissions Office to serve all prospective student applicants – undergraduate, graduate and non-degree. This centralized structure honors the University’s commitment to lifelong learning and to offer a more fluid and comprehensive service for those seeking access to a quality educational experience.

#### **Degree-seeking Admission**

##### **Philosophy**

Harrisburg University of Science and Technology seeks to admit students from a variety of backgrounds. Many factors are considered in the review of applicant files. The student’s motivation and interest in science or technology and academic potential, which is generally assessed by the courses completed and grades earned in secondary school, are the key elements in considering the applicant for acceptance. The applicant’s interest in science and technology is evaluated by reviewing educational records and reading the goal statement that each applicant must submit as part of the application process.

##### **Undergraduate Admission Process**

There is no application deadline. A high school student is encouraged to apply during the fall or early spring of the senior year in high school. An adult learner is encouraged to apply at least two months prior to the start of any semester. This application process allows ample time to be accepted, develop an academic schedule, and to process financial aid applications (if applicable).

##### **Undergraduate Admission Requirements**

Each applicant’s candidacy is evaluated once all admissions materials have been received. Offers of admission are made to qualified candidates on a rolling basis. The undergraduate admission process requires the applicant to:

- complete the application online at [www.HarrisburgU.edu/Apply](http://www.HarrisburgU.edu/Apply) or a paper application;
- submit an official high school transcript or equivalent (required of applicants transferring less than 30 semester hours; encouraged of applicants transferring more than 30 semester hours). A student who has successfully completed the General Educational Development (GED) test may submit an official copy of the scores in lieu of the high school transcript. Documentation of successful completion of high school must be received prior to the end of the first semester of enrollment;
- submit official college transcript(s), if applicable, for any and all college, university or career/trade schools attended (whether or not academic credit was earned);
- submit a personal goal statement: “I am interested in science and technology because...” This statement may be handwritten, emailed or typed, and should be two to four paragraphs in length, or approximately one full page; and,
- submit scores from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) when the applicant’s native language is not English. For specific score requirements, see TOEFL and IELTS section at the end of this chapter.

- High school students applying for admission to the University should have a minimum high school grade point average of 2.75 or higher.

Optional materials:

- be interviewed - preferably in person during a campus visit or by telephone;
- submit results of standardized test scores from the SAT or ACT (optional, but recommended for those in high school); and,
- submit a letter of recommendation (preferably from someone who can attest to the student's work ethic, motivation and strengths, or from a teacher in a subject area tied to the student's academic field of interest).

## **Required Placement Testing**

In order to give the student the best opportunity for success, completion of the University's placement testing program is required of all new undergraduate students – degree-seeking, non-degree-seeking or dual enrollment, regardless of full-time or part-time status. Placement tests are not an entrance examination. The tests measure skills in English, mathematics, and reading.

A student who has demonstrated satisfactory achievement via college transcripts or the equivalent is exempt from the placement tests. A non-native speaker of English must substitute completion of the English placement test with the Test of English as a Foreign Language (TOEFL).

## **Non-Degree Admission**

### **Philosophy**

The University offers various non-degree programs at both the undergraduate and graduate levels, in the form of individual courses, a specialized series of courses, and certificates. Semester hours earned become part of the student's academic record and can be applied to a degree as defined by the appropriate policy and program requirements.

The University also offers professional development experiences in the form of certificate options, workshops, and seminars, which can be taken on a non-credit or audit basis.

In some cases, courses may have prerequisites that must be met prior to registration.

### **Undergraduate Non-Degree Admission Process**

There is no application deadline. An applicant is encouraged to apply at least two months prior to the start of a session or course to allow ample time to develop a finalized course registration. Each applicant's candidacy is evaluated once all admissions materials have been received.

The undergraduate non-degree admission process requires the applicant to:

- complete the non-degree application online at [www.HarrisburgU.edu/Apply](http://www.HarrisburgU.edu/Apply) or a paper application; and,
- submit scores from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) when the applicant's native language is not English. For specific score requirements, see TOEFL and IELTS section at the end of this chapter.

If required by a specific certificate or non-degree program, submit official college transcript(s) for any college, university or career/trade schools attended (whether or not academic credit was earned). Some non-degree programs may require evidence of completion of an associate or bachelor degree program. A candidate who has not yet earned at least an associate degree may be asked to take and successfully pass the required placement tests.

### **Undergraduate Non-Degree Policies**

A student may enroll in up to 21 semester hours under the non-degree status when taking individual courses. Beyond 21 semester hours, a student must apply for full degree status. Non-degree admission does not guarantee admission into a degree-seeking program.

A non-degree student must maintain a 2.00 grade point average to continue from semester to semester.

### **Dual Enrollment Program**

A student may enroll in courses at the University to earn college credit while still in high school. This program provides a student the opportunity to be introduced to the college environment, explore majors, and get a head start on a Bachelor of Science degree.

### **Application Timeline**

An application for acceptance into the Dual Enrollment Program is required. There is no application deadline. Application files are reviewed within two weeks of submission. The applicant is encouraged to apply as soon as possible and coordinate the application with the appropriate high school personnel (often the Guidance Office) prior to high school course selection for the appropriate semester.

### **Dual Enrollment Admission Requirements for a Student from a Sponsoring School District**

The Dual Enrollment admission process requires the applicant to:

- complete the application online at [www.HarrisburgU.edu/Apply](http://www.HarrisburgU.edu/Apply) or via a paper application;
- submit an official high school transcript showing a minimum cumulative GPA of 2.75 on a 4.00 scale;
- successfully complete the placement examination administered by the University, as required;
- submit consent forms from high school guidance department and parent or legal guardian; and,
- submit scores from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) when the applicant's native language is not English. For specific score requirements, see TOEFL and IELTS section at the end of this chapter.

### **Dual Enrollment Policies for a Student from a Sponsoring School District**

A dual enrollment agreement with the sending school district is required. A dual-enrolled student may enroll in as many courses as the sending district approves; however, only 6 semester hours may be taken at the agreed upon dual-enrolled price. Semester hours greater than 6 will be charged at the prevailing semester hour rate. Under the terms of the formal agreement with the school district, the

district must agree to assume the additional semester hour cost when the student enrolls in more than 6 semester hours.

A laptop computer is required for dual enrollment study and the student must also obtain any required textbooks and supplies, if any, prior to the start of the semester.

A Parent Consent Form must be signed by the student and a parent or guardian, which provides various required releases protecting the University's interests.

An applicant desiring to enroll full-time, 12 or more semester hours, must apply under the Early College Program policy.

### **Dual Enrollment Admission Requirements for a Student Without a Sponsoring School District**

The Dual Enrollment admission process requires the applicant to:

- complete the application online at [www.HarrisburgU.edu/Apply](http://www.HarrisburgU.edu/Apply) or a paper application;
- submit an official high school transcript or equivalent showing a minimum cumulative GPA of 2.75 on a 4.00 scale;
- successfully complete the placement examination administered by the University, as required;
- submit consent forms signed by a parent or legal guardian; and,
- submit scores from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) when the applicant's native language is not English. For specific score requirements, see TOEFL and IELTS section at the end of this chapter.

### **Dual Enrollment Policies for a Student Without a Sponsoring School District**

A dual enrollment agreement with the parent or guardian is required. A dual-enrolled student may enroll in as many courses as the parent or guardian approves; however, only 6 semester hours may be billed at the agreed upon reduced dual-enrolled price. Semester hours greater than 6 will be charged at a semester hour rate. Under the terms of the formal agreement, the parent or guardian must agree to assume the additional semester hour cost when the student enrolls in more than 6 semester hours.

A laptop computer is required for dual enrollment study and the student must also obtain any required textbooks and supplies, if any, prior to the start of the semester.

A Parent Consent Form must be signed by the student and a parent or guardian, which provides various required releases protecting the University's interests.

An applicant wishing to enroll full-time, 12 or more semester hours, must apply under the Early College Program policy.

### **Early College Program (ECP)**

A high school student who wishes to attend college on a full-time basis prior to receiving a high school diploma must be admitted under the Early College Program policy. The applicant must show strong academic preparation and personal maturity as exhibited by the high school transcript, placement test scores, and a personal interview to qualify for the Early College Program.

**Application Timeline**

There is no application deadline. Application files are reviewed within two weeks of completion. The applicant is encouraged to apply as soon as possible and coordinate the application with the appropriate high school personnel, often the guidance counselor.

**Early College Program Requirements**

The Early College Program admission process requires the applicant to:

- complete the full-time undergraduate application;
- submit an official high school transcript showing a minimum cumulative grade point average of 3.30 on a 4.00 scale;
- successfully complete the placement examination administered by the University.
- submit written approval from the school district or diploma program describing the required plan of study necessary to complete the high school curriculum by the conclusion of the first two semesters of study at the University;
- schedule an interview for admission; and,
- submit a consent form from the high school guidance department endorsed by the parent or legal guardian.

**Early College Program Policies**

Participation in the Early College Program is contingent upon results of the placement test and the availability of the course(s) in which the applicant plans to enroll.

A student admitted to the Early College Program without a high school diploma is not eligible for Federal and State financial assistance.

Tuition funding for the Early College Program may come from a sponsoring school district; in which case, a dual enrollment contract must be completed with the district. The traditional dual enrollment policies and rates apply.

An independent student who is not from a sponsoring school district will be billed for 6 semester hours at the dual enrollment rate and the prevailing semester hour tuition rate for semester hours in excess of 6.

**International Students**

An international student planning to attend the University on a student (F-1) visa must satisfy the appropriate undergraduate admissions requirements and procedures, demonstrate proficiency in the English language, and provide an affidavit of financial support. Academic records should include courses studied, grades earned, diplomas, certificates, and results of comprehensive national examinations.

A demonstration of English language proficiency is required of any student who is not a United States citizen. Acceptable demonstrations would include one of the following:

- completing a college degree program from a regionally accredited United States institution of higher education,
- earning a score of 4.0 or higher on the Analytical Writing section of the Graduate Record Examination (GRE);

- earning a TOEFL score of 80 or higher on the web-based version, 200 on the computer version, or 520 on the paper version; or
- earning an IELTS score of 6.0 or higher.

Harrisburg University of Science and Technology is approved by the Department of Homeland Security – U.S. Customs and Immigration and Enforcement (DHS-USCIS) as an eligible institution for the Student and Exchange Visitor Information System (SEVIS).

This approval allows an international student to apply for entry into the United States for study on an F-1 visa only after an “Affidavit of Financial Support” is deemed sufficient by the University and a tuition deposit payment of at least \$1,000 toward the first semester’s tuition has been received. A USCIS Form I-20 is then certified and submitted to SEVIS. The SEVIS application fee of \$200 is then paid by the student directly to SEVIS.

Following entry into the United States and arrival at the University, the student will be required to provide a copy of the passport, I-20 Certificate of Eligibility, and the Form I-94 departure record to confirm all identification information in SEVIS.

An international student does not qualify for Federal or State aid awards. Private education loans through participating lenders may be available, if eligible.

### **Readmission**

The Readmission Application Form is available at the Office of Records and Registration and must be completed and submitted to that office. A student who was in good academic standing, had satisfied all financial obligations to the University at the time of withdrawal, and had no disciplinary sanctions imposed will be readmitted. A student who left the University on academic probation or dismissal can only apply for readmission after an absence of one year. The application will be reviewed by a committee appointed by the Provost, who will make the readmission decision. A student who leaves the University and returns from an absence of one year or more will be subject to the Catalog edition in effect during the year of return.



## **TUITION CHARGES, REFUND POLICIES AND BUSINESS OFFICE POLICIES**

All undergraduate tuition, charges and policies listed in this publication are effective as of July 1, 2015 and are subject to change, without notice, by the University's Board of Trustees.

### **Admission Application Charge**

There is no charge to apply for admission to the University.

### **Tuition Deposit**

A non-refundable tuition deposit of \$150 must be paid in advance of final course registration for the initial semester of attendance. A tuition deposit made for the Fall Semester is non-refundable after May 1, 2017. A deposit for the Spring Semester is non-refundable after November 1, 2017.

### **Tuition – Semester Schedule**

Tuition payment or satisfactory arrangement to pay tuition is due generally one week prior to the beginning of the semester. Tuition is charged at the per semester hour rate shown below. Full-time tuition charges are for 12 to 17 semester hours. A student who registers for more than 17 semester hours is subject to additional tuition costs at the per-semester hour rate (for example, tuition charged for 18 semester hours will be \$11,950 + \$1,000 or \$12,950). A student who registers for 11 semester hours or fewer is charged the per semester hour rate multiplied by the number of registered semester hours.

Undergraduate Registration Schedule per Semester

Full-Time Tuition (12 – 17 Semester Hours)	Semester Hour Rate (1 - 11 semester hours or each semester hour over 17)
\$11,950	\$1,000

See the Academic Calendar for withdrawal deadlines.

### **Financial Aid Counseling and Financial Clearance Date**

The student is encouraged to apply for federal and state grant program funding to determine the student's eligibility. A student seeking federal or state financial aid program assistance is required to contact the Office of Financial Aid at least 30 days prior to the start of a semester to complete the application process, submit all required documents and materials requested, and finalize a financial assistance plan by the end of the Add/Drop Period. A student whose financial assistance plan is not finalized by the end of the Add/Drop Period will not be allowed to attend class.

### **Tuition Payments**

Payments may be made in the Business Office by cash, check, or money order. Electronic payment options including credit card, debit card, and electronic check/ACH are available online via the Finance page of MyHU. A preregistered student can view account information online.

A convenience fee of 2.75% will be added for any credit/debit card transactions involving student tuition payments or other services. Online ACH/electronic check payments will not incur a convenience fee.

### **Tuition Payment Plans**

A monthly, interest-free payment plan is offered to the student and or parent to make four (4) monthly installment payments during the semester. There is an enrollment fee of \$50 per semester for this service. A student may enroll in a payment plan via the Finance page of MyHU.

Many employers offer employees a tuition reimbursement benefit. Because reimbursement is usually dependent upon the employee's proof of grade completion, an Employee Deferred Payment (EDP) plan permits a student's allowable tuition payment to be deferred until the end of the semester. The service fee for the plan is \$50 per semester. The application form is available online at the Finance page of MyHU.

### **Laptop Computer**

A laptop computer with wireless capability is required for attendance in all programs of study and should be obtained prior to the first day of class. Minimum requirements are listed on the University's website at <http://www.HarrisburgU.edu/campuslife/technology/laptop.php>. The cost is approximately \$700 to \$1,200.

### **Textbooks**

Textbooks and other supplies (if specified for a course) must be obtained by the student prior to the first day of class. Textbooks may include both hard- and soft-bound books, journals, CDs, or software. Supplies may include a laboratory coat, goggles, gloves or any other required item specified. The estimated cost for textbooks and other supplies per course is \$100.

### **Prior Learning Assessment Charge**

A student who submits an application for prior learning assessment is charged a per semester hour amount of \$225 for the number of semester hours of the course equivalent sought. This charge is imposed at the time of application. No refund will be made if the application is unsuccessful.

### **Other Charges**

**Tuition Payment Late Charge** - A late payment charge of \$250 will be assessed if the student fails to make payment arrangements or pay tuition on or before the payment due date.

**Returned Check Charge** - A charge of \$20 will be assessed if a check or electronic check/ACH transaction processed for payment is returned by the issuing bank.

**Campus ID Card Replacement Charge** - Upon enrollment, a student receives, at no cost, a photo-imprinted Campus ID Card to be used as an identification badge, as a library card, and for building and elevator access. A student is required to wear the Campus ID Card badge when on campus. If a student desires a photo ID, submission of a 2" x 2" photo is required and a charge of \$25 is assessed to replace the card. If a Campus ID Card is lost or stolen, a charge of \$25 is assessed to replace the card.

**Late Registration Charge** – A charge of \$50 will be assessed if the student registers for a course after the Add/Drop Period has ended.

**Pay to Print Charge** – On-campus printing is available to the student. A charge may be assessed depending upon the nature of the print job: paper size, ink color, and quantity.

**Transcript Requests** – The official transcript request form is available on the Harrisburg University website or electronically submitted via MyHU. Each official transcript requested will be charged \$10.00 per transcript for standard domestic delivery and \$35.00 per transcript for standard international delivery.

### **Enrollment Status Determination and Financial Aid Payments**

A student's enrollment status is determined at the end of the Add/Drop Period. The student is charged the applicable tuition rate for the number of semester hours in which the student is enrolled. Federal student financial aid program assistance for which the student may be eligible is then calculated and paid, in accordance with regulations, based on the student's enrollment status. Direct student loans and PLUS loans for first-time students are scheduled for disbursement on or after the 31<sup>st</sup> calendar day from the first day of the semester. University merit and need-based grants and scholarships, if any, are credited to the student's account in week 4 or thereafter during the semester. Advance payment of an estimated credit balance resulting from anticipated institutional financial aid awards is prohibited.

### **Refund Policy for Traditional Semesters**

A student who withdraws from the University prior to the end of the third week of the semester may be due a credit for the unearned portion of the tuition charge.

The rate of tuition refund for withdrawal from the University is as follows:

- prior to the first day of a semester 100%
- during the first week 75%
- during the second week 50%
- during the third week 25%
- after the third week 0%

### **Tuition Refund Policy**

Tuition for the semester is considered fully-earned at the end of the third week of classes. For refund purposes, the semester begins on the first day of class for that semester, regardless of the student's first class day of attendance during week one. The period of time used to calculate the tuition refund is the first day of class of the semester to the University's determination date of official or unofficial withdrawal.

There will be no refund or additional charges for a student who adds and drops an equal number of semester hours within the same semester prior to the end of the Add/Drop Period.

If a student reduces the number of courses and/or semester hours during the published Add/Drop Period, a tuition adjustment for that course or semester hour reduction will be made, except when the student maintains full-time enrollment status with 12 semester hours or more.

There is no tuition refund when a student withdraws from one or more courses after the Add/Drop Period but remains enrolled in one or more other scheduled courses.

A scholarship payment received from a company or organization is applied to the student's tuition balance. The refund policy does not apply separately to the various types of payments credited to the student's account.

### **Official Withdrawal Procedure**

A student is encouraged to contact the Financial Aid and Business Offices in advance of any decision to withdraw from the University to obtain an explanation of the tuition and financial aid adjustments that will occur, if any, as the result of withdrawal from the program of study.

A student who intends to officially withdraw is encouraged to contact the Office of Records and Registration by telephone (717.901.5136), e-mail (Registrar@HarrisburgU.edu), or in person. It is recommended that a Withdrawal Form be completed or one will be completed for the student.

The determination date for withdrawal purposes shall either be the actual date of formal notification by the student or some future date specified by the student as the intended last date of attendance. The determination date is used to calculate the tuition refund, if any, and the student financial assistance program refund, if applicable.

### **Unofficial Withdrawal**

A student who discontinues attendance in all courses during a semester and does not officially withdraw from the University is considered to have unofficially withdrawn. The determination date for unofficial withdrawals shall be the end of the semester, unless other evidence is provided to the Office of Records and Registration. There are serious federal student financial aid program implications for a student who unofficially withdraws, as explained below.

### **Federal Student Financial Aid Program Refund Calculation**

Refunds are calculated upon official withdrawal from all classes and, if the student was deemed eligible for Title IV, HEA student financial assistance program funds, any refund due will be paid within 45 days from the date the student is determined to have withdrawn.

A student who officially withdraws before the 60 percent point in time of the semester will incur an adjustment to the amount of financial aid program funds awarded and/or disbursed for the term based on the percentage of time attended from the first day of class to the University's determination date of withdrawal. If a student officially withdraws during or after week 10 of the 14-week semester, 100 percent of the student's financial assistance program awards are considered earned and will be applied to the total amount of institutional charges due for the term.

For a student who unofficially withdraws during a semester, the withdrawal date shall be the end of the semester. The student is then responsible for all tuition charges due resulting from this reduction in awards and/or payments previously credited to the student's account.

### **Institutional Financial Assistance Awards, Payments and Refunds**

Merit- and need-based financial aid assistance awarded by the University for a semester are earned ratably through week 9 of the 14-week academic term, similar to the federal student assistance program refund calculation described above.

While payments of institutional aid may be credited to the student's account on or after week 4 of a semester, the student must remain enrolled through week 9 of the semester to fully earn the award.

For example, a student with a merit award of \$2,000 who officially withdraws in week 6 of the 14-week semester would only have \$800 of institutional financial aid assistance applied toward tuition due for the term [ $\$2,000 \times 6/14 = \$857$ ]. The difference of \$1,143 is rescinded and the student is responsible for any remaining tuition balance due.

## STUDENT FINANCIAL AID PROGRAMS & POLICIES

The Office of Financial Aid assists qualified applicants who, without assistance, would otherwise be unable to pursue a post-secondary education. The Free Application for Federal Student Aid (FAFSA) and resulting need analysis is used to apply for federal, state and institutional award consideration for payment of tuition, housing, or other charges.

A student must apply each year to renew financial aid eligibility. The amount of financial aid awarded will reflect changes in tuition, housing, or other costs and updates to the financial profile of the student and family.

All students are encouraged to apply for federal and state grant program funding to determine the student’s eligibility. A student seeking federal or state financial aid program assistance is required to contact the Office of Financial Aid at least 30 days prior to the start of a semester to complete the application process, submit all required documents and materials requested, and finalize a financial assistance plan by the end of the Add/Drop Period. A student whose financial assistance plan is not finalized by the end of the Add/Drop Period will not be allowed to attend class.

Financial aid awards are based on the enrollment status of the student during a semester as of the conclusion of the Add/Drop Period, defined as:

Full-time	12 or more semester hours
Three-quarter time	9 through 11 semester hours
Half-time	6 through 8 semester hours
Less than half-time	1 through 5 semester hours

Required enrollment status for federal, state and university financial aid awards:

Program	Full-time	Half-time	Less than Half-time
Pell Grant	Yes	Yes	Yes
FSEOG	Yes	Yes	Yes
Direct Loan	Yes	Yes	Not eligible
PA State Grant	Yes	Yes	Not eligible
HU Merit Aid	Yes	No	No
HU Gift Aid	Yes	No	No
Funded Scholarships	Yes	No	No

A non-degree or non-credit student is not eligible for financial aid.

### **Progress toward a Degree**

A student is classified based upon the number of semester hours completed and reported to the Office of Records and Registration. The classification is based on credits completed, not attempted, and does not include courses for which one of the following grades has been assigned: “I”, “IP”, “NR” or “F”.

First Year	fewer than 24 semester hours earned
Second Year	greater than or equal to 24 semester hours earned but less than 60
Third Year	greater than or equal to 60 semester hours earned but less than 90
Fourth Year	greater than or equal to 90 semester hours earned

## Aid Sources

**Federal Pell Grant** - The Federal Pell Grant is awarded based on a federal formula using the information provided on the Free Application for Federal Student Aid (FAFSA). Awards for a full-time student vary from \$600 - \$5,920 for the 2017-2018 academic year, depending on financial need.

**Federal Supplemental Educational Opportunity Grant (SEOG)** - A limited amount of funds from the SEOG program are available to supplement a Pell-eligible student with exceptional need. Awards vary depending on need and fund availability.

**Federal Direct Loan** - There are two types of Federal Direct Loans: subsidized and unsubsidized. The subsidized loan is interest-free while the student is in school, and is awarded based on financial need. Interest accrues on the unsubsidized loan while the student is enrolled in school. The borrower may opt to pay it as it accrues, or allow it to accrue and capitalize. The unsubsidized loan is a non-need based loan program.

The maximum subsidized Direct Loan per academic year is \$3,500 for first-year students, \$4,500 for second-year students, and \$5,500 for third-year students and beyond. A dependent student may borrow an additional \$2,000 unsubsidized per year. An independent student may borrow an additional \$6,000 unsubsidized loan per year as a first-year and second-year student, and an additional \$7,000 per year as a third-year student and beyond.

**Federal Parent Loan for Undergraduate Students (PLUS) Loan** - The PLUS is available for parents of an undergraduate student through the Direct Loan program. A parent may borrow up to the cost of attendance less any other financial aid received. Repayment begins 60 days after this loan is fully disbursed.

**Federal Work-Study** – An eligible student can seek part-time employment either on-campus or in community service positions off-campus. A student may work up to 20 hours per week during a semester and up to 35 hours per week when classes are not in session.

## **Pennsylvania Higher Education Assistance Agency (PHEAA) State**

**Grants & Special Programs** – PHEAA State Grants are awarded to eligible Pennsylvania residents based on need. Estimated awards will vary from \$200 to \$3,772 for the 2018-2019 academic year. A student applies for the State Grant by completing the FAFSA. Renewal applicants must apply before PHEAA's May 1 deadline. Information from the FAFSA is automatically submitted to PHEAA. After the initial application is filed, students and parents should respond directly to the PHEAA Grant Division if additional information is required to process the state grant award.

Other special programs are offered to eligible applicants as determined by PHEAA. An official high school transcript, or equivalent, may be required to evaluate an applicant's eligibility for these programs.

**Other Programs** – The following federal, state or private financial aid sources are available to a student based upon the individual's affiliations or experiences.

Veterans Administration Education Benefits  
Pennsylvania Office of Vocational Rehabilitation

Job Training Agencies  
Employer Sponsorship

**Institutional Grant and Scholarship Programs** – The University offers a variety of merit- and need-based grant assistance programs for full-time enrollment status during a semester. First-year student merit awards are determined using the record of high school achievement. An official high school transcript, or equivalent, is required to evaluate an applicant's eligibility for these programs. Renewal provisions apply to merit-based awards for subsequent year funding.

Need-based grants are awarded to a student who has remaining need after receiving available federal and state grant sources of aid and borrow a Direct loan and/or PLUS loan for the academic year. Award amounts are discretionary and may change from year to year. Although a student may meet the criteria for multiple gift aid grant awards, receiving any particular award is not assured.

Several scholarship awards are made through funded programs coordinated by the Office of Financial Aid.

### **Satisfactory Academic Progress for Financial Aid Recipients**

Satisfactory academic progress (SAP) for federal Title IV, Higher Education Act (HEA) student financial aid program assistance is defined as the minimum progress required toward the completion of a degree, and must be maintained in order to receive federal and institutional financial aid. The Pennsylvania State Grant Program, administered through PHEAA, has different criteria to determine academic progress.

Federal regulations require the University to establish standards of academic progress in both of the following areas:

- the student's cumulative grade point average, the qualitative measure; and,
- the maximum time limit for completing the program of study, the quantitative measure.

Satisfactory academic progress is evaluated at the end of each semester. Financial aid recipients must maintain the standards in both areas, regardless of whether aid was received in the past. A student who does not meet one or both of the standards is not making satisfactory progress until the standards are met.

A student who is academically eligible to continue enrollment at the University, but does not meet the standards of academic progress, may remain enrolled without financial aid until eligibility to receive financial aid is reestablished. A student should contact the Office of Financial Aid to discuss strategies for meeting the standards and to inquire about options for financial assistance that are not subject to the satisfactory academic progress requirements.

**Academic Standing and Financial Aid Eligibility (qualitative)** - A student with a cumulative grade point average of 2.00 or higher is in satisfactory academic standing. If a student has a cumulative grade point average below 2.00 at the end of a semester, the student has failed to meet the minimum satisfactory academic progress standard and is subject to the warning, probation or dismissal sanction, as applicable, as stated below.

After the initial semester, if at any time the cumulative grade point average falls below 1.00 the University reserves the right to dismiss the student.

**Program Pursuit - Maximum Timeframe for Completing the Program of Study (quantitative)**

- A full-time student must successfully complete a program of study within one- and one-half times the normal time frame in semester hours attempted to continue to receive Title IV, HEA student financial aid program assistance. More simply stated, program pursuit requirements for a normal 4-year, 8 semester program consisting of 120 semester hours must be completed successfully within 6 years (i.e., 12 semesters, 180 semester hours) to maintain eligibility for federal financial aid program assistance throughout the program of study.

A student who is enrolled less than full-time will have the policy applied on a pro-rata basis in accordance with enrollment status.

The quantitative measure of satisfactory academic progress is measured using the following calculation:

$$\text{Total Earned Semester Hours} \div \text{Total Attempted Semester Hours} = \text{a percentage (\%)}$$

The calculated percentage each semester is compared to the following chart to determine if the student has achieved satisfactory academic standing:

Semester	Minimum Percentage of Earned Credit Hours Required
1	25%
2	40%
3	40%
4	50%
5	50%
6	60%
7	60%
8	75%
9	75%
10	85%
11	85%
12	100%

This chart shows the need to complete an average of semester hours each semester to complete a full-time 120 semester hour degree program of study within one- and one-half times the normal time frame:

Normal Time Frame	Number of Semesters	Avg. # of Sem. Hrs. Per Semester	Maximum Attempted Sem. Hrs.	Maximum Number of Semesters	Avg. # of Sem. Hrs. Must Be Completed Per Semester
Degree Programs: 120 semester hours	8	15	180	12	10



## **Failure to Meet One of the Required Satisfactory Academic Progress Standards**

A student who fails to meet either the qualitative or quantitative measure of satisfactory academic progress at the end of a semester is subject to warning, probation, or dismissal according to the following policy:

### **First Occurrence - Warning**

A letter shall be issued placing the student on financial aid warning status for the subsequent semester. No appeal is needed, but an academic plan may be required. The student remains eligible for financial aid program assistance during the warning semester.

### **Second Consecutive Occurrence - Probation**

A letter shall be issued placing the student on probation for the subsequent semester. An academic plan is required during the probationary period. The student should work with the Office of Student Services to create the academic plan. The student remains eligible for financial aid during the probation semester.

### **Third Consecutive Occurrence - Dismissal**

If a student after three consecutive semesters has a cumulative grade point average that remains below 2.00 or fails to meet the program pursuit percentage, a letter of dismissal will be issued.

Federal regulations provide only one remedy to the dismissal action: if evidence is presented showing that the academic plan was successfully executed, the cumulative grade point average has improved, and the required satisfactory progress grade point average can potentially be achieved within the maximum timeframe limitation required by federal regulations, then one second probation period may be granted.

Transfer credit hours from another institution that are accepted toward a program of study are counted as both attempted semester hours and earned semester hours in the program pursuit calculation to determine satisfactory academic progress for Title IV, HEA student assistance program purposes. Grades for transfer credit hours are not included in the calculation of the cumulative grade point average.

Semester hours for a grade of Incomplete (I) are counted in the total attempted semester hours in the program pursuit calculation of satisfactory academic progress for Title IV, HEA student assistance program purposes.

Semester hours for a Withdrawal grade (W) are considered attempted semester hours in the calculations of satisfactory academic progress for Title IV, HEA student assistance program purposes.

When a course is repeated, the attempted credit hours are used to determine the student's enrollment status for the semester (i.e., full-time, half-time, less-than-half-time), but the repeated hours are not counted a second time as attempted credit hours in the cumulative grade point average calculation. Earned semester hours and quality points for a grade used in the cumulative grade point average calculation for a course repeat are taken from the most recent grade.

## **Academic Standing and Satisfactory Academic Progress Review and**

**Notification** – The University evaluates academic standing and satisfactory academic progress at the end of each semester. All students who receive federal and state financial aid must meet the

standards for satisfactory academic progress in order to establish and retain student financial aid program eligibility. The University may establish academic policies that may be different than the policies governing academic warning, probation, and dismissal for institutional grant and scholarship aid and state student assistance program purposes. Written notification of financial aid ineligibility is mailed to a student at the most recently reported permanent address.

**Appeals** – A student who becomes ineligible to participate in the financial aid programs as a result of failure to meet satisfactory academic progress after the Probation period, as defined above, may file an appeal by submitting a letter outlining the nature of the appeal to the Director of Financial Aid. An appeal will be considered only if the student’s failure to meet the standards of academic progress is determined to be due to events beyond the student’s control. Examples of circumstances for which an appeal may be considered include: military obligation; death of a relative; injury or illness of the student; unusual personal hardship or other extenuating circumstance. Written documentation of the circumstances of why the student failed to make satisfactory progress and what has changed that will allow the student to make satisfactory progress by the next evaluation must be submitted with the appeal and should reference the student’s name and student ID number. In addition, evidence must be received documenting that the required academic plan was completed, the cumulative grade point average has improved, and the required satisfactory progress grade point average can potentially be achieved to complete a program of study within the maximum timeframe limitation. Appeals submitted without documentation will not be considered. A timely determination will then be made and documented in the student’s file.

**Re-establishing Eligibility for Federal Student Assistance Programs –**

Following a dismissal action, a student may re-establish eligibility by earning course credit successfully at another institution that will directly transfer into the University’s program of study and the required cumulative grade point average and maximum timeframe percentage for minimum satisfactory progress is achieved by the transfer credit and grades accepted.

## **STUDENT SERVICES**

### **Overview**

The Office of Student Services provides educational, personal, and professional support to promote student development and success. The Office of Student Services, in collaboration with other staff and faculty, enhances the mission of the University by providing an inclusive campus community, promoting leadership opportunities and providing resources and programming to facilitate academic success.

### **Orientation and Welcome Weekend**

A first-time student is required to participate in Orientation and Welcome Weekend. Orientation provides the student an opportunity to become familiar with the University and housing facilities; technology services; academic support services; policies; and local entertainment, food, and transportation options. Most importantly, it provides the opportunity to meet other new students and other members of the University community

Orientation sessions precede each semester. A new student entering in the fall semester attends orientation during the summer months. A new student entering in spring semester or summer semester is required to attend an orientation session during the week prior to the start of the semester.

Welcome Weekend is a series of events during the first weekend of the fall semester. The weekend includes meetings with faculty, staff and advisors, combined with social events and other activities in preparation for a successful transition to the University.

### **Student Housing**

There are a variety of housing options available through local housing partners. These facilities vary from the more traditional college-style apartment setting with shared living space to the more independent, fully furnished high-rise apartment. The majority of these facilities are within a few blocks of the University. The Office of Student Services can assist the student to find optional housing, if necessary.

### **Student Parking**

ParkUP Harrisburg ([parkHarrisburg.com](http://parkHarrisburg.com)) operates the parking facilities in Harrisburg. Prices vary by facility. Check the website for specifics.

### **Student Activities**

Student activities promote and enhance leadership, involvement, and engagement with the campus community. The student can create, attend, and lead programs or clubs of specific interest with assistance and guidance of the Office of Student Services.

### **Student Government Association (SGA)**

The SGA serves as the liaison to various campus constituent groups and advocates for the student body. The SGA encourages the student to be more active in the community, to help maintain a positive image for relationships to grow within the community, and to give direction for programs or clubs to prosper.

## **Health and Personal Counseling Services**

Medical services are not provided on campus. A full-service hospital is located three city blocks from the University. Referral contact information for a student requiring health care assistance or personal counseling services can be obtained from the Office of Student Services.

Mental health counseling is provided by HU's Counseling Center to undergraduate students. To schedule an appointment or make a referral, call (717) 901-5100 x 0253. In the case of emergency, contact Campus Security (717) 901-5180 or Dial 9-1-1.

## **Student Concerns and Complaints**

The Office of Student Services offers guidance to the student when uncertainty exists about the appropriate process to address a topic, concern, or problem. A request for assistance may be submitted to obtain clarification of a policy or procedure. The request is then reviewed and a recommended course of action is provided in a timely manner.

## **Disability Support Services**

Harrisburg University of Science and Technology welcomes diversity among its students and, in accordance to the Americans with Disabilities Act of 1990, seeks to provide reasonable and effective support services.

The Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973 prohibit discrimination on the basis of disability and require the University to make reasonable accommodations for those otherwise qualified individuals with a disability who request accommodations. A reasonable academic accommodation is a modification or adjustment that allows an individual to gain equal access and have equal opportunity to participate in the University's courses, services, activities, and use of the facilities. The University is not obligated to provide an accommodation that requires a substantial change in the curriculum or alteration of any essential elements or functions of a program.

The applicant must provide recent documentation (within 3 years) of any disability that may affect learning to ensure that appropriate accommodations are considered. The documentation must be certified by a licensed professional in that field and include a specific diagnosis indicating the severity, a description of how the disability substantially impacts the student, and any suggested accommodation. A student may apply for an accommodation prior to admission with the requested documentation. The student can contact the Office of Student Services to request accommodations.

## **Academic Success**

**Academic Advising** - Academic advising can be a critical component in educational progress. An advisor who is a faculty member in the program of study in which the student is enrolled is assigned to each undergraduate student. The faculty advisor guides the student to explore academic goals and assists in course selection for the academic program. The Office of Student Services supports the faculty role in advising; in addition, it also supports the student to access resources and develop strategies when non-academic factors affect a student's ability to achieve.

**First-Year Experience** – The first-time undergraduate student is enrolled in many of the same courses as other first-year students in the initial academic year. This creates a learning community in which the student develops a bond with other students and faculty. Additionally, the student obtains the necessary foundational skills needed for academic achievement in the program. SEMR 100

Cornerstone is designed to help the student transition to the University setting and to provide resources and guidance on how to responsibly manage all the major components of University life.

**One-on-One Advising and Counseling** - Individual student advising is provided for the student throughout the period of enrollment. This advising is focused on academic success strategies such as time management, study skills, career aptitude, decision making and goal setting. If Student Services staff determine that a student would benefit from personal counseling, referrals are available. . For more information, contact [advising@HarrisburgU.edu](mailto:advising@HarrisburgU.edu).

**Group Study Sessions** - In some courses, when requested by the faculty, a group study session is assigned a student peer leader.

**Tutoring Program** - A student may request the assistance of a tutor to supplement classroom instruction. The tutor usually meets individually with the student, or may be available to answer questions via email, Moodle, or other means. A tutor may be requested by selecting “Tutoring” on the home page of MyHU or contacting the Office of Student Services. Additionally, group tutoring sessions are sometimes available; the student can attend without appointment. A student who is interested in becoming a tutor should contact the Office of Student Services. For more information, contact [tutoring@HarrisburgU.edu](mailto:tutoring@HarrisburgU.edu).

**On-line Tutoring** - *Smarthinking*<sup>TM</sup> is an online tutoring service that is free to the student. A student may submit an essay to a professional tutor for review or feedback, complete a mock interview, attend video sessions, and review resumes. This site is accessed directly through Moodle, the University’s course management system.

**Technology Literacy Program** - Technology literacy tutorials at [www.Lynda.com](http://www.Lynda.com) are available to a student if technology skill improvement is needed. This site is accessed directly through Moodle, the University’s course management system.

### **Textbook Services**

Textbooks are made available at the time of registration for student purchase through the services of MBS Direct, which has an online store at <http://bookstore.mbsdirect.net/harrisburgu.htm> for new and used textbook purchase or rentals. A complete textbook listing is available on MBS Direct. Textbooks and other supplies (if specified for a course) must be obtained by the student prior to the first day of class.

Additional online textbook purchase and rental options are available through companies such as [Amazon.com](http://Amazon.com) and [Chegg.com](http://Chegg.com). Book retailers carry a small selection of texts but also have the ability to process online textbooks orders.

### **University Library**

The mission of the Library is to support the mission of the University by enabling excellence in teaching and learning through the provision of robust access to information resources, the integration of information literacy throughout the curriculum, and the provision of physical and virtual spaces for free intellectual curiosity, learning, collaboration, and knowledge sharing and creation. Library services include:

- collaboration between the librarians and faculty to integrate information literacy skill development and use of information resources into the curriculum;
- access to a wide range of information sources selected to enhance course-based and independent learning, such as

- o online databases of articles from newspapers, magazines, and scholarly journals;
- o streaming multimedia such as documentaries and video learning courses;
- o electronic books; and
- o a self-service library located in the Learning Commons offering physical-format books, games, and periodicals;
- research guidance for students by phone, e-mail, or in person;
- partnerships with other libraries to provide access to their information sources, free of charge to our students and faculty; and
- group study rooms which may be reserved in advance through a librarian.

For more information including reporting of lost or damaged items and replacement charges see the Student Handbook.

For more information, visit the library's website at <http://library.harrisburgu.edu>. Electronic content is available on the website 24 hours a day from on- or off-campus. Off-campus use requires authentication with valid University credentials.

### **Technology Services**

Information Technology Services is responsible for connecting students, faculty, and staff to technology resources in support of the University's mission. Technology services include:

- a robust and reliable infrastructure to enable excellence in learning;
- a required laptop program and an entirely wireless campus to facilitate mobile computing and access to content;
- high-end classroom technologies to enhance interactivity and the capture and distribution of classroom content;
- access to enterprise software applications such as our course management system;
- MyHU; Office365 email and productivity suite; and many other course-related software programs;
- the Harrisburg University Campus Card services, which enables building access, pay-for-print, and book checkout from the library while serving primarily as the official university identification; and,
- training, orientation, and support for all university technology services.

For more information, contact Helpdesk at [Helpdesk@HarrisburgU.edu](mailto:Helpdesk@HarrisburgU.edu).

### **Experiential Education**

**Experiential Education Advising** - The student should meet with the academic advisor and the Office of Experiential Programs during the second year for information about experiential programs. The student should also obtain a recommended sequence of experiences for the program of study selected.

**Mentor Program** - The Connection Leader peer mentor program begins during the first year of study. The purpose of the mentor program is to successfully transition the student from high school to college and from college to career. First-year students are assigned a peer mentor to aid in successful transition to University life. Peer mentors are returning students who serve as leaders and mentors by guiding a group of new students from Orientation and Welcome Weekend through the first semester by participation in SEMR 100 Cornerstone. Selection of peer mentor candidates is completed during Spring Semester for the upcoming Fall Semester of the new academic year.

The student transitions into the business mentor program by participating in a professional development experience when enrolled in SEMR 200 Steppingstone. The purpose of the student's experience is to replicate the employment search process. The student is responsible for researching and contacting the prospective company or organization, visiting that location, and conducting an informational interview. The business mentor is a successful professional in the local community who guides the student with career-related advice while assisting the student to build a professional network. For more information, contact [CareerServices@HarrisburgU.edu](mailto:CareerServices@HarrisburgU.edu).

**Civic Engagement, Teamwork and Collaboration** - A student is expected to demonstrate a commitment to community involvement and an interest in community-oriented activities. SEMR 100 Cornerstone, SEMR 200 Steppingstone, and SEMR 300 Keystone are structured to develop these competencies. The student is encouraged to pursue additional volunteer activities as a way to improve competencies and gain rewarding experiences that can be listed as accomplishments on a resume.

### **Career Services**

Career advising begins during the first year of study. The student obtains career counseling from the academic advisor, the Office of Experiential Programs, and the Office of Workforce Development, through classroom instruction in the seminar courses and on-site experience during the internship and project process. The following services are offered for enrolled students and alumni: career counseling, assessment inventories, career exploration, professional development resources, events and programs, graduate and professional school advising, mock interviews, resume review, and mentoring. All of these efforts are available to encourage the student to begin planning early for eventual entry into the workplace. The University partners with staffing agencies to provide support and resources for the student during a career search. For more information, contact [CareerServices@HarrisburgU.edu](mailto:CareerServices@HarrisburgU.edu).

## ACADEMIC POLICIES

### Calendar, Credit System and Final Examinations

The University operates on a semester calendar and uses the semester hour credit system. There are three semesters per twelve-month period: Fall Semester, Spring Semester, and Summer Semester. Each semester consists of fourteen weeks of classes with final examinations occurring during the two or three final examination days. Within each semester, there are two subterms listed on the Academic Calendar.

### Credit Hour Policy Program Instructional Equivalencies

A wide variety of course delivery is utilized. “Learning hours” are assigned to each course. Each “learning hour” represents one hour per week of student engagement, including both instructional and outside of class activities.

Traditional 14-week semesters are offered, plus subterms and an accelerated format. Regardless of the format or delivery, all programs whether online, blended/hybrid, executive weekend, accelerated, subterms or traditional classrooms, must meet the 126-learning hours requirement for a 3-credit course (3 credits \* 3 hours/credit \* 14 weeks = 126 hours). Adherence to these regulations enhances the quality and rigor of the academic programs and is achieved by utilizing the “instructional equivalencies” detailed below.

Faculty establish the learning-based interactions (when, where, how and why) including frequency, duration, evaluation, and assessment techniques. These guidelines recognize the need for the faculty to actively manage the learning space, both inside and outside the classroom. This policy is extremely important in helping faculty in the design and teaching of courses and in the student learning. It is the responsibility of the faculty to deliver academic quality regardless of delivery format.

Provided below is an outline of acceptable “Instructional Equivalencies”:

	Description	Rate of Equivalency
Blogs, Journals, Logs	Students’ opportunity to apply learned concepts or for reflection on learning experiences; to be shared with instructor and/or classmates for thoughtful analysis, feedback and assessment.	1 private online posting = ½ learning hour 1 shared online posting (required to read all classmates’ postings) = 1 learning hour
Cases studies & problem-solving scenarios	In-depth analysis requiring utilization of higher order analytical skills which relate to course objectives and is shared with instructor and/or classmates for feedback and assessment.	1 case study analysis & posting = 1-3 learning hour
Required Online Chat rooms for group projects	Instructor led opportunities for collaborative, synchronous learning with specific expectations for participation & feedback. (Chats are posted for review.)	1 hour online chat = 1 learning hour
Conference calls	Instructor led opportunities for collaborative, synchronous learning	½ hour call = ½ learning hour



	with specific expectations for participation & feedback. (When possible, calls to be recorded for review.)	
Discussion Board	Instructor-guided or mediated threaded discussion that directly relates to course objectives and which has specified timeframes, expectations for participation, and thoughtful analysis.	1 posting (requires reading all postings) = ½ learning hour 1 posting (requires reading all postings and reply to a minimum of 2) = 1 learning hour
Field trips, tours and experiential learning (to include virtual tours)	Students participate as individuals or in groups in analyzing an activity & preparing a paper or presentation, to be shared in whole or in part with instructor and/or classmates.	(Facilitator or Instructor-Led)- 1-hour tour= 1 learning hour  (Student(s) alone without instructor or facilitator)- 1-hour tour plus reflection paper= 1 learning hour
Group projects	An instructor-mediated culminating activity with specific learning objectives; students collaborate via e-mail, chat rooms, discussion boards, wikis, and/or face-to-face contact to research, analyze, synthesize, & prepare project with instructor receiving periodic updates & providing guidance to group.	1 hour = 1 learning hour
Guided Project/Thesis	An instructor-mediated culminating individual project/thesis with specific learning objectives; student and facilitator collaborate via email, chat, discussion boards, and/or face-to-face to research, analyze & prepare project/thesis with instructor receiving periodic updates and providing guidance and feedback.	1 hour = 1 learning hour
In-Class Instruction, Presentations, & Tests	Instruction, presentations, and tests provided in person in live classroom setting.	1 hour = 1 learning hour
Instructional CDs, Powerpoints, Videos	Instructor-mediated to expand upon and clarify course concepts and objectives.	Reviews & posts response to 1 unit= 1 learning hour
Lecture activity-written or audio	Opportunity for students to develop questions, comments, or observations, to be shared with classmates & instructor through discussion board postings or participation in chat rooms.	Reviews 1 lecture & posts response= 1 learning hour
Library Research (instructor led)	In-depth instructor led opportunity for students to research scholarly articles or professional journals that	Research for 1 five-page project = 1 learning hour

	relate to course objectives; to be shared with class in a designated manner.	Research for 1 3-5-page paper = 1-2 learning hours
Online Quizzes	Opportunity for instructor to assess students' subject knowledge and provide feedback on students' progress.	1-hour test = 1 learning hour
Reflection Paper or Article Review	Instructor-guided activity for students to apply learned concepts and relate practices to personal experiences or apply higher order analytic skills in assessing scholarly articles or professional journals.	1 private posting = ½ learning hour 1 shared posting (required to read all classmates' postings)- 1 learning hour
Service Learning Project; Jr and Sr projects, capstone	An instructor-led service project with specific learning objectives that integrates community service with academic study; faculty provides guidance, support, and feedback to students and students shares experience and reflection with fellow classmates via emails, chats, discussion boards, and/or face-to-face.	1 hour = 1 learning hour
Web-conferencing	Instructor-led desktop to desktop or classroom video streaming instruction for collaborative, synchronous learning with specific expectations for participation and feedback. (i.e., Moodle, Adobe Connect, Skype, etc.)	1 hour = 1 learning hour
Web-Quest (Internet Research)	Instructor-guided opportunity for students to research information on the Internet that enhances student learning and addresses specific course outcomes; findings shared with the instructor and classmates.	1 in-depth posting = 1 learning hour

\*Researching, PowerPoint/video reviews, WebQuest activities, reading articles, etc. are considered "homework" assignments. The Rate of Equivalency denoted pertains to posting, reviewing, sharing, and providing student-to-student and/or instructor-to-student feedback.

*Adapted from Misericordia University, Dallas, PA and modified for Harrisburg University.*

### **Catalog in Effect**

A new student entering the University during the 2018-2019 academic year will be subject to the academic program requirements contained in this Catalog edition unless the student elects to complete a revised set of program requirements published in a future edition of the Catalog.

A student who elects to complete a revised set of program requirements must notify Records and Registration of this intent by completing a Declaration of Programs/Catalog Option Form.

A student who leaves the University and returns from an absence of one year or more will be subject to the Catalog edition in effect during the year of return.

### **Enrollment Status**

Student enrollment status is defined as either full-time or part-time. The minimum full-time undergraduate student enrollment is 12 semester hours in a semester. Part-time status is any number of credits fewer than 12 semester hours. The full-time course load is 12 through 17 semester hours. A course load average of 15 earned semester hours is needed to complete the program within 4 years. A course load greater than 18 semester hours requires approval of Provost.

Part-time status is sometimes defined further using one of the following terms:

Three-quarter time	fewer than 12 semester hours but greater than or equal to 9 semester hours
Half-time	fewer than 9 semester hours but greater than or equal to 6 semester hours
Less-than-half time	fewer than 6 semester hours but greater than none

### **Registration Process**

Course registration is completed for first-time and transfer students by the Office of Records and Registration. If a student considers a course registration change or increase or reduction in semester hour load, the student should meet with the academic advisor and complete the Add/Drop procedure.

For subsequent semesters, the student registers on-line at MyHU/Academics to indicate course selections. The selections are then reviewed by the student's academic advisor and finalized when the student and the advisor agree to the selections. The start and end dates for registration appear on the Academic Calendar and Registration Instructions which are posted on MyHU/Academics and [www.HarrisburgU.edu](http://www.HarrisburgU.edu).

A student who intends to enroll in an experiential project (298 or 498) or internship (365) is required to submit a learning contract to the Office of Experiential Programs in advance of starting the experience. Once the student's learning contract receives the designation of an appropriate academic advisor and a site supervisor (if applicable), and is executed by the Office of Experiential Programs, the student will be enrolled in the appropriate academic course. If a student begins an experience without an approved learning contract in place, the student will not receive academic credit for the course.

A student requesting a directed study for a course from this catalog must obtain a Directed Study Request form from the Records and Registration. The student must provide a rationale for requesting the directed study before approval can be granted by Records & Registration. The following guidelines are required for a directed study:

1. Directed studies are only open to juniors and seniors.
2. Directed studies must be necessary. Directed studies are deemed necessary if a student needs a specific course in their major in order to graduate that can only be met through a directed study.
3. A student must have a minimum GPA of 2.25 in order to request a directed study.
4. A student may not take more than 6 credits of independent study or directed study from one faculty member.

5. The program lead and the student's faculty advisor must agree to offer the directed study.

### **Add/Drop Period and Course Withdrawals**

The Add/Drop Period begins on the first day of the semester or subterm and ends after 6 days of classes have occurred (this includes Saturday). A student may make schedule adjustments during the add/drop period on MyHU, or in the Office of Records and Registration. No course may be added after the end of this period. If a student withdraws from any course after the conclusion of this period and up until the last day to withdraw from a course with a "W", a final grade of "W" will appear on the permanent record. After that period, a "WF" will appear on the permanent record. The withdrawal deadlines appear on the Academic Calendar for both semesters and subterms.

### **Enrollment Status Determination**

A student's enrollment status is determined at the end of the Add/Drop Period. The student is charged the applicable tuition rate for the number of semester hours in which the student is enrolled as of the census date.

### **Audit Policy**

The student may choose to participate in a course on an audit basis. The student who elects this option is expected to attend and participate in class regularly and complete all course requirements. The course that is being audited carries no academic credit but is recorded on the student's academic record and will receive a Pass (P) or No Pass (NP) grade at the conclusion of the course. The student who wants to audit a course must notify the Office of Records and Registration in writing no later than the end of the Add/Drop Period. The semester hour tuition rate applies to audited courses. An audited course cannot be subsequently taken for credit.

### **Class Attendance**

Attendance is a critical part of a student's education. The student is expected to attend class regularly and participate fully in the activities of each course. The instructor is responsible to set forth the attendance requirements in the syllabus.

If, in the judgment of the instructor, a student is excessively absent from class or fails to complete the requested participatory assignments:

1. the instructor will notify the student of this determination;
2. the student will have one week to meet with the instructor to address the situation;
3. if the student fails to do so, the instructor will notify the Office of Records and Registration to recommend withdrawal of the student from the course; and
4. Notify the Office of Student Services for consideration of academic sanctions.

### **Advanced Standing**

A student may earn advanced standing at the University in a variety of ways: transfer of credit from another institution, the awarding of credit for armed services training, successful prior learning assessment, or by examination.

A student without a degree who has earned advanced standing is classified on the basis of total semester hours accepted by the University.

A student who has earned a baccalaureate degree and is working toward a second degree is classified as a fourth-year student.

**Articulation Agreements or Transfer Credit** –The maximum number of semester hours that may be transferred to the student’s record is 87; no more than 70 may have been earned at a two-year institution. A student must take 33 semester hours (of which a minimum of 15 hours are within the major) at Harrisburg University to meet residency and earn a degree from Harrisburg University. Unofficial or student copies of transcripts may be used to initiate the transfer credit evaluation process. However, official final transcripts from the institution of origin are required before the transfer evaluation process can be finalized by the Office of Records and Registration and academic credit is posted to the student’s permanent record.

Certain 2-year associate degree programs covered under an existing articulation agreement are accepted into the University’s baccalaureate degree programs that satisfy the coursework requirements of the first and second year of study. An unofficial transcript may be used to initiate this transfer credit process. The official final transcript from the institution of origin reflecting the degree name and the date the degree was conferred is required to finalize the awarding of coursework credit or exemption.

**Domestic** – In lieu of articulation agreements, academic credit earned at another U.S. higher educational institution for college-level work is awarded when:

- a final grade of “C” (not “C-”) or higher is earned;
- a course is a reasonable substitute of a University course;
- the course is a reasonable substitute for competencies associated with one of the general education requirements; and,
- the course is considered college-level work, worthy of elective credit in the student’s intended program of study and the student has sufficient unsatisfied elective credit requirements to which this course may be applied.

**International** – a World Education Services (WES) transcript or American Association of Collegiate Registrars and Admissions Officers (AACRAO) international transcript evaluation is required. If the original evaluation received by the Office of Records and Registration from one of these evaluators deems the student’s prior work to be at the college level and the quality of the completed work is assessed to be at the “C” or higher level, credit is awarded for the courses that apply to the student’s intended program of study at Harrisburg University, as indicated above for domestic transfer credit. If the prior work was earned under an educational system that did not assign credit values, the Harrisburg University semester hour value is assigned for each course being accepted. If the student completed courses that are evaluated to be at the college level, but Harrisburg University has no comparable course(s), the student is granted elective credit unless all required elective credit hours have been satisfied.

**Massive Open Online Courses (MOOC)** – a massive open online course is an online course targeting large-scale interactive participation and is delivered via open access on the web. A MOOC that is successfully completed will be reviewed and considered for transfer credit.

**Coursework at Other Institutions** – A student may study at other institutions and transfer the credit to the student’s record at Harrisburg University.

Process for Approval - The student must complete a Course Approval form at the Office of Records and Registration notifying the University of the student's intention to enroll on a visiting basis at another higher educational institution. The request will be reviewed by the Office of Records and Registration, which may consult with an appropriate member of the University's faculty. Prior to enrollment, a written response will be sent to the student stating whether or not the proposed course is acceptable.

Process for Awarding of Credit – The student must arrange for an official transcript from the other college or university to be sent to the Office of Records and Registration. If the approved course was completed with a final grade of “C” or higher, the semester hours earned from the course will be posted to the student's record as transfer credits and not calculated in the student's GPA.

**Armed Services Training Programs** – Under the following conditions, a student may receive academic credit for training programs completed while serving in the U. S. Armed Services: 1) the student must present a copy of the discharge notice (completed DD-214 form); 2) the veteran's military occupational specialty (MOS) designation must appear on the discharge; and, 3) the student's MOS is described in the American Council on Education's Educational Experiences in The Armed Services volumes 1–3. Credit is awarded based upon the ACE recommendation and the closeness of the match between the training program and a University course.

**Prior Learning Assessment**– The University may award undergraduate academic credit for prior knowledge, skills and abilities acquired through non-accredited and work-related learning experience equivalent to:

- the outcomes of a specific course; or,
- the outcomes of college-level work not currently offered at the University.

The experience and evidence provided should have a direct relation to the material taught in a course in the University's curriculum and should extend over a sufficient period to provide substantive knowledge in the relevant area. A baccalaureate degree-seeking student who is in good academic standing, has completed a minimum of 6 semester hours in a program of study at Harrisburg University, and demonstrates the qualities to receive such credit may petition the Provost through the academic advisor for consideration of prior learning assessment.

The petition must include the following:

- a detailed description of the relevant experience;
- appropriate supporting evidence;
- the equivalent University program, course number, and title; and,
- the number of semester hours sought.

A student may receive a maximum of 18 semester hours of credit for prior learning. However, not more than 6 semester hours of that credit may be substituted for core courses in the program of study.

Prior learning assessment for an undergraduate student is coordinated through a unique partnership with Thomas Edison State College, located in Trenton, New Jersey, which has decades of experience with and a proven track record of assessment of demonstrable, college-level learning.

The prior learning assessment process is a way to demonstrate to a mentor, who is an expert in the field, college-level knowledge in a particular course area. These college-level skills and knowledge may be from applicable work experience, volunteer activities, training programs, hobbies, religious activities, homemaking skills, prior independent reading or special accomplishments. This process is not independent study.

Working with a mentor, the student is guided to develop an online, electronic portfolio to demonstrate prior college-level learning. The student can choose between standard prior learning assessment and individualized prior learning assessment. Standard prior learning assessment is an option when existing course descriptions match the college-level learning that the student wants to demonstrate. Individualized prior learning assessment occurs when the student proposes a course description that does not currently exist in the course catalog for either Harrisburg University or Thomas Edison State College.

Prior learning assessment cannot be awarded for physical education courses, field experiences, student teaching, cooperative education, practicum courses, internships, projects, seminars, independent study or laboratories.

Approval of prior learning credit must be made in writing from the academic advisor, the appropriate faculty member, and the Provost. A per semester hour charge of \$225.00 is incurred by the student for the number of semester hours sought under prior learning assessment.

For more information about prior learning assessment, contact the Office of Records and Registration.

**Credit by Examination** – A student is limited to earning no more than 18 semester hours of credit via standardized tests: 1) successful performance on an Advanced Placement (AP) examination; 2) successful performance on a College Level Examination Program (CLEP) examination; or 3) successful performance on a challenge examination created by the Harrisburg University faculty.

**Advanced Placement (AP)** – a student who participates in the College Entrance Examination Board’s program in association with secondary schools may earn college credit for this work by: 1) completing the course offered in the secondary school, 2) sitting for the Advanced Placement examination offered in May of each year, and 3) arranging for an official AP score report from College Entrance Examination Board (CEEB) to be forwarded to the Office of Records and Registration at the University. See the AP chart indicating the required minimum score for each discipline and the University’s course equivalencies for which credit may be awarded.

<u>AP Subject Examinations</u>	<u>Minimum Score</u>	<u>Harrisburg University Course Granted 2016-2017 Curriculum</u>	<u>Semester Hours</u>
Art History	3	Art history portion of GEND 300 The Cultured Mind	6
Art/Studio	3	elective	3
Biology	3	BIOL 102 General Biology and BIOL 103 General Biology Laboratory	4
Biology	5	BIOL 102 General Biology and BIOL 103 General Biology Laboratory & biology elective	8
Calculus AB	3	MATH 220 Calculus I	3
Calculus BC	3	MATH 260 Calculus II	3

Chemistry	3	CHEM 151 General Chemistry I Lecture & CHEM 152 General Chemistry I Laboratory	4
Chemistry	5	CHEM 151 General Chemistry I Lecture & CHEM 152 General Chemistry I Laboratory and CHEM 161 General Chemistry II Lecture & CHEM 162 General Chemistry II Laboratory	8
Chinese Language and Culture	4	elective	9
Computer Science A	3	CISC 120 Fundamentals of Computing	4
Economics – Macro	3	Macroeconomics portion of GEND 201 The Civic Mind	3
Economics – Micro	3	Microeconomics portion of GEND 351 The Organizational Mind or elective	3
English Language	3	ENGL 105 College Composition	3
English Literature	3	GEND 103 or elective	3
Environmental Science	3	ENVS 101 Introduction to Environmental Science	4
French Language and Culture	3	elective	6
French Language and Culture	4	elective	9
French Language and Culture	5	elective	12
Geography – Human	3	elective	3
German Language and Culture	3	elective	6
German Language and Culture	4	elective	9
German Language and Culture	5	elective	12
Government & Politics-Comparative	3	Political Science/Policy portion of GEND 201 The Civic Mind or elective	3
Government Politics - US	3	Political Science/Policy portion of GEND 201 The Civic Mind or elective	3
History – European	3	History portion of GEND 201 The Civic Mind or elective	3
History – US	3	History portion of GEND 201 The Civic Mind or elective	6
History – World	3	History portion of GEND 201 The Civic Mind or elective	6
Italian Language and Culture	3	elective	6
Italian Language and Culture	4	elective	9
Italian Language and Culture	5	elective	12
Japanese Language and Culture	4	elective	9
Latin	3	elective	3
Music Theory	3	elective	3
Physics B	3	GEND 112 Scientific Mind I	3
Physics C–Electricity and Magnetism	3	elective	4
Physics C–Mechanics	3	elective	4
Physics 1	3	PHYS 210 General Physics I	4
Physics 2	3	PHYS 260 General Physics II	4



Psychology	3	GEND 102 The Creative Mind I	3
Spanish Language and Culture	3	elective	6
Spanish Language and Culture	4	elective	9
Spanish Language and Culture	5	elective	12
Spanish Literature and Culture	4	elective	3
Statistics	3	MATH 280 Introductory Statistics	3

**College Level Examination Program (CLEP)** - The University awards academic credit to a student who has performed satisfactorily on a College Entrance Examination Board CLEP general or subject examination when the test is a reasonable substitute for a requirement of the student's program of study under the following conditions:

- The optional essay portion of a subject examination has been completed successfully;
- For all subjects (with the exception of Level 2 French, German, and Spanish), representing the performance of the student who has earned a grade of "C" in the corresponding course, a minimum score of 50 per the American Council on Education's (ACE) credit-granting recommendations; and,
- For Level 2 (four-semester) foreign language examinations representing the performance of the student who has earned a grade of "C" in the corresponding course: 60 for German language; 59 for French language; and, 63 for Spanish language per the American Council on Education's (ACE) credit-granting recommendations.

Official score reports must be sent to the Office of Records and Registration before credit can be awarded.

**Challenge Examination** – The University awards academic credit to a student who has performed satisfactorily on a challenge examination created by a member of Harrisburg University's faculty. A student may do so by obtaining a Challenge Examination Form from the Office of Records and Registration, obtain the signature of the sponsoring instructor from the appropriate discipline, pay a fee equal to one-third the normal tuition charge for the course, and return the form to the Office of Records and Registration which will schedule a time and location for the examination. If successfully completed, student will receive a "P" on transcript.

### **Off-Campus Study Program**

#### **Pennsylvania Nanofabrication Manufacturing Technology Partnership Capstone**

**Semester** – This program is comprised of a 6 course, 18 semester hour, one-semester experience at The Pennsylvania State University's Center for Nanotechnology Education and Utilization on the University Park Campus focusing on nanofabrication manufacturing technology.

Policy - Any biotechnology student who is a Pennsylvania resident may choose to participate if the following criteria are met: (1) has earned a minimum of 60 semester hours; (2) has achieved a minimum 2.50 cumulative grade point average; and (3) be in satisfactory financial

standing. The student is enrolled at The Pennsylvania State University during the Capstone Semester, so all registration, financial aid awards, and tuition payments must be coordinated with The Pennsylvania State University. If final grades of “C” or higher are earned at Penn State, the academic credit will be posted to the student’s academic record at Harrisburg University.

Procedure – The student should express an interest to participate in this program at least one semester in advance of the desired semester of attendance. The application form is available on MyHU>Academics>Forms. The student registers for these courses in Harrisburg University’s Office of Records and Registration after a letter of acceptance from The Pennsylvania State University has been received.

Additional information is available in the Office of Records and Registration.

### **Dual Programs**

A student may elect to complete a second program while earning the Bachelor of Science degree. The student must satisfy all of the requirements of both programs. One or more courses may simultaneously satisfy requirements of both programs, but the student must complete one additional experiential course, either an Internship or a Project II, in the second program of study. The student is required to have a minimum GPA of 3.2 and notify the Office of Records and Registration in writing of the intention to complete two programs. Dual programs cannot be completed within the minimum 120 semester hours required for a Bachelor of Science degree.

### **Dual Concentrations**

A student may elect to complete a second concentration within the program of study. The student must complete both the primary and secondary concentration requirements. The student may simultaneously use one or more courses to satisfy requirements of both concentrations, but at least four unique courses (or a minimum of 12 semester hours) must be completed toward the second concentration. The student is required to have a minimum GPA of 3.2 and notify the Office of Records and Registration in writing of the intention to complete two concentrations.

### **Graduation Requirements**

A student must satisfy all of the following requirements to receive a Bachelor of Science degree:

1. At least 120 semester hours must be successfully completed.
2. Student must successfully complete all of the requirements of the declared program of study for which the degree is to be awarded.
3. A cumulative grade point average of at least 2.00 in all course work completed at the University is required for graduation from a baccalaureate degree program.
4. The program required courses must be completed with a minimum GPA of 2.00.
5. A student must earn a minimum of 33 semester hours in residence toward a baccalaureate degree from Harrisburg University of Science and Technology: 9 semester hours must be completed in experiential courses, 18 semester hours must be completed in required program courses, and 6 other semester hours. The maximum number of semester hours that may be transferred to Harrisburg University is 87; no more than 70 may have been earned at a two-year institution.

Verification that the student has met these requirements is made by the Office of Records and Registration. A candidate for graduation must complete all requirements for the degree to be eligible to participate in Commencement.

A candidate must apply for graduation at least two semesters before the anticipated completion date by submitting an Application for Graduation via MyHU.

### **Requirements for Earning a Second Bachelor's Degree**

A person who has earned a bachelor's degree from HU or another accredited college or university may earn a second bachelor's degree by meeting the following requirements:

1. A student may not pursue a second degree under the same program of study (e.g., if a student already has earned a B.S. in Computer and Information Systems he or she cannot pursue a second B.S. in Computer and Information Systems). If a student intends to pursue a different concentration under the same degree, please refer to the "Dual Concentrations" section of the catalog.
2. The student must satisfactorily meet all graduation requirements for the second degree program unless there is an exception listed below.
3. Graduates from HU shall not be required to repeat any general education, foundation, or seminar course requirements of HU. Graduates who earned their first degree from another accredited college or university must submit transcripts for audit to determine if prior coursework meets the General Education and Foundation requirements.
4. A minimum of 30 additional undergraduate course semester hours and an additional 6 experiential learning semester hours including Project II and Internship must be successfully completed at HU.
5. Coursework completed successfully as part of the first degree program may be used to satisfy the graduation requirements of the second major but will not count toward the 30 required semester hours minimum.
6. A student may not repeat a course he or she already completed for credit during his or her first degree program.

NOTE: A student currently pursuing a second program at HU does not receive a second degree (please refer to the "Dual Programs" section of the catalog). A student who intends to earn a second bachelor's degree must meet all the requirements listed above for the second bachelor's degree and must submit a request for a second bachelor's degree to the Office of Records and Registration before beginning the second degree.

### **Grades and Grading**

Grades are awarded to each student for academic credit completed. A grade is assigned by the instructor responsible for the course in which the student is enrolled, using the following grading scale to indicate the quality of the student's academic work.

Grade	Description	Numerical Value
A	Superior achievement	4.00
A-		3.67

B+		3.33
B	Above average achievement	3.00
B-		2.67
C+		2.33
C	Average achievement	2.00
C-		1.67
D+		1.33
D	Minimum achievement	1.00
F	Fail	0.00
AU	Audit	Not applicable
CR	Credit	Not applicable
I	Incomplete	Not applicable
IP	In progress	Not applicable
LB	Laboratory	Not applicable
NP	No Pass	Not applicable
NR	Not reported	Not applicable
P	Pass	Not applicable
PLA	Prior Learning Assessment	Not applicable
TR	Transfer credit	Not applicable
TA	Transferred credit earned with superior achievement	Not applicable
TA-		Not applicable
TB+		Not applicable
TB	Transferred credit earned with above average achievement	Not applicable
TB-		Not applicable
TC+		Not applicable
TC	Transferred credit earned with average achievement	Not applicable
W	Withdrawal	Not applicable
WA	Administrative withdrawal	Not applicable
WF	Withdrawal after the period to withdraw with a "W" grade	0.00

Grades of "AU", "CR", "I", "IP", "NP", "NR", "P", "PLA", "TR", "TA", "TA-", "TB+", "TB", "TB-", "TC+", "TC", "W", or "WA" are not included in the calculation of a student's grade point average (GPA). They are used by the University in circumstances when grades of "A" through "F" are not appropriate. A WF grade is calculated into a student's GPA.

**Audit (AU)** – The audit grade is assigned by the instructor when the student has properly registered to audit the course and has met all requirements of the University’s course audit policy.

**Credit (CR)** – A grade of “CR” is used to indicate on the student’s permanent record that credit has been awarded by the University for military training or successful completion of an examination. While courses with a “CR” grade are counted toward the student’s degree requirements, there are no quality points associated with this grade so there is no impact upon the calculation of the student’s grade point average.

**Incomplete (I)** – Inability to complete coursework due to documented circumstances beyond the student’s control (such as severe illness) may, at the discretion of the instructor, result in a grade of incomplete (I). However, all work must be completed by the end of the Add/Drop Period of the subsequent semester. If all work is not completed by that time, the “I” grade will convert automatically to a grade of “F.” It is the responsibility of the student to contact the instructor to make the necessary arrangements for makeup work.

**In Progress (IP)** – This is a deferred grade assigned by the instructor to be used for research projects, internships, independent study, directed study, etc., when it is understood that the course will extend over more than one semester. An “IP” grade should be accompanied by a written plan and a schedule for completing the course within a specified time period to be no longer than 12 months. If all work is not completed by that time, the “IP” grade will convert automatically to a grade of “F.”

**Laboratory (LB)** – This grade is assigned by the Office of Records and Registration at the conclusion of a semester to a student who is enrolled in a non-credit developmental recitation section of a course. This grade and such a course does not appear on the student’s transcript.

**Withdrawal (W)** – This grade is recorded by the Office of Records and Registration when the student has withdrawn from the course according to the policy set forth by the University for withdrawing from a course.

**Administrative Withdrawal (WA)** – The “WA” grade can be assigned only by the Provost or other designated official. It is used under extenuating circumstances and when the normal withdrawal process is not available to the student. A request for administrative withdrawal with accompanying documentation will be submitted to the Office of Records and Registration. The “WA” grade can be submitted at any time during the semester.

**Withdrawal Fail (WF)** – This grade is recorded by the Office of Records and Registration when the student has withdrawn from the course after the period a student can withdraw with a “W” grade.

**Transfer (TR)** – A grade of “TR” is used to indicate on the student’s transcript a block of credit that has been earned at another institution and that will count toward the degree at Harrisburg University.

**Transfer with Grade Notation (Txx)** – A grade of “Txx” is used to indicate on the student’s transcript each course that has been successfully completed at another institution and that has been accepted toward the degree at Harrisburg University.

**Not Reported (NR)** – The temporary grade of “NR” is recorded by the Office of Records and Registration when the instructor does not report a grade for the student for the course. The Office of Records and Registration will advise the Provost when an “NR” grade has been recorded for the student, and will work with the student and the instructor to determine why a grade was not reported.

**Pass (P)** - The “P” grade is assigned by instructors for a student who successfully completes a course that is designated as a course that will be graded on a Pass/No Pass basis. A “P” grade indicates a grade of C or higher.

**No Pass (NP)** – The “NP” grade is assigned by the instructors for a student who does not successfully complete a course that is designated as a course that will be graded on a Pass/No Pass basis.

**Prior Learning Assessment (PLA)** – The “PLA” grade is used to indicate credit that has been awarded by the University for prior learning. Although a course completed with a “PLA” grade is applied toward the student’s degree requirements, no quality points are associated with this grade so there is no impact upon the calculation of the student’s grade point average.

## Grade Point Averages

A grade point average (GPA) is a statistical calculation of a student’s performance in a semester. The semester grade point average summarizes the student’s performance during that academic term and the cumulative grade point average (CGPA) summarizes the student’s performance during all semesters completed at the University.

### Calculation of the Semester Grade Point Average

Course	Sem. Hrs. Attempted	Grade	Numerical Value	Quality Points
Course A	6	C	2.00	12.00
Course B	4	B	3.00	12.00
Course C	3	B+	3.33	9.99
Course D	<u>1</u>	A-	3.67	<u>3.67</u>
Total	<b>14</b>			<b>37.66</b>

$$\text{Total Quality Points} = 37.66/14 = \mathbf{2.69}$$

1. Compute the quality points earned for each course by multiplying the semester hours attempted for the course by the numerical value of the grade earned in the course. *Example: A student registered for a course worth 6 semester hours who earns a final grade of “C” in that course will earn 12 quality points for that course (6 semester hours  $\times$  2.00).*
2. Add quality points earned for each course in which the student is registered in the semester.
3. Add the number of semester hours attempted for all courses in which a grade of “A” through “F” and “WF” was earned.
4. Divide the total number of quality points earned by the total number of semester hours attempted. The result is the grade point average for the semester.

The cumulative grade point average (CGPA) is determined in a similar way using the cumulative attempted semester hours and cumulative quality points earned. GPA and CGPA are truncated to the hundredths.

### **Early Warning**

Each instructor notifies the Office of Records and Registration of a student's poor academic performance in a course by submitting early warning deficiencies of "C-", "D+", "D", "F" or "I" at the end of the fifth week of classes, as indicated on the Academic Calendar. The student is notified of the deficiency in writing. A student who receives a five-week early warning is encouraged to consult with the instructor and academic advisor and seek assistance offered from the Office of Student Services.

### **Deferred Examination Policy**

This section applies to all examinations, including mid-term and take-home examinations, whether or not administered during the final examination period.

#### **No Right to Defer**

No student has a right to defer an examination. A student who fails to take an examination when scheduled will receive a failing grade of "F" on the examination unless the examination has been deferred according to the procedure outlined in this policy.

#### **Policy on Deferral of Examinations**

Examinations will be deferred only for "good cause." "Good cause" will be determined by the instructor of the course. Examples of "good cause" include:

- serious personal injury or illness with appropriate documentation;
- serious injury, illness or death in the immediate family that can be documented; or,
- other extenuating mitigating circumstances beyond the student's control.

#### **Procedure for Requesting Deferred Examination**

If a student desires to request deferral of an examination, the student shall file a timely request with the instructor. Each student requesting deferral of an examination must provide evidence of the event or situation which the student believes is justification for the deferral request.

#### **Emergency Deferral of Examination**

If a student is unable to take an examination for good cause (as defined previously) that arises within 24 hours immediately prior to the examination time, the student may appear in person, communicate by electronic mail, or telephone the instructor and the Office of Student Services to obtain permission to defer an examination.

If a student cannot appear in person, communicate by electronic mail, or by telephone, the student may miss the examination and apply for a deferral after the examination date. Such application for deferral must be made to the instructor within 24 hours of the administration of the examination for which the student seeks the deferral.

#### **Timing of Make-up Examination**

The deferred examination will be taken at a time determined by the instructor, in conjunction with the student. The make-up examination must be completed in no more than five (5) business days after the original test date. Make-up examinations for documented emergencies can be arranged to be

proctored through the Office of Student Services by emailing [exams@harrisburgu.edu](mailto:exams@harrisburgu.edu) or through the faculty member directly.

### **Illness During an Examination**

If a student becomes ill during an examination and is unable to continue, the student shall notify the proctor and leave all examination materials with the proctor. The student shall seek medical attention immediately and obtain medical documentation describing the illness that prevented the student from completing the examination. The student will be permitted to complete the exam at a time determined by the instructor, no more than five (5) business days after the original test date.

### **Final Examination Policy**

Final exams are administered over a two-day period following the last day of the semester. A final exam schedule is distributed during week 8 of the semester, reflecting those courses for which a 2-hour final exam period was requested. Courses not listed on the final exam schedule typically have a project, oral presentation, or term paper as the final grade assessment.

### **Final Grading Process**

After the conclusion of a semester, each instructor notifies the Office of Records and Registration of a student's academic performance in a course by entering grades via MyHU. The Office of Records and Registration makes these grades available on MyHU according to the dates noted on the Academic Calendar.

### **Final Grade Appeal**

A final grade is assigned by the instructor upon completion of coursework to earn credit during a semester or other term. A student who disagrees with the final grade assigned by the instructor should first contact the faculty member directly to resolve the grade dispute informally. The student that cannot approach the faculty member because of perceived discrimination, cannot reach the faculty member, or have received a response with which the student still disagrees, may seek remedy using an evidence-based argument within five (5) days after grades are posted on one of the following grounds:

1. **Discrimination:** defined as unfair treatment or assignment of grade on the basis of race, religion, national origin, sex, age, ancestry, handicapped status, gender identity, sexual orientation, or political affiliation.
2. **Capricious evaluation:** defined as significant or unjustified departure from grading procedures outlined in the course syllabus or by the University or arbitrary assignment of grades. Capricious evaluation cannot be claimed if a student merely disagrees with the subjective evaluation of the instructor.
3. **Errors:** including clerical errors or errors in grade calculations that can be demonstrated in an objective manner.

A student who chooses to appeal a grade must obtain a Final Grade Appeal Form from the Office of Records and Registration. The form must be completed with an explanation forming the basis of the appeal. The student's academic record will be placed in a "hold" status during the grade appeal process. A final grade appeal must be initiated on or before the fifth (5th) business day after grades are posted or other term as specified in the Academic Calendar.

The instructor must indicate and sign the form to either change the final grade, reaffirm the original grade assigned, or continue with the appeal process.



- If the original final grade is improved and satisfies the student's appeal, the instructor shall submit a Grade Change Form to the Office of Records and Registration, the grade will be posted, and the academic record hold status will be released.
- If the original final grade is reaffirmed and both the instructor and student agree with the grade determination, the instructor shall submit a Grade Affirmation Form signed by the student and instructor confirming the original grade to the Office of Records and Registration, the grade will be posted, and the academic record hold status will be released.
- When a student is unable to meet with the instructor because of personal differences or if the instructor denies the initial appeal (above), the student may choose to pursue a final grade appeal by submitting the completed and endorsed form, with any and all tests, grades, essays or project summaries and a complete explanation as evidence in support of the student's position, to the Office of Student Services requesting a review and determination, with a copy to the Office of the Provost. The student may seek the assistance of the Office of Student Services to review a possible appeal and to prepare the appeal. Additional information may be requested from the student and/or the instructor during this time.
- A committee consisting of a representative of the Office of Student Services, Office of Compliance, one faculty member, and a student representative will review the appeal. The student and instructor will be offered the opportunity to participate in the appeal hearing. The committee will send a final determination to the Office of Records and Registration within five (5) days of receipt. The committee's decision is final and is not subject to further appeal. The Office of Records and Registration will then post the grade and release the academic record hold status.
- If a student would like to appeal a grade during the semester, students should approach the faculty member to resolve informally. All documentation should be saved. If at the time the final grades is insufficient, the student can file a formal appeal at that time.

### **Release of Grades**

In accordance with the requirements of the Family Educational Rights and Privacy Act (FERPA), reports of the student's grades are not routinely sent to the student's parents or guardians. The parent or guardian of a student under 18 years of age may obtain grades by writing to the Office of the Records and Registration requesting a FERPA Release Form for the student to complete, sign, and submit. The grades of a student over 18 years of age will be sent to the parents only with the written consent of the student.

### **Repeated Courses**

A student may repeat a course in which a final grade of C- or below was received. The original grade remains on the student's academic record. After a course has been repeated, the most recent grade is used in the calculation of the student's cumulative grade point average. A student cannot repeat a course for the sole purpose of improving the overall GPA if the degree requirement has already been met.

### **Academic Honors**

**Honors List** A student is eligible for the Honors List at the conclusion of a semester when:

1. the semester grade point average is 3.50 or higher; and,
2. a minimum of 9 semester hours of course work was completed, excluding those courses in which final grades were earned that are not included in the calculation of the grade point average.

**Graduation Honors** A student who has earned consistently superior grades will be recognized for this achievement at graduation with the designation listed below representing the student's level of achievement. Both the student's diploma and university record will carry the appropriate honors designation as follows:

*Summa Cum Laude* for a cumulative grade point average between 3.95 and 4.00

*Magna Cum Laude* for a cumulative grade point average between 3.75 and 3.94

*Cum Laude* for a cumulative grade point average between 3.50 and 3.74

### **Academic Standing**

A student with a cumulative grade point average of 2.00 or higher is in satisfactory academic standing. A student who is not in satisfactory academic standing is subject to warning, probation and dismissal according to the following policy:

#### **First Occurrence - Warning**

If a student has a cumulative grade point average below 2.00 at the end of the semester, a notification will be issued placing the student on warning for the subsequent semester. No appeal is needed, but an academic plan may be required. Additional academic requirements and conditions may be imposed at this time.

#### **Second Consecutive Occurrence - Probation**

If a student has a cumulative grade point average that remains below 2.00 at the end of the warning period, a notification will be issued placing the student on probation for the subsequent semester. An academic plan created in collaboration with the Office of Student Services is required during the probationary period. . The student remains eligible for financial aid during the probation semester.

#### **Third Consecutive Occurrence - Dismissal**

If a student after three consecutive semesters has a cumulative grade point average that remains below 2.00, a letter of dismissal will be issued.

#### **Academic Dismissal**

The University reserves the right to exclude at any time a student whose academic record is unsatisfactory.

If at any time the cumulative grade point average falls below a 1.00 the University reserves the right to dismiss the student.

**Appeals** – A student who fails to meet satisfactory academic progress after the Probation period, as defined above, may file an appeal within 10 days of receiving a dismissal notice by submitting a letter outlining the nature of the appeal to the Office of Student Services. An appeal will be considered only if the student's failure to meet the standards of academic progress is determined to be due to events beyond the student's control. Examples of circumstances for which an appeal may be considered include: military obligation; death of a relative; injury or illness of the student; unusual personal hardship or other extenuating circumstance. Written documentation of the circumstances of why the student failed to make satisfactory progress and what has changed that will allow the student to make satisfactory progress by the next evaluation must be submitted with the appeal and should reference the student's name and student ID number. In addition, evidence must be received documenting that the required academic plan was completed, the cumulative grade point average has improved, and the required satisfactory progress grade point average can potentially be achieved to

complete a program of study within the maximum timeframe limitation. Appeals submitted without documentation will not be considered. A timely determination will then be made by the Appeals Committee and documented in the student's file.

### **Official Withdrawal Procedure**

A student is encouraged to contact the Financial Aid and Business Offices in advance of any decision to withdraw from the University to obtain an explanation of the tuition and financial aid adjustments that will occur, if any, as the result of withdrawal from the program of study.

A student who intends to officially withdraw is encouraged to contact the Office of Records and Registration by telephone (717.901.5136), e-mail (Registrar@HarrisburgU.edu), or in person. A withdrawal Form should be completed. The determination date for withdrawal purposes shall either be the actual date of formal notification by the student or some future date specified by the student as the intended last date of attendance. The determination date is used to calculate the tuition refund, if any, and the student financial assistance program refund, if applicable.

### **Withholding of Records**

Student records may be withheld by the Office of Records and Registration when directed by the appropriate University officials. The release of academic transcripts or a diploma may be held for a period of time. More specifically, an official academic transcript or diploma will not be released if tuition or other charges remain unpaid to the University. The Office of Compliance determines when a student's record should be placed on hold for disciplinary reasons and the Business Office determines when a student's record should be placed on hold for financial reasons.

### **Standards of Academic Integrity**

Harrisburg University expects a student to act honorably and in accordance with the standards of academic integrity. Academic integrity is grounded in mutual trust and respect. Therefore, it is expected that a student will respect the rights of others and will only submit work that is their own, refraining from all forms of lying, cheating and plagiarism. Lack of academic integrity includes:

- **Plagiarism:** Plagiarism is using the ideas of others and/or words without clearly acknowledging the source of that information. It is assumed that all work submitted for a grade will be the product of the student's own understanding, and thus expressed in the student's own words, calculations, computer language, etc. This means all writing assignments, in class or outside of class, are assumed to be composed entirely of words written (not simply found) by the student, except where words written by someone else are specifically marked as such with proper citation.
- **Cheating:** All examinations and other assignments are to be completed by the student alone, without inappropriate assistance of any kind. That means no help is to be given to or received from other persons during tests; no books, notes, cellphones, iPods, calculators, or other materials or devices of any kind are to be consulted, unless the professor instructs otherwise.
- **Fabrication, alteration of documents, lying, etc.:** It is wrong to lie to an instructor in order to get an excused absence, an extension on a due date, a makeup examination, an Incomplete, admission to a class or program, etc. It is wrong to forge an instructor's signature on any document, or anywhere else for academic advantage. It is wrong to falsify transcripts and diplomas. It is wrong to falsify data, for example, in an assigned lab project, or fabricate quotations or sources for a paper.
- **Assisting others in academic misconduct:** Helping someone else cheat is a violation of the academic integrity standards. In other words, providing another student with a paper or

homework, or any other form of help, where the student knows, or reasonably should know, that the other student will use it to cheat is considered a violation.

A violation of the Standards of Academic Integrity could result in academic consequences. Please see the Student Handbook for details on the procedures in cases of a violation of Harrisburg University's Standards of Academic Integrity.

### **Disciplinary/Academic Dismissal**

The University reserves the right to exclude at any time a student whose behavior or conduct is found to be detrimental to the orderly functioning of the University. When misconduct may constitute a threat to person or property within the University community or under other circumstances, it may result in disciplinary action. The University assumes the responsibility to regulate the private conduct of the student when such conduct could constitute a hazard to or an infringement on the rights of others, a violation of the law, or a disruption of the legitimate academic and administrative processes of the University. Please see the Student Handbook for details on the policies regarding the Student Code of Conduct/Honor Code, Academic Dishonesty-Plagiarism Policy and Disciplinary Process for Student Incidents of Misconduct.

## CURRICULUM OVERVIEW

### Learning at Harrisburg University

The goal of learning at Harrisburg University is to obtain the relevant knowledge, competence, and experiences to best be prepared for an enriching career. Learning is, therefore, a multi-faceted activity that occurs throughout and across the college experience; it integrates both academic learning (acquiring and applying new knowledge) and student development (learning about oneself). Competency-based learning outcomes with programs that are intentionally designed to be engaging, integrative, and experiential are emphasized. There are four inter-dependent program characteristics that help define the Harrisburg University experience:

- **Highly Available:** The University provides learning experiences to meet the student's needs. This is demonstrated through one or more team-taught general education courses, the use of technology inside and outside of the classroom, and the non-curricular or co-curricular learning opportunities available.
- **Highly Collaborative:** The student develops knowledge and skills through shared experience, as opposed to learning in isolation or in competition with each other. The faculty is responsible for creating learning environments based upon the premise that knowledge can be gained from everyone. The student has the advantage of learning from the minds and experiences of classmates, business mentors, or future employers.
- **Highly Experiential:** The University deliberately ensures that learning is highly linked to both practical and professional experience. This represents a shift from one-way (faculty to student), text-heavy content delivery to a more robust learning model that deliberately values experience, both inside and outside the classroom. Experience is emphasized through Projects I and II for undergraduates and industry-related internships and experiences for the student.
- **Highly Applied:** The learning conversation focuses on the practical application of knowledge. The intention is to shift the question from "How do I remember this information?" to "How can I act on this information in order to create knowledge that is both useful and actionable?" In this way, learning becomes an exercise in both preparation for career and readiness for life.

### Learning Assessment at Harrisburg University

Harrisburg University's model for the assessment of student learning is structured to support learning goals. The goals of the programs and courses are clearly defined and are relevant to the mission of the University. Course syllabi establish specific learning objectives, articulate the instructor's expectation of the student, and outline the standards against which the student's learning will be measured. Learning assessment of coursework and experiential learning is creative, in that it goes beyond instructor-driven evaluation through examinations and papers in most cases, and is done both inside and outside the classroom by faculty, business and academic professionals. Further, student learning around each of the University competencies is a focus of assessment activities. Student learning assessment is anchored in the use of ePortfolios throughout the student's program of study. The University is committed to improve its program offerings by comparing student assessment outcomes to the program and course goals.

## **Competencies and ePortfolio**

**Competency-Driven and Across-the-Curricula:** A hallmark of the Harrisburg University experience is competency-driven education. The student will be expected to demonstrate mastery of eight university-wide competencies:

### **Civic Engagement**

Definition: Civic engagement is "working to make a difference in the civic life of our communities and developing the combination of knowledge, skills, values and motivation to make that difference. It means promoting the quality of life in a community through both political and non-political processes." (Excerpted from *Civic Responsibility and Higher Education*, edited by Thomas Ehrlich, published by Oryx Press, 2000, Preface, page vi.). In addition, civic engagement is participation in personal and public activities that are both life-enriching and socially beneficial to the community.

### **Written and Oral Communication**

Definition: Written communication is the development and expression of ideas in writing. It involves writing in a variety of styles, genres, and technologies and mixing text, data, and images. Written communication abilities develop through repeated writing experiences across the disciplines.

### **Critical Thinking**

Definition: Critical thinking is the use of deliberative thought, characterized by the comprehensive exploration of topics, ideas, artifacts, or events before accepting or formulating an opinion or conclusion. Using reason and experience to form informed judgments, the critical thinker combines or synthesizes existing ideas, images, or expertise in original ways; and reacts to experience in imaginative ways, characterized by innovation, divergent thinking, and risk-taking. The critical thinker solves problems by designing, evaluating, and implementing a strategy to answer an open-ended question or achieve a desired goal. Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

### **Entrepreneurship**

Definition: Entrepreneurship is the process of organizing tangible and intangible resources in order to pursue opportunities that generate value, meet an identified need, or satisfy an organizational or societal market (such as the creation of a business, organization, or laboratory). At Harrisburg University, entrepreneurship represents a "frame of mind" demonstrated by both thinking and action.

### **Ethical Awareness and Reasoning**

Definition: Ethical decision making actualizes the realization and inclusion of the moral dimension for personal decision-making. "Reasoning about right and wrong human conduct requires students to be able to 1) assess their own ethical values and the social context of problems, 2) recognize ethical issues in a variety of settings, 3) think about how different ethical perspectives might be applied to ethical dilemmas, and 4) consider the ramifications of alternative actions." Ethical self-identity evolves both on individual and organizational (e.g., corporate) levels.

\* Source: AAC&U / VALUE rubric

**Global Awareness Rubric**

Definition: Global awareness is knowledge of the world citizenry's common interests in community, social, political, information, and financial systems of different scales; appreciation and respect for diversity, culture, and environment; and the interactions and impacts of individuals, global systems, and cultures.

**Information Literacy Rubric**

Definition: Information literacy encompasses knowledge and familiarity with different media types, efficient data storage, retrieval methods, and research techniques. For the purposes of this rubric, "information" is not only text-based information, but also includes images, sounds, data sets, databases, artifacts, numerical and statistical data.

**Teamwork and Collaboration Rubric**

Definition: Teamwork and Collaboration encompass the ability to work effectively with others in a concerted effort toward a common goal. "Behaviors under the control of individual team members" include efforts put into team tasks, manner of interacting with others on the team, and the quantity and quality of contributions to team discussions.

\* Source: AAC&U / VALUE rubric

Regardless of the student's program of study, employers and community leaders desire these competencies; they also serve the broader purpose of preparation for life and citizenship.

**ePortfolio Requirement:** Harrisburg University defines an ePortfolio as *an organized, media-rich collection of documents that allows the student to demonstrate competence to a multitude of audiences*. The ePortfolio will be central in how the student organizes, develops, and reflects upon learning. It will also be a lever for assisting the way in which faculty develop curricula, view teaching, and deliver content. Ultimately, the ePortfolio will be a coalescing force for making tangible and visible the University-wide competency program while serving as a key tool in evaluating student success.

## Structure of the Program

The undergraduate program structure is designed to provide the student with basic foundation knowledge, program specific knowledge, opportunities to apply new knowledge, and the flexibility to explore interesting topics. All undergraduate degree programs have the same five structural elements: 1) Foundation courses, 2) General Education courses, 3) Program Requirement courses, 4) Experiential courses, and 5) Elective courses. The number of semester hours covered by the structural elements adds up to the total of 120 semester hours needed for graduation. Each structural element has specific semester hour and course requirements associated with it. Generally, the breakdown of semester hours by structural element is 18 semester hours in Foundation courses, 30 semester hours in General Education courses, 40 – 50 semester hours in Program Requirement courses, 13 semester hours in Experiential courses, and 9 – 19 semester hours in Electives.

### **Foundation**

The purpose of the Foundation courses is to provide the student with mathematics and communication knowledge and skills that will be used throughout the selected program of study. More importantly, mastery of foundational knowledge and skill is required for success in science and technology careers.

Every student must complete 9 semester hours of mathematics courses: MATH 120 College Algebra, MATH 280 Introductory Statistics, and MATH 220 Calculus I (MATH 210 Discrete Mathematics I for the CISC, GSTC, and IMED program student). The student

completing the Analytics program must satisfy the mathematics requirements by completing MATH 220 Calculus I, MATH 210 Discrete Mathematics I, and MATH 280 Introductory Statistics.

MATH 081 Prealgebra may not be used to satisfy any portion of this requirement because it is a developmental course. The course is included in the student's semester course load, which determines the student's enrollment status. The final grade earned is calculated in the student's term and cumulative grade point averages. The credit value associated with the course is not applicable toward the minimum 120 semester hours needed for graduation.

Additionally, every student must complete 9 semester hours of communication including the following topics: composition, speech, and advanced composition and technical writing.

## **General Education**

The purpose of general education is to offer the undergraduate student a dynamic platform for both foundational and skill-based learning to prepare them for a well-rounded life during which they will make informed decisions, contribute to society, and become lifelong learners. General education is a degree requirement for each undergraduate student.

Given the sheer vastness of knowledge and the rate at which new knowledge is developed, the student typically cannot command mastery or deep expertise in the broad areas known as the sciences, social sciences, humanities, or applied knowledge domains such as entrepreneurship or leadership. The purpose of general education is not to produce experts. Instead, the goal is to integrate contributions from multiple fields to give the student more comprehensive explanations and understandings of the world. In essence, general education – and all academic work at the University, begins within a framework of applied and self-directed learning.

The Mind courses are cross-disciplinary, applied courses. The student is required to successfully complete at least 30 semester hours of general education, 24 of which must be the Mind courses.

Two 2-course sequences totaling 12 semester hours are part of the first-year program.

- GEND 102-103: The Creative Mind I and II
- GEND 112-113: The Scientific Mind I and II

Two other Mind courses are 6 semester hours and usually team-taught.

- GEND 201: The Civic Mind
- GEND 351: The Organizational Mind

The remaining 6 semester hours can be additional Mind courses or General Education (GEND) electives.

## **Experiential Learning**

The student will complete 13 semester hours of experiential learning. The University is committed to preparing students for careers in science and technology fields. Part of what makes the degree program unique is an emphasis on experiential learning, which includes an internship, two projects, and seminar courses. By connecting the classroom, workplace, and research experiences within the program, the student can gain a range of marketable skills.



These skills are linked to the eight competencies at the heart of the University's curriculum in addition to the learning goals within the student's program of study. The experiential courses are expected to provide the student with an enhanced resume prior to graduation from the University.

### **Guidelines for Experiential Learning – Multiple Components in One Semester**

In order for a student to be able to complete two experiential learning components in one semester, the student must comply with the following:

1. Student must have a GPA of 3.0 or above.
2. Student must not have an "I" or incomplete in any previous Experiential Learning component (Project or Internship).
3. Student must not have previously failed any Experiential Learning component (Project or Internship).

**Seminar Courses** - The seminar courses integrate the student's academic, personal, and professional development success. These courses provide the student with the support and skill development needed to complete experiential learning courses and achieve the university core competencies. Additionally, seminars facilitate the completion of a reflective ePortfolio that includes evidence of experiential and competency-based learning.

**Projects** – Each project challenges the student to identify, investigate and analyze a particular topic or problem in the program of study and concentration. A key objective is to apply skills, methods, and knowledge obtained in previously completed courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. Projects are undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analyses or development plans for external organizations, the development of software applications, or market studies and business proposals. The student develops a unique plan and contract and establishes individual learning goals in consultation with a member of the faculty.

**Internships** - Internships - An internship allows the student to apply classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. For one semester, the student interacts with professionals in an external organization to explore career options related to the student's program of study. Each student is responsible for finding and completing an internship. The Office of Experiential Learning and the students' Faculty Advisor provides guidance through the process of obtaining and completing the internship. A student is able to enhance post-graduation career prospects by integrating this external experience into the academic program.

### **Electives**

The elective component of the curriculum provides the student opportunities: 1) to explore disciplines not included in the foundation, general education, and program requirements; 2) for study beyond the minimum requirements in the program discipline; or 3) to independently pursue an area of interest under the supervision of a faculty member. The number of elective semester hours required for graduation is specified by each program.

## Outline of Baccalaureate Degree Program

The curriculum requires a minimum of 120 earned semester hours to fulfill the Bachelor of Science degree requirements. The courses are distributed in the following required areas: foundation, general education, experiential, program, and electives. Each requirement is detailed as follows:

### *Foundation Courses*

### **18 semester hours**

Mathematics (9 semester hours) – MATH 120 College Algebra I, MATH 280 Introductory Statistics, and MATH 220 Calculus I (MATH 210 Discrete Mathematics I for the CISC, GSTC, and IMED program student). The student completing the Analytics program must satisfy the mathematics requirements by completing MATH 220 Calculus I, MATH 210 Discrete Mathematics I, and MATH 280 Introductory Statistics.

English and Communication (9 semester hours) – ENGL 105 College Composition or ENGL 106 Advanced Writing and Critical Thinking, COMM 110 Speech, and ENGL 200 Advanced Composition and Technical Writing

### *General Education Courses*

### **30 semester hours**

*All of the following courses - 24 semester hours:*

#### GEND 102 The Creative Mind I (3)

English Literature  
Introductory Psychology  
Sociology

#### GEND 103 The Creative Mind II (3)

English Literature  
Introductory Psychology  
Sociology

#### GEND 112 The Scientific Mind I (3)

Chemistry  
Physics

#### GEND 113 The Scientific Mind II (3)

Earth Sciences  
Life Sciences  
Space Sciences

#### GEND 201 The Civic Mind (6)

U.S. or World History  
U.S. or World Politics  
Macroeconomics

#### GEND 351 The Organizational Mind (6)

Organizational Theory  
Microeconomics

*Six (6) semester hours chosen from the following:*

#### GEND 104 Our Ocean World (3)

#### GEND 120 Intro to Sociology (3)

#### GEND 130 General Psychology (3)

#### GEND 140 Intro to Astronomy (3)

#### GEND 150 The Learned Mind (6)

Philosophy  
Literature

#### GEND 225 Cinema Studies (2)

#### GEND 251 The Political Mind (6)

Intl Government Institutions  
Global Health, Energy, Poverty & Security

#### GEND 275 Gender and Society (3)

#### GEND 300 The Cultured Mind (6)

Art  
World Cultures

#### GEND 325 Consulting (3)

#### GEND 400 Entrepreneurial Mind (3)

#### GEND 425 Globalization (3)

#### GEND 450 Healthy Mind & Body (3)

#### GEND 460 Ethical Mind: Research Ethics & Scientific Integrity (3)

#### GEND 465 Ethical Mind: Ethics in a Digital Age (3)

**Outline of Baccalaureate Degree Program (continued)***Experiential Courses***13 semester hours**

ADMA, ANLY, BTEC, CISC, MEBA, GSTC, IMED, or INSC (according to program of study) 298

Project I (3)

ADMA, ANLY, BTEC, CISC, MEBA, GSTC, IMED, or INSC (according to program of study) 365

Internship (3)

ADMA, ANLY, BTEC, CISC, MEBA, GSTC, IMED, or INSC (according to program of study) 498

Project II (3)

SEMR 100 Cornerstone (1)

SEMR 200 Steppingstone (1)

SEMR 300 Keystone (1)

SEMR 400 Capstone (1)

*Electives***9 - 19 semester hours***Program Requirements***40 – 50 semester hours***Bachelor of Science Degree***total of 120 semester hours**

## ACADEMIC PROGRAMS

### **Bachelor of Science in Advanced Manufacturing Program (ADMA)**

Advanced manufacturing is the application of information, computation, automation, devices, software, sensing, and networking to the manufacturing process. Advanced manufacturing can include cutting edge materials and emerging technologies that are enabled by the physical and biological sciences. This involves both traditional and tailored solutions in order to enhance manufacturing for existing products and new products emerging from new advanced manufacturing technologies. Advanced manufacturing is not limited to emerging technologies; it is also comprised of efficient, productive, highly integrated and controlled processes across a spectrum of globally competitive manufacturers and suppliers. Advanced manufacturing results in new markets, new products, new technologies, and new ways to position manufacturing to support societies that are or will be connected globally in the future.

### **Program Goals**

Graduates of the Bachelor of Science in Advanced Manufacturing program are able to:

- Produce simple and complex solutions to issues in manufacturing;
- Communicate research-based information in oral and written formats to both advanced manufactures and non-manufactures;
- Collect and analyze data gathered from industry and industrial-related issues;
- Evaluate the ability to analyze metallic and nonmetallic materials needed to produce prototypes and advanced manufacturing solutions; and,
- Create solutions that support global awareness and ethical decision making when resolving issues.

As part of the Advanced Manufacturing Program, the student completes a professional portfolio as a means for assessing learning outcomes and enhancing personal and professional development.

**Advanced Manufacturing Requirements** – This program requires a total of 47 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following courses – 47 semester hours:

ADMA 115	Microcomputer Applications in Technology	(3)
ADMA 135	Manufacturing Technology and Society	(2)
ADMA 160	Metallic Materials and Manufacturing Processes	(3)
ADMA 230	Applied Analog and Digital Electronics	(3)
ADMA 240	Computer Assisted Drawing	(3)
ADMA 310	Basics of Manufacturing Simulation	(3)
ADMA 323	Comp Assist Product Design & Rapid Prototyping	(3)
ADMA 338	Non-Metallic Materials and Processing	(3)
ADMA 345	Designing & Rapid Prototyping w/Solid Modeling	(3)
ADMA 370	CAD/CAM and Industrial Robotics	(3)
ADMA 410	Application of CAD/CAM and Industrial Robots	(3)
ADMA 420	Advanced Manufacturing	(3)
ADMA 430	Programmable Logic Controllers and Integrations	(3)
ADMA 455	Manufacturing Automation Systems (CIM/FMS)	(3)
ADMA 465	Simulation of Systems and Integrations	(3)
ADMA 480	Application of Advanced Manufacturing	(3)

**Recommended Sequence for the Full-time Student Completing the Advanced Manufacturing Program** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester		Spring Semester		Summer Semester	
ENGL 105 College Composition or ENGL 106 Academic Writing & Critical Thinking	3	ADMA 115 Microcomputer Applications in Technology	3	<i>Optional</i>	
GEND 102 Creative Mind I	3	COMM 110 Speech	3		
GEND 112 Scientific Mind I	3	GEND 103 Creative Mind II	3		
MATH 120 College Algebra	3	GEND 113 Scientific Mind II	3		
SEMR 100 Cornerstone	1	MATH 280 Intro Statistics	3		
<b>Total semester hours</b>	<b>13</b>	<b>Total semester hours</b>	<b>15</b>		

**SECOND YEAR**

Fall Semester		Spring Semester		Summer Semester	
ADMA 135 Manufacturing Technology and Society	2	ADMA 230 Applied Analog and Digital Electronics	3	<i>Optional</i>	
ADMA 160 Metallic Materials and Manufacturing Processes	3	ADMA 240 Computer Assisted Drawing	3		
ENGL 200 Advanced Composition & Technical Writing	3	GEND 201 Civic Mind	6		
MATH 210 Discrete Mathematics I	3	ADMA 298 Project I	3		
Electives	3				
SEMR 200 Steppingstone	1				
<b>Total semester hours</b>	<b>15</b>	<b>Total semester hours</b>	<b>15</b>		

**THIRD YEAR**

Fall Semester		Spring Semester		Summer Semester	
ADMA 310 Basics of Manufacturing Simulation	3	ADMA 345 Designing and Rapid Prototyping with Solid Modeling	3	<i>Optional</i>	
ADMA 323 Computer Assisted Product Design&Rapid Prototyping	3	ADMA 370 CAD/CAM and Industrial Robotics	3		
ADMA 338 Non-Metallic Materials and Processing	3	ADMA 365 Internship	3		
GEND 351 Organizational Mind	6	GEND Elective	3		
SEMR 300 Keystone	1	Electives	3		
<b>Total semester hours</b>	<b>16</b>	<b>Total semester hours</b>	<b>15</b>		

**FOURTH YEAR**

Fall Semester		Spring Semester		Summer Semester	
ADMA 410 Application of CAD/CAM and Industrial Robotics	3	ADMA 455 Manufacturing Automation Systems (CIM/FMS)	3	<i>Optional</i>	
ADMA 420 Advance Manufacturing	3	ADMA 465 Simulation of Systems and Integrations	3		
ADMA 430 Programmable Logic Controllers and Integrations	3	ADMA Application of Advanced Manufacturing	3		
ADMA 498 Project II	3	SEMR 400 Capstone	1		
GEND Elective	3	Electives	6		
<b>Total semester hours</b>	<b>15</b>	<b>Total semester hours</b>	<b>16</b>		

## **Bachelor of Science in Analytics Program (ANLY)**

The Analytics program explores the knowledge and skills that are essential to collect, analyze, interpret and present information obtained from data drawn from multiple, often disparate sources of organizational data. In today's workplace, analytics is essential for keeping an organization running smoothly. Many analytics professionals plan and coordinate all technology-related activity for a business and work beside managers of the company to meet the technological needs of the organization. This degree program of study is designed for the student seeking a greater emphasis on studying informatics and business intelligence. Professionals in analytics use advanced computation and mathematical techniques to solve critical business problems. Computer technology is used to develop quantitative models and create database systems that the student applies to management decision-making.

### **Program Goals**

Graduates of the Bachelor of Science in Analytics program are able to:

- Identify and assess the opportunities, needs and constraints for data usage within an organizational context;
- Integrate information technology and data science to maximize the value of data;
- Design innovative and creative data analytics solutions;
- Communicate clearly and persuasively to a variety of audiences;
- Strengthen state and local economies by meeting the demand for well-educated and skilled data analysis; and,
- Lead analytics teams and projects.

As part of the Analytics Program, the student completes a professional portfolio as a means for assessing learning outcomes and enhancing personal and professional development.

**Analytics Requirements** – This program requires a total of 50 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following courses – 50 semester hours:

ANLY 400	Analytics Tools and Techniques	(4)
ANLY 405	Predictive Modeling	(3)
ANLY 410	Data Warehousing and Mining	(3)
ANLY 415	Advanced Analytics and Reporting	(3)
CISC 120	Fundamentals of Computing	(4)
CISC 160	Data Structures	(4)
CISC 233	Essential Algorithms	(4)
CISC 340	Introduction to Artificial Intelligence	(4)
CISC 460	SQL Database Design & Implementation	(4)
CISC 491	SW Development Processes & Quality	(4)
MATH 310	Discrete Mathematics II	(3)
MATH 380	Mathematical Modeling	(4)
MEBA 110	Introduction to eBusiness Management	(3)
GEND 400	The Entrepreneurial Mind	(3)

**Recommended Sequence for the Full-time Student Completing the Analytics Program** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester		Spring Semester		Summer Semester	
ENGL 105 College Composition or ENGL 106 Academic Writing & Critical Thinking	3	CISC120 Fundamentals of Computing	4	<i>Optional</i>	
GEND 102 Creative Mind I	3	COMM 110 Speech	3		
GEND 112 Scientific Mind I	3	GEND 103 Creative Mind II	3		
MATH 220 Calculus I	3	GEND 113 Scientific Mind II	3		
SEMR 100 Cornerstone	1	MATH 280 Intro Statistics	3		
<b>Total semester hours</b>	<b>13</b>	<b>Total semester hours</b>	<b>16</b>		

**SECOND YEAR**

Fall Semester		Spring Semester		Summer Semester	
CISC 160 Data Structures	4	ENGL 200 Advanced Composition & Technical Writing	3	ANLY 298 Project I ( <i>or Fall Semester of the third year</i> )	3
CISC 233 Essential Algorithms	4	GEND 201 Civic Mind	6		
MATH 210 Discrete Mathematics I	3	MATH 310 Discrete Mathematics II	3		
GEND elective	3	MEBA 110 Introduction to eBusiness and Management	3		
SEMR 200 Steppingstone	1				
<b>Total semester hours</b>	<b>15</b>	<b>Total semester hours</b>	<b>15</b>	<b>Total semester hours</b>	<b>3</b>

**THIRD YEAR**

Fall Semester		Spring Semester		Summer Semester	
CISC 340 Introduction to Artificial Intelligence	4	ANLY 400 Analytics Tools & Techniques	4	ANLY 365 Internship ( <i>or Fall Semester of the third year</i> )	3
CISC 491 SW Development Process & Quality	4	ANLY 405 Predictive Modeling	6		
MATH 380 Mathematical Modeling	4	CISC 460 SQL Database Design & Implementation	4		
SEMR 300 Keystone	1	GEND 400 Entrepreneurial Mind	3		
<b>Total semester hours</b>	<b>13</b>	<b>Total semester hours</b>	<b>14</b>	<b>Total semester hours</b>	<b>3</b>

**FOURTH YEAR**

Fall Semester		Spring Semester		Summer Semester	
ANLY 410 Data Warehousing & Mining	3	ANLY 415 Advanced Analytics & Reporting	3	<i>Optional</i>	
ANLY 498 Project II	3	GEND 325 Consulting	3		
GEND 351 Organizational Mind	6	SEMR 400 Capstone	1		
Elective	3	Electives	6		
<b>Total semester hours</b>	<b>15</b>	<b>Total semester hours</b>	<b>13</b>		

## **Bachelor of Science in Biotechnology Program (BIOT)**

Biotechnology is a multi-disciplinary program that incorporates the foundations of biology, microbiology, genetics, molecular biology, and chemistry. Biotechnology focuses on the manipulation of living organisms, their products, and their processes to further knowledge, improve quality of life and engineer new tools and applications. Biotechnology is applied to a broad range of industries including the pharmaceutical, chemical, agricultural, food development and manufacturing, to name but a few. Biotechnology has impacted significantly in the fields of medicine, health, environment and new technology and will continue to do so far into the future.

### **Program Goals**

Graduates of the Bachelor of Science in Biotechnology program are able to:

- Demonstrate a broad range of basic laboratory skills and technical competencies applicable to the field of biotechnology and to the workplace.
- Develop a broad understanding of foundational concepts, mechanisms and principles which can be applied across the fields of applied biotechnology, molecular and microbial biotechnology, food biotechnology, and nanotechnology.
- Demonstrate scientific reasoning and critical thinking skills including the ability to evaluate and integrate multiple sources of information, recognize problems, evaluate data, and draw conclusions.
- Model independent and collaborative work environments in the classroom, the laboratory, the field, and the workplace.
- Demonstrate the successful ability to communicate scientific information to a variety of audiences and incorporate multiple modes of technology to achieve that goal.
- Connect the classroom to the world of work through multi-modal and interdisciplinary learning experiences.



**Biotechnology Requirements** – This program requires a total of 48 to 55 semester hours:

1) 23-27 semester hours from Core courses and 2) 25-28 semester hours completed in one of the following concentrations: Food Safety and Quality Assurance, General Biotechnology, Nanobiotechnology, Nanobiotechnology and Nanofabrication, and Pharmaceutical Design. The semester hour value of each course appears in parentheses ( ).

**Food Safety and Quality Assurance Concentration – 48 semester hours**

Complete all of the following Biotechnology Core courses – 23 semester hours:

BIOL 102	General Biology Lecture	(3)
BIOL 103	General Biology Laboratory	(1)
BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
BTEC 170	Introduction to Biotechnology	(3)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry II Laboratory	(1)
CHEM 161	General Chemistry II	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 210	Organic Chemistry I	(4)

Complete all of the following courses – 19 semester hours:

BIOL 330	Microbiology	(4)
BIOL 370	Molecular Biology	(4)
BTEC 350	Biotechnology Techniques	(4)
BTEC 361	Food Biotechnology Seminar	(1)
BTEC 362	General Biotechnology Seminar	(1)
BTEC 363	Nanobiotechnology Seminar	(1)
BTEC 371	Food Science and Technology	(4)

Complete 6 semester hours from the following:

BTEC 200	Introduction to Quality and Food Safety	(3)
BTEC 210	Food and Nutrition	(3)
BTEC 235	Applied Cell and Agro Culture	(4)
BTEC 370	Genetically Modified Foods	(3)
BTEC 405	Applied Food Microbiology	(3)
BTEC 420	Food Safety and Quality Assurance	(3)
INSC 410	Epidemiology	(3)

**Recommended Sequence for the Full-time Student Completing the Food Safety and Quality Assurance Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	(3) BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3) (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics <b>Total semester hours = 16</b>	(3) <i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture BIOL 282 Cell Biology Laboratory BTEC 170 Introduction to Biotechnology CHEM 151 General Chemistry I CHEM 152 General Chemistry I Laboratory MATH 220 Calculus I SEMR 200 Steppingstone <b>Total semester hours = 15</b>	(3) CHEM 161 General Chemistry II (1) CHEM 162 General Chemistry II Laboratory (1) (3) ENGL 200 Advanced Composition and Technical Writing (3) (1) GEND 201 The Civic Mind (6) (3) Food Safety and Quality Assurance concentration electives (3) <b>Total semester hours = 16</b>	(3) <i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 370 Molecular Biology BTEC 350 Biotechnology Techniques BTEC 298 Project I CHEM 210 Organic Chemistry I SEMR 300 Keystone <b>Total semester hours = 16</b>	(4) BIOL 330 Microbiology (4) (3) BTEC 365 Internship (3) (4) BTEC 371 Food Science and Technology (4) (4) Electives (4) <b>Total semester hours = 15</b>	(4) <i>optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
BTEC 498 Project II GEND 351 The Organizational Mind Electives <b>Total semester hours = 16</b>	(3) BTEC 361 Food Biotechnology Seminar (1) (6) BTEC 362 General Biotechnology Seminar (1) (7) BTEC 363 Nanobiotechnology Seminar (1) (6) GEND electives (6) (1) SEMR 400 Capstone (1) (3) Food Safety and Quality Assurance concentration electives (3) <b>Total semester hours = 13</b>	<i>optional</i>

**General Biotechnology Concentration – 50 semester hours**

Complete all of the following Biotechnology Core courses – 23 semester hours:

BIOL 102	General Biology	(3)
BIOL 103	General Biology Laboratory	(1)
BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
BTEC 170	Introduction to Biotechnology	(3)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
CHEM 161	General Chemistry II	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 210	Organic Chemistry I	(4)

Complete all of the following courses – 20 semester hours:

BIOL 330	Microbiology	(4)
BIOL 370	Molecular Biology	(4)
BTEC 350	Biotechnology Techniques	(4)
BTEC 351	Biotechnology Applications	(4)
CHEM 330	Biochemistry I	(4)

Complete 7 semester hours from the following:

BIOL 210	Introduction to Bioinformatics	(4)
BIOL 214	Anatomy and Physiology I	(4)
BIOL 215	Anatomy and Physiology II	(4)
BIOL 320	Genetics	(3)
BIOL 375	Immunology	(4)
BTEC 100	Nanobiotechnology Explorations	(2)
BTEC 110	Medical Terminology	(1)
BTEC 210	Food and Nutrition	(3)
BTEC 220	Applied Nanobiotechnology	(4)
BTEC 222	Emerging Laboratory Techniques	(4)
BTEC 235	Applied Cell and Agro Culture	(4)
BTEC 250	Medical Biotechnology	(3)
BTEC 311	Pharmacology I	(3)
BTEC 320	Drug Design and Development	(3)
BTEC 340	Forensic Biotechnology	(3)
BTEC 355	Neurology & Biotechnology	(3)
BTEC 361	Food Biotechnology Seminar	(1)
BTEC 362	General Biotechnology Seminar	(1)
BTEC 363	Nanobiotechnology Seminar	(1)
BTEC 370	Genetically Modified Foods	(3)
BTEC 371	Food Science and Technology	(4)
BTEC 401	Biosensor Technology	(4)
BTEC 420	Food Safety and Quality Assurance	(3)
BTEC 435	Computer-Aided Drug Design	(4)
PHYS 210	General Physics I	(4)

## Recommended Sequence for the Full-time Student Completing the General Biotechnology Concentration

– The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking	BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3)	<i>optional</i>
GEND 102 The Creative Mind I (3)	GEND 103 The Creative Mind II (3)	
GEND 112 The Scientific Mind I (3)	GEND 113 The Scientific Mind II (3)	
MATH 120 College Algebra (3)	MATH 280 Introductory Statistics (3)	
SEMR 100 Cornerstone (1)		
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3) BIOL 282 Cell Biology Laboratory (1)	CHEM 161 General Chemistry II (3) CHEM 162 General Chemistry II Laboratory (1)	<i>optional</i>
BTEC 170 Introduction to Biotechnology (3)	ENGL 200 Advanced Composition and Technical Writing (3)	
CHEM 151 General Chemistry I (3)	GEND 201 The Civic Mind (6)	
CHEM 152 General Chemistry I Laboratory (1)	BTEC Concentration electives (3)	
MATH 220 Calculus I (3)		
SEMR 200 Steppingstone (1)		
<b>Total semester hours = 15</b>	<b>Total semester hours = 16</b>	

### THIRD YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 370 Molecular Biology (4)	BIOL 330 Microbiology (4)	<i>optional</i>
BTEC 350 Biotechnology Techniques (4)	BTEC 365 Internship (3) BTEC 351 Biotechnology Applications (4)	
BTEC 298 Project I (3)	Electives (4)	
CHEM 210 Organic Chemistry I (4)		
SEMR 300 Keystone (1)		
<b>Total semester hours = 16</b>	<b>Total semester hours = 15</b>	

### FOURTH YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 330 Biochemistry I (4)	SEMR 400 Capstone (1)	<i>optional</i>
BTEC 498 Project II (3)	BTEC Concentration electives (4)	
GEND 351 The Organizational Mind (6)	GEND electives (6) Electives (5)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**Nanobiotechnology Concentration – 52 semester hours**

Complete all of the following Biotechnology Core courses – 23 semester hours:

BIOL 102	General Biology	(3)
BIOL 103	General Biology Laboratory	(1)
BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
BTEC 170	Introduction to Biotechnology	(3)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
CHEM 161	General Chemistry II Lecture	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 210	Organic Chemistry I	(4)

Complete all of the following courses – 25 semester hours:

BTEC 100	Nanobiotechnology Explorations	(2)
BTEC 220	Applied Nanobiotechnology	(4)
BTEC 350	Biotechnology Techniques	(4)
BTEC 361	Food Biotechnology	(1)
BTEC 362	General Biotechnology	(1)
BTEC 363	Nanobiotechnology	(1)
BTEC 401	Biosensor Technology	(4)
CHEM 330	Biochemistry I	(4)
PHYS 215	Principles of Physics for Nanobiotechnology	(4)

Complete one of the following courses – 4 semester hours:

BIOL 370	Molecular Biology	(4)
or		
BTEC 250	Medical Biotechnologies 2020	(3)

**Recommended Sequence for the Full-time Student Completing the Nanobiotechnology Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking	BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1)	<i>optional</i>
GEND 102 The Creative Mind I (3)	COMM 110 Speech (3)	
GEND 112 The Scientific Mind I (3)	GEND 103 The Creative Mind II (3)	
MATH 120 College Algebra (3)	GEND 113 The Scientific Mind II (3)	
SEMR 100 Cornerstone (1)	MATH 280 Introductory Statistics (3)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3)	BTEC 298 Project I (3)	<i>optional</i>
BIOL 282 Cell Biology Laboratory (1)	CHEM 161 General Chemistry II (3)	
BTEC 100 Nanobiotechnology Explorations (2)	CHEM 162 General Chemistry Laboratory II (1)	
BTEC 170 Introduction to Biotechnology (3)	ENGL 200 Advanced Composition and Technical Writing (3)	
CHEM 151 General Chemistry I (3)	GEND 201 The Civic Mind (6)	
CHEM 152 General Chemistry I Laboratory (1)		
MATH 220 Calculus I (3)		
SEMR 200 Steppingstone (1)		
<b>Total semester hours = 17</b>	<b>Total semester hours = 16</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
BTEC 350 Biotechnology Techniques (4)	BTEC 220 Applied Nanobiotechnology (4)	<i>optional</i>
BTEC 401 Biosensor Technology (4)	PHYS 215 Principles of Physics for Nanobiotechnology (4)	
CHEM 210 Organic Chemistry I (4)	GEND electives (6)	
BTEC 365 Internship (3)	SEMR 300 Keystone (1)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 15</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 330 Biochemistry I (4)	BTEC 361 Food Biotechnology Seminar (1)	<i>optional</i>
BTEC 498 Project II (3)	BTEC 362 General Biotechnology Seminar (1)	
GEND 351 The Organizational Mind (6)	BTEC 363 Nanobiotechnology Seminar (1)	
Electives (3)	SEMR 400 Capstone Nanobiotechnology Concentration electives (4)	
	Electives (4)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 12</b>	

## Nanobiotechnology and NanoFabrication Concentration – 55 semester hours

Complete all of the following Biotechnology Core courses – 23 semester hours:

BIOL 102	General Biology Lecture	(3)
BIOL 103	General Biology Laboratory	(1)
BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
BTEC 170	Introduction to Biotechnology	(3)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
CHEM 161	General Chemistry II Lecture	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 210	Organic Chemistry I	(4)

Complete all of the following courses – 14 semester hours:

BTEC 100	Nanobiotechnology Explorations	(2)
BTEC 350	Biotechnology Techniques	(4)
CHEM 330	Biochemistry I	(4)
PHYS 215	Principles of Physics for Nanobiotechnology	(4)

Complete all of the 18 semester hours at the University Park Campus of The Pennsylvania State University:

NANO 211	Materials, Safety and Equipment Overview for Nanotechnology	(3)
NANO 212	Basic Nanotechnology	(3)
NANO 213	Materials in Nanotechnology	(3)
NANO 214	Patterning for Nanofabrication	(3)
NANO 215	Materials Modification in Nanotechnology Applications	(3)
NANO 216	Characterization, Testing of Nanofabricated Structures and Materials	(3)

**Recommended Sequence for the Full-time Student Completing the Nanobiotechnology and NanoFabrication Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking	BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3) GEND 103 The Creative Mind II (3)	<i>optional</i>
GEND 102 The Creative Mind I (3)	GEND 113 The Scientific Mind II (3)	
GEND 112 The Scientific Mind I (3)	MATH 280 Introductory Statistics (3)	
MATH 120 College Algebra (3)		
SEMR 100 Cornerstone (1)		
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3)	CHEM 161 General Chemistry II (3)	<i>optional</i>
BIOL 282 Cell Biology Laboratory (1)	CHEM 162 General Chemistry Laboratory (1)	
BTEC 100 Nanobiotechnology Explorations (2)	PHYS 215 Principles of Physics for Nanobiotechnology (4)	
BTEC 170 Introduction to Biotechnology (3)	ENGL 200 Advanced Composition and Technical Writing (3)	
CHEM 151 General Chemistry I (4)	GEND electives (3)	
CHEM 152 General Chemistry I Laboratory (1)	SEMR 200 Steppingstone (1)	
MATH 220 Calculus I (3)		
<b>Total semester hours = 17</b>	<b>Total semester hours = 15</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
BTEC 350 Biotechnology Techniques (4)	NANO 211 Materials, Safety, and Equipment Overview of Nano-biotechnology (3)	<i>optional</i>
CHEM 210 Organic Chemistry I (4)	NANO 212 Basic Nano-technology Processes (3)	
BTEC 365 Internship (3)	NANO 213 Materials in Nano-technology (3)	
Electives (3)	NANO 214 Patterning for Nanofabrication (3)	
SEMR 300 Keystone (1)	NANO 215 Materials Modification in Nanotechnology Applications (3)	
	NANO 216 Characterization, Testing of Nanofabricated Structures and Materials (3)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 18</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 330 Biochemistry I (4)	SEMR 400 Capstone (1)	<i>optional</i>
BTEC 498 Project II (3)	GEND 201 The Civic Mind (6)	
GEND 351 The Organizational Mind (6)	GEND electives (3)	
	Electives (3)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 13</b>	

Note: The student completing the BTEC – Nanobiotechnology and NanoFabrication concentration may substitute successful completion of NANO 216 for Project I.



**Pharmaceutical Design Concentration – 50 semester hours**

Complete all of the following Biotechnology Core courses – 23 semester hours:

BIOL 102	General Biology Lecture	(3)
BIOL 103	General Biology Laboratory	(1)
BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
BTEC 170	Introduction to Biotechnology	(3)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
CHEM 161	General Chemistry II Lecture	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 210	Organic Chemistry I	(4)

Complete all of the following courses – 22 semester hours:

BIOL 210	Introduction to Bioinformatics	(4)
BTEC 351	Biotechnology Applications	(4)
CHEM 330	Biochemistry I	(4)
BTEC 311	Pharmacology I	(3)
BTEC 320	Drug Design and Development	(3)
BTEC 435	Computer-Aided Drug Design	(4)

Complete 5 semester hours from the following:

BIOL 214	Anatomy and Physiology I	(4)
BIOL 215	Anatomy and Physiology II	(4)
BIOL 320	Genetics	(3)
BIOL 330	Microbiology	(4)
BIOL 370	Molecular Biology	(4)
BIOL 375	Immunology	(4)
BTEC 100	Nanobiotechnology Explorations	(2)
BTEC 220	Applied Nanobiotechnology	(4)
BTEC 222	Emerging Laboratory Techniques	(4)
BTEC 250	Medical Biotechnologies of 2020	(3)
BTEC 350	Biotechnology Techniques	(4)
BTEC 355	Neurology and Biotechnology	(3)
BTEC 361	Food Biotechnology Seminar	(1)
BTEC 362	General Biotechnology Seminar	(1)
BTEC 363	Nanobiotechnology Seminar	(1)

**Recommended Sequence for the Full-time Student Completing the Pharmaceutical Design Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking	BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3)	<i>optional</i>
GEND 102 The Creative Mind I (3) GEND 112 The Scientific Mind I (3) MATH 120 College Algebra (3) SEMR 100 Cornerstone (1) <b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology (3) BIOL 282 Cell Biology Laboratory (1) BTEC 170 Introduction to Biotechnology (3) CHEM 151 General Chemistry I Lecture (3) CHEM 152 General Chemistry I Laboratory (1) MATH 220 Calculus I (3) SEMR 200 Steppingstone (1) <b>Total semester hours = 15</b>	BIOL 210 Introduction to Bioinformatics (4) CHEM 161 General Chemistry II (3) CHEM 162 General Chemistry Laboratory (1) ENGL 200 Advanced Composition and Technical Writing (3) Electives (2-3)	<i>optional</i>
	<b>Total semester hours = 13-14</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
BTEC 311 Pharmacology I (3) BTEC 298 Project I (3) CHEM 210 Organic Chemistry I (4) SEMR 300 Keystone (1) Electives (3-4) <b>Total semester hours = 14-15</b>	BTEC 320 Drug Design and Development (3) BTEC 365 Internship (3) GEND electives (6) Pharmaceutical Design Concentration electives (3-4)	<i>optional</i>
	<b>Total semester hours = 15-16</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 330 Biochemistry I (4) BTEC 498 Project II (3) GEND 351 The Organizational Mind (6) Electives (3) <b>Total semester hours = 16</b>	BTEC 435 Computer-Aided Drug Design (4) BTEC 351 Biotechnology Applications (4) SEMR 400 Capstone (1) GEND 201 The Civic Mind (6) Pharmaceutical Design Concentration electives (1-2) <b>Total semester hours = 16-17</b>	<i>optional</i>

The following sequences should be used by the student in this concentration who has an interest in a post-baccalaureate health-related degree (MD, DO, DDS, VMD). Other support for the student includes our Health Careers Society and faculty advisors.

## BIOTECHNOLOGY

### Placing into Calculus

#### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I Lecture (3)	BIOL 102 General Biology (3) BIOL 103 General Biology Lab (1)	<i>Optional, but recommended MCAT Review course, non-credit</i>
CHEM 152 General Chemistry I Laboratory (1)	CHEM 161 General Chemistry II Lecture (3)	
GEND 102 The Creative Mind I (3)	CHEM 162 General Chemistry II Laboratory (1)	
GEND 112 Scientific Mind I (3)	ENGL 105 College Composition or (3)	
MATH 280 Introductory Statistics (3)	ENGL 106 Academic Writing and Critical Thinking (3)	
SEMR 100 Cornerstone (1)	GEND 113 Scientific Mind II (3)	
	MATH 220 Calculus I (3)	
<b>Total semester hours = 14</b>	<b>Total semester hours = 17</b>	

#### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3)	CHEM 220 Organic Chemistry II (4)	<i>Optional, but recommended MCAT Review course, non-credit</i>
BIOL 282 Cell Biology Lab (1)	PHYS 260 General Physics II (4)	
BTEC 170 Intro to Biotechnology (3)	SEMR 200 Steppingstone (1)	
CHEM 210 Organic Chemistry I (4)	GEND 103 Creative Mind II (3)	
PHYS 210 General Physics I (4)	ENGL 200 Adv. Composition and Technical Writing (3)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 15</b>	

#### THIRD YEAR

Fall Semester	Spring Semester	Summer Semester
BTEC 350 Biotechnology Techniques (4)	BTEC 351 Biotechnology Applications (4)	<i>Optional, but recommended MCAT Review course, non-credit</i>
CHEM 330 Biochemistry I (4)	BIOL 320 Genetics (3)	
GEND 130 General Psychology (3)	COMM 110 Speech (3)	
BTEC 298 Project I (3)	GEND 120 Intro to Sociology (3)	
MATH 260 Calculus II (3)	SEMR 300 Keystone (1)	
<b>Total semester hours = 17</b>	<b>Total semester hours = 14</b>	

#### FOURTH YEAR

Fall Semester	Spring Semester	Summer Semester
BTEC 498 Project II (3)	SEMR 400 Capstone (1)	<i>optional</i>
BTEC 365 Internship (3)	GEND 201 The Civic Mind (6)	
GEND 351 The Organizational Mind (6)	BIOL 330 Microbiology (4)	
BIOL 370 Molecular Biology (4)	BTEC 110 Medical Terminology (1)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 12</b>	

## **Bachelor of Science in Computer and Information Sciences Program (CISC)**

Choosing to major in computer and information sciences helps the student gain core knowledge of information sciences in order to integrate business and real-world perspectives, interpersonal and team skills, and the competencies that lead to a career in computer and information sciences. The ability to devise a solution and execute it is at the core of this program. The design of these solutions is what we call “creating a computation,” which involves the integration of few key design notions of data representation, algorithms, programming, knowledge in systems, data security, and software engineering within one unified framework. The ultimate goal is to enable the student to understand a problem and build a general-purpose computer system from the ground up through a program of study that provides a sound computer information system engineering design experience.

### **Program Goals**

Graduates of the Bachelor of Science in Computer and Information Sciences program have to:

- Apply theoretical constructs of mathematical analysis, and sound reasoning to develop and deploy practical solutions for real world problems.
- Evaluate computing system requirements sufficient for developing efficient computational solutions for real world problems.
- Assimilate new methodologies and advances in computer technology in an ever-evolving discipline.
- Master the elements of effective written and oral communication of results to technical and non-technical audience.
- Work independently and in collaboration with colleagues.
- Live up to the ethical standards of the profession and professional knowledge and skills to contribute to society.
- Develop an understanding of the code of ethics of the software industry (social contract); and, therefore a sense of what it means to be a good citizen.

**Computer and Information Science Requirements** – This program requires a total of 50 semester hours: 1) 27 semester hours from the core courses listed below and 2) 23 semester hours completed in one of the following concentrations: Computer Science, Cyber Security, Software Engineering and Analysis, Computational Biology, and Machine Learning. The semester hour value of each course appears in parentheses().

Complete all of the following Core courses - 27 semester hours:

CISC 120	Fundamentals of Computing	(4)
CISC 160	Data Structures	(4)
CISC 211	Computer organization & Architecture	(4)
CISC 225	Information System Design And Analysis	(4)
CISC 233	Essential Algorithms	(4)
CISC 301	Operating Systems	(4)
MATH 310	Discrete Mathematics II	(3)

The student must also complete at least 23 semester hours in one of the following concentrations.

**Computer Science Concentration**

CISC 340	Introduction to Artificial Intelligence	(4)
CISC 399	Formal Languages and Automata	(4)
CISC 400	Computer Graphics	(4)
CISC 433	Elements of Computing Systems I	(4)
CISC 444	Elements of Computing Systems II	(4)
CISC 499	Industry Software Ethics	(3)

**Cyber Security Concentration**

CISC 320	Computer Forensics	(4)
CISC 330	Computer Networks	(4)
CISC 333	Defensive Programming	(4)
CISC 370	Ethical Hacking	(4)
CISC 440	Wireless Security Management	(4)
CISC 499	Industry Software Ethics	(3)

**Software Engineering and System Analysis Concentration**

CISC 340	Introduction to Artificial Intelligence	(4)
CISC 397	Principle of SW Eng & System Analysis	(4)
CISC 400	Computer Graphics	(4)
CISC 460	SQL Database Design & Implementation	(4)
CISC 491	SW Development Processes and Quality	(4)
CISC 499	Industry Software Ethics	(3)

**Computational Biology Concentration**

BIOL 102/3	General Biology + Lab	(4)
CHEM 151/2	General Chemistry I + Lab	(4)
BIOL 281/2	Cell Biology + Lab	(4)
CISC 311	Introduction to Computational Biology	(4)
BIOL 370	Molecular Biology	(4)
CISC 499	Industry Software Ethics	(3)

**Machine Learning Concentration**

CISC 340	Introduction to Artificial Intelligence	(4)
CISC 349	Smartphones Programming	(4)
CISC 400	Computer Graphics	(4)
CISC 431	Natural Language Processing	(4)
CISC 432	Statistical Pattern Recognition	(4)
CISC 499	Industry Software Ethics	(3)

**Recommended Sequence for the Full-time Student Completing the Computer Science Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing COMM 110 Speech GEND 103 The Creative Mind II GEND 113 The Scientific Mind II MATH 280 Intro to Statistics <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 200 Advanced Composition and Technical Writing CISC 160 Data Structures CISC 233 Essential Algorithms MATH 210 Discrete Math I SEMR 200 Steppingstone <b>Total semester hours = 15</b>	CISC 211 Computer Organization & Architecture CISC 225 Info System Design & Analysis Electives (INSC, Biotech, CISC) MATH 310 Discrete Math II <b>Total semester hours = 14</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 301 Operating Systems CISC 340 Introduction of Artificial Intelligence Electives (INSC, Biotech, CISC) SEMR 300 Keystone CISC 298 Project I <b>Total semester hours = 15</b>	CISC 399 Formal Languages & Automata GEND 201 The Civic Mind CISC 365 Internship Electives (INSC, Biotech, CISC) <b>Total semester hours = 16</b>	<i>optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 400 Computer Graphics CISC 433 Elements of Computing Systems GEND 351 The Organizational Mind CISC 498 Project II <b>Total semester hours = 17</b>	CISC 444 Elements of Computing Systems II CISC 499 Industry Software Ethics GEND electives SEMR 400 Capstone <b>Total semester hours = 14</b>	<i>optional</i>

**Recommended Sequence for the Full-time Student Completing the Cyber Security Concentration**– The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing COMM 110 Speech GEND 103 The Creative Mind II GEND 113 The Scientific Mind II MATH 280 Intro to Statistics <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 200 Advanced Composition and Technical Writing CISC 160 Data Structures CISC 233 Essential Algorithms MATH 210 Discrete Math I SEMR 200 Steppingstone <b>Total semester hours = 15</b>	CISC 211 Computer Organization & Architecture CISC 225 Info System Design & Analysis GEND 201 The Civic Mind MATH 310 Discrete Math II <b>Total semester hours = 17</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 301 Operating Systems CISC 320 Computer Forensics CISC 330 Computer Networks SEMR 300 Keystone CISC 298 Project I <b>Total semester hours = 16</b>	Electives (INSC, Biotech, CISC) CISC 333 Defensive Programming Electives (INSC, Biotech, CISC) CISC 365 Internship <b>Total semester hours = 16</b>	<i>optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 370 Ethical Hacking GEND 351 The Organizational Mind CISC 498 Project II <b>Total semester hours = 13</b>	CISC 440 Wireless Security Management CISC 499 Industry Software Ethics GEND electives SEMR 400 Capstone <b>Total semester hours = 14</b>	<i>optional</i>

**Recommended Sequence for the Full-time Student Completing the Software Engineering and System Analysis Concentration**– The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition (3) or ENGL 106 Academic Writing and Critical Thinking (3)	CISC 120 Fundamentals of Computing (4) COMM 110 Speech (3) GEND 103 The Creative Mind II (3)	<i>optional</i>
GEND 102 The Creative Mind I (3)	GEND 113 The Scientific Mind II (3)	
GEND 112 The Scientific Mind I (3)	MATH 280 Intro to Statistics (3)	
MATH 120 College Algebra (3)		
SEMR 100 Cornerstone (1)		
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 200 Advanced Composition and Technical Writing (3)	GEND 201 The Civic Mind (6) CISC 211 Computer Organization & Architecture (4)	<i>optional</i>
CISC 160 Data Structures (4)	CISC 225 Info System Design & Analysis (4)	
CISC 233 Essential Algorithms (4)	MATH 310 Discrete Math II (3)	
MATH 210 Discrete Math I (3)		
SEMR 200 Steppingstone (1)		
<b>Total semester hours = 15</b>	<b>Total semester hours = 17</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 301 Operating Systems (4)	CISC 460 SQL Database Design & Implementation (4)	<i>optional</i>
CISC 340 Introduction of AI (4)	CISC 397 Principles of SW Eng & System Analysis (4)	
Electives (INSC, Biotech, CISC) (3)	CISC 365 Internship (3)	
SEMR 300 Keystone (1)	Electives (INSC, Biotech, CISC) (6)	
CISC 298 Project I (3)		
<b>Total semester hours = 15</b>	<b>Total semester hours = 17</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 400 Computer Graphics (4)	CISC 491 SW Development & Quality (4)	<i>optional</i>
GEND 351 The Organizational Mind (6)	CISC 499 Industry Software Ethics (3)	
CISC 498 Project II (3)	GEND electives (6)	
	SEMR 400 Capstone (1)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 14</b>	



**Recommended Sequence for the Full-time Student Completing the Computational Biology Concentration**– The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing COMM 110 Speech GEND 103 The Creative Mind II GEND 113 The Scientific Mind II MATH 280 Intro to Statistics <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 200 Advanced Composition and Technical Writing CISC 160 Data Structures CISC 233 Essential Algorithms SEMR 200 Steppingstone MATH 210 Discrete Math I <b>Total semester hours = 15</b>	BIOL 102/103 General Biology Lecture + Lab CISC 211 Computer Organization & Architecture CISC 225 Info System Design & Analysis MATH 310 Discrete Math II <b>Total semester hours = 15</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology + Lab CISC 301 Operating Systems CHEM 151/152 General Chemistry Lecture + Lab SEMR 300 Keystone CISC 298 Project I <b>Total semester hours = 16</b>	Electives (Math, INSC, Biotech, CISC) CISC 365 Internship GEND 201 The Civic Mind <b>Total semester hours = 15</b>	<i>optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 311 Introduction to Computational Biology BIOL 370 Molecular Biology GEND 351 The Organizational Mind CISC 498 Project II <b>Total semester hours = 17</b>	CISC 499 Industry Software Ethics Electives (Math, INSC, Biotech, CISC) GEND electives SEMR 400 Capstone <b>Total semester hours = 13</b>	<i>optional</i>

**Recommended Sequence for the Full-time Student Completing the Machine Learning Concentration**– The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing COMM 110 Speech GEND 103 The Creative Mind II GEND 113 The Scientific Mind II MATH 280 Intro to Statistics <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 200 Advanced Composition and Technical Writing CISC 160 Data Structures CISC 233 Essential Algorithms MATH 210 Discrete Math I SEMR 200 Steppingstone <b>Total semester hours = 15</b>	CISC 211 Computer Organization & Architecture CISC 225 Info System Design & Analysis GEND 201 The Civic Mind MATH 310 Discrete Math II <b>Total semester hours = 17</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 301 Operating Systems CISC 340 Intellectual Systems & Artificial Intelligence Electives (INSC, Biotech, CISC) SEMR 300 Keystone CISC 298 Project I <b>Total semester hours = 15</b>	CISC 349 Smartphones Programming GEND Elective Electives (INSC, Biotech, CISC) CISC 365 Internship <b>Total semester hours = 13</b>	<i>optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 400 Computer Graphics GEND 351 The Organizational Mind GEND electives CISC 498 Project II <b>Total semester hours = 16</b>	CISC 431 Natural Language Processing CISC 432 Statistical Pattern Recognition CISC 499 Industry Software Ethics Electives (INSC, Biotech, CISC) SEMR 400 Capstone <b>Total semester hours = 15</b>	<i>optional</i>

## **Bachelor of Science in Geospatial Technology Program (GSTC)**

The Geospatial Technology program prepares the student with a cross-disciplinary education that promotes the development of computer science and geospatial technology competencies through conceptual, experiential and technology-based learning. The student will utilize leading-edge software and hardware tools to current and industry-driven geospatial needs. The student will develop the blended set of geospatial technology, application development and spatial database capabilities that are in highest demand. The program addresses not only the hardware and software tools, but also application development and database skills. Industry partnerships for corporate faculty, substantive internships, and project-based use of resources are a core component of this program and a leading factor in preparing graduates for seamless integration into the workforce.

### **Program Goals**

Graduates of the Bachelor of Science in Geospatial Technology program are able to:

- Determine and apply appropriate geographic positioning and data development technologies to collect and accurately aggregate georeferenced observations, events and features.
- Select and apply the analytical functions of geospatial software tools to support the geographic inquiry process and improve decision support.
- Design and develop geospatial software applications and databases for processing, analyzing automating tasks or adding value to geospatial data.
- Demonstrate professionalism within the geospatial technology industry through application of legal and ethical decision making, proactive engagement within the professional community and appropriate professional conduct.

### **Geospatial Technology Requirements (46 semester hours)**

Complete all of the following courses – 46 semester hours:

GSTC 130	Applied Geography	(3)
GSTC 140	Introduction to GIS	(4)
GSTC 210	Cartography	(3)
GSTC 220	Applied Geospatial Technology	(4)
GSTC 240	GIS/GSI Policy	(4)
GSTC 340	Advanced Spatial Analysis	(4)
GSTC 350	Spatial Software and Database Development I	(4)
GSTC 450	Spatial Software and Database Development II	(4)
GSTC 460	Satellite Remote Sensing	(4)
CISC 120	Fundamentals of Computing	(4)
CISC 160	Data Structures	(4)
CISC 300	Web Technologies	(4)

**Recommended Sequence for the Full-time Student Completing the Geospatial Technology Program**– The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	GSTC 140 Intro to GIS (4) COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3) <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
GSTC 130 Applied Geography (3) GSTC 210 Cartography (3) GEND electives (6) SEMR 200 Steppingstone (1) <b>Total semester hours = 13</b>	GSTC 220 Applied Geospatial Technology (4) GSTC 240 GIS Policy (4) CISC 120 Fundamentals of Computing (4) ENGL 200 Advanced Composition & Technical Writing (3) <b>Total semester hours = 15</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
GSTC 298 Project I (3) GSTC 460 Satellite Remote Sensing (4) CISC 160 Data Structures (4) MATH 210 Discrete Mathematics I (3) SEMR 300 Keystone (1) <b>Total semester hours = 15</b>	GSTC 350 Spatial Software and Database Development I (4) CISC 300 Web Technologies (4) GEND 201 The Civic Mind (6) <b>Total semester hours = 14</b>	GSTC 365 Internship (3) <i>(or Spring Semester of the third year)</i> <b>Total semester hours = 3</b>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
GSTC 498 Project II (3) GSTC 340 Advanced Spatial Analysis (4) GSTC 450 Spatial Software and Database Development II (4) GEND 351 The Organizational Mind (6) <b>Total semester hours = 17</b>	SEMR 400 Capstone (1) Electives (13) <b>Total semester hours = 14</b>	<i>optional</i>

## **Bachelor of Science in Interactive Media (IMED)**

Interactive media includes the disciplines of new media, interactivity, human computer interaction, and digital cultures. The student's learning also focuses on interactive narrative, social media, virtual reality, digital and analog games, and augmented reality.

### **Program Goals**

A graduate of the Bachelor of Science in Interactive Media program is prepared to:

- Develop critical awareness and understanding of theory and research in the related fields of interactive multimedia;
- Develop skills to plan and implement interactive products and systems;
- Develop capacity to research and implement new emerging technologies;
- Develop skills and ability to participate effectively in production processes and teams;
- Develop advanced level communications skills; and,
- Develop interpersonal skills consistent with professional practice.

**Interactive Media Requirements** – This program requires a total of 47 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following Interactive Media Core courses – 41 semester hours:

IMED 110	Introduction to Digital Design	(2)
IMED 170	Visual Design Fundamentals	(4)
IMED 205	Critical Game Studies	(2)
IMED 240	Interactive Media I	(4)
IMED 250	Video Production I	(2)
IMED 290	Game Analysis Laboratory	(1)
IMED 300	3D Modeling I	(3)
IMED 340	Interactive Media II	(4)
IMED 400	Interactive Studio	(4)
CISC 120	Fundamentals of Computing	(4)
COMM 225	Cinema Studies	(2)
ENGL 310	Creative Writing	(3)
MEBA 210	Introduction to Internet and Web Technologies	(3)
PMGT 510	Principles of Project Management	(3)

Complete one of the following courses:

IMED 385	Game Design	(3)
or		
IMED 330	Information Visualization	

Complete one of the following courses:

IMED 310	3D Modeling II	(3)
or		
MEBA 230	Marketing	

**Recommended Sequence for the Full-time Student Completing the Interactive Media Program** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking (3)	IMED 110 Introduction to Digital Design (2)	<i>optional</i>
GEND 102 The Creative Mind I (3)	CISC 120 Fundamentals of Computing (4)	
GEND 112 The Scientific Mind I (3)	COMM 110 Speech (3)	
MATH 120 College Algebra (3)	GEND 103 The Creative Mind II (3)	
SEMR 100 Cornerstone (1)	GEND 113 The Scientific Mind II (3)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 15</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
IMED 170 Visual Design Fundamentals (4)	IMED 240 Interactive Media I (4)	IMED 365 Internship (3) <i>(or Spring Semester of second year)</i>
IMED 205 Critical Game Studies (2)	IMED 250 Video Production I (2)	
COMM 225 Cinema Studies (2)	IMED 290 Game Analysis Laboratory (1)	
MATH 280 Introductory Statistics (3)	ENGL 200 Advanced Composition and Technical Writing (3)	
MEBA 210 Introduction to Internet and Web Technologies (3)	GEND electives (3)	
SEMR 200 Steppingstone (1)		
<b>Total semester hours = 15</b>	<b>Total semester hours = 13</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
IMED 300 3D Modeling I (3)	IMED 298 Project I (3)	<i>optional</i>
ENGL 310 Creative Writing (3)	IMED 340 Interactive Media II (4)	
MATH 210 Discrete Mathematics I (3)	IMED 310 3D Modeling II or (3)	
SEMR 300 Keystone Electives (3)	MEBA 230 Marketing (3)	
IMED 385 Game Design or (3)	GEND 201 The Civic Mind (6)	
IMED 330 Information Visualization		
<b>Total semester hours = 16</b>	<b>Total semester hours = 16</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
IMED 498 Project II (3)	IMED 400 Interactive Studio (4)	<i>optional</i>
GEND 351 The Organizational Mind (6)	GEND electives (3)	
Electives (3)	SEMR 400 Capstone (1)	
PMGT 510 (3)	Electives (6)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 14</b>	

## **Bachelor of Science in Integrative Sciences Program (INSC)**

This program produces a well-prepared student who is able to contribute to the local, regional, and global community on current scientific topics. An environment favorable to interdisciplinary learning in science is provided, and through classroom and experiential learning opportunities, the student is allowed to develop his or her own interests in the areas where the different disciplines overlap. In conjunction with the general education coursework, the student develops the skills to competently communicate with scientists and non-scientists, the motivation to be engaged citizens, the capacity to be sensitive to the needs of local and global communities, and the knowledge in the physical sciences to enter the workforce or graduate school.

### **Program Goals**

Graduates of the Bachelor of Science in Integrative Sciences program are able to:

- Demonstrate the basic knowledge and technical skills to work effectively in a cross-disciplinary scientific field by demonstrating the knowledge and skills from more than one of the scientific disciplines.
- Demonstrate the ability to communicate scientific information, including information that results from laboratory experimentation or field work, in oral and written formats to both scientists and nonscientists.
- Demonstrate the ability to make effective use of the library and other information resources in an academic area, including finding, conveying and critically evaluating scientific information obtained in scholarly journal articles, as well as sources obtained through an internet search.
- Demonstrate the ability to make effective use of computers in addition to using technology as a tool in writing, collaborating with a team, illustrating, and data analysis to communicate scientific information.
- Demonstrate sufficient mathematical and quantitative reasoning skills to perform competently in a professional position in the chosen field or in continuing professional training.

**Integrative Sciences Requirements** - Complete all of the following courses (15 semester hours): INSC 180 Integrative Sciences (3), BIOL 102 General Biology Lecture (3), BIOL 103 General Biology Laboratory (1), CHEM 151 General Chemistry I Lecture (3), CHEM 152 General Chemistry I Laboratory, and PHYS 210 General Physics I (4). Completion of one of the following concentrations is also required (a complete list of the program requirements by concentration follows):

- Biology;
- Biological Chemistry;
- Chemistry;
- Environmental Science and Renewable Energy; and
- Forensics.

### **Biology Concentration - 50 semester hours**

The following courses comprise the biology concentration of the Integrative Sciences program. The semester hour value of each course appears in parentheses ( ).

Complete all of the following courses - 15 semester hours:

BIOL 102	General Biology Lecture	(3)
BIOL 103	General Biology Laboratory	(1)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I laboratory	(1)
INSC 180	Integrative Sciences	(3)
PHYS 210	General Physics I	(4)

Complete all of the following courses - 23 semester hours:

BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
BIOL 302	Principles of Ecology	(4)
BIOL 320	Genetics	(3)
BIOL 330	Microbiology	(4)
CHEM 161	General Chemistry II Lecture	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 210	Organic Chemistry I	(4)

Complete three of the following courses - 12 semester hours:

BIOL 214	Anatomy and Physiology I	(4)
BIOL 215	Anatomy and Physiology II	(4)
BIOL 225	Entomology	(4)
BIOL 305	Evolution	(3)
BIOL 370	Molecular Biology	(4)
BIOL 375	Immunology	(4)
BIOL 380	Special Topics in Biology	(3)
CHEM 330	Biochemistry I	(4)
ENVS 350	Ecosystem Management and Restoration	(4)
FORS 315	Forensic Entomology	(4)
INSC 310	Conservation Biology	(3)
INSC 320	Study of Disease	(3)
INSC 335	Field Studies in Ecology	(3)
INSC 340	Community Health and Research	(3)
INSC 350	Animal Behavior	(4)



## Recommended Sequence for the Full-time Student Completing the

**Biology Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking	BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3)	<i>optional</i>
GEND 102 The Creative Mind I GEND 112 The Scientific Mind I	GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3)	
MATH 120 College Algebra (3) SEMR 100 Cornerstone (1)	MATH 280 Introductory Statistics (3)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3) BIOL 282 Cell Biology Laboratory (1) CHEM 151 General Chemistry I Lecture (3) CHEM 152 General Chemistry I Laboratory (1) MATH 220 Calculus I (3) SEMR 200 Steppingstone (1) Electives (3)	BIOL 320 Genetics (3) CHEM 161 General Chemistry II Lecture (3) CHEM 162 General Chemistry II Laboratory (1) ENGL 200 Adv. Composition and Technical Writing (3) INSC 180 Integrative Sciences (3) INSC 298 Project I (3)	<i>optional</i>
<b>Total semester hours = 15</b>	<b>Total semester hours = 16</b>	

### THIRD YEAR

Fall Semester	Spring Semester	Summer Semester
*BIOL 302 Principles of Ecology (4) CHEM 210 Organic Chemistry I (4) PHYS 210 General Physics I (4) SEMR 300 Keystone (1)	BIOL 330 Microbiology (4) GEND 201 The Civic Mind (6) INSC 365 Internship (3) Electives (3)	<i>optional</i>
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

### FOURTH YEAR

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3) GEND 351 The Organizational Mind (6) BIOL Concentration electives (4) Electives (3)	SEMR 400 Capstone (1) BIOL electives (8) GEND electives (6)	<i>optional</i>
<b>Total semester hours = 16</b>	<b>Total semester hours = 15</b>	

\* If Fall Semester of the third year of the student's program falls in an odd-numbered year, the student will have to defer enrolling in BIOL 302 Principles of Ecology until the fourth year.

**Biological Chemistry Concentration – 48 to 50 semester hours**

The following courses comprise the biological chemistry concentration of the Integrative Sciences program. The semester hour value of each course appears in parentheses ( ).

Complete all of the following courses - 15 semester hours:

BIOL 102	General Biology Lecture	(3)
BIOL 103	General Biology Laboratory	(1)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
INSC 180	Integrative Sciences	(3)
PHYS 210	General Physics I	(4)

Complete all of the following courses - 27 semester hours:

BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
CHEM 161	General Chemistry II Lecture	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 200	Environmental Chemistry I	(3)
CHEM 210	Organic Chemistry I	(4)
CHEM 220	Organic Chemistry II	(4)
CHEM 330	Biochemistry I	(4)
PHYS 260	General Physics II	(4)

Complete two of the following courses – 6-8 semester hours:

CHEM 310	Environmental Chemistry II	(4)
CHEM 320	Bio-Organic Chemistry	(4)
CHEM 340	Forensic Chemistry	(4)
CHEM 350	Biochemistry II	(4)
CHEM 380	Special Topics in Chemistry	(3)
CHEM 420	Inorganic Chemistry	(3)
INSC 401	Nanoscience	(3)
PHYS 315	Quantum Mechanics and Spectroscopy	(3)

**Recommended Sequence for the Full-time Student Completing the Biological Chemistry Concentration** –The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	BIOL 102 General Biology (3) <i>optional</i> BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3) <b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3) BIOL 282 Cell Biology Laboratory (1) CHEM 151 General Chemistry I (3) CHEM 152 General Chemistry I Laboratory (1) MATH 220 Calculus I (3) SEMR 200 Steppingstone Electives (3) <b>Total semester hours = 15</b>	CHEM 161 General Chemistry II (3) <i>optional</i> CHEM 162 General Chemistry II Laboratory (1) ENGL 200 Advanced Composition and Technical Writing (3) INSC 180 Integrative Sciences (3) GEND 201 The Civic Mind (6) <b>Total semester hours = 16</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 200 Environmental Chemistry I (3) CHEM 210 Organic Chemistry I (4) INSC 298 Project I (3) PHYS 210 General Physics I (4) SEMR 300 Keystone (1) <b>Total semester hours = 15</b>	CHEM 220 Organic Chemistry II (4) <i>optional</i> INSC 365 Internship (3) PHYS 260 General Physics II (4) Electives (3) <b>Total semester hours = 14</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3) CHEM 330 Biochemistry I (4) GEND 351 The Organizational Mind (6) Biological Chemistry Concentration electives (3-4) <b>Total semester hours = 16-17</b>	SEMR 400 Capstone (1) <i>Optional</i> GEND electives (6) Biological Chemistry Concentration electives (3-4) Electives (3-4) <b>Total semester hours = 13-15</b>	

**Chemistry Concentration – 44 to 46 semester hours**

The following courses comprise the chemistry concentration of the Integrative Sciences program. The semester hour value of each course appears in parentheses ( ).

Complete all of the following courses -15 semester hours:

BIOL 102	General Biology	(3)
BIOL 103	General Biology Laboratory	(1)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
INSC 180	Integrative Sciences	(3)
PHYS 210	General Physics I	(4)

Complete all of the following courses - 15 semester hours:

CHEM 161	General Chemistry II	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 200	Environmental Chemistry I	(3)
CHEM 210	Organic Chemistry I	(4)
PHYS 260	General Physics II	(4)

Complete 14 - 16 semester hours from the following courses:

CHEM 220	Organic Chemistry II	(4)
CHEM 310	Environmental Chemistry II	(4)
CHEM 320	Bio-Organic Chemistry	(3)
CHEM 330	Biochemistry I	(4)
CHEM 350	Biochemistry II	(4)
CHEM 340	Forensic Chemistry	(4)
CHEM 380	Special Topics in Chemistry	(3)
CHEM 420	Inorganic Chemistry	(3)
INSC 401	Nanoscience	(3)
PHYS 315	Quantum Mechanics and Spectroscopy	(3)

**Recommended Sequence for the Full-time Student Completing the Chemistry Concentration** –The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	BIOL 102 General Biology (3) <i>optional</i> BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3) <b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I (3) CHEM 152 General Chemistry I Laboratory (1) ENGL 200 Advanced Composition and Technical Writing (3) PHYS 210 General Physics I (4) SEMR 200 Steppingstone (1) Electives (3-4) <b>Total semester hours = 15-16</b>	CHEM 161 General Chemistry II (3) <i>optional</i> CHEM 162 General Chemistry II Laboratory (1) GEND 201 The Civic Mind (6) PHYS 260 General Physics II (4) <b>Total semester hours = 14</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 200 Environmental Chemistry I (3) CHEM 210 Organic Chemistry I (4) MATH 220 Calculus I (3) INSC 298 Project I (3) Electives (3-4) <b>Total semester hours = 16-17</b>	INSC 180 Integrative Sciences (3) <i>optional</i> INSC 365 Internship (3) SEMR 300 Keystone (1) Chemistry Concentration electives (4) Electives (3-4) <b>Total semester hours = 14-15</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
GEND 351 The Organizational Mind (6) INSC 498 Project II (3) Chemistry Concentration electives (7-8) <b>Total semester hours = 16-17</b>	SEMR 400 Capstone (1) <i>optional</i> Chemistry Concentration electives (3-4) GEND electives (6) Electives (3-4) <b>Total semester hours = 13-15</b>	

**Environmental Science and Renewable Energy Concentration - 50**

**semester hours** - The following courses comprise the Environmental Science and Renewable Energy concentration of the Integrative Sciences program. The semester hour value of each course appears in parentheses ( ).

Complete all of the following courses - 15 semester hours:

BIOL 102	General Biology	(3)
BIOL 103	General Biology Laboratory	(1)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
INSC 180	Integrative Sciences	(3)
PHYS 210	General Physics I	(4)

Complete all of the following courses - 11 semester hours:

ENVS 101	Introduction to Environmental Science	(4)
ENVS 211	Introduction to Renewable Energy Systems	(3)
GSTC 140	Introduction to GIS	(4)

Complete 24 semester hours from the following courses:

BIOL 281	Cell Biology Lecture	(3)
BIOL 282	Cell Biology Laboratory	(1)
BIOL 302	Principles of Ecology	(4)
BIOL 320	Genetics	(3)
BIOL 330	Microbiology	(4)
BIOL 375	Immunology	(4)
BIOL 380	Special Topics in Biology	(3)
BTEC 170	Introduction to Biotechnology	(3)
BTEC 350	Biotechnology Techniques	(4)
BTEC 351	Biotechnology Applications	(4)
CHEM 161	General Chemistry II Lecture	(3)
CHEM 162	General Chemistry II Laboratory	(1)
CHEM 200	Environmental Chemistry I	(3)
CHEM 210	Organic Chemistry I	(4)
CHEM 220	Organic Chemistry II	(4)
CHEM 310	Environmental Chemistry II	(4)
CHEM 320	Bio-Organic Chemistry	(3)
CHEM 330	Biochemistry I	(4)
CHEM 380	Special Topics in Chemistry	(3)
CHEM 420	Inorganic Chemistry	(3)
ENVS 104	Our Ocean World	(3)
ENVS 201	Introduction to Geology	(3)
ENVS 301	Global Change: Physical Processes and Human Impact	(3)
ENVS 302	Environmental Regulation and Management	(3)
ENVS 350	Ecosystem Management and Restoration	(4)
ENVS 380	Special Topics in Environmental Science	(3)
ENVS 401	Environmental Modeling	(3)
GEND 251	The Political Mind	(6)

*Continued on next page*

INSC 310	Conservation Biology	(3)
INSC 335	Field Studies in Ecology	(3)
INSC 401	Nanoscience – An Integrative Approach	(3)
PHYS 315	Quantum Mechanics and Spectroscopy	(3)

If doing Nanotechnology, complete all the following courses – 21 semester hours:

NANO 211*	Materials, Safety and Equipment Overview for Nanotechnology	(3)
NANO 213*	Materials in Nanotechnology	(3)
NANO 212*	Basic Nanotechnology Processes	(3)
NANO 214*	Lithography for Nanofabrication	(3)
NANO 215*	Materials Modification in Nanofabrication	(3)
NANO 216*	Characterization, Testing of Nanofabricated Structures and Materials	(3)
PHYS 301	Applied Energy Physics	(3)

\* If a student has an interest in nanofabrication, all six courses (18 semester hours) can be completed as an off-campus study program at The Pennsylvania State University's Center for Nanotechnology Education.

**Recommended Sequence for the Full-time Student Completing the Environmental Science and Renewable Energy Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	BIOL 102 General Biology (3) <i>optional</i> BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3) <b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I (3) CHEM 152 General Chemistry I Laboratory (1) ENGL 200 Advanced Composition and Technical Writing (3) ENVS 101 Introduction to Environmental Science (4) MATH 220 Calculus I (3) SEMR 200 Steppingstone (1) <b>Total semester hours = 15</b>	ENVS 211 Introduction to Renewable Energy (3) GSTC 140 Introduction to GIS (4) INSC 180 Integrative Sciences (3) Environmental Science and Renewable Energy Concentration electives (6) <b>Total semester hours = 16</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 298 Project I (3) PHYS 210 General Physics I (4) SEMR 300 Keystone (1) Environmental Science and Renewable Energy Concentration electives (8) <b>Total semester hours = 16</b>	GEND 201 The Civic Mind (6) <i>optional</i> INSC 365 Internship (3) Electives (4) <b>Total semester hours = 13</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3) GEND 351 The Organizational Mind (6) Environmental Science and Renewable Energy Concentration electives (3) Electives (4) <b>Total semester hours = 16</b>	SEMR 400 Capstone (1) <i>optional</i> GEND electives (6) Environmental Science and Renewable Energy Concentration electives (8) <b>Total semester hours = 15</b>	



## Recommended Sequence for the Full-time Student Completing the Environmental Science and Renewable Energy Concentration with Nanotechnology Education Semester at The Pennsylvania State University

University – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone	BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1) COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3)	<i>optional</i>
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I (3) CHEM 152 General Chemistry I Laboratory (1) ENGL 200 Advanced Composition and Technical Writing (3) ENVS 101 Introduction to Environmental Science (4) MATH 220 Calculus I (3) SEMR 200 Steppingstone (1)	ENVS 211 Introduction to Renewable Energy (3) GSTC 140 Introduction to GIS (4) INSC 180 Integrative Sciences Environmental Science and Renewable Energy (3) Concentration electives (7)	<i>optional</i>
<b>Total semester hours = 15</b>	<b>Total semester hours = 17</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 365 Internship (3)	NANO 211 Materials, Safety, and Equipment (3)	<i>optional</i>
PHYS 210 General Physics I (4)	Overview of Nano-biotechnology (3)	
SEMR 300 Keystone (1)	NANO 212 Basic Nano-technology Processes (3)	
Electives (5)	NANO 213 Materials in Nano-technology (3)	
	NANO 214 Patterning for Nanofabrication (3)	
	NANO 215 Materials Modification in Nanotechnology Applications (3)	
	NANO 216 Characterization, Testing of Nanofabricated Structures and Materials (3)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 18</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
BTEC 498 Project II (3)	GEND 201 The Civic Mind (6)	<i>optional</i>
GEND 351 The Organizational Mind (6)	SEMR 400 Capstone (1)	
Electives (6)	GEND electives (6)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 13</b>	

Note: The student completing INSC – Environmental Science and Renewable Energy with the Nanotechnology Education Semester at The Pennsylvania State University concentration may substitute successful completion of NANO 216 for Project I.

**Forensics Concentration – 43 to 44 semester hours**

The following courses comprise the Forensics concentration of the Integrative Sciences program. The semester hour value of each course appears in parentheses ( ).

Complete all of the following courses - 15 semester hours:

BIOL 102	General Biology	(3)
BIOL 103	General Biology Laboratory	(1)
CHEM 151	General Chemistry I Lecture	(3)
CHEM 152	General Chemistry I Laboratory	(1)
INSC 180	Integrative Sciences	(3)
PHYS 210	General Physics I	(4)

Complete all of the following courses - 9 semester hours:

FORS 125	Introduction to Forensics	(3)
FORS 270	Crime Scene Investigation	(3)
FORS 360	Forensic Case Study	(3)

Complete six of the following courses – 19 to 20 semester hours:

CISC 320	Forensic Computing	(4)
FORS 160	Introduction to Forensic Computing	(3)
FORS 315	Forensic Entomology	(4)
FORS 361	Criminal Profiling	(3)
FORS 362	Medico-Legal Death Investigation	(3)
FORS 363	Forensic Population Studies	(3)
FORS 364	Fraud Investigation	(3)
FORS 365	Crime Scene Management	(3)
FORS 366	Interrogation Techniques	(3)
FORS 367	Evidence	(3)
FORS 380	Special Topics in Integrative Sciences	(3)

**Recommended Sequence for the Full-time Student Completing the Forensics Concentration** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking (3)	BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1)	<i>optional</i>
GEND 102 The Creative Mind I (3)	COMM 110 Speech (3)	
GEND 112 The Scientific Mind I (3)	GEND 103 The Creative Mind II (3)	
MATH 120 College Algebra (3)	GEND 113 The Scientific Mind II (3)	
SEMR 100 Cornerstone (1)	MATH 280 Introductory Statistics (3)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I (3)	FORS 125 Forensic Science (3) INSC 180 Integrative Sciences (3)	<i>optional</i>
CHEM 152 General Chemistry I Laboratory (1)	ENGL 200 Advanced Composition and Technical Writing (3)	
MATH 220 Calculus I (3)	GEND 201 The Civic Mind (6)	
GEND electives (6)		
SEMR 200 Steppingstone (1)		
<b>Total semester hours = 14</b>	<b>Total semester hours = 15</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 298 Project I (3)	FORS 270 Crime Scene Investigation (3)	<i>optional</i>
PHYS 210 General Physics I (4)	INSC 365 Internship (3)	
SEMR 300 Keystone Forensics Concentration electives (3)	Forensics Concentration electives (6)	
Electives (4)	Electives (3)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 15</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3)	SEMR 400 Capstone (1)	<i>optional</i>
GEND 351 The Organizational Mind (6)	FORS 360 Forensic Case Study (3)	
Forensics Concentration electives (7)	Forensics Concentration electives (3)	
	Electives (9)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 16</b>	

The following sequences should be used by the student in this concentration who has an interest in a post-baccalaureate health-related degree (MD, DO, DDS, VMD). Other support for the student includes our Health Careers Society and faculty advisors.

## BIOLOGY Placing into Calculus

### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I Lecture (3)	BIOL 102 General Biology (3) <i>optional</i> BIOL 103 General Biology Laboratory (1)	
CHEM 152 General Chemistry I Laboratory (1)	CHEM 161 General Chemistry II Lecture (3)	
ENGL 105 College Composition or (3)	CHEM 162 General Chemistry II Laboratory (1)	
ENGL 106 Academic Writing and Critical Thinking (3)	GEND 103 The Creative Mind II (3)	
GEND 102 The Creative Mind I (3)	MATH 220 Calculus I (3)	
MATH 280 Introductory Statistics (3)	COMM 110 Speech (3)	
SEMR 100 Cornerstone (1)		
<b>Total semester hours = 14</b>	<b>Total semester hours = 17</b>	

### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3)	BIOL 320 Genetics (3) <i>optional</i> CHEM 220 Organic Chemistry II (4)	
BIOL 282 Cell Biology Laboratory (1)	PHYS 260 General Physics II (4)	
ENGL 200 Adv. Composition and Technical Writing (3)	SEMR 200 Steppingstone (1)	
CHEM 210 Organic Chemistry I (4)		
PHYS 210 General Physics I (4)		
<b>Total semester hours = 15</b>	<b>Total semester hours = 12</b>	

### THIRD YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 302 Principles of Ecology (4)	BIOL 330 Microbiology (4) <i>optional</i>	
CHEM 330 Biochemistry I (4)	INSC 365 Internship (3)	
GEND 130 General Psychology (3)	BIOL Electives (4)	
INSC 298 Project I (3)	GEND 120 Intro to Sociology (3)	
MATH 260 Calculus II (3)	SEMR 300 Keystone (1)	
<b>Total semester hours = 17</b>	<b>Total semester hours = 15</b>	

### FOURTH YEAR

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3)	SEMR 400 Capstone (1) <i>optional</i>	
GEND 351 The Organizational Mind (6)	GEND 201 The Civic Mind (6)	
GEND 112 Scientific Mind I (3)	GEND 113 Scientific Mind II (3)	
BIOL Concentration electives (4)	INSC 180 Integrative Sciences (3)	
	Elective (1)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 14</b>	

\*\*Using CHEM 330 as one BIOL Elective

\*\*Using CHEM 161/162, 220, PHYS 260 as free electives

## BIOCHEMISTRY Placing into Calculus

### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I Lecture (3)	BIOL 102 General Biology (3) <i>optional</i> BIOL 103 General Biology Laboratory (1)	
CHEM 152 General Chemistry I Laboratory (1)	CHEM 161 General Chemistry II Lecture (3)	
ENGL 105 College Composition or (3)	CHEM 162 General Chemistry II Laboratory (1)	
ENGL 106 Academic Writing and Critical Thinking (3)	GEND 103 The Creative Mind II (3)	
GEND 102 The Creative Mind I (3)	MATH 220 Calculus I (3)	
MATH 280 Introductory Statistics (3)	COMM 110 Speech (3)	
SEMR 100 Cornerstone (1)		
<b>Total semester hours = 14</b>	<b>Total semester hours = 17</b>	

### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3)	CHEM 220 Organic Chemistry II (4) <i>optional</i> PHYS 260 General Physics II (4)	
BIOL 282 Cell Biology Laboratory (1)	SEMR 200 Steppingstone (1)	
ENGL 200 Adv. Composition and Technical Writing (3)	INSC 180 Integrative Sciences Elective (3)	
CHEM 210 Organic Chemistry I (4)		
PHYS 210 General Physics I (4)		
<b>Total semester hours = 15</b>	<b>Total semester hours = 15</b>	

### THIRD YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 200 Environmental Chem (3)	CHEM Elective (4) <i>optional</i>	
CHEM 330 Biochemistry I (4)	INSC 365 Internship (3)	
GEND 130 General Psychology (3)	GEND 120 Intro to Sociology (3)	
INSC 298 Project I (3)	SEMR 300 Keystone (1)	
MATH 260 Calculus II (3)	Elective (3)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 14</b>	

### FOURTH YEAR

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3)	SEMR 400 Capstone (1) <i>optional</i>	
GEND 351 The Organizational Mind (6)	GEND 201 The Civic Mind (6)	
GEND 112 Scientific Mind I (3)	GEND 113 Scientific Mind II (3)	
CHEM 320 Bio-Organic Chemistry (3)	Elective (4)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 14</b>	

## CHEMISTRY

### Placing into Calculus

#### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I Lecture (3)	BIOL 102 General Biology (3)	<i>optional</i>
CHEM 152 General Chemistry I Laboratory (1)	BIOL 103 General Biology Laboratory (1)	
ENGL 105 College Composition or (3)	CHEM 161 General Chemistry II Lecture (3)	
ENGL 106 Academic Writing and Critical Thinking (3)	CHEM 162 General Chemistry II Laboratory (1)	
GEND 102 The Creative Mind I (3)	GEND 103 The Creative Mind II (3)	
MATH 280 Introductory Statistics (3)	MATH 220 Calculus I (3)	
SEMR 100 Cornerstone (1)	COMM 110 Speech (3)	
<b>Total semester hours = 14</b>	<b>Total semester hours = 17</b>	

#### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
Elective (4)	CHEM 220 Organic Chemistry II (4)	<i>optional</i>
ENGL 200 Adv. Composition and Technical Writing (3)	PHYS 260 General Physics II (4)	
CHEM 210 Organic Chemistry I (4)	SEMR 200 Steppingstone (1)	
PHYS 210 General Physics I (4)	INSC 180 Integrative Sciences (3)	
	Elective (3)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 15</b>	

#### THIRD YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 200 Environmental Chem (3)	CHEM Elective (4)	<i>optional</i>
CHEM 330 Biochemistry I (4)	INSC 365 Internship (3)	
GEND 130 General Psychology (3)	GEND 120 Intro to Sociology (3)	
INSC 298 Project I (3)	SEMR 300 Keystone (1)	
MATH 260 Calculus II (3)	Elective (3)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 14</b>	

#### FOURTH YEAR

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3)	SEMR 400 Capstone (1)	<i>optional</i>
GEND 351 The Organizational Mind (6)	GEND 201 The Civic Mind (6)	
GEND 112 Scientific Mind I (3)	GEND 113 Scientific Mind II (3)	
CHEM Elective (4)	Elective (3)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 13</b>	

**BIOLOGY**  
**Placing into Algebra**

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
GEND 112 Scientific Mind I (3) ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking (3) GEND 102 The Creative Mind I (3) MATH 120 College Algebra (3) SEMR 100 Cornerstone (1)	GEND 113 Scientific Mind II (3) BIOL 102 General Biology Lecture (3) BIOL 103 General Biology Laboratory (1) GEND 103 The Creative Mind II (3) MATH 220 Statistics (3) COMM 110 Speech (3)	<i>optional</i>
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3) BIOL 282 Cell Biology Lab (1) ENGL 200 Adv. Composition and Technical Writing (3) CHEM 151 General Chemistry I Lecture (3) CHEM 152 General Chemistry I Laboratory (1) PHYS 210 General Physics I (4) SEMR 200 Steppingstone (1)	BIOL 320 Genetics (3) CHEM 161 General Chemistry II Lecture (3) CHEM 162 General Chemistry II Laboratory (1) PHYS 260 General Physics II (4) MATH 220 Calculus I (3)	CHEM 210 Organic Chemistry I (4) CHEM 220 Organic Chemistry II (4)
<b>Total semester hours = 16</b>	<b>Total semester hours = 14</b>	<b>Total semester hours = 8</b>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
BIOL 302 Principles of Ecology (4) CHEM 330 Biochemistry I (4) GEND 130 General Psychology (3) INSC 298 Project I (3)	BIOL 330 Microbiology (4) INSC 365 Internship (3) GEND 120 Intro to Sociology (3) SEMR 300 Keystone (1) Free Elective (1)	<i>optional</i>
<b>Total semester hours = 14</b>	<b>Total semester hours = 12</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3) GEND 351 The Organizational Mind (6) BIOL Concentration electives (4)	SEMR 400 Capstone (1) GEND 201 The Civic Mind (6) INSC 180 Integrative Sciences (3) BIOL Concentration Elective (4)	<i>optional</i>
<b>Total semester hours = 13</b>	<b>Total semester hours = 14</b>	

\*\*Using CHEM 330 as one BIOL Elective

\*\*Using CHEM 161/162, 220, PHYS 260 as free electives



## BIOCHEMISTRY

### Placing into Algebra

#### FIRST YEAR

Fall Semester	Spring Semester	Summer Semester
GEND 112 The Scientific Mind I (3) ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking (3) GEND 102 The Creative Mind I (3) MATH 120 College Algebra (3) SEMR 100 Cornerstone (1) Total semester hours = 13	GEND 113 The Scientific Mind II (3) <i>optional</i> BIOL 102 General Biology (3) BIOL 103 General Biology Laboratory (1) GEND 103 The Creative Mind II (3) MATH 280 Introductory Statistics (3) COMM 110 Speech (3) Total semester hours = 16	

#### SECOND YEAR

Fall Semester	Spring Semester	Summer Semester
BIOL 281 Cell Biology Lecture (3) BIOL 282 Cell Biology Lab (1) MATH 220 Calculus I (3) CHEM 151 General Chemistry I Lecture (3) CHEM 152 General Chemistry I Laboratory (1) PHYS 210 General Physics I (4) Total semester hours = 15	CHEM 161 General Chemistry II Lecture (3) CHEM 162 General Chemistry II Laboratory (1) PHYS 260 General Physics II (4) ENGL 200 Adv. Composition and Technical Writing (3) SEMR 200 Steppingstone (1) Total semester hours = 12	CHEM 210 Organic Chemistry I (4) CHEM 220 Organic Chemistry II (4) Total semester hours = 8

#### THIRD YEAR

Fall Semester	Spring Semester	Summer Semester
CHEM 200 Environmental Chem (3) CHEM 330 Biochemistry I (4) GEND 130 General Psychology (3) INSC 298 Project I (3) SEMR 300 Keystone (1) Total semester hours = 14	CHEM Elective (4) <i>optional</i> INSC 365 Internship (3) GEND 120 Intro to Sociology (3) INSC 180 Integrative Sciences (3) Total semester hours = 13	

#### FOURTH YEAR

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3) GEND 351 The Organizational Mind (6) CHEM 320 Bio-Organic Chemistry (3) Free Elective (3) Total semester hours = 15	SEMR 400 Capstone (1) <i>optional</i> GEND 201 The Civic Mind (6) Free Elective (7) Total semester hours = 14	

**CHEMISTRY**  
**Placing into Algebra**

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
GEND 112 The Scientific Mind I (3) ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking (3) GEND 102 The Creative Mind I (3) MATH 120 College Algebra (3) SEMR 100 Cornerstone (1) Total semester hours = 13	GEND 113 The Scientific Mind II (3) BIOL 102 General Biology Lecture (3) BIOL 103 General Biology Lab (1) GEND 103 The Creative Mind II (3) MATH 280 Introductory Statistics (3) COMM 110 Speech (3)  Total semester hours = 16	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 151 General Chemistry I Lecture (3) CHEM 152 General Chemistry I Laboratory (1) ENGL 200 Adv. Composition and Technical Writing (3) MATH 220 Calculus I (3) PHYS 210 General Physics I (4) SEMR 200 Steppingstone (1) Total semester hours = 15	CHEM 161 General Chemistry II Lecture (3) CHEM 162 General Chemistry II Laboratory (1) PHYS 260 General Physics II (4) INSC 180 Integrative Sciences (3) Free Elective (3)  Total semester hours = 14	CHEM 210 Organic Chemistry I (4) CHEM 220 Organic Chemistry II (4)       Total semester hours = 8

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CHEM 200 Environmental Chem (3) CHEM 330 Biochemistry I (4) GEND 130 General Psychology (3) INSC 298 Project I (3) Free Electives (3) Total semester hours = 16	CHEM Elective (4) INSC 365 Internship (3) GEND 120 Intro to Sociology (3) SEMR 300 Keystone (1) Free Elective (3)  Total semester hours = 14	<i>optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
INSC 498 Project II (3) GEND 351 The Organizational Mind (6) CHEM Elective (4) Total semester hours = 12	SEMR 400 Capstone (1) GEND 201 The Civic Mind (6) Free Elective (3)  Total semester hours = 12	<i>optional</i>

## **Bachelor of Science in Management and eBusiness (MEBA)**

Management and eBusiness provides a unique opportunity for the student to learn about management and the technical aspects of modern businesses. Instead of separate and isolated courses in technology and business, the core curriculum is designed to integrate management and business principles with the latest eTechnologies, such as the Internet, web technologies, social networking, mobile computing and wireless communications. Specifically, the core courses cover business strategy, eBusiness, eCommerce, business management, business analysis and design, information technologies, media design, and the management aspects of marketing, finance and accounting with emphasis on eTechnologies (e.g., eMarketing and eManagement). Experiential projects and a capstone course on enterprise architectures further serve to develop a practice based integrated view of modern enterprises.

The program is designed to prepare the student to lead and engage in business analysis, marketing, finance, project management, entrepreneurship, information technology consulting, information technology management, eCommerce development and business system design. Because the University is located in the state capital, the student has access to a diverse array of government and business sites for suitable opportunities. The MEBA Program has concentrations in Digital Health, Digital Marketing, Business Analytics and Individualized.

### **Program Goals**

Graduates of the Bachelor of Science in Management and eBusiness program are able to:

- Know and critique core concepts of foundational business disciplines using business management and technology skills required to move organizations forward in a digital age;
- Integrate IT with business management skills;
- Collect and analyze business data using quantitative and qualitative methods to make informed business decisions, create processes and promote innovation;
- Identify and develop strategies for the challenges of managing and leading organizations in a global digital age;
- Design innovative entrepreneurial projects that directly apply to organizations; and,
- Apply business knowledge and principles ethically to organizations which can help transform organizations and society.

### **Management and eBusiness Requirements with Individualized**

**Concentration** —The program requires a total of 49 semester hours: a) 30 semester hours from the required Core courses: MEBA 110, 210, 220, 230, 310, 320, 350, 420, and MEBA 470 and 480; and b) 19 semester hours completed from the list of concentration electives.

#### **Individualized Concentration – 49 semester hours**

The following courses comprise the individualized concentration of the Management and eBusiness program. The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses - 30 semester hours

MEBA 110	Introduction to eBusiness and Management	(3)
MEBA 210	Introduction to Internet and Web Technologies	(3)
MEBA 220	Principles of Business Management	(3)
MEBA 230	Marketing in the Digital Age	(3)

MEBA 310	eCommerce and mCommerce	(3)
MEBA 320	Financial and Managerial Accounting	(3)
MEBA 350	Financial Management	(3)
MEBA 420	International Business and Strategies	(3)
MEBA 470	Business Systems Analysis, Modeling and Design	(3)
MEBA 480	Enterprise Architectures and Integration	(3)
Complete 19 semester hours from the following courses:		
CISC 120	Fundamentals of Computing	(4)
CISC 160	Data Structures	(4)
CISC 211	Computer Organization & Architecture	(4)
CISC 330	Computer Networks	(4)
CISC 300	Web Technologies and Applications	(4)
CISC 340	Introduction to Artificial Intelligence	(4)
CISC 460	SQL Database Design & Implementation	(4)
CISC 491	SW Development Processes & Quality	(4)
GEND 400	The Entrepreneurial Mind	(3)
GEND 425	Globalization	(3)
IMED 110	Introduction to Digital Design	(2)
IMED 170	Visual Design Fundamentals	(4)
IMED 240	Interactive Media I	(4)
IMED 330	Information Visualization	(3)
MEBA 330	Sales and Sales Management	(3)
MEBA 360	Introduction to Healthcare Systems	(3)
MEBA 380	Special Topics in Management and eBusiness	(3)
MEBA 381	Special Topics in Digital Health	(3)
MEBA 390	Independent Study	(1-3)
MEBA 410	Business Entrepreneurship in Practice	(3)
MEBA 411	Entrepreneurial Investment	(3)
MEBA 430	Business Law	(4)
MEBA 440	Leadership and Organizational Behavior	(3)
MEBA 464	eGovernment and mGovernment	(3)
MEBA 472	Business Intelligence and Decision Support	(3)

**Recommended Sequence for the Full-time Student Completing the Individualized Concentration-** The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites. Semester hours are shown in parentheses ( ).

**FIRST YEAR**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3) MEBA 110 Introduction to eBusiness and Management (3) <b>Total semester hours = 15</b>	<i>optional</i>

**SECOND YEAR**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
MEBA 210 Introduction to Internet and Web Technologies (3) MEBA 220 Principles of Business Management (3) ENGL 200 Advanced Composition and Technical Writing (3) MATH 220 Calculus I (3) SEMR 200 Steppingstone (1) Electives (3) <b>Total semester hours = 16</b>	MEBA 230 Marketing in the Digital Age (3) MEBA 298 Project I (3) GEND 201 The Civic Mind (6) Electives (3) <b>Total semester hours = 15</b>	<i>optional</i>

**THIRD YEAR**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
MEBA 310 eCommerce and mCommerce (3) MEBA 320 Financial and Managerial Accounting (3) GEND 351 The Organizational Mind (6) SEMR 300 Keystone (1) MEBA Electives (3) <b>Total semester hours = 16</b>	MEBA 350 Financial Management (3) MEBA 365 Internship (3) MEBA Electives (3) GEND Electives (3) Electives (4) <b>Total semester hours = 16</b>	<i>optional</i>

**FOURTH YEAR**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
MEBA 498 Project II (3) MEBA 470 Business Systems Analysis, Modeling and Design (3) MEBA Electives (6) GEND electives (3) <b>Total semester hours = 15</b>	MEBA 420 International Business and Strategies (3) MEBA 480 Enterprise Architecture and Integration (3) SEMR 400 Capstone (1) MEBA Electives (7) <b>Total semester hours = 14</b>	<i>optional</i>

## Management and eBusiness Requirements with Digital Health

**Concentration** –The program requires a total of 49 semester hours: a) 30 semester hours from the required Core courses: MEBA 110, 210, 220, 230, 310, 320, 350, 420, 470, and 480; and b) 19 semester hours completed in Digital Health concentration courses.

### Digital Health Concentration – 49 semester hours

The following courses comprise the Digital Health concentration of the Management and eBusiness program. The semester hour value of each course appears in parentheses ().

Complete all of the following Core courses - 34 semester hours

MEBA 110	Introduction to eBusiness and Management	(3)
MEBA 210	Introduction to Internet and Web Technologies	(3)
MEBA 220	Principles of Business Management	(3)
MEBA 230	Marketing in the Digital Age	(3)
MEBA 310	eCommerce and mCommerce	(3)
MEBA 320	Financial and Managerial Accounting	(3)
MEBA 350	Financial Management	(3)
MEBA 420	International Business and Strategies	(3)
MEBA 470	Business Analysis, Modeling and Design	(3)
MEBA 480	Enterprise Architecture and Integration	(3)

Complete all of the following courses - 19 semester hours

CISC 410	Information Technology Project Management	(4)
MEBA 360	Introduction to Healthcare Systems	(3)
MEBA 381	Special Topics in Digital Health	(6)
ISEM 542	Health Informatics and Information Systems	(3)
ISEM 543	Digital Health	(3)

**Recommended Sequence for the Full-time Student Completing the Digital Health Concentration-** The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites. Semester hours are shown in parentheses ( ).

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking	COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3)	<i>optional</i>
GEND 102 The Creative Mind I (3)	MATH 280 Introductory Statistics (3)	
GEND 112 The Scientific Mind I (3)	MEBA 110 Intro to eBusiness and Management (3)	
MATH 120 College Algebra (3)		
SEMR 100 Cornerstone (1)		
<b>Total semester hours = 13</b>	<b>Total semester hours = 15</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
MEBA 210 Introduction to Internet and Web Technologies (3)	MEBA 230 Marketing in the Digital Age (3) MEBA 298 Project I (3)	<i>optional</i>
MEBA 220 Principles of Business Management (3)	GEND 201 The Civic Mind Electives (3)	
ENGL 200 Advanced Composition & Technical Writing (3)		
MATH 220 Calculus I (3)		
SEMR 200 Steppingstone Electives (3)		
<b>Total semester hours = 16</b>	<b>Total semester hours = 15</b>	

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
MEBA 310 eCommerce and mCommerce (3)	MEBA 365 Internship (3) MEBA 350 Financial Management (3)	<i>optional</i>
MEBA 320 Financial and Managerial Accounting (3)	MEBA 470 Business Analysis, Modeling and Design (3)	
MEBA 360 Introduction to Healthcare Systems (3)	GEND electives (6)	
GEND 351 The Organizational Mind (6)		
SEMR 300 Keystone (1)		
<b>Total semester hours = 16</b>	<b>Total semester hours = 15</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
ISEM 542 Health Informatics and Information Systems (3)	CISC 410 Information Technology Project Management (4)	<i>optional</i>
MEBA 381 Special Topics in Digital Health (6)	ISEM 543 Digital Health (3)	
MEBA 498 Project II (3)	MEBA 420 International Business and Strategies (3)	
Electives (4)	MEBA 480 Enterprise Architecture and Integration (3)	
	SEMR 400 Capstone (1)	
<b>Total semester hours = 16</b>	<b>Total semester hours = 14</b>	

### Digital Marketing Concentration – 48 semester hours

The program requires a total of 49 semester hours: a) 30 semester hours from the required Core courses: MEBA 110, 210, 220, 230, 310, 320, 350, 420, 470, and 480; and b) 18 semester hours completed in Digital Marketing concentration courses.

The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses - 30 semester hours

MEBA 110	Introduction to eBusiness and Management	(3)
MEBA 210	Introduction to Internet and Web Technologies	(3)
MEBA 220	Principles of Business Management	(3)
MEBA 230	Marketing in the Digital Age	(3)
MEBA 310	eCommerce and mCommerce	(3)
MEBA 320	Financial and Managerial Accounting	(3)
MEBA 350	Financial Management	(3)
MEBA 420	International Business and Strategies	(3)
MEBA 470	Business Systems Analysis, Modeling and Design	(3)
MEBA 480	Enterprise Architectures and Integration	(3)

Complete the following courses – 18 semester hours:

Four Required courses:

MEBA 352	Consumer Behavior	(3)
MEBA 354	Integrated Marketing Communication	(3)
MEBA 366	SEO/SEM	(3)
MEBA 488	Marketing Research	(3)

Choose either the Management or Practitioner Option

Management Option (2 courses):

MEBA 375	Statistics for Managers	(3)
MEBA 485	Marketing Analytics	(3)

Practitioner Option (2 courses):

IMED 170	Visual Design Fundamentals	(3)
MEBA 370	User-Experience Design and Interactive Development	(3)



**Recommended Sequence for the Full-time Student Completing the Digital Marketing Concentration-** The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites. Semester hours are shown in parentheses ( ).

<b>FIRST YEAR</b>		
<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	COMM 110 Speech (3) <i>optional</i> GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3) MEBA 110 Introduction to eBusiness and Management (3)	
<b>SECOND YEAR</b>		
<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
MEBA 210 Intro to Internet & Web Technologies (3) MEBA 220 Principles of Business Management (3) ENGL 200 Advanced Composition & Technical Writing (3) MATH 220 Calculus I (3) SEMR 200 Steppingstone Electives (3) <b>Total semester hours = 16</b>	MEBA 230 Marketing in the Digital Age (3) MEBA 298 Project I (3) GEND 201 The Civic Mind Electives (3)	<i>Optional</i>
<b>THIRD YEAR</b>		
<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
MEBA 310 eCommerce and mCommerce (3) MEBA 320 Financial & Managerial Accounting (3) GEND 351 The Organizational Mind (6) SEMR 300 Keystone (1) MEBA 375 Statistics for Managers OR IMED 170 Visual Design Fund (3) <b>Total semester hours = 16</b>	MEBA 365 Internship (3) <i>optional</i> MEBA 350 Financial Management (3) MEBA 352 Consumer Behavior (3) GEND electives (3) Electives (3)	
<b>FOURTH YEAR</b>		
<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
MEBA 470 Business Systems Analysis, Modeling and Design (3) MEBA 354 Integrated Marketing Communication (3) MEBA 366 SEO/SEM (3) MEBA 498 Project II (3) GEND Elective (3) <b>Total semester hours = 15</b>	MEBA 420 International Business and Strategies (3) MEBA 480 Enterprise Architecture and Integration (3) SEMR 400 Capstone (1) Elective (2) MEBA 488 Marketing Research (3) MEBA 370 User-Experience Design and Interactive Dev (3) OR MEBA 485 Marketing Analysis (3) <b>Total semester hours = 15</b>	<i>optional</i>

### **Business Analytics Concentration – 50 semester hours**

The program requires a total of 49 semester hours: a) 30 semester hours from the required Core courses: MEBA 110, 210, 220, 230, 310, 320, 350, 420, 470, and 480; and b) 20 semester hours completed in Business Analytics concentration courses.

The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses - 30 semester hours

MEBA 110	Introduction to eBusiness and Management	(3)
MEBA 210	Introduction to Internet and Web Technologies	(3)
MEBA 220	Principles of Business Management	(3)
MEBA 230	Marketing in the Digital Age	(3)
MEBA 310	eCommerce and mCommerce	(3)
MEBA 320	Financial and Managerial Accounting	(3)
MEBA 350	Financial Management	(3)
MEBA 420	International Business and Strategies	(3)
MEBA 470	Business Systems Analysis, Modeling and Design	(3)
MEBA 480	Enterprise Architectures and Integration	(3)

Complete the following courses – 20 semester credits:

MEBA 375	Statistics for Managers	(3)
MEBA 382	Research Design and Methodology	(3)
ANLY 400	Analytics Tools and Techniques	(4)
MEBA 472	Business Intelligence and Decision Making	(3)
MEBA 482	Quantitative Methods in Managerial Decision Making	(3)
MEBA 485	Marketing Analytics	(3)

**Recommended Sequence for the Full-time Student Completing the Business Analytics Concentration-** The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites. Semester hours are shown in parentheses ( ).

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Introductory Statistics (3) MEBA 110 Introduction to eBusiness and Management (3) <b>Total semester hours = 15</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
MEBA 210 Intro to Internet & Web Technologies (3) MEBA 220 Principles of Business Management (3) ENGL 200 Advanced Composition & Technical Writing (3) MATH 220 Calculus I (3) SEMR 200 Steppingstone Electives (3) <b>Total semester hours = 16</b>	MEBA 230 Marketing in the Digital Age (3) MEBA 298 Project I (3) GEND 201 The Civic Mind Electives (3) <b>Total semester hours = 15</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
MEBA 310 eCommerce and mCommerce (3) MEBA 320 Financial and Managerial Accounting (3) MEBA 375 Statistics for Managers (3) GEND 351 The Organizational Mind (6) SEMR 300 Keystone (1) <b>Total semester hours = 16</b>	MEBA 350 Financial Management (3) MEBA 365 Internship (3) MEBA 382 Research Design and Methodology (3) GEND electives (3) Electives (4) <b>Total semester hours = 16</b>	<i>Optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
MEBA 400 Analytics Tools & Techniques (4) MEBA 472 Business Intelligence & Decision Making (3) MEBA 470 Business Systems Analysis, Modeling & Design (3) MEBA 498 Project II (3) GEND Electives (3) <b>Total semester hours = 16</b>	MEBA 420 International Business and Strategies (3) MEBA 480 Enterprise Architecture and Integration (3) MEBA 482 Quantitative Methods in Managerial Decision Making (3) MEBA 485 Marketing Analysis (3) SEMR 400 Capstone (1) <b>Total semester hours = 13</b>	<i>optional</i>

## COURSE DESCRIPTIONS – UNDERGRADUATE

### ADVANCED MANUFACTURING (ADMA)

#### **ADMA 115 Microcomputer Applications in Technology** (3 semester hours)

Prerequisites: None

Description: Fundamental computer literacy skills for manufacturing in a Windows environment. Productivity software applications such as word processing, spreadsheets, OneNote, Microsoft Teams, Skype for Business, Access database and PowerPoint with an emphasis on organizing, accessing, managing and presenting data for personal and professional communication. Applications will be applied to Gantt charts, return on investments calculations (ROI), critical path tasks, gated processing, lean manufacturing, quality control reports, inspection reports, and maintaining an engineering notebook. Offered Spring Semester, annually.

#### **ADMA 135 Manufacturing Technology and Society** (2 semester hours)

Prerequisites: ADMA 115

Description: Manufacturing Technology and Society is an overview of the development and design of technical systems in society, their impact throughout history, and procedures for making choices of appropriate technology to apply currently and in the future, based on global awareness and strong moral and ethical standards. Topics of discussion will include the agricultural revolution, industrial revolution, information revolution and the forces that brought them into existence and their downfalls. Lab activities and possibly visitations utilized to reinforce concepts. Offered Fall Semester, annually.

#### **ADMA 160 Metallic Materials and Manufacturing Processes** (3 semester hours)

Prerequisites: ADMA 115

Description: This course is an overview of the selection, nondestructive testing, procedures, processing and application of metallic materials providing manufacturing-based solutions. Supporting topics to be covered in this course include the fundamentals of industrial safety, OSHA, lockout/tagout, finishing products and quality control. Lab activities, demonstrations and visitations may be utilized to reinforce concepts. Offered Fall Semester, annually.

#### **ADMA 230 Applied Analog and Digital Electronics** (3 semester hours)

Prerequisites: ADMA 115

Description: This course is an introduction to analog and digital electronics as it relates to advanced manufacturing through hands-on activities centered around building and logically troubleshooting circuits and devices. The concepts and theories will be covered in an industrial and or an advanced manufacturing setting. Use of instrumentation will be stressed with the application of problem-solving techniques. Offered Spring Semester, annually.

#### **ADMA 240 Computer Assisted Drawing** (3 semester hours)

Prerequisites: None

Description: Computer Assisted Drawing is a basic course in computer-aided drawing, which integrates with manufacturing and automation. Content stresses learning major CAD commands and using the graphic user interface. Conceptual drawings, 2D drawings, 3D drawings, and spatial relationships will be explored. Additional topics include file maintenance, printing formats, plotting and 3D printing are used to create two and three-dimensional design models. Offered Spring Semester, annually.

**ADMA 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours  
Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**ADMA 310 Basics of Manufacturing Simulation** (3 semester hours)

Prerequisites: None

Description: This course is the application of sophisticated computer simulation software for analysis of manufacturing operations, procedures and processes. The course includes an overview of server-based and cloud-computing applications to permit secure data sharing and collaborations in company partnerships. Team and individual projects with utilizing manufacturing simulation and data management applications will be applied and presented. Offered Fall Semester, annually.

**ADMA 323 Computer Assisted Product Design and Rapid Prototyping** (3 semester hours)

Prerequisites: ADMA 240

Description: This course is based on, and not limited to, applied product design and rapid prototyping techniques. An introduction to the application of the cradle-to-grave engineering model will be used to design or redesign industrial solutions. The use of hand tools, 3D printers and equipment will be applied to quickly produce mockups of the developed solution and its presentation. Offered Fall Semester, annually.

**ADMA 338 Non-Metallic Materials and Processing** (3 semester hours)

Prerequisites: None

Description: This course is an overview of the types of non-metallic materials, selection, destructive testing, processing and application of non-metallic materials including and not limited to natural, laminated, plastic, compounds and fluids provided through industrial based solutions. Lab activities, demonstrations and visitations may be utilized to reinforce concepts. Offered Spring Semester, annually.

**ADMA 345 Designing and Rapid Prototyping with Solid Modeling** (3 semester hours)

Prerequisites: ADMA 323

Description: Designing and Rapid Prototyping with Solid Modeling with parametric technology includes rapid prototyping, technical sketching, product design processes and the components/variables of good design will be applied. Utilizing CAD solids modeling software to create part models and assemblies will be covered. Product designs will be designed and analyzed for manufacturability, performance, and potential for profitability for a company. Oral presentations, patent searches and prototype development will be assigned and completed. Offered Spring Semester, annually.

**ADMA 365 Internship** (3 semester hours)

Prerequisites: SEMR 200 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guides the learning process. The student integrates the collective observations, analyses, and reflections of the experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed

throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**AMDA 370 CAD/CAM and Industrial Robotics** (3 semesters hours)

Prerequisites: None

Corequisites: ADMA 345

Description: This course is the conversion of CAD resources into NC machine code for the production of metallic and non-metallic products while integrated with industrial robots. Industrial robots will be introduced with hands-on programming of industrial robots and include tasks such as welding, palletizing, placement, finishing and robot integration into advanced manufacturing facilities. Offered Spring Semester, annually.

**ADMA 390 Independent Study** (1 to 4 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**AMDA 410 Application of CAD/CAM and Industrial Robotics** (3 semesters hours)

Prerequisites: ADMA 370

Description: This course furthers the investigation into automation systems dealing with automated manufacturing practices in CNC machines, PLC's, vision systems, RFID and industrial robotics. Activities include automated handling and processing of materials using conveyors, positioners/work-holders and industrial robots. Computer Integrated Manufacturing techniques including technologies such as sensing, vision, automated product identification, storage and retrieval are covered. Offered Fall Semester, annually.

**ADMA 420 Advanced Manufacturing** (3 semester hours)

Prerequisites: ADMA 410

Description: This course in an introduction to advanced manufacturing techniques including setup and use of current and advanced material processing machines and devices, includes 5 axis milling, laser cutting, water knife utilization, EDM processing, digitation and multiple 3D printing experiences. Offered Fall Semester, annually.

**ADMA 430 Programmable Logic Controllers and Integrations** (3 semester hours)

Prerequisites: ADMA 230

Description: This course is the application of a combination of digital and analog logic technologies that will lay down a framework from which programmable logic controllers are programmed. The concepts of inputs, outputs, relay logic and ladder logic will be addressed. Industrial robots and automated devices will be introduced, on-line as well as pendent programming to include tasks such as pick and place, finish application and device integration. Offered Fall Semester, annually.

**ADMA 455 Manufacturing Automation Systems (CIM/FMS)** (3 semester hours)

Prerequisites: ADMA 420

Description: This course is the approach of using computers to control the entire production process utilizing closed-loop control processes, based on real-time input from scenarios. The student will totally complete the digitization of manufacturing scenarios into advanced manufacturing scenarios in this course by including the application of CAD/CAM techniques. Offered Spring Semester, annually.

**ADMA 465 Simulation of Systems and Integrations** (3 semester hours)

Prerequisites: ADMA 310

Description: This course is the application of sophisticated computer simulation software for a complete analysis of manufacturing operations and processes for a cradle to grave evaluation. Ground up individual and team projects utilizing simulation software, active data collection and storage to refine the manufacturing process that is controlled while providing and implementing efficiencies. Offered Spring Semester, annually.

**ADMA 480 Application of Advanced Manufacturing** (3 semester hours)

Prerequisites: None

Description: This course is the application of the completed advanced manufacturing suite of resources, which will be applied to solve several different manufacturing issues/projects provided by manufacturing experts. The cradle to grave experience will document the project and then delivered in professional presentations and papers. Offered Spring Semester, annually.

**ADMA 498 Project II** (3 semester hours)

Prerequisites: ANLY 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration(s). It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

**ANALYTICS (ANLY)****ANLY 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours

Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**ANLY 365 Internship** (3 semester hours)

Prerequisites: SEMR 200 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guides the learning process. The student integrates the collective observations, analyses, and reflections of the experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**ANLY 390 Independent Study** (1 to 4 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**ANLY 400 Analytics Tools and Techniques** (4 semester hours)

Prerequisites: MATH 280

Description: The use of analytics is a common practice in modern business settings. This course introduces the basic concept and practice of analytics and its role in business. The emphasis is on the tools and techniques of analytics with case studies and examples. Topics include: data querying and reporting; data access and management; data cleansing; statistical programming; data mining introduction; relational databases; and, statistical analysis of databases. The student is also introduced to Business Intelligence (BI) and statistical methodology (i.e. clustering, decision tree, etc.) along with using popular analytics packages such as SAS, Google Analytics, Business Objects, Aginity, and others. Offered Fall Semester, annually.

**ANLY 405 Predictive Modeling** (3 semester hours)

Prerequisites: ANLY 400 and MATH 380

Description: The development and implementation of models to predict outcomes based on input data is becoming an essential skill in modern enterprises. The objective of this course is to teach this skill. The course covers the principles of qualitative as well as quantitative models that can be used for predicting outcome based on input data. The predictions may be definitive, based on the assumptions or estimates based on probabilities. The student explores how to prepare input data, build predictive models, and assess the models by examining the output produced. Topics include: exploratory data analysis, linear regression, multiple linear regression, regression diagnostics, logistics regression, analysis of variance (ANOVA), time series and forecasting, statistical methods for process improvement, classifiers, and non-linear models. General concepts behind how software packages roll up and how they screen data and produce risk scores on topics such as in-patient probability of readmissions. Offered Spring Semester, annually.

**ANLY 410 Data Warehousing and Mining** (3 semester hours)

Prerequisites: CISC 460 or permission of instructor

Description: Data mining evolved from the disciplines of statistics and artificial intelligence. This course addresses emerging topics to design, build, manage, and evaluate advanced data-intensive systems and applications. Data engineering is defined as the role of data in the design, development, management, and utilization of complex computing or information systems. Topics of interest include: database design; meta-knowledge of the data and its processing; languages to describe data, define access, and manipulate databases; strategies and mechanisms for data access, security, and integrity control; and extracting, transforming and loading data (ETL). Data mining is a rapidly growing field that is concerned with developing techniques to assist managers to make intelligent use of these data repositories. Successful applications have been developed for specialty areas such as credit rating, fraud detection, database marketing, customer relationship management, and stock market investments. Offered Fall Semester, annually.

**ANLY 415 Advanced Analytics and Reporting** (3 semester hours)

Prerequisites: ANLY 400 and 405

Description: The student is introduced to deterministic and stochastic decision tools used by leading corporations and applied researchers. The student utilizes these tools to solve complex, real-world



problems, building on the basic theoretical understanding of optimization, simulation and predictive modeling obtained in prerequisite courses. The student works with commercial decision modeling programs such as Premium Solver professional (linear, integer and non-linear optimization), TreePlan (decision-trees), Crystal Ball (simulation), and OptQuest (optimization under uncertainty). Throughout the course, the importance of outside-the-model considerations, model limitations, and sources of modeling error are stressed while general frameworks for approaching particular problem types are developed. Offered Spring Semester, annually.

**ANLY 498 Project II** (3 semester hours)

Prerequisites: ANLY 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration(s). It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

## **BIOLOGY (BIOL)**

**BIOL 102 General Biology\*\*** (3 semester hours)

Prerequisites: None

Corequisites: BIOL 103

Description: This course introduces the student to the major themes of biology, including properties of living organisms, comparison of eucaryotes vs. procaryotes, patterns of inheritance, the central dogma, mitosis and meiosis, the diversity of life in both plants and animals, classification of organisms, evolution, metabolism, photosynthesis, cell structures, basic structure of the body, infectious disease, the Hardy-Weinberg principle, biodiversity, ecosystems, and the biosphere. A broad understanding of biology and living organisms in the biosphere is developed through hands-on, multi-modal engaged learning opportunities in both the classroom and the companion laboratory component. Offered Spring and Summer Semesters, annually.

**BIOL 103 General Biology Laboratory\*\*** (1 semester hour)

Prerequisites: None

Corequisites: BIOL 102

Description: Companion laboratory component that demonstrates the major themes of biology presented in BIOL 102. Offered Spring and Summer Semesters, annually.

**BIOL 210 Introduction to Bioinformatics** (4 semester hours)

Prerequisites: MATH 120 and BIOL 102-103 or BTEC 170

Description: Developing automated ways to deal with vast quantities of scientific information is an essential part of modern research. Bioinformatics aims to link scant pieces of seemingly unrelated information. This discipline seeds the very origins of new lines of scientific research investigations. Bioinformatics is shaping many research disciplines from genetics and molecular biology through to drug discovery, computer science, and even entomology. Offered Spring Semester, annually.

**BIOL 214 Anatomy and Physiology I\*** (4 semester hours)

Prerequisites: BIOL 102-103

Description: This course discusses the structural and functional makeup of the human body. Medical and anatomical terminology is mastered, and an emphasis is placed on covering the details of

development, histology and functioning of the muscular, circulatory, cardiovascular and endocrine systems. Offered Fall Semester, even-numbered years.

**BIOL 215 Anatomy and Physiology II\*** (4 semester hours)

Prerequisites: BIOL 214

Description: This course studies the immune system, lymphatic system, gastrointestinal tract and digestion, genitourinary system, and the nervous system. An in-depth examination of the five senses is also conducted. Offered Spring Semester, odd-numbered years.

**BIOL 225 Entomology\*** (4 semester hours)

Prerequisites: BIOL 102-103

Description: This course introduces the biology, ecology and evolution of insects in both naturalistic and human contexts. Subject matter and course content includes field observation and collection techniques in addition to case studies of evolutionary, economical and historical importance. Offered Summer Semester, even-numbered years.

**BIOL 281 Cell Biology Lecture\*\*** (3 semester hours)

Prerequisites: C or higher in BIOL 102-103 or permission of instructor

Corequisites: BIOL 282

Description: This course examines the foundations of cell biology including the structure, function, differentiation, and growth of the eucaryotic cell. It is primarily concerned with eukaryotic cells from their evolution, organization, differentiation and biosynthesis. The simplicity and complexity of macromolecules in the cell are covered through multi-modal learning technologies on nutrition, energy production, and synthesis of cellular components. The student develops a thorough understanding of the mechanisms underlying mitosis and meiosis, the cell cycle, and cancer. Offered Fall Semester, annually.

**BIOL 282 Cell Biology Laboratory\*\*** (1 semester hour)

Prerequisites: C or higher in BIOL 102-103 or permission of instructor

Corequisites: BIOL 281

Description: Companion laboratory component that examines the foundations of cell biology including the structure, function, differentiation, and growth of the eucaryotic cell. It is primarily concerned with eukaryotic cells from their evolution, organization, differentiation and biosynthesis. The simplicity and complexity of macromolecules in the cell are covered through multi-modal learning technologies on nutrition, energy production, and synthesis of cellular components. The student develops a thorough understanding of the mechanisms underlying mitosis and meiosis, the cell cycle, and cancer. Offered Fall Semester, annually.

**BIOL 302 Principles of Ecology\*** (4 semester hours)

Prerequisites: BIOL 102-103 or permission of instructor

Description: This course examines theories (including a variety of mathematical, verbal, and graphical models of important ecological processes), techniques of study (both laboratory and field-based), and natural history. The student explores: 1) various questions (in a broad sense) asked by ecologists; 2) ideas (theories, models) from which hypotheses are suggested to answer the questions; and 3) ways in which ecologists go about gathering data to refute or support the proposed hypotheses. Specific ecological studies are used to illustrate what has been learned about the natural world. Offered Fall Semester, even-numbered years.

**BIOL 305 Evolution** (3 semester hours)

Prerequisites: BIOL 102-103

Description: This course reviews evidence for evolution prior to Darwin's seminal work and follows through to modern neo-Darwinist concepts. Natural selection, phenotypic and genotypic variation, population biology, extinction, and speciation are covered. The student examines mechanisms of

evolutionary change. Material looks at different scales and perspectives from molecular to ecological, generational changes in populations, as well as observable patterns over millennia. Offered Spring Semester, odd-numbered years.

**BIOL 320 Genetics** (3 semester hours)

Prerequisites: BIOL 281-282 and CHEM 151-152, or permission of instructor

Description: This course is an introduction to human and population genetics including Mendelian and non-Mendelian genetics (DNA replication, transcription, and translation; genetic recombination and mutation), genetic basis of gender (sex-linked and non-sex linked genetic diseases), and emerging areas of genetics research. The student connects facts together to get a whole picture, to apply knowledge, then to solve a problem. Basic genetics introduces the student to the traditional elements of genetic biology and contemporary genetic topics. Offered Spring Semester, annually.

**BIOL 330 Microbiology\*** (4 semester hours)

Prerequisites: BIOL 281-282 and CHEM 151-152

Description: This course is an introduction to microbial cell structure, growth and physiology combined with basic laboratory techniques. The relationship between host and parasite is emphasized, especially as related to human disease, epidemiology and infection control. A broad range of infectious diseases are covered, including etiologic agent identification, modes of transmission and prevention. Offered Spring Semester, annually.

**BIOL 370 Molecular Biology\*** (4 semester hours)

Prerequisites: BIOL 281-282 and CHEM 151-152

Description: The complicated process that goes on in living cells and organisms, in terms of the law of chemistry and physics, is described. The genetic message is examined, as it is carried in the form of DNA through transcription and translation as well as the biosynthesis of macromolecules. The course is designed to follow chemistry (general and organic) and biology coursework to complete an understanding of life chemistry. Offered Fall Semester, annually.

**BIOL 375 Immunology\*** (4 semester hours)

Prerequisites: BIOL 281-282

Corequisites: BIOL 320 (Can be taken prior to or at the same time as BIOL 375.)

Description: This advanced course explores the specific innate and acquired aspects of the immune system. Innate host defenses, which protect humans against disease and foreign contaminants, are examined. Cellular immune response interaction with viral infections, foreign cells, or defective host cells are covered as to how the humoral immune response produces antibodies against foreign antigen and how these immune responses are controlled. Through an understanding of the nature of antibodies, lymphokines and specific cellular reaction, the student discovers the power and limitation of the immune system. This course also includes a significant laboratory component focusing on the analysis of blood cells, enzyme-linked immunosorbent assays (ELISAs), blood typing, and rapid commercial test technologies. Offered Summer Semester, even-numbered years.

**BIOL 380 Special Topics in Biology** (3 semester hours)

Prerequisites: Consent of the instructor and academic advisor

Description: This course covers topics in biology. It is an in-depth study of a selected specialized area of biology and the content varies by semester. Offered as needed.

\*Three hours of lecture, three hours of laboratory per week.

\*\* Three hours of lecture, three hours of laboratory per week from both portions of companion courses.

## BIOTECHNOLOGY (BTEC)

### **BTEC 100 Nanobiotechnology Explorations** (2 semester hours)

Prerequisites: None

Description: This is an introductory course to nanobiotechnology, which is the use of existing elements of natural systems to develop new technologies. The concepts of how nano-structures are characterized are defined and a review is conducted of the applications of this new technology. The course includes a laboratory component in addition to lecture component. Offered Fall Semester, annually.

### **BTEC 101 Exploring Biotechnology Through Food, Science, and Cooking** (2 semester hours)

Prerequisites: None

Description: This course provides an overview of basic science and technology through the lens of food and cooking. The student explores the importance of biology, physics, and chemistry in creating food flavor, texture, aroma, and consistency. Visiting chefs explain techniques used to create food products in the kitchen while the student engages in interactive, experiential learning activities to understand the related scientific principles. The student is also being introduced to scientific methods used to evaluate food products. Offered Summer Semester, annually.

### **BTEC 102 Exploring Nanobiotechnology** (2 semester hours)

Prerequisites: None

Description: This is an introductory course to nanobiotechnology, which is the use of existing elements of natural systems to develop new technologies. The concepts of how nano-structures are characterized are defined and a review is conducted of the applications of this new technology.

Includes active learning experiences. *Limited to the Dual Enrollment student.* Offered Summer Semester, annually.

### **BTEC 104 Special Topics** (1 -2 semester hours)

Description: This course covers topics in biotechnology. *Limited to the Dual Enrollment student.* Offered as needed.

### **BTEC 105 The Art of Genes and Fusion** (3 semester hours)

Prerequisites: None

Description: The student is introduced to molecular concepts regarding DNA, genes, proteins, and chromosome mapping to describe the importance of biotechnology to help combat human diseases and disorders. The student examines links between diseases and genes, such as leukemia and cancer. Lastly, the student will use case studies and contemporary topics in biotechnology and genetic engineering to understand the significance of gene manipulation in technology development. Offered as needed.

### **BTEC 110 Medical Terminology (1 semester hour)**

Prerequisites: BIOL 102/103 or High School Biology

Description: This course is designed as an introduction to the nomenclature used by various medical and dental professionals. The course focuses on learning techniques that will enable students to easily understand medical terminology. *Cross-listed with INSC 110.* Offered as needed.

### **BTEC 170 Introduction to Biotechnology** (3 semester hours)

Prerequisites: BIOL 102-103 or permission of instructor

Description: Biotechnology explores biological processes to produce raw materials, foodstuffs, and medical treatments for use by humans. The industry is key for generating income worldwide and feeds into the pharmaceutical, textile, food and agricultural industries. The course centers on three main goals: 1) to understand the biological processes involved in biotechnology methods; 2) to identify and criticize

the benefits and drawbacks of current methods; and 3) to review new emerging technologies that focus on ecological solutions. Offered Fall Semester, annually.

**BTEC 200 Introduction to Quality and Food Safety** (3 semester hours)

Prerequisites: None

Description: Overview of quality and food safety spanning all segments of the food industry. Topics include: meat, dairy, poultry, confectionary, and bakery segments including allied industry involvement. Offered as needed.

**BTEC 210 Food and Nutrition** (3 semester hours)

Prerequisites: BTEC 170

Description: This course provides an overview of the diet and nutritional requirements of protein, energy, whole grains, major vitamins and minerals and other food groups that are determinants of health and diseases in human populations. The sources, recommended intake, role of major nutrients, and metabolism are explored, in addition to case studies that address the impact of nutrition on human growth and development of chronic or acute diseases (i.e. cancer, diabetes, heart disease, etc.). Offered Spring Semester, annually.

**BTEC 220 Applied Nanobiotechnology\*** (4 semester hours)

Prerequisites: BTEC 100 or permission of instructor

Description: This course addresses applications of nanobiotechnology for various fields such as medicine, drug-delivery, food and environment. The student explores how various nanostructures can be “functionalized” to perform targeted interactions. The need, application, limitations, and ethical positions for these topics are covered through a multimodal approach of lecture, lab, presentations, group discussions and interactive modules. Offered Spring Semester, annually.

**BTEC 222 Emerging Laboratory Techniques\*** (4 semester hours)

Prerequisites: BTEC 170 or permission of instructor

Description: This course covers the planning, execution and implementation of experimental design, the first step toward independent research. The problem areas covered center primarily on abstract principles that are difficult to convey in the standard lecture format. Accordingly, this course is laboratory intensive – 6 laboratory hours per week - with visual and hands-on experiments used to reinforce concepts. Offered as needed.

**BTEC 235 Applied Cell and Agro Culture\*** (4 semester hours)

Prerequisites: BTEC 170

Description: The fields of biology, biochemistry, molecular biology and biotechnology are increasingly dependent on growing and experimenting with cells in culture. This course offers a concise, practical guide to the basic essentials of the techniques used in a modern cell culture laboratory. Offered Spring Semester, even-numbered years.

**BTEC 240 Techniques for Biomolecular Research** (3 semester hours)

Prerequisites: BIOL 102/103

Description: This course gives an in-depth, hands-on experience to fundamental laboratory techniques applied to bio-molecular research to the student in life sciences. The Biotech (life science in general) industry heavily depends on ability for use of these techniques for extraction, purification and characterization of biomolecules (proteins, a variety of types) using several bioanalytical techniques. This course allows the student to get a “life-at-the-bench” experience in application of these techniques. The course covers topics related to successful design of protocols for extraction, purification, characterization, and analysis of structure-function relationship of biomolecules for application in diagnostics, therapeutics, and several industrial applications. It also offers experience in using

instrumentation generically used in medical, pharmaceutical, environmental, and other BTEC industries with an introduction to Good Laboratory Practices (GLP). Offered Spring Semester, annually.

**BTEC 250 Medical Biotechnologies of 2020** (3 semester hours)

Prerequisites: BTEC 170 or permission of instructor

Description: The field of biotechnology is evolving quickly with innovative technologies. The course covers the concept of biomarkers, its application in diagnostics and therapeutics. Topics such as pharmacogenomics, gene therapy, medical imaging, regenerative medicine, prosthetics, and point of care devices are at the interface of emerging medical technologies and applied biotechnology. This course serves to introduce the student to these emerging trends and technologies in the field of medical biotechnology. Offered Spring Semester, annually, or as needed.

**BTEC 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours

Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**BTEC 311 Pharmacology I** (3 semester hours)

Prerequisites: BTEC 170 or permission of instructor

Description: This course studies how specific small molecules can impact and affect body behavior and responses. Small molecules or drugs made by man or from nature can modulate special gates and enzymes. These concepts are the first step into the world of pharmacology. The understanding of this course depends heavily on knowing what is considered normal for the body. Consequently, human physiological systems are featured as an integral part of this course. Offered Fall Semester, annually.

**BTEC 320 Drug Design and Development** (3 semester hours)

Prerequisites: BTEC 311 or permission of instructor

Description: New drug discovery is a long process with soaring costs as the level of scientific complexity increases through research. This course is structured to follow the discovery process and is reliant on outside specialists and speakers. Offered Spring Semester, annually.

**BTEC 340 Forensic Biotechnology** (3 semester hours)

Prerequisites: BIOL 102/103 or permission of instructor

Description: This course is designed to introduce the student to the hands-on techniques and opportunities in the field of biotechnology for the forensic field. The course will cover topics including introduction to biotechnology, DNA applications in forensic investigation, spectroscopic techniques, molecular biotechnology, and DNA fingerprinting, etc. The course will cover various techniques used in biotechnology (very significant for forensics) such as PCR, DNA immobilization, and DNA diagnostics. There will be field visits, case studies, and group discussions about the latest events in the field of forensic biotechnology.

**BTEC 350 Biotechnology Techniques\*** (4 semester hours)

Prerequisites: BTEC 170 or permission of instructor

Description: This course develops the skills, competencies, and fundamentals of research procedures in biotechnology. The student is exposed to a variety of relevant biotechnology techniques in the laboratory at research or commercial centers. Offered Fall Semester, annually.

**BTEC 351 Biotechnology Applications\*** (4 semester hours)

Prerequisites: BTEC 350 or permission of instructor

Description: This laboratory-intensive course examines the various applications in the field of biotechnology at a molecular level, which aids the understanding of cellular mechanisms. The power, limitation, proper use and theoretical framework around biotechnology applications are explored. Biotechnology-related workforce growth, and the area corporations involved in this field, provide case study illustrations. Offered Spring Semester, annually.

**BTEC 355 Neurology and Biotechnology** (3 semester hours)

Prerequisites: BTEC 170 or BIOL 280 or permission of instructor

Description: This course will provide a comprehensive overview of the molecular biology and genetic basis of both age-related and injury-induced neurological diseases. Biotechnological research on the molecular mechanisms of neurological pathologies, focusing on unique as well as common mechanisms of age- and injury-related conditions, can lead to emerging diagnostic methods and result in more effective treatments, therapeutic assessments, and strategies for prevention.

**BTEC 361 Food Biotechnology Seminar** (1 semester hour)

Prerequisites: Minimum of 60 earned semester hours

Description: This course reviews advances and applications in the field of food biotechnology. Class activities include primary article reviews, internet research, critiquing of research articles and presentations on topics from food biotechnology such as safety and quality issues with the food industry and applications of food technology in the food safety and quality protocols. Offered Spring Semester, annually.

**BTEC 362 General Biotechnology Seminar** (1 semester hour)

Prerequisites: Minimum of 60 earned semester hours

Description: This course reviews newsworthy advances and application in the field of biotechnology. Class activities include primary article reviews, internet research, critiquing of research articles and presentations on topics from general biotechnology, such as the ethics of biotechnology. Offered Spring Semester, annually.

**BTEC 363 Nanobiotechnology Seminar** (1 semester hour)

Prerequisites: Minimum of 60 earned semester hours

Description: This course reviews newsworthy advances and applications in the field of biotechnology. Class activities include primary article reviews, internet research, critiquing of research articles and presentations on topics from nanobiotechnology and its application. Offered Spring Semester, annually.

**BTEC 365 Internship** (3 semester hours)

Prerequisites: SEMR 200 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guide the learning process. The student integrates the collective observations, analyses, and reflections of this experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**BTEC 370 Genetically Modified Foods** (3 semester hours)

Prerequisites: BTEC 170 or permission of instructor

Description: This course explores the impact of plant and animal biotechnology on food nutrition and provides an understanding of the techniques and methods in genetically-modified food products. The advantages and disadvantages of genetically modified foods are explored, in addition to cultivation, production, processing, and manufacturing concerns that are related to genetically modified foods. A broad knowledge of the current laws governing use of genetically modified foods, ethical discussions surrounding production of these foods, and the global impact of those laws are studied. Offered Spring Semester, even-numbered years.

**BTEC 371 Food Science and Technology\*** (4 semester hours)

Prerequisites: BTEC 170 or permission of instructor

Description: This course explores the fundamental principles of food science including the nature of foods, causes of deterioration, and related advances in technology used in food processing, production, and preservation. The student becomes familiar with the types of micro-organisms that are utilized in the food industry, in addition to the control and prevention of food-borne illnesses through biotechnology and quality-control case studies. Offered Spring, even-numbered years.

**BTEC 380 Special Topics in Biotechnology** (3 semester hours)

Prerequisites: None

Description: This course covers emerging topics in biotechnology. It is an in-depth study of a selected specialized area of biotechnology and the content varies by semester. Offered as needed.

**BTEC 390 Independent Study** (1 to 4 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**BTEC 401 Biosensor Technology \*** (4 semester hours)

Prerequisites: BTEC 100 or permission of instructor

Description: The course covers aspects such as: what is a biosensor, the types of biosensors, and how to develop a specific assay for a specific detection system. Also covered are the major techniques used in developing and functionalizing nanoparticles for specific biosensor assays. Applications of biosensor technology in medical diagnostics, environmental monitoring, bioremediation and quality control in the food industry are reviewed. Offered Fall Semester, annually.

**BTEC 405 Applied Food Microbiology** (3 semester hours)

Prerequisites: BTEC 200

Description: This course provides insight into the most recent developments of food-borne pathogens, toxins, and contaminants that may occur in a food production plant environment. The course is delivered in classroom and laboratory environments and includes a mixture of theory, demonstrations, and practical sessions on the fundamentals of food microbiology and food safety. Offered as needed.

**BTEC 411 Pharmacology II** (3 semester hours)

Prerequisites: BTEC 311

Description: This course covers how specific small molecules affect body behavior and response. Various areas of pharmacology are explored, with a special focus on the central nervous system. The drugs covered modulate and alter signals that are in turn interpreted by special gates and enzymes, but



pathways and control are typically more complex. These concepts mirror those of other disciplines, in particular biochemistry and molecular genetics, and require critical and procedural thought. A primary component of this course is an understanding of what is considered normal for the body. Accordingly, human physiological systems are studied as an integral part of this course. Offered as needed.

**BTEC 420 Food Safety and Quality Assurance** (3 semester hours)

Prerequisites: BTEC 200 or permission of instructor

Description: This course explores the fundamental principles of food quality assurance and quality control based on the principles of Safe Quality Foods (SQF) and Hazard Critical Control Point (HACCP) planning. The student becomes familiar with the seven HACCP principles for controlling food safety within the food processing, production, and manufacturing environments. In addition, the student is shown basic and advanced principles for safely managing quality assurance and quality control (QA/QC) within the food industry. Offered Spring Semester, annually.

**BTEC 435 Computer-Aided Drug Design\*** (4 semester hours)

Prerequisites: BIOL 210 and BTEC 311

Description: Conducting drug research in a directed and specific manner previously relied on how many small molecules could be tested per unit time. Over recent years, more and more drug design is coordinated with available literature and modern databases containing overwhelming amounts of information. To identify new potential drug molecules, automation has become essential to narrow the field before embarking on a biological screening process. Offered Spring Semester, annually.

**BTEC 498 Project II** (3 semester hours)

Prerequisites: BTEC 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration(s). It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

\*Three hours of lecture, three hours of laboratory per week.

## **CHEMISTRY (CHEM)**

**CHEM 151 General Chemistry I Lecture\*\*** (3 semester hours)

Prerequisites: MATH 120 or MATH 220

Corequisites: CHEM 152

Description: This course provides a general introduction to atoms and molecules, stoichiometry, states of matter, solutions, reactions, kinetics and equilibrium which serve as a prerequisite for advanced courses. Offered Fall Semester, annually.

**CHEM 152 General Chemistry I Laboratory\*\*** (1 semester hour)

Prerequisites: MATH 120 or MATH 220

Corequisites: CHEM 151

Description: Companion laboratory component that illustrates the general introduction to atoms and molecules, stoichiometry, states of matter, solutions, reactions, kinetics and equilibrium which serve as a prerequisite for advanced courses. Offered Fall Semester, annually.

**CHEM 161 General Chemistry II\*\*** (3 semester hours)

Prerequisites: C or higher in CHEM 151-152 or permission of instructor

Corequisites: CHEM 162

Description: A study of chemical principles including acid/base chemistry, bonding, thermodynamics and electrochemistry. Offered Spring Semester, annually.

**CHEM 162 General Chemistry II Laboratory\*\*** (1 semester hour)

Prerequisites: C or higher in CHEM 151-152 or permission of instructor

Corequisites: CHEM 161

Description: Companion laboratory component that illustrates the study of chemical principles including acid/base chemistry, bonding, thermodynamics and electrochemistry. Offered Spring Semester, annually.

**CHEM 200 Environmental Chemistry I** (3 semester hours)

Prerequisites: C or higher in CHEM 151-152 or permission of instructor

Description: An introductory investigation of current concerns and problems dealing with chemistry of the environment. Chemistry of the atmosphere, biosphere and hydrosphere are examined and discussed. Offered Fall Semester, even-numbered years.

**CHEM 210 Organic Chemistry I\*** (4 semester hours)

Prerequisites: C or higher in CHEM 161-162 or permission of instructor

Description: This course with laboratory is designed as a first-level introduction to the carbon-based reactions involved in life chemistry. The course focuses on the nomenclature, structure and fundamental basis for reactivity of organic compounds. It sets a background for advanced study in forensic or environmental chemistry and biochemistry. Offered Fall Semester, annually.

**CHEM 220 Organic Chemistry II\*** (4 semester hours)

Prerequisites: C or higher in CHEM 210 or permission of instructor

Description: This course builds upon the principles learned in the first course and is designed to provide a foundation in the fundamentals of organic compounds, their structures, reactions, and underlying reaction mechanisms. Offered Spring Semester, annually.

**CHEM 310 Environmental Chemistry II\*** (4 semester hours)

Prerequisites: CHEM 200 or permission of instructor

Description: This laboratory-intensive course addresses specific topics related to environmental chemistry; specifically, the transport of chemicals and energy amongst soil, air and water phases, rates of movement of solutes, and the chemical impact to biological systems. This is an advanced course specifically tailored for those in the integrative sciences program of study or those with specific interest in environmental chemistry. This course is required for the environmental chemistry concentration. Offered Spring Semester, odd-numbered years.

**CHEM 315 Analytical Chemistry** (4 semester hours)

Prerequisites: CHEM 161/162 and MATH 280

Description: This course will introduce theoretical and practical aspects of quantitative chemical analysis: primary analysis, error analysis, data handling; solution equilibria and acid-base titrations; spectrophotometry. The laboratory component emphasizes proper analytical techniques. Offered Fall Semester, annually.

**CHEM 320 Bio-Organic Chemistry** (3 semester hours)

Prerequisites: CHEM 220

Description: This course is designed as an advanced undergraduate study of the structure and reactivity of carbon-based bio-molecules. Approximately one-half of the course is devoted to a description of the structure and chemical properties of bio-organic compounds. The second half of the course draws upon

the concepts from organic and inorganic chemistry in order to investigate enzymatic reactions and metabolism. Offered Fall Semester, odd-numbered years.

**CHEM 325 Instrumental Chemical Analysis** (4 semester hours)

Prerequisites: CHEM 161-162 and MATH 280

Description: This course introduces instrumental and method design, function, and operation applied to chemical analysis. The laboratory component emphasizes hands-on instrument use, data analysis, and unknown identification. Offered Spring Semester, even-numbered years.

**CHEM 330 Biochemistry I** (4 semester hours)

Prerequisites: CHEM 210

Description: This course is an in-depth study of several classes of biomolecules: proteins, carbohydrates, and lipids. The course emphasizes the chemistry that dictates the structure and functions of biological molecules. Particular focus is given to: 1) amino acid and protein chemistry; 2) enzyme activity; and, 3) combination of the major classes of biological molecules to form biological membranes. Offered Fall Semester, annually.

**CHEM 340 Forensic Chemistry\*** (4 semester hours)

Prerequisites: CHEM 161-162, MATH 280

Description: This course surveys the applications of science in a criminal investigation with a laboratory-based examination of the methods and analyses from a fundamental chemical perspective. Proper evidence sampling methods are introduced. This laboratory intensive course will provide students hands-on analytical experience with solution preparation, techniques for chemical separations of complex samples, preliminary, and/or confirmatory chemical tests for different types of evidence such as documents, fibers, body fluids, hair, and drugs. Offered Spring Semester, even-numbered years.

**CHEM 350 Biochemistry II\*** (4 semester hours)

Prerequisites: CHEM 330

Description: This course is a detailed study of carbohydrate and fatty acid metabolism including biochemical thermodynamics. An in-depth study of nucleic acids and how their chemistry dictates their structure and biological function is also presented. Offered Spring Semester, annually.

**CHEM 380 Special Topics in Chemistry** (3 semester hours)

Prerequisites: Consent of the instructor and academic advisor

Description: This course covers topics in chemistry. It is an in-depth study of a selected specialized area and the content varies by semester. Offered as needed.

**CHEM 420 Bioinorganic Chemistry** (3 semester hours)

Prerequisites: CHEM 210

Description: This course provides the student an advanced level of understanding of inorganic chemistry and its role in biological molecules. The relationship between structure, bonding, and reactivity of transition metals is discussed with a primary focus on coordination chemistry. Offered Fall Semester, odd-numbered years.

\*Three hours of lecture, three hours of laboratory per week.

\*\* Three hours of lecture, three hours of laboratory per week from both portions of companion course.

## COMMUNICATION (COMM)

### **COMM 110 Speech** (3 semester hours)

Prerequisites: None

Description: This course builds on the skills acquired in ENGL 105 or ENGL 106. The student continues to study the process of effective communication, based on an understanding of purpose and audience using speaking techniques such as enunciation and modulation. The student builds an understanding of the basic skills needed to communicate across disciplines. Offered each semester, annually.

### **COMM 225 Cinema Studies** (2 semester hours)

Prerequisites: ENGL 105 or ENGL 106, COMM 110, GEND 102 and 30 or more semester hours

Description: This survey course investigates major movies, historical events, schools of thought, and developments in the history of film and mass communication. Through readings, lectures, and independent research, the student focuses on the relationships between history, technology, and media development and explores the impact motion media and mass communication have on society and the economy. Fall Semester, annually. *Cross-listed with GEND 225.*

## COMPUTER AND INFORMATION SCIENCES (CISC)

### **CISC 100 Lego Robotics Programming** (3 semester hours)

Prerequisites: Two years of high school algebra or equivalent

Description: This course provides an introduction to mobile robots and the fundamental concepts of programming by using Lego Mindstorms RCX robots. Lectures are followed by hands-on exercises performed in groups, where creativity is a key component. The primary goal is to obtain both visual and textual programming skills while promoting social aptitudes such as leadership and teamwork. Offered Summer Semester, annually.

### **CISC 101 Exploring Lego Robotics** (2 semester hours)

Prerequisites: None

Description: This course provides an introduction to mobile robots and the fundamental concepts of programming using Lego Mindstorms robots. Lectures are followed by hands-on labs where creativity and problem solving are key components. The primary goal is to obtain both visual and textual programming skills while promoting social aptitudes such as leadership and teamwork. *Limited to the Dual Enrollment student.* Offered Summer Semester, annually.

### **CISC 103 Introduction to Computers & Information Sciences** (4 semester hours)

Prerequisites: None

Description: This course serves as an introduction to computing and information systems. It uses both lecture and laboratory practice to introduce students to the use of computers to solve problems. The student is presented the techniques, concepts, analysis, and reports on experiences and technologies and trends. This includes the concepts of hardware, software, networking, computer security, programming, database, e-commerce, decision support systems, and other emerging technologies. The student is introduced to techniques that search, evaluate, validate, and cite information found online. Widely-used applications including word processing, spreadsheets, databases, presentation, and web development software are also studied. Offered Spring Semester, annually.

**CISC 106 Special Topics** (1 – 4 semester hours)

Description: This course covers topics in Computer & Information Sciences. Offered as needed.

**CISC 120 Fundamentals of Computing** (4 semester hours)

Prerequisites: MATH 120 (or taken concurrently) or MATH 280

Description: This course introduces the concepts and techniques of computer programming. Emphasis is placed on developing the student's ability to apply problem-solving strategies to design algorithms and to implement these algorithms in a modern, structured programming language. Topics include fundamental programming constructs, problem solving techniques, simple data structures, Object-Oriented Programming (OOP), program structure, data types and declarations, control statements, algorithm strategies and algorithm development. Offered each semester.

**CISC 160 Data Structures** (4 semester hours)

Prerequisites: CISC 120

Description: This lecture and laboratory course further develops the concepts and techniques of computer programming. Emphasis is placed on structured programming, top-down design, more advanced data structures, and the proper use of the programming language and development tools. Topics include abstract data types (ADTs), sets, records, recursion, problem solving and algorithms, fundamental computing algorithms, searching, introductory sorting, hash tables, basic algorithm analysis, Object-Oriented Programming (OOP), files, linked lists, queues, stacks, and binary trees. Offered Fall Semester and Summer Semester, annually.

**CISC 201 Experiential eBike Charging Technology** (3 semester hours)

Prerequisites: None

The course will focus on Object Orientated Programming (OOP) application. The student will learn how to program applications for pLc controllers that interact with wireless communion components, solar charge controllers, battery array volt meters, monitors, controls, human-machine interfaces (hmi, tablets and/or smart phones) and database driven websites using python (and other languages). Student application will be tested in lass using the hands-on PxC easel and in lab on the "HU eBike Charging Station." The student will learn how to ride and operate an eBike, and understand the science of solar power and battery array systems. Offered Fall Semester, annually.

**CISC 211 Computer Organization and Architecture** (4 semester hours)

Prerequisites: CISC 120

Description: The goal of the course is to teach the design and operation of a digital computer. It serves the student in two ways: First, for those who want to continue studying computer architecture, embedded systems, and other low-level aspects of computer systems, it lays the foundation of detailed implementation experience needed to make the quantitative tradeoffs in more advanced courses meaningful; and, second, for a student interested in other areas of computer science, it solidifies an intuition about why hardware is as it is and how software interacts with hardware. The subject matter covered in the course includes technology trends and their implications, performance measurement, instruction sets, computer arithmetic, design and control of a datapath, pipelining, memory hierarchies, input and output, and brief introduction to multiprocessors. Offered Spring Semester, annually.

**CISC 225 Information System Design and Analysis** (4 semester hours)

Prerequisites: CISC 120

Description: This course is a foundation for database design and database security courses. Systems Analysis and Design is a fundamental, active field in which analysts continually learn new techniques and approaches to develop systems more effectively and efficiently. There is a core set of skills that all analysts need to know no matter what approach or methodology is used. All information systems projects move through the four phases of planning, analysis, design, and implementation; all projects require analysts to gather requirements, model the business needs, and create blueprints for how the

systems should be built; and all projects require an understanding of organizational behavior concepts like change management and team building. This course captures the dynamic aspects of the field by keeping the student focused on doing Systems Analysis and Design while presenting the core set of skills that the analyst needs to know. Offered Spring Semester, annually.

**CISC 233 Essential Algorithms** (4 semester hours)

Corequisites: CISC 160

Description: This course covers the basic techniques used to analyze problems and algorithms, including asymptotic, upper/lower bounds, and best/average/worst case analysis. Amortized analysis, complexity, and basic techniques are used to design algorithms (including divide & conquer / greedy / dynamic programming / heuristics, choosing appropriate data structures) and important classical algorithms (including sorting, string, matrix, and graph algorithms). The goal is for the student to be able to apply all of the above to design solutions for real-world problems. Offered Fall Semester, annually.

**CISC 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours

Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**CISC 300 Web Technologies** (4 semester hours)

Prerequisites: CISC 120 or MEBA 210

Description: The student studies, explores and designs a website using static as well as dynamic content. The student experiments with the latest developments in web technologies and web services. Coursework is accomplished both individually and in teams to build, launch, and market a website for a community member or as a university project. This course includes an interactive programming component utilizing an Object-Oriented Programming Language. Offered Spring Semester, annually.

**CISC 301 Operating Systems** (4 semester hours)

Prerequisites: CISC 211 and CISC 233

Description: This course provides an introduction to the design and implementation of operating systems. The student is exposed to different operating systems on various computer platforms and is expected to develop a significant operating system programming project in this area. Topics include operating systems principles, computer architecture, concurrency threads, CPU scheduling and dispatching, memory management techniques, computer security and system administration using Windows XP, Unix and Linux. Offered Fall Semester, annually.

**CISC 311 Introduction to Computational Biology** (4 semester hours)

Prerequisites: CISC 160, CISC 225, MATH 280 and BIOL 281-282

Description: This course introduces the topic, history, and current research issues in bioinformatics, and prepares the student in the skills necessary to communicate with researchers across the disciplines of computer science and biology. The course is designed for computer scientists who want an introduction to the language of molecular biology and to the significant computation problems in the field of biology. The course is also designed for biophysicists, biochemists, and molecular biologists who want an introduction to the language of computer programming and algorithm development, focusing on solving computation problems in biology. Offered Fall Semester, annually.

**CISC 320 Computer Forensics** (4 semester hours)

Prerequisites: CISC 211 and CISC 233

Description: This course provides the student with a unique hands-on experience in digital forensics using case studies. Emphasis is placed on computer incident responses and security risk assessments. Technical and legal issues regarding computer evidence are also covered since they have a bearing on both the computer incident response and the investigation. Computer evidence preservation is stressed using cross-validation of forensic tools and the documentation of computer evidence findings. Computer evidence processing methodologies and practices are also reviewed to combat legal challenges against the admissibility of computer-related evidence. Offered Fall Semester, odd-numbered years.

**CISC 330 Computer Networks** (4 semester hours)

Prerequisites: CISC 211

Description: The essential topics in computer (digital) and network security are covered. Areas covered include: viruses, computer crime, web server security, denial of service attacks, authentication protocols, firewalls, Trojan horses, intrusion detection, data encryption methods, public key cryptography (RSA, DES), email viruses, attachments, spy ware, digital homeland security in wireless technologies and mobile computing. The student is expected to develop a significant programming project in this area. Offered Fall Semester, annually.

**CISC 333 Defensive Programming** (4 semester hours)

Prerequisites: CISC 233 and MATH 210

Description: This course covers the analysis of cryptographic algorithms, cryptanalysis, symmetric key cryptography, public key cryptography, Diffie-Hellman, DES, AES, RSA, Blowfish, Twofish, hash and MAC functions, digital signatures, pseudo-random generators, cryptographic protocols, SSL/TLS and SET. These algorithms represent the actual ciphers used in most standard secure applications. The student is challenged to implement these algorithms using an Object-Oriented Programming Language such as C# or Java. Offered Spring Semester, odd-numbered years.

**CISC 340 Introduction to Artificial Intelligence** (4 semester hours)

Prerequisites: CISC 233 and MATH 310

Description: This course introduces intellectual issues and intelligent systems in the computer field. Topics include: Fundamentals of intelligent systems, artificial intelligence (AI), AI search strategies, knowledge representation, privacy rights and civil liberties, intellectual property, digital copyrights and patents, social and ethical issues, intelligent (Internet) agents, intelligent manufacturing systems, and robotics. Offered Fall Semester, annually.

**CISC 349 Smart Phones Programming** (4 semester hours)

Prerequisites: CISC 233 and MATH 210

Description: As technologies evolve, new interaction styles are made possible. The goal of this course is to teach the student how to design, implement, test, debug and publish smartphone applications. The student will learn how to take their innovative ideas from conception to the smartphones market through a series of rigorous hands-on programming assignments and group projects. There is a significant amount of programming in this course requiring a commitment on the part of the student. Offered Spring Semester, annually.

**CISC 365 Internship** (3 semester hours)

Prerequisites: SEMR 200 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guide the learning process. The student

integrates the collective observations, analyses, and reflections of this experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**CISC 370 Ethical Hacking** (4 semester hours)

Prerequisites: CISC 333 and MATH 310

Description: Teaching the student how to hack is a legitimate means of identifying a company's network weaknesses and can be an effective component of computer security. This course introduces the student to the role of an ethical hacker and the essential hacking technologies required. The different phases involved in hacking are exploited. The student is introduced to the techniques of penetration testing, intrusion testing, and "red-teaming." The student also reviews of the legal considerations for working as an ethical hacker. Offered Fall Semester, ~~odd-numbered years~~.

**CISC 380 Special Topics in Computer Science** (3 semester hours)

Prerequisites: 60 credit hours completed and consent of the instructor and academic advisor

Description: This course covers emerging topics in Computer and Information Science. It is an in-depth study of a selected specialized area of Computer and Information Science and the content varies by semester. Offered Fall Semester, odd-numbered years and Summer Semester, annually.

**CISC 390 Independent Study** (1 to 4 semester hours)

Prerequisites: CISC 120 and a minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**CISC 397 Principle of Software Engineering and System Analysis** (4 semester hours)

Prerequisites: CISC 225 and CISC 301

Description: This course develops specific programming designs and specifications and the formal methods used. It is particularly important that the student place a great deal of emphasis in understanding the different design models and the sections covering requirements analysis and system specification. Developing a complete set of requirements and specifications is one of the more difficult and critical tasks in software engineering. During the course, the student is involved with a real problem solving/software development situation. The student is required to gather functional requirements, identify the problem, form a solution and present this solution to a prospective customer. Offered Spring Semester, annually.

**CISC 399 Formal Languages and Automata Theory** (4 semester hours)

Prerequisites: CISC 233

Description: This course presents a study of formal languages and the correspondence between language classes and the automata that recognize them. Formal definitions of grammars and acceptors, deterministic and non-deterministic systems, grammar ambiguity, finite state and push-down automata, and normal forms will be discussed. Offered Spring Semester, annually.

**CISC 400 Computer Graphics** (4 semester hours)

Prerequisites: CISC 233 and CISC 301

Description: This course covers the fundamental techniques behind applications such as PhotoShop, medical MRIs, video games, and movie special effects. It begins by building a mathematical model of the interaction of light with surfaces, lenses, and an imager. The student then studies the data structures and



processor architectures that allow for efficiently evaluating that physical model. The student completes a series of programming assignments for both photorealistic image creation and real-time 3D rendering using C++, OpenGL, and GLSL. These assignments cumulate in a multi-week final project. Topics covered in the course include: projective geometry, ray tracing, bidirectional surface scattering functions, binary space partition trees, matting and compositing, shadow maps, cache management, and parallel processing of GPUs. This is a core CS course. Offered Fall Semester, annually.

**CISC 431 Natural Language Processing** (4 semester hours)

Prerequisites: CISC 233, CISC 399 and MATH 310

Description: This course introduces the fundamental concepts and ideas in natural language processing (NLP), otherwise known as computational linguistics. It develops an in-depth understanding of both algorithms for processing linguistic information and the underlying computational properties of natural languages. Word-level, syntactic, and semantic processing from both a linguistic and an algorithmic perspective are covered, aiming to get current with present research in the area. The course focuses on modern quantitative techniques in NLP using large corpora, statistical models for acquisition, disambiguation, and parsing and the construction of representative systems. Offered Spring Semester, even-numbered years.

**CISC 432 Statistical Pattern Recognition** (4 semester hours)

Prerequisites: CISC 233 and MATH 310

Description: Many emerging applications, such as indexing, security, forensics, and information discovery, involve the use of novel ideas and effective techniques in teaching computers to recognize patterns in various signals and data, ranging from documents, images, audio, and other sensory signals. This course includes the introduction to basic theories, algorithms, and practical solutions of statistical pattern recognition. Topics covered include feature extraction, feature selection, Bayesian classifiers, neural networks, discriminative classifiers, clustering, performance evaluation, and fusion of models. The student gets some hands-on experience in the design, implementation and evaluation of pattern recognition algorithms by applying them to real-world problems. Offered Spring Semester, annually.

**CISC 433 Elements of Computing Systems I** (4 semester hours)

Prerequisites: CISC 301 and CISC 399

Description: The course is the first part of an integration process of key notions from algorithms, computer architecture, operating systems, compilers, and software engineering in one unified framework. This is done constructively, by building a general-purpose computer system from the ground up. In that process, ideas and techniques used in the design of modern hardware and software systems are explored, and discuss major trade-offs and future trends. This course evolves around building a series of HW and SW modules, including building a chip set of simple yet functional computer using a simulator, developing the assembler, and building part of the virtual machine translator. Offered Fall Semester, annually.

**CISC 440 Wireless Security Management** (4 semester hours)

Prerequisites: CISC 370 and 60 credit hours completed

Description: This course exposes the student to authentication, access control, and auditing (the 3As), which are the fundamental mechanisms required in enterprise security management for countering the various types of threats on wireless based systems. The student is presented with an approach to managing enterprise security policies using wireless devices in order to effectively monitor and defend trusted domains. Specifically, the student will describe security architecture for designing and implementing a wireless-enabled solution for enterprise security management. Offered Spring Semester, even-numbered years.

**CISC 444 Elements of Computing Systems II** (4 semester hours)

Prerequisites: CISC 433

Description: The course is the second part of an integration process of key notions from algorithms, computer architecture, operating systems, compilers, and software engineering in one unified framework. This is done constructively, by building a general-purpose computer system from the ground up. In that process, ideas and techniques used in the design of modern hardware and software systems are explored, and discuss major trade-offs and future trends. This course evolves around building a series of HW and SW modules, including building a chip set of simple yet functional computer using a simulator, developing the assembler, and building part of the virtual machine translator. Offered Spring Semester, annually.

**CISC 460 SQL Database Design and Implementation** (4 semester hours)

Prerequisites: CISC 225, CISC 233 and MATH 310

Description: This course introduces the physical and logical organization of databases, data retrieval languages, relational database languages, security and integrity, concurrency, distributed databases, and web access to database information. Emphasis is on software design using a relational database management system. Topics include: information systems, database management systems, relational databases, database design, query languages (SQL), data warehousing, data mining, database security, web site architecture and development (with database access.) The student is expected to develop a significant programming project in this area. Offered Spring Semester, even-numbered years.

**CISC 491 Software Development Processes and Quality** (4 semester hours)

Prerequisites: CISC 225 and CISC 301

Description: This course builds the foundation for core concepts in the Software Engineering knowledge area, most notably in the Software Processes, Software Design, and Software Evolution knowledge units. Topics include: program comprehension, program correctness, types of errors (syntax, logic, run-time), the concept of a specification, defensive programming (e.g. secure coding, exception handling), code reviews, testing fundamentals and test-case generation, the role and the use of contracts, including pre- and post-conditions, unit testing, simple refactoring, modern programming environments, code search, programming using library components and their APIs, debugging strategies, documentation and program style. Offered Fall Semester, annually.

**CISC 498 Project II** (3 semester hours)

Prerequisites: CISC 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration(s). It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

**CISC 499 Industry Software Ethics** (3 semester hours)

Prerequisites: Senior Status

Description: Ethical obligations have both a professional and a personal dimension. Each are essential to consider; without a sense of personal ethics, one would be indifferent to their effect on the lives of others in circumstances where one's professional code is silent. So personal ethics helps us to be sure that we take full responsibility for our moral choices and their consequences. This course teaches the student how to gain knowledge and understanding of a number of aspects of this claim, including: the types of harms the public can suffer as result of this work; how software engineers contribute to the food life for others; who exactly are the "public" to whom the engineer is obligated; why the software engineer is obligated to protect the public; what other ethical obligations software engineers are under; how software

engineers can actually live up to ethical standards; what is the end goal of an ethical life in software engineering; what are the professional codes of software engineering ethics. *Cross-listed with GEND 465.* Offered Spring Semester, annually.

## **ENGLISH (ENGL)**

### **ENGL 005 College Composition Recitation** (0 semester hours)

Prerequisites: Placement by assessment

Corequisites: ENGL 105

Description: This course is offered as a companion to ENGL 105 for the student that requires improvement of college-level composition skills and serves as an opportunity to develop the foundations necessary to succeed in subsequent courses. Offered each semester, annually.

### **ENGL 050 Basic English** (3 credits)

Prerequisites: None

Description: This course develops the foundation composition skills necessary to succeed in required composition courses. *Credits do not count towards graduation requirements*

### **ENGL 105 College Composition** (3 semester hours)

Prerequisites: Placement by assessment

Description: This first-year composition course is an introduction to college-level writing strategies. By reading various writing styles and genres, the student will contemplate how purpose and audience guide the writing process. Writing assignments are to be completed according to a deadline with a goal of improving style, grammar, and diction. Offered each semester, annually.

### **ENGL 106 Academic Writing and Critical Thinking** (3 semester hours)

Prerequisites: Placement by assessment

Description: This course introduces the student to academic writing expectations and techniques for reading critically, researching effectively, and writing persuasively. The student is shown how to use critical thinking as a tool for composition development. Writing assignments are to be completed according to a deadline with a goal of improving expanded thought and technical writing. Offered Fall Semester, annually.

### **ENGL 200 Advanced Composition and Technical Writing** (3 semester hours)

Prerequisites: Minimum of 30 earned semester hours including GEND 102, ENGL 105 or 106 and COMM 110

Description: This course introduces the student to technical communication and prepares the student for designing and producing technical documents. Practice strategies are used for effective professional and technical writing to produce documents in various formats with attention to clarity and design. Offered each semester, annually.

### **ENGL 300 English Language Literature** (3 semester hours)

Prerequisites: ENGL 105 or 106

Description: This course covers original literature written in the English language. The student studies the exemplary works of literary genres, the author(s), elements of the genre, and the historical context within which the genres developed, in order to understand the connection between the works in a genre and that the history of people leads to such a body of work. Offered Spring Semester and Summer Semester, annually.

**ENGL 305 The Art of the Narrative** (3 semester hours)

Prerequisites: ENGL 105 or 106 and GEND 102

Description: In this course the student will study the structure of narrative by exploring how stories take shape in the five art forms of poetry, fiction, non-fiction, drama, and film. The student examines the unique elements of each of these forms of art and also how the art forms borrow elements from each other. The course also explores how the structure of a narrative both creates and enhances the narrative's meaning. This exploration includes viewing narratives from five literary perspectives: formalist, historical, psychological, archetypal/mythological, and reader-response. Coursework will include creative as well as analytical writing. Offered as needed.

**ENGL 310 Creative Writing** (3 semester hours)

Prerequisites: ENGL 105 or ENGL 106

Description: The student is familiarized with professional fiction writing through the short story, with a focus on idea generation, scene setting, characterization and plot. Other forms of fiction writing, appropriate to student needs and interests, such as gaming, screenplays, or works of various lengths, are discussed. Offered Fall Semester, annually. *Cross-listed with GEND 310 and IMED 320*

**ENGL 380 Special Topics** (1-6 semester hours)

Prerequisites: Placement by assessment

Description: This course covers topics related to composition, literature or language arts. It is an in-depth study of a selected specialized area and the content varies by semester. Offered as needed.

**ENVIRONMENTAL SCIENCE (ENVS)****ENVS 101 Introduction to Environmental Science\*** (4 semester hours)

Prerequisites: None

Description: Environmental science is the study of natural ecosystems, human impacts on the environment, and sustainable management of the Earth's resources. Processes of the physical and biological environment are used as a basis for consideration of current environmental topics. Other areas covered include: energy consumption and global warming, water and air pollution, waste management, impacts of deforestation on biodiversity and other environmental changes occurring on a global scale. Offered Fall Semester, annually.

**ENVS 104 Our Ocean World** (3 semester hours)

Prerequisites: None

Description: This course investigates the historical, geological, physical, chemical, and biological characteristics of the ocean environment. The basic language of marine science, and its underlying principles, are explored. The student pursues an understanding of the underwater history of the planet and the importance of the sciences, including the scientific method of research. Offered as needed.

**ENVS 201 Introduction to Geology** (3 semester hours)

Prerequisites: ENVS 101

Description: This course is designed to give the student a tour through the planet Earth; from the inside to the outside and from the past to the present. The large-scale structure of the Earth, formation of mountains, explosive processes like volcanoes, earthquakes, and how water, glaciers, and other weather processes can shape the landscape are covered. Offered Fall Semester, odd-numbered years.

**ENVS 211 Introduction to Renewable Energy Systems** (3 semester hours)

Prerequisites: ENVS 101

Description: This course presents: photovoltaics, solar thermal systems, green building, fuel-cells, hydrogen, wind power, waste heat, biofuels, wave power, tidal power and hydroelectric. Discussions of environment and social policy are integral components of the course. Offered Spring Semester, annually.

**ENVS 301 Global Change: Physical Processes and Human Impact** (3 semester hours)

Prerequisites: ENVS 211

Description: This course examines the physical processes and potential human impact of global climate change. The physical, chemical and biological cycles contributing to the global environment are covered with the study of the recent explosive growth of the human population, and the impacts on land, air, and water resources and on biological diversity produced by human advances in technology and society. Offered Fall Semester, even-numbered years.

**ENVS 302 Environmental Regulation and Management** (3 semester hours)

Prerequisites: ENVS 211

Description: This course covers the fundamental approaches of managing, land, air and water resources for environmental protection and pollution control. The course also covers compliance with environmental laws, regulations and policies currently in effect. Offered Fall Semester, odd-numbered years.

**ENVS 303 Environmental Impact of Agricultural and Industrial Pollutants** (3 semester hours)

Prerequisites: MATH 300 and BTEC 311

Description: The effects of human activities on the surrounding environment and water supplies are discussed from the perspective of pollutants entering water systems. A rational solution to the water supply problem may become an economic and environmental priority in the next 20 to 30 years. Offered Spring Semester, as needed.

**ENVS 350 Ecosystem Management and Restoration\*** (4 semester hours)

Prerequisites: BIOL 302 and INSC 310

Description: The student is introduced to ecosystem management through both lecture and field studies, with introductions to impacted, restored and managed areas. This course investigates ideas and concerns of ecosystems through basic theories to discussions of case studies. Local areas of consideration and concern are visited and assessed using techniques introduced through course materials. The student is expected to be well-versed to argue for or against various corrective actions, depending on different views and interests. Several protection groups and their goals, both inside and outside of government, are discussed. Successful ecosystem restoration requires a balance between site conditions and needs, as well as human impact and use necessities. The course also includes the "human factors" of economics, politics and tradition in finding working solutions for management. Offered Spring Semester, even-numbered years.

**ENVS 380 Special Topics in Environmental Science** (3 semester hours)

Prerequisites: Consent of the instructor and academic advisor

Description: This course covers topics in environmental science and renewable energy. It is an in-depth study of a selected specialized area and the content varies by semester. Offered as needed.

**ENVS 401 Environmental Modeling** (3 semester hours)

Prerequisites: ENVS 211 and MATH 220

Description: This course uses environmental models to examine environmental policies. Topics presented are: basic modeling ideas, including the systems modeling approach, model formulation, prediction and validation. Offered Spring Semester, even-numbered years.

**ENVS 402 Field Study of Environmental Pollutants** (3 semester hours)

Prerequisites: ENVS 303, MATH 300 and BTEC 311

Description: The course presents cross-discipline exposure. Topical research, specialist knowledge, and sampling to identify the presence of pharmaceutical or agricultural agents from water locally are practiced. Cataloging, reporting, and presenting findings subject the student to meaningful and extensive exposure to scientific methods, troubleshooting, design and execution of environmental science- based experiments. Offered Spring Semester, as needed.

\*Three hours of lecture, three hours of laboratory per week.

**FORENSICS (FORS)****FORS 125 Forensic Science** (3 semester hours)

Prerequisites: None

Description: This course explores the science and art of forensic investigations and the identification, proper collection and recognition of evidence. The student looks at a variety of specialty areas such as firearms, tool marks, fiber tracing, hair paint, toxicology and photography. Crime scenes are explored using critical thinking skills to produce alternative strategies by thinking creatively. Experts in forensics are guest presenters. Fundamentals of the science behind the crime are explored. Case studies are presented as group projects and the student is expected to provide several scenarios and evidence for alternative conclusions. Offered Spring Semester, annually.

**FORS 160 Introduction to Forensic Computing** (3 semester hours)

Prerequisites: None

Description: Computers are increasingly critical to forensic investigations. This course introduces the student to the basics of computer-stored data and methods of hiding, erasing and recovering data from storage media. It also explores the relationship between computer technology and crime scene investigation. Offered Spring Semester, odd-numbered years.

**FORS 270 Crime Scene Investigation** (3 semester hours)

Prerequisites: None

Description: This is a fundamental course in forensic death investigations. The areas of specialized focus include the causes, manner, physical circumstances, and mechanisms of both natural and unnatural deaths. Death scenes are examined and investigations reviewed, with evidence pertaining to how people die. In addition, the course looks at the various legal considerations and methods germane to concluding equivocal death determinations. Offered Spring Semester, annually.

**FORS 315 Forensic Entomology\*** (4 semester hours)

Prerequisites: Minimum of 45 earned semester hours and BIOL 225 or permission of instructor

Description: The forensic entomologist can use a number of different techniques including insect species succession, larval weight, length, and technical methods such as the accumulated degree-hour technique. The student is introduced to standard forensic procedures and, when practical, will see and use those procedures. Offered Summer Semester, odd-numbered years.

**FORS 360 Forensic Case Study** (3 semester hours)

Prerequisites: FORS 125 and FORS 270

Description: This course stresses field work and the application of collected evidence in the sometimes messy real world. The student analyzes several case studies, looking beyond the verdicts or newspaper reports to the actual workings of forensic science's involvement in the prosecution of criminal cases. Offered Spring Semester, annually.

**FORS 361 Criminal Profiling** (3 semester hours)

Prerequisites: FORS 125 and FORS 270

Description: This course examines the process of profiling during the investigation of a crime. The process of psychological profiling was first institutionally used by the Federal Bureau of Investigation, but there are now multiple models for criminal profiling. The student studies the various models and how they relate both to expert witness standards and scientific methodologies. The course also examines the differences of these models and their application in case studies. Offered Fall Semester, annually.

**FORS 362 Medico-Legal Death Investigation** (3 semester hours)

Prerequisites: FORS 125 and BIOL 215

Description: This course is a study of the process known as medico-legal death investigation. The course introduces the student to the legal systems surrounding the investigation of the cause and manner of death. The role of forensic pathology and the application of pathology to law are studied in relation to crime scene investigation. Natural, accidental, homicide and suicide deaths are explored in the perspective of the forensic pathologies. Offered Fall Semester, annually.

**FORS 363 Forensic Population Studies** (3 semester hours)

Prerequisites: FORS 125, FORS 270 and MATH 280

Description: This course utilizes large data sets to discern large scale crime patterns. The student is introduced to crime databases and follows criminal activity patterns correlated to such variables as physical area, time or economics. This course involves research design and statistical analysis and is a group project-driven course. Offered Spring Semester, odd-numbered years.

**FORS 364 Fraud** (3 semester hours)

Prerequisites: FORS 125 and FORS 270

Description: This course examines all aspects of fraud investigation, including medical and corporate fraud. Case studies are used and guest speakers employed in the field of fraud investigation are presenters. Practical knowledge of investigation techniques and knowledge of the common traits existing in fraud cases are examined. Offered as needed.

**FORS 365 Crime Scene Management** (3 semester hours)

Prerequisites: FORS 125

Description: This course provides a practical introduction to criminal investigation and reflects the most recent investigative techniques and technology. The course outlines the fundamentals of inquiry and detail each element of an investigation. The course covers from the outset of an investigation, case preparation, and prosecution. Offered as needed.

**FORS 366 Interrogation Techniques** (3 semester hours)

Prerequisites: FORS 125

Description: This course introduces the student to the principles of interview and interrogation by using innovative and effective techniques for obtaining information and detection of deception. The course also develops knowledge necessary to allow the student to understand laws used in dealing with interviews and interrogations. Offered as needed.

**FORS 367 Evidence** (3 semester hours)

Prerequisites: FORS 125

Description: This course demonstrates how evidence is maintained for legal integrity and presentation in a court of law. The student studies and applies the Pennsylvania Rules of Evidence in areas such as physical evidence, testimonial evidence (including fact and expert testimony), the procedure to include the introduction of evidence in court, and the scientific standard. Offered as needed.

**FORS 368 Forensic Anthropology** (3 semester hours)

Prerequisites: None

Description: Forensic anthropology is a science applied to law which focuses on the identification of remains, human or non-human, that are beyond recognition due to decompositional changes and are more or less skeletonized. Osteology is the study of bone. The student studies basic human skeletal anatomy involving the axial and appendicular skeleton. The student uses that knowledge in osteology to determine sex, age, stature, and ancestry of unknown individuals. The student is then able to apply knowledge to casework and have a general understanding of forensic anthropology laboratory practices. Offered Fall Semester, annually.

**FORS 380 Special Topics in Forensic Science** (3 semester hours)

Prerequisites: Consent of the instructor and academic advisor

Description: This course covers topics in forensic science. It is an in-depth study of a selected specialized area and the content varies by semester. Offered as needed.

**FORS 390 Independent Study** (1 to 4 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**GENERAL EDUCATION (GEND)****GEND 102 The Creative Mind I** (3 semester hours)**Psychology, English Literature and Sociology**

Prerequisites: None

Description: This course addresses learning and creativity by drawing from three fields of study: psychology, English literature and sociology. More specifically, learning and creativity are exposed by focusing on the theme of creating self-identity through self-analysis and creating self-identity through interactions with other individuals or small groups. Offered Fall Semester, annually.

**GEND 103 The Creative Mind II** (3 semester hours)**Psychology, English Literature and Sociology**

Prerequisites: None

Description: This course addresses learning and creativity by drawing from the three fields of study: psychology, English literature and sociology. More specifically, learning and creativity are explored by focusing on the theme of serving a community through involvement with its social policies. Offered Spring Semester, annually.

**GEND 104 Our Ocean World** (3 semester hours)

Prerequisites: None

Description: This course investigates the historical, geological, physical, chemical, and biological characteristics of the ocean environment. The basic language of marine science, and its underlying principles, are explored. The student pursues an understanding of the underwater history of the planet and the importance of the sciences, including the scientific method of research. Offered as needed.



**GEND 112 The Scientific Mind I** (3 semester hours)**Physical Science and Chemistry**

Description: The first course of this two-course Scientific Mind sequence presents a broad overview of modern science by integrating basic scientific principles and methodology to various disciplines of the natural and applied sciences. The overall emphasis of the scientific mind series is to begin the development of critical thinking, problem solving, experimental, mathematical, and information research skills that lie at the heart of scientific inquiry. The course emphasizes how the interplay between theory and experiment has led to our current understanding of physical science and chemistry and how this knowledge has found application towards the advancement of technology. Offered Fall Semester, annually.

**GEND 113 The Scientific Mind II** (3 semester hours)**Earth, Space, and Life Sciences**

Prerequisites: None

Description: The second course of this two-course Scientific Mind sequence presents topics from the natural sciences with the underlying framework of basic scientific principles and methodologies. This course stresses the interconnectedness of the natural world, demonstrably built on the foundations and building blocks of the basic physical sciences. Classwork includes technology applications for observing and understanding the natural world. The student explores the areas of cosmology and astronomy, earth sciences, and finally the biological sciences including genetics, ecology, and modern concepts of evolution. A student completing this sequence should have an understanding of scientific thought, advancement and philosophy that prepares them for higher-level courses. Offered Spring Semester, annually

**GEND 120 Self & Society: Introduction to Sociology** (3 semester hours)

Prerequisites: None

Description: Sociology focuses on the systematic understanding of the way self-identity, social interaction, social organization, social institutions, and social change occur in western societies like the United States. Major themes in sociological thinking include the interplay between the individual and society, how society is both stable and changing, the causes and consequences of social inequality, and the social construction of human life. Therefore, it can be said that sociology is the study of social actions, relations, and roles for both individuals and groups, researched through inductive analysis of case studies and generalizations. Understanding sociology helps us discover and explain social patterns and see how such patterns change over time and in different settings, in interaction with different people and groups. Through analyzing, discussing and writing about the social basis of everyday life, sociology also develops our ability for critical thinking, by revealing the social structure and processes that shape diverse forms of human life. Offered Summer and Spring Semesters, annually.

**GEND 130 General Psychology** (3 semester hours)

Prerequisites: None

Description: This course is a survey presentation of the fundamental theories, principles, and research methods of psychology. Emphasis is placed on psychology as the scientific study of behavior and cognitive processes. Students will be expected to demonstrate critical evaluation and creative thinking skills, an understanding of the data-gathering methods of psychology, and an ability to utilize information technology. Offered Fall Semester, annually.

**GEND 140 Introduction to Astronomy** (3 semester hours)

Prerequisites: MATH 081

Corequisites: MATH 120 or equivalent

Description: This course demonstrates how we learn about our universe; its past, present and future through application of the scientific method. Our approach to this investigation focuses on developing a conceptual understanding of the fundamental scientific theories and measurement tools used by

astronomers to deduce the properties of objects throughout the universe. The course covers the evolution of stars, galaxies, and the universe itself.

**GEND 150 The Learned Mind** (6 semester hours)

*Introduction to Philosophy and English Literature*

Prerequisites: COMM 110 and ENGL 105 or 106

Description: This course introduces the student to the readings and study of philosophy. This includes reading and reflecting on the great philosophies of modern history and, through a study of the people and their writings (literature), development of an appreciation of the power of the written word. The student is exposed to a large number of writings and learn to carefully critique both the approach and manner of writing. Offered Spring Semester, annually and Summer Semester, odd-numbered years.

**GEND 201 The Civic Mind** (6 semester hours)

*U.S. or World History, U.S. or World Politics, and Macroeconomics*

Prerequisites: GEND 102

Corequisites: ENGL 200

Description: This course draws on topics related to American history and government, macroeconomics and ecology. The course demonstrates the interconnection between these fields of study by focusing on the civic responsibility involved with decisions regarding the distribution of the nation's resources. The course provides a historical look at the American democratic system, political institutions, fiscal policy, monetary institutions and the national economy and examines the influence of these structures on public and environmental health. Offered Spring Semester, annually and Summer Semester, even-numbered years.

**GEND 225 Cinema Studies** (2 semester hours)

Prerequisites: ENGL 105 or 106 and GEND 102

Description: This survey course investigates major movies, historical events, schools of thought, and developments in the history of film and mass communication. Through readings, lectures, and independent research, the student focuses on the relationships between history, technology, and media development and explore the impact motion media and mass communication have on society and the economy. Offered Fall Semester, annually. *Cross-listed with COMM 225.*

**GEND 251 The Political Mind** (6 semester hours)

*International Governing Institutions and Global Health, Energy, Poverty, and Security*

Prerequisites: GEND 102

Description: This course introduces the student to a wide spectrum of critical global topics in governance, energy, health, poverty and security. The primary objective of the course is to encourage the student to understand international issues that affect global communities at different levels. The role of international institutions, intergovernmental and non-governmental organizations that promote globalization, environmental issues, trade, international finance, peace and human rights are covered. Offered Fall Semester, annually.

**GEND 275 Gender and Society** (3 semester hours)

Prerequisites: ENGL 105 or 106

Description: This course explains how gender affects people's lives in a variety of ways. Most people consider gender the learned or social differences between girls and boys, and women and men. Gender is a variable, and members of both sexes can vary in the extent to which they conform to gender roles and expectations. The course reviews the impact of gender on education, science, language, employment, history and politics. Offered as needed.

**GEND 300 The Cultured Mind** (6 semester hours)*World Cultures and Art*

Prerequisites: GEND 102

Description: This course integrates the study of culture and art and introduces the student to a global and comparative study of culture as a key to understanding human behavior in different societies. The formation and application of art and culture is studied in relation to the impact of religious belief and tradition in different societies. The course explores similarities and differences in the world's major cultures and attempts to pinpoint the impacts on social institutions and human behavior. Offered Summer Semester, annually.

**GEND 310 Creative Writing** (3 semester hours)

Prerequisites: ENGL 105 or ENGL 106

Description: The student is familiarized with professional fiction writing through the short story, with a focus on idea generation, scene setting, characterization and plot. Other forms of fiction writing, appropriate to student needs and interests, such as gaming, screenplays, or works of various lengths, are discussed. Offered Fall Semester Annually. *Cross-listed with ENGL 310 and IMED 320.*

**GEND 325 Consulting** (3 semester hours)

Prerequisites: None

Description: Consulting is the practice of assisting organizations or individuals through the analysis of existing situations and development of plans and solutions to address problems. The course introduces the principles and practice of consulting in modern settings through case studies, examples, and real-life projects. The course explains different types of consulting models (for internal as well as external users) and covers the consulting life cycle from engagement start to finish. Topics include: business requirements gathering and analysis; teamwork and conflict resolution; consulting skills; problem-solving; and communications skills. Emphasis is placed on producing deliverables in a timely and professional manner. Offered Spring Semester, annually.

**GEND 351 Organizational Mind** (6 semester hours)*Organizational Theory, Leadership and Microeconomics*

Prerequisites: GEND 102, COMM 110 and ENGL 200

Description: This course introduces the student to organization, leadership, and decision-making in firms and businesses by drawing from the fields of organizational theory, leadership, and microeconomics. The objective is to encourage the student to understand the significance of organization and leadership in professional, economic and entrepreneurship activities. The role and impact of organizational theory and leadership is also explored in relation to a firm's microeconomic decisions, while attempting to be successful and productive in the marketplace. Offered Fall Semester, annually and Summer Semester, odd-numbered years.

**GEND 380 Special Topics in General Education** (3 semester hours)

Prerequisites: None

Description: This course covers topics in general education. It is an in-depth study of a selected specialized area and the content varies by semester. Offered as needed.

**GEND 400 The Entrepreneurial Mind** (3 semester hours)*Business and Social Entrepreneurship*

Prerequisites: Minimum of 60 earned semester hours

Description: The student studies and compares key features of entrepreneurship from two important vantage points: business entrepreneurs and social entrepreneurship. The drive and creativity of individuals who question the status quo and explore new opportunities are examined. The student reads stories, completes case studies, and speaks with community entrepreneurs. Examples are taken from business and others from ordinary people who do remarkable work. The objective of this course is to

help the student identify a specific entrepreneurial spirit, set goals, and develop skills in entrepreneurship. Offered Spring Semester, annually.

**GEND 425 Globalization** (3 semester hours)

*Trade and Finance*

Prerequisites: Minimum of 60 semester hours completed

Description: This course explores the significance of trade and finance by investigating the benefits and harms of globalization as it relates to world economic development. The course also probes the role of international organizations that promote well-being and security. Offered Fall Semester, even-numbered years.

**GEND 450 The Healthy Mind and Body** (3 semester hours)

*Personal and Environmental Health*

Prerequisites: Minimum of 60 earned semester hours

Description: This course provides the foundation for a study of various current health issues. The student investigates a topic related to personal, community or environmental health to conduct research, formulate an opinion of the topic, discuss relevant facts, and write about the topic. The projects in this class focus on the development of competence in both oral and written communication and information literacy. Offered Fall Semester, annually.

**GEND 460 The Ethical Mind: Research Ethics and Scientific Integrity** (3 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course addresses the important issues of professional ethics in sciences. These include normative standards of conduct and research integrity in diverse scientific disciplines. The course covers the core instructional areas identified by the U.S. Public Health Service's Office of Research Integrity. The student will learn how to apply an ethics method to recognize and deal effectively with issues pertaining to human/animal experimentation, conflicts of interest, collaborative research, peer review, and other important issues that will benefit them now and in their future personal, academic, and professional endeavors. Offered Fall Semester, annually.

**GEND 465 The Ethical Mind: Ethics in a Digital Age** (3 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course examines current issues in digital technologies from a range of ethical frameworks. While professional codes of conduct and ethical workplace practices are addressed and examined, the course focuses on critical thinking about the role of the software designer in the workplace, community, and world. *Cross-listed with CISC 490*. Offered Spring Semester, annually.

## **GEOSPATIAL TECHNOLOGY (GSTC)**

**GSTC 100 Exploring Geographic Information Systems** (2 semester hours)

Prerequisites: None

Description: This course focuses on the concepts of Geospatial Technology, including topology, projections, data modeling and spatial operations managed by Geographic Information Systems (GIS). The course includes lectures on GIS concepts and usage as well as GIS exercises include data capture, storage, query, analysis, display and output using ArcGIS software. The course also introduces the student to other Geospatial Technology like Global Positioning systems and Remote Sensing. *Limited to the Dual Enrollment student*. Offered Summer Semester, annually.

**GSTC 130 Applied Geography** (3 semester hours)

Prerequisites: None

Description: This course has three specific ways of looking at the geography of the world: 1) World Geography – where regions of the world are examined based on human and physical features; 2) Applied Geography – which focuses on applying physical and human geography concepts to phenomenon such as environmental, political, and economic; and 3) how modern geospatial technology is changing the way geographic information is studied and used. Laboratory exercise include research and map exercises for world geography, worksheets and diagramming for physical geography exercises, and final project research into a selected applied geography topic of interest to each student. Offered Fall Semester, annually.

**GSTC 140 Introduction to GIS** (4 semester hours)

Prerequisites: None

Description: This course focuses on the first of three primary Geospatial Technologies, Geographic Information Systems, but also introduces students to Remote Sensing and Global Positioning Systems (GPS). The course includes both lecture on concepts and applications as well as laboratory exercises designed to develop students abilities in core GIS functionality. GIS exercises include spatial data capture, storage, query, analysis display and map output using the industry standard, ArcGIS software. Practical applications of GIS to areas such as environmental analysis, land use planning, emergency management and fundamental mapping techniques. Students finish the course by completing a custom mapping project on a topic of interest to them. Offered Spring Semester, annually.

**GSTC 210 Cartography** (3 semester hours)

Prerequisites: GSTC 140

Description: The presentation of data is both an art and a science. The student uses GIS to produce high-quality maps that expose complex spatial information and relationships in a clear and easy-to-understand display. Cartographic concepts and techniques, used to create not only hard copy printed maps but also prepare cartographic data for modern devices such as web pages and digital media, are explored. The class emphasizes laboratory work and a final project that uses GIS from an initial map concept, through data collection and analysis, to a final product. Offered Fall Semester, annually.

**GSTC 220 Applied Geospatial Technology** (4 semester hours)

Prerequisites: GSTC 140

Description: This course bridges the gap between the concepts and tools introduced in GSTC 140 and the more advanced functions of ArcEditor/ArcInfo, including spatial operations and data modeling. The student integrates diverse datasets, creates methodologies for data conversion/migration, and develops guidelines for spatial data quality control. The course continues to build competency in alternative GIS software solutions including Open Source GIS. Advanced modules of ArcGIS, including Spatial Analyst and 3D Analyst, are introduced. Offered Spring Semester, annually.

**GSTC 240 GIS Policy** (4 semester hours)

Prerequisites: GSTC 140

Description: Through the use of geospatial technology examples, the current policy on managing data for public administration and public policy is explored. The student utilizes knowledge and skills in geospatial technology to understand the impact and constraints it places on both public and corporate policies. Knowledge of GIS is used to explore emerging public policy, professional standards, ethics, and future directions of geographic data. Offered Spring Semester, annually.

**GSTC 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours

Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**GSTC 340 Advanced Spatial Analysis** (4 semester hours)

Prerequisites: GSTC 220

Description: This course focuses on critical evaluation of real-world case studies to determine the appropriate spatial data and advanced-level geospatial technology and tools to analyze, replicate and improve upon past solutions. The student works independently and in teams to develop and apply geospatial problem solving skills to a range of real-world scenarios. The growing requirement for the integration of GIS and 3-D building information modeling (BIM) for use in facilities management and emergency response is explored. Offered Fall Semester, odd-numbered years.

**GSTC 350 Spatial Software and Database Development I** (4 semester hours)

Prerequisites: CISC 160 and GSTC 220

Description: This course introduces the student to basic topics in spatial database and software design and creation. Building on skills acquired in prerequisites in both GIS and Computer Science, the student uses industry standard tools and technologies to explore and develop foundational components of a functioning spatial web application and database. The bulk of the classroom time will be spent on a practical project in small groups with guidance from the instructor. The student must demonstrate a final project at the end of the semester. Offered Spring Semester, annually.

**GSTC 360 Sub-Arctic Geospatial Field Studies** (4 semester hours)

Prerequisites: GSTC 130 and GSTC 140

Description: This course exposes the student to the application of geographic and geospatial technology knowledge in a field studies environment. Learning activities focus on regional and cultural geography, geomorphology, climatology and GPS/GIS field data collection. Exposure to different cultures and environments is intended to provide practical experience with global awareness and a broader, more external, understanding of informational literacy. Offered as needed.

**GSTC 365 Internship** (3 semester hours)

Prerequisites: SEMR 300 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guide the learning process. The student integrates the collective observations, analyses, and reflections of this experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**GSTC 380 Special Topics in Geospatial Technology** (3 semester hours)

Prerequisites: None

Description: This course covers emerging topics in geospatial technology. It is an in-depth study of a selected specialized area and the content varies by semester. Offered Spring Semester, even-numbered years.

**GSTC 390 Independent Study** (1 to 4 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**GSTC 450 Spatial Software and Database Development II** (4 semester hours)

Prerequisites: CISC 160, CISC 300 and GSTC 220

Description: This course immerses the student into advanced topics in spatial database and software design and creation. Building on skills acquired in prerequisites in both GIS and Computer Science, the student uses industry standard tools and technologies to design and create a functioning spatial web application and database. The bulk of the classroom time will be spent on practical project in small groups with guidance from the instructor. The student must demonstrate a final project at the end of the semester. Offered Fall Semester, annually.

**GSTC 460 Satellite Remote Sensing** (4 semester hours)

Prerequisites: GSTC 220 and a minimum of 60 earned semester hours

Description: Remote sensing through the use of satellites and other aircraft is the science of acquiring and analyzing information about feature or phenomena from a distance. Satellite-borne sensors observe, measure and record the electromagnetic spectrum reflected or emitted by the earth and its environment for subsequent analysis and extraction of the information. Applications for satellite remote sensing include military surveillance, oil, insurance, real estate, transportation, city planning, environmental monitoring and other uses. The student works with raster-based satellite and aerial images to manipulate and analyze the electromagnetic signatures gathered from this technology. Offered Fall Semester, odd-numbered years.

**GSTC 498 Project II** (3 semester hours)

Prerequisites: GSTC 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration(s). It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

**INTERACTIVE MEDIA (IMED)****IMED 102 Exploring Video Gaming** (2 semester hours)

Prerequisites: None

Description: This course introduces the student to the video game development workflow. The student has an intensive one-week experience working in small teams to develop prototypical game projects. The student leaves the course with a portfolio piece and new skills in programming, game design, graphics arts, public speaking and team building. *Limited to the Dual Enrollment student.* Offered Summer Semester, annually.

**IMED 105 Introduction to Game Modding** (2 semester hour)

Prerequisites: Two years of high school algebra or equivalent

Description: Many video game companies are actively promoting “modding” (the modification of) existing video games, a trend sweeping the industry. This course is a mix of game design and game play. Skills needed to create maps, import models, and mod nearly every aspect of the game experience are taught. Once completed, the student leaves with the latest tips and tricks to begin a career path in game design and development. Offered Fall Semester, even-numbered years.

**IMED 110 Introduction to Digital Design** (2 semester hours)

Prerequisites: None

Description: Digital design introduces the essentials of visual computing, graphics, web technologies, and the design disciplines (graphic, information, game, social, and interactive) to the student interested in interactive media. Emphasis is placed on image manipulation, HTML/CSS design, crafting interactive experiences, and 3D modeling. By reviewing these fields of interest, the student is more prepared to choose a focus for continued study. Offered Spring Semester, annually.

**IMED 170 Visual Design Fundamentals** (4 semester hours)

Prerequisites: None

Description: This course introduces the basic concepts of design on print and time-based digital media. The principles of composition and color theory, and how these are affected by movement, duration and display, are covered. Vector and bitmap manipulation tools are explored in relation to graphic production across the design fields. Offered Fall Semester, annually.

**IMED 200 Cross-Media Communications** (2 semester hours)

Prerequisites: None

Description: Cross-media communications are integrated, interactive experiences that occur across multiple media, with multiple authors and have multiple styles. This course presents how the audience becomes an active participant in the cross-media experience. Offered as needed.

**IMED 205 Critical Game Studies** (2 semester hours)

Prerequisites: ENGL 105 or 106

Description: This course combines approaches from history, literature, media studies, and design. A key goal of critical game studies is to develop and refine a critical vocabulary for articulating the aesthetics of games. This includes both the distinctive features unique to games and those they share with other forms of media and culture. Also included here are: the history of computer and digital games and toys; the construction and critique of a canon of significant and influential games; and game criticism and journalism. Offered Fall Semester, annually.

**IMED 240 Interactive Media I** (4 semester hours)

Prerequisites: CISC 290 or IMED 170

Description: The fundamental theory and practice of new media is explored in this course. It prepares the student for creative expression and technology application in all aspects of multimedia for effective message communication, whether it is for a specific product, a game or entertainment site, instruction, or eCommerce. New and emerging interactive digital media is used to create, store, transmit and sell products and services. The student may work on a project to enhance a local employer to recruit and expand business. Offered Spring Semester, annually.

**IMED 250 Video Production I** (2 semester hours)

Prerequisites: COMM 225

Description: This course explores the fundamental theory and practice of creating digital media. The course also prepares the student for creative expression and technology application in all aspects of media for effective message communication, whether it is for a specific product, a game or entertainment site,



instruction, or eCommerce. New and emerging digital media tools are used to create, store, transmit and sell products and services. The student employs these new skills to develop portfolio-ready pieces. Offered Spring Semester, annually.

**IMED 251 Video Production II** (2 semester hours)

Prerequisites: IMED 250

Description: This course builds on digital video production skill development. The student uses visual design principles, motion graphics, sound design, and creative camera techniques and editing to produce client-based projects. This course also includes considerable training on the use of studio equipment, including its care and maintenance. Offered Fall Semester, annually.

**IMED 255 Audio Production** (3 semester hours)

Prerequisites: None

Description: Audio production can make or break media-based projects. Understanding how sound is created, recorded, processed and managed in digital formats is at the heart of crafting interactive experiences. This course is designed as an introduction to computer based recording, editing, mixing and production of sound. A software purchase is required. Offered Fall Semester, annually.

**IMED 290 Game Analysis Laboratory** (1 semester hours)

Prerequisites: None

Description: This laboratory-intensive course examines the various components of game design. The student will examine archetypical games to study the fundamental structure, principles, and methodologies behind the design process. The student is required to maintain a laboratory notebook, documenting the process of empirical research and game genre exploration. Offered Spring Semester, annually.

**IMED 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours

Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**IMED 300 3D Modeling I** (3 semester hours)

Prerequisites: None

Description: Media arts and animation is used in various industries including architecture, television, advertising, education, and forensics. Skills needed in the media arts and animation industry include design, illustration, compositing, and three-dimensional computer modeling. Additionally, the student improves skills in story development, background and layout design, and special effects. This interactive course utilizes industry-related technology and software. Offered Fall Semester, annually.

**IMED 310 3D Modeling II** (3 semester hours)

Prerequisites: IMED 300

Description: The creation of rigs and the motion of characters and objects in games and animation are explored, including full character, muscle, facial, and dynamic rigs. Also reinforced are the principles of animation, such as movement and weight. Offered Spring Semester, annually.

**IMED 320 Creative Writing** (3 semester hours)

Prerequisites: ENGL 105 or ENGL 106

Description: The student is familiarized with professional fiction writing through the short story, with a focus on idea generation, scene setting, characterization and plot. Other forms of fiction writing, appropriate to student needs and interests, such as gaming, screenplays, or works of various lengths, are discussed. Offered Fall Semester Annually. *Cross-listed with ENGL 310 and GEND 310.*

**IMED 330 Information Visualization** (3 semester hours)

Prerequisites: IMED 170 and MATH 280

Description: The increasing amount of data that an individual is exposed to is simultaneously creating an increase in cognitive load. Information Visualization (InfoVis) systems and techniques are intended to aid in dealing with this deluge. Information visualization is the use of interactive interfaces to visually represent abstract data. This course is intended for the student interested in understanding and utilizing information visualization in their own work. Offered Fall Semester, annually.

**IMED 340 Interactive Media II** (4 semester hours)

Prerequisites: IMED 240

Description: This course focuses on analyzing, managing, producing, and deploying interactive media projects. Topics include: initial planning, proposal writing, information architecture, interface design, project management, user testing, and installation. The student develops various project ideas and presents a final design concept to potential museum, hospitality, theme park or government agency client. Software, hardware, and resources vary based on technical aspects and unique aesthetics of an interactive encounter. Offered Spring Semester, annually.

**IMED 350 Digital Photography** (3 semester hours)

Prerequisites: None

Description: This course is designed to introduce three major components of digital photography; camera mechanics, image composition and digital photo editing. The student is expected to confidently control the photographic process and produce a portfolio of work that has been carefully imagined, executed, edited and presented. A digital SLR camera and Adobe Creative Cloud license are required for this course. Offered Fall Semester, annually.

**IMED 365 Internship** (3 semester hours)

Prerequisites: SEMR 300 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guide the learning process. The student integrates the collective observations, analyses, and reflections of this experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**IMED 380 Special Topics in Interactive Media** (3 semester hours)

Prerequisites: Consent of the Instructor and Academic Advisor

Corequisites: 60 credit hours completed

Description: This course covers emerging topics in Interactive Media. It is an in-depth study of a selected specialized area of Interactive Media and the content varies by semester. Offered as needed.

**IMED 385 Game Design** (3 semester hours)

Prerequisites: ENGL 200

Description: This is a studio course that explores and teaches the principles, mechanics and processes of game design. The student is shown the fundamental philosophies of game design and how to apply them to various entertainment and educational projects. The tips, tools, and techniques taught in this course exist to provide practical resources needed to develop skills and strategies for individuals interested in exploring careers in the game design industry. Offered Fall Semester, even-numbered years.

**IMED 390 Independent Study** (1 to 4 semester hours)

Prerequisites: IMED 240 and a minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**IMED 400 Interactive Studio** (4 semester hours)

Prerequisites: IMED 340

Description: This course is an upper-level production course focusing on the creation of innovative, workable prototypes using a variety of interactive techniques and emerging technologies. New media (games, digital simulations, mobile applications, and social experience design) is the latest development genre and are analyzed as cultural artifacts. The aesthetics of user experience, personal interaction, and delivery systems are covered along with an analysis of leadership techniques used in independent and AAA production firms. Offered Spring Semester, annually.

**IMED 485 Game Development** (4 semester hours)

Prerequisites: IMED 385

Description: As the growth of digital simulations and entertainment continues, this course is an opportunity for the student to examine models and strategies for creating digital games. Through lectures, hands-on labs, and team projects, the student gains experience applying the fundamentals of game design into the development process. Projects are developed using standard game development environments and provide interactive media experiences for the student's e-portfolio. Offered as needed.

**IMED 498 Project II** (3 semester hours)

Prerequisites: IMED 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration. It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

**INTEGRATIVE SCIENCES (INSC)****INSC 101 Introduction to Laboratory Sciences I** (1 semester hour)

Prerequisites: None

Description: This course introduces the student to the laboratory environment where the safe handling of material, equipment, and waste is learned. The course includes an introduction to the sciences,

specifically organic and inorganic chemistry, bio-molecules, and ecology. Experiments performed by the student using the periodic table to learn about chemical interactions, chemical synthesis and other principles supplement the course content. The biological content focuses on the links between the chemistry learned and how biology relies on controlled chemistry to function at the cellular level. The course culminates at the ecology level on how species are identified and interact with one another. *Limited to the Dual Enrollment student.* Offered as needed.

**INSC 102 Introduction to Laboratory Sciences II** (1 semester hour)

Prerequisites: INSC 101

Description: This course is a continuation of the introduction to the sciences, specifically organic and inorganic chemistry, bio-molecules, and ecology. Experiments performed by the student using the periodic table to learn about chemical interactions, chemical synthesis and other principles supplement the course content. The student is shown how to separate, measure, account and record starting materials against what is attained and use equations to predict actual and theoretical yields. Weak acids and bases are also discussed as these principles are extremely relevant to the bio-molecules component. The course relies on mastery of techniques from INSC 101 and those within 102 for an extended ecology project that is planned, modified and executed in the field studying a local ecosystem. *Limited to the Dual Enrollment student.* Offered as needed.

**INSC 105 Field Studies in Natural Science** (3 semester hours)

Prerequisites: None

Description: The student is introduced to the natural world in this course through discussion, multimedia and field experience. The exploration of the natural world takes the class from shores of the Susquehanna River to stellar nurseries where new stars and planets are born. The journey together builds the foundation for more intensive studies in science and personal ownership of our own discoveries. Offered Spring Semester, even-numbered years.

**INSC 110 Medical Terminology (1 semester hour)**

Prerequisites: BIOL 102/103 or High School Biology

Description: This course is designed as an introduction to the nomenclature used by various medical and dental professionals. The course focuses on learning techniques that will enable students to easily understand medical terminology. *Cross-listed with BTEC 110.* Offered as needed.

**INSC 115 The Chemistry of Life** (3 semester hours)

Prerequisites: None

Description: What's Organic about Organic Chemistry? This is one of the many discussions that occurs in the O.C. (Organic Connection). Why is organic chemistry important for a future nurse, lawyer, teacher, scientist or informed citizen? To answer this question, organic chemistry in the context of everyday life is presented. Teamwork and outdoor expeditions keeps the student moving and thinking while studying the chemistry of life. Offered as needed.

**INSC 120 The Scientific Method and Public Opinion** (3 semester hours)

Prerequisites: None

Description: Public opinion is often dictated by preconceived notions, tradition and superstition. This class uses the power of the scientific method, experimental design and statistics to explore some of the things accepted by the public as givens: lunar cycle effects; life, death and holidays; and superstition and old wives' tales. Data-mining techniques are employed, followed by a discussion and application of the appropriate quantitative methods to explore the phenomena under scrutiny. This course has field trips, with one overnight stay. Relations with local hospitals and police officials are developed for access to data. Offered Summer Semester, annually.

**INSC 140 Introduction to Integrative Science** (3 semester hours)

Prerequisites: None

Description: Many things live side-by-side with humans, often remaining hidden from day-to-day life yet thriving among homes and city streets. Humanity's reach has been extended through ceaseless questioning and technology to observe the very large and the very small. Telescopes, microscopes, and swarming satellites overhead all assist to understand both the world around us and our place within it. The student is introduced to the natural world through science and science's tools of observation, and will learn to ask the questions which expand the mind and ignite the innate sense of wonder and curiosity. Offered as needed.

**INSC 180 Integrative Science** (3 semester hours)

Prerequisites: None

Description: The student continues the exploration of the natural world through the use of active, collaborative approaches to help connect mechanisms, ideas, patterns, and numeracy measures amongst fields which are often considered to be distinct and separate. The nature of such vital elements as molecules of life, the earth and cosmos, diversity and biodiversity, evolution, and strategies for successful ecosystems are explored. Offered Spring Semester, annually.

**INSC 200 Applications of Field Ecology** (4 semester hours)

Prerequisites: CHEM 151-152, INSC 180 and MATH 120

Description: Organism data is used to understand evolutionary relationships. Field ecologists collect ranges of species samples and specimens. This work is crucial for learning how and where new infections and invasive species evolve. Applied molecular biology is studied and practiced. One to three field trips are required. Offered Fall Semester, as needed.

**INSC 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours

Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**INSC 310 Conservation Biology** (3 semester hours)

Prerequisites: BIOL 305

Description: This course covers the importance of biodiversity, the existence of a wide variety of plant and animal species in their natural environment, and the causes and consequences of its reduction and the efforts at prevention of its loss. The student becomes familiar with the history of conservation efforts and identifies instances of success and failure. Material includes applications of conservation science to single species, communities or ecosystems. Offered Spring Semester, odd-numbered years.

**INSC 320 The Study of Disease** (3 semester hours)

Prerequisites: BIOL 281-282, minimum of 45 earned semester hours, or permission of instructor

Description: The human body is studied in health and disease with a focus on the contemporary causes of human pathology. Information on metabolic and infectious disorders that effect major body systems is explained. The study surveys system organ structure and metabolic/genetic aspects of disease, from simple to complex. Offered as needed.

**INSC 335 Field Studies: Estuarial Ecosystems – Chesapeake Bay** (3 semester hours)

Prerequisites: Minimum of 45 earned semester hours or permission of instructor

Description: This course introduces the student to a broad range of subject areas in matters associated with the Chesapeake Bay and its watershed. During the week-long field trip, the ecologically-rich area is visited and studied. Historic and economically important sites are also visited. Research methodologies are introduced to the student and participation leads to a better understanding of the environment.

Offered Summer Semester, annually.

**INSC 336 Field Studies: Tropical Ecosystems** (3 semester hours)

Prerequisites: Minimum of 45 earned semester hours or permission of instructor

Description: This course introduces the student to a broad range of subject areas in matters associated with tropical ecosystems. During the week-long field trip, the ecologically-rich area is visited and studied. Historic and economically important sites are also visited. Research methodologies are introduced to the student and participation leads to a better understanding of the environment. A non-refundable deposit of \$500 is required in order to preregister for this course. Offered Spring Semester, annually.

**INSC 337 Field Studies: Wetland Ecosystems** (3 semester hours)

Prerequisites: Minimum of 45 earned semester hours or permission of instructor

Description: This course introduces the student to a broad range of subject areas in matters associated with wetland ecosystems. During the week-long field trip, the ecologically-rich area is visited and studied. Historic and economically important sites are also visited. Research methodologies are introduced to the student and participation leads to a better understanding of the environment. A non-refundable deposit of \$500 is required in order to preregister for this course. Offered Summer Semester, annually.

**INSC 340 Community Health and Research** (3 semester hours)

Prerequisites: Minimum of 45 earned semester hours

Description: This course provides the foundation for a study into relevant community health topics facing area residents. The course has three important and integrated components: reading and discussion in seminar fashion on a variety of subjects related to community health, environmental health and research practices; the development, investigation and conduct of a community-based research project mentored by the faculty or a business/agency partner; and, the synthesis of the results and implications of the research into a final public and poster presentation. This course stresses both oral and written communication in issues of science and public policy (content, process and competency). Offered Spring Semester, odd-numbered years.

**INSC 350 Animal Behavior\*** (4 semester hours)

Prerequisites: INSC 180 or permission of instructor

Description: This course exposes the student to a broad range of topics within the area of animal behavior, from evolutionary and ecological perspectives. Natural selection and adaptation as functions of behavioral ecological and socio-biological processes are the focus. Ethological questions are also addressed. Offered Fall Semester, odd-numbered years.

**INSC 365 Internship** (3 semester hours)

Prerequisites: SEMR 200 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guide the learning process. The student integrates the collective observations, analyses, and reflections of this experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed

throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**INSC 380 Special Topics in Integrative Sciences** (3 semester hours)

Prerequisites: None

Description: This course covers emerging topics in integrative sciences. It is an in-depth study of a selected specialized area and the content varies by semester. Offered as needed.

**INSC 390 Independent Study** (1 to 4 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered as needed.

**INSC 401 Nanoscience** (3 semester hours)

Prerequisites: CHEM 210 and PHYS 210

Description: This course is an inter-disciplinary course in nanoscience, from a first principles perspective. The course also covers societal and environmental impacts of nanotechnology. Offered Fall Semester, even-numbered years.

**INSC 410 Epidemiology** (3 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course studies how diseases are detected, identified, and distributed within populations. Epidemiology is the study of the distribution and determination of health-related states or events in specific populations and the application of this study to the control of health problems. The student is shown the medical and scientific investigative skills needed to critically think, strategize, and predict new epidemics and control current ones. Mathematics is used to model disease progression. Offered Spring Semester, even-numbered years.

**INSC 498 Project II** (3 semester hours)

Prerequisites: INSC 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration(s). It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

\*Three hours of lecture, three hours of lab per week.

## **MANAGEMENT AND eBUSINESS (MEBA)**

**MEBA 100 Exploring Entrepreneurship** (2 semester hours)

Prerequisites: None

Description: This course focuses on entrepreneurship and innovation. The goal is to improve the participant's understanding, insight, and skill as a potential entrepreneur. The key skill areas addressed are

creativity, critical thinking, collaboration and communication. The topic of ethical decision-making as a component of entrepreneurship is also addressed. This course is designed for the student who is interested in defining and transforming a creative, problem solving idea into a sustainable business or program. *Limited to the Dual Enrollment student.* Offered Summer Semester, annually.

**MEBA 104 Special Topics in IMED** (1 – 6 semester hours)

Prerequisites: None

Description: This course covers topics in Management and eBusiness. Offered as needed.

**MEBA 110 Introduction to eBusiness Management** (3 semester hours)

Prerequisites: None

Description: This course introduces the basic concepts of conducting and managing business through a large number of real-life case studies and examples. Modern enterprises and the evolution of those enterprises through adoption of the Internet and Web technologies are examined. The student is exposed to different models such as eBusiness, eCommerce, eGovernment, eMarketing, eManagement, eProcurement and eSupply chains. Offered Spring Semester, annually.

**MEBA 210 Introduction to Internet and Web Technologies** (3 semester hours)

Prerequisites: None

Description: The main objective of this course is to introduce the current as well as emerging Internet and Web technologies that enable and drive the modern enterprises. The student is exposed to the key building blocks (enterprise applications, computing platforms, databases, and networks) of the modern Internet-Web infrastructure. Through experiments and examples, the main ideas of the Internet, the ISPs, wireless networks, Classical Web, Semantic Web, XML, Web 2.0, social networking, wireless web, and mobile apps are explained. The course exposes the student to the main aspects of web-based software development processes through simple hands-on projects. The student is introduced to the basic software concepts by developing simple web sites by using HTML5 and CSS3 and then using Javascript, Java applets, XML and XSL to introduce more sophisticated features. The student also has an opportunity to develop a simple web portal that involves simple database queries by using SQL. Offered Fall Semester, annually.

**MEBA 220 Principles of Business Management** (3 semester hours)

Prerequisites: None

Description: The student is provided with analytical tools to understand and synthesize the most current applications of theories and concepts in business management and is exposed to the debate on the dynamic of business environment, evolving business models, economic systems, and scale of domestic and global competition in the market place. Offered Fall Semester, annually.

**MEBA 230 Marketing** (3 semester hours)

Prerequisites: None

Description: The student is provided with analytical tools to understand and synthesize the most current applications of theories and concepts in marketing. The student is shown how to design strategic planning for competitive advantage in the marketplace and is encouraged to explore the essence of marketing environment and the global vision for business marketing. Topics such as consumer and business marketing, segmentation, support systems in marketing, product concepts and management, marketing channels and supply chain management are explored. Offered Spring Semester, annually.

**MEBA 298 Project I** (3 semester hours)

Prerequisites: SEMR 200, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor, and a minimum of 40 earned semester hours

Description: This first project in the student's experiential program challenges the student to identify, investigate and analyze a particular topic in the program of study or a concentration. A key objective is to



apply skills, methods, and knowledge obtained in prior courses with independent thinking and research; the final product represents the successful and purposeful application of knowledge. The project is undertaken with the close mentorship of a faculty member, and may involve a community partner. Projects can involve scientific-based research or laboratory experiences, needs analysis or development plans for external organizations, or market studies and business plan proposals. Offered as needed.

**MEBA 310 eCommerce and mCommerce** (3 semester hours)

Prerequisites: MEBA 110 and MEBA 210 or CISC 120; MEBA 210 may be completed concurrently

Description: This course studies, analyzes and evaluates the business and technical aspects of eCommerce and mCommerce (mobile commerce). Business strategies to start a business, advertising a business, and selling the business product are covered. Case studies are used to explain the business process that needs to be automated to support the eCommerce and mCommerce initiatives. Economic trends and emerging web and mobile computing technologies are explored to understand the technical, business, and social processes that are shaping the electronic marketplace. Offered Fall Semester, even-numbered years.

**MEBA 320 Financial and Managerial Accounting** (3 semester hours)

Prerequisites: MEBA 220 and a minimum of 45 earned semester hours

Description: This course explores the basic financial and managerial accounting competencies needed to manage a business or product line. The accounting concepts are introduced with a discussion of how general purpose financial statements reflect the business corporation's performance and position for users external to management. The course also examines major elements of the statements such as cash, receivables, inventory, long-lived assets, depreciation, payroll, bonds, and other liabilities and stocks. Concepts of financial accounting are applied to management accounting for internal reporting and decision-making. The course emphasizes applications of accounting strategies, decision-making, and evaluation. A conceptual framework is established to enable managers to be profitable and to read and understand ledgers. Accounting information systems commonly used (e.g., Quickbooks) are examined by the student. Offered Fall Semester, even-numbered years.

**MEBA 330 Sales and Sales Management** (3 semester hours)

Prerequisites: MEBA 210 and MEBA 220

Description: This course examines sales management strategies, approaches and best practices in creating an adaptive sales force. Areas explored include the human dimension of hiring and firing employees, how to look proactively at how to market and sell in a global and technological environment, and identify where people skills and competencies are vitally important. The productivity and assessment of the sales force, through motivation and training, are also explored. Methods to advertise and sell over the Internet are studied. Current events, market trends and areas, and regional associations for the various sales trades are covered. Offered as needed.

**MEBA 350 Financial Management** (3 semester hours)

Prerequisites: MEBA 220 and a minimum of 45 earned semester hours

Description: This course covers the principles of corporate finance and examines the foundations of tools for successful financial management. Concepts of corporate finance and the basic tools for financial decision making are presented. The student is then exposed to capital budgeting, capital markets and securities, risk and return on investment, dividend policy, derivatives, valuation, cost of capital, capital structure, short and long-term investment decisions, financial implications of mergers and acquisitions, and other recent and relevant topics. Offered Spring Semester, odd-numbered years.

**MEBA 352 Consumer Behavior** (3 semester hours)

Prerequisites: MEBA 230

Description: This course includes an understanding of consumer behavior in the digital marketplace and the foundation for digital marketing strategy. The student is introduced to consumer segmentation, use of

consumer research, and trends in adoption of digital media. Exploration for channels of digital communications including desktop, mobile, tablet, gaming and TV are discussed and analyzed. The student is shown how to plan and execute basic consumer research using digital tools and the use of CRM (customer relationship management) tools to track and market to different consumer types. Offered as needed.

**MEBA 354 Integrated Marketing Communications** (3 semester hours)

Prerequisites: MEBA 230

Description: Agencies and individuals need to possess expertise in professional marketing practices and mediums. Integrated marketing merges all aspects of marketing communication such as advertising, sales promotion, public relations, direct marketing and social media, through a mix of tactics, methods, channels, media and activities into a unified user-centric strategy. Through critical evaluation and marketplace analysis, the student applies theories, utilizes frameworks, examines case studies, and integrates marketing practices in both team and individual projects. Offered as needed.

**MEBA 360 Healthcare Systems** (3 semester hours)

Prerequisites: None

Description: This course introduces the business, operational, and management aspects of healthcare. Through case studies and examples, the student is introduced to a wide range of healthcare topics such as healthcare business processes, healthcare clinical systems and services (patient care, physician support systems, healthcare networks), hospital systems, healthcare management, and government regulations. Offered Fall Semester, even-numbered years.

**MEBA 365 Internship** (3 semester hours)

Prerequisites: SEMR 200 or permission, an approved learning contract, permission of Office of Experiential Programs, designation of an appropriate academic advisor, and a site supervisor

Description: An internship allows the student to put theory into practice. The student applies classroom experiences to the workplace at an off-site placement, where ideas are tested and competencies and skills are developed. Throughout the internship, the student works regularly with a faculty supervisor, the Office of Experiential Programs, and a site supervisor who guide the learning process. The student integrates the collective observations, analyses, and reflections of this experiential team into an internship portfolio that showcases the accomplishments of the experience. The unique portfolio is constructed throughout the internship, and represents the evolutionary and dynamic nature of the learning process. Offered as needed.

**MEBA 366 Search Engine Optimization and Search Engine Marketing** (3 semester hours)

Prerequisites: MEBA 210

Description: Search Engine Optimization and Search Engine Management (SEO, SEM) instructs the student to optimize websites and ads to outperform the competition, to drive traffic to the desired website by learning and practicing keyword research and implementation strategies, and to utilize social media leveraging tactics for video, image and landing page optimization. Offered as needed.

**MEBA 370 User Experience Design and Interactive Development** (3 semester hours)

Prerequisites: None

Description: The student is shown the importance of why establishing a high level of end-user and client involvement is absolutely critical in creating usable and effective software and technology that attracts audiences and/or generates revenue. User-experience design (UXD) describes an approach to business analysis and technology development that demands user interaction and user feedback in all stages of the development lifecycle. Offered as needed.

**MEBA 375 Statistics for Managers** (3 semester hours)

Prerequisites: MATH 280

Description: This course applies statistical knowledge to business. It explains to the student the managerial use of data for decision making and systematic problem solving using basic statistical concepts. The student explores the ability to collect business data, ask the right questions, analyze the collected data using both descriptive and inferential statistical tools, and how to formulate and test hypothesis. The student is expected to master probability concepts and understand their role in probabilistic decision making. Topics covered include: descriptive statistics, probability distributions, sampling and sampling distributions, interval estimation, hypothesis testing, and regression (simple linear and multiple). Offered Fall Semester Annually and as needed.

**MEBA 380 Special Topics in Management and eBusiness** (3 semester hours)

Prerequisites: MEBA 110 and MEBA 210

Description: This course covers emerging topics in management and eBusiness. The topics change as the field evolves but will span management strategies, emerging eBusiness models, next generation of digital enterprises, emerging technologies, globalization trends, or a combination of multiple trends. Offered Summer Semester, even-numbered years.

**MEBA 381 Special Topics in Digital Health** (3 semester hours)

Prerequisites: MEBA 360 and permission of instructor

Description: This course covers emerging topics in Digital Health. The topics will change as the field evolves but will span digital healthcare management, security and privacy issues, the role of public policies and regulations in healthcare IT, electronic health records (EHR), and the growing role of information and communication technologies in global health. Offered Spring Semester, even-numbered years.

**MEBA 382 Research Design and Methodology** (4 semester hours)

Prerequisites: MATH 280

Description: This course introduces the student to the design of experiments and quasi-experiments using statistical techniques. Various experimental issues are explored such as randomized control trials, validity, reliability, and confounding variables. The student explores the relationship between the research questions, research objectives, data collection, sampling, data quality, statistical techniques, qualitative and quantitative data, results, conclusions, and applications. Offered as needed.

**MEBA 390 Independent Study** (1 to 4 semester hours)

Prerequisites: Minimum of 60 earned semester hours

Description: This course is designed for the student who demonstrates an interest in an area of study not offered or who wishes to pursue a discipline in greater depth than possible through existing courses. An independent study counts as an elective and may not be used for accelerated or remedial credit. A learning contract between the student and instructor defines the responsibilities of the parties and specifies the learning objectives and standards for successful completion of the project. A calendar of meeting times and deadlines shall be a part of that contract. Offered Summer Semester, even-numbered years.

**MEBA 410 Business Entrepreneurship in Practice** (3 semester hours)

Prerequisites: GEND 400

Description: This course is designed for the student and working professional with interest in owning, or participating in, a successful startup. The focus of this course is on the principles that are essential to forming a successful startup company and the role of innovation in entrepreneurship. Offered Fall Semester, even-numbered years.

**MEBA 411 Entrepreneurial Investment** (3 semester hours)

Prerequisites: GEND 400

Description: The principles of investment in entrepreneurship are studied through case studies and example. An understanding of the capital required, the return on investment desired, and the potential for profit in entrepreneurial settings is expected. The student identifies and assess different investment options available to the investors, the risks involved, and how to mitigate risk. The role of foreign direct investment and the management of political risk are highlighted. From an entrepreneurial point of view, techniques for negotiating funding, and managing the investment are discussed. The student is shown how to make the company an attractive investment and positioning the company for rapid growth. Offered Fall Semester, odd-numbered years.

**MEBA 420 International Business and Strategies** (3 semester hours)

Prerequisites: MEBA 110, MEBA 220 and MEBA 230

Description: This course discusses how global markets impact managerial processes. The questions under investigation are how managers adapt their organizational practices to accommodate global and local cultures and businesses practices in different parts of the world. The course explores the best practices in global strategic management, organizational design, human resource processes and organizational behavior. Also discussed are business strategy, Porter Models, and micro-macro economics in global and extended enterprises. Global supply chains and global operation management, with an emphasis on total quality management (TQM), are also examined. Offered Spring Semester, even-numbered years.

**MEBA 430 Business Law** (4 semester hours)

Prerequisites: MEBA 110, a minimum of 60 earned semester hours, or permission of instructor

Description: This course represents a fundamental study of current acceptable practices in business law. The major types of law that pertain to business activities and start-up companies, including the legal environments in which business arise, are covered. The Constitution is discussed and different types of laws are covered, with a focus on cyber law as it applies today. Through readings, class discussions, seminars and case study analysis, the foundation of American business law is derived. Offered Spring Semester, odd-numbered years.

**MEBA 440 Leadership and Organizational Behavior in Modern Settings** (3 semester hours)

Prerequisites: MEBA 110 and a minimum of 60 semester hours completed

Description: Modern organizations are characterized by constant change, market fluctuations, increased automation, and globalization. This course explores and examines the basic framework for leadership styles and focuses on ethical leadership in times of change and crisis through use of case studies and examples. The course examines the behavior of individuals and groups in the modern global settings and concentrates on improving productivity, job satisfaction, team development and continuous improvement practices and experiences. Special attention is paid to introducing organizational change smoothly, humanistic concern for people, and cultural tolerance in a global business world. Topics include theories and case studies concerning the behavior of people in modern business organizations, analysis of the internal organizational structure and managerial roles and functions, examination of theory and design of organizational structure, and the impact of work flow, leadership styles and control systems on human behavior. Offered as needed.

**MEBA 464 eGovernment and mGovernment: Public Administration in the Digital Age** (3 semester hours)

Prerequisites: MEBA 110 and MEBA 210

Description: This course examines how eGovernment and mGovernment (mobile) are changing the way businesses and citizens interact with government. The course covers principles of public administration and discusses the role of emerging technologies to manage public assets and deliver services to the public. Highlighted are the emerging web and mobile computing technologies (e.g., Web 2.0+, text messaging,

location based services, RFID and wireless sensor networks) to improve the government services. Offered as needed.

**MEBA 470 Business Systems Analysis, Modeling and Design** (3 semester hours)

Prerequisites: MEBA 110 and MEBA 210

Description: This course prepares the student to analyze business information systems and to build models and logical designs that can be implemented later. Emphasis is on understanding the business processes and business requirements and building conceptual models that help in the analysis of business requirements. Complex systems and to build designs and architectures that can satisfy the business requirements are discussed. The course emphasizes business process modeling, business patterns, object orientation, design patterns and component-based design approaches. Topics include modern system life cycles, project management, BRODE (buy, rent, outsource, develop, extend) strategies in system building, business system modeling, requirements analysis, conceptual design, architectures, physical design, and design for the modern mobile systems with security and integration considerations. Offered Spring Semester, odd-numbered years.

**MEBA 472 Business Intelligence and Decision Support Systems** (3 semester hours)

Prerequisites: MEBA 110 and MEBA 210

Description: Modern electronically-enabled enterprises rely increasingly on knowledge that needs to be managed and processed through a variety of intelligent tools. This course covers the vital issue of business intelligence and knowledge management in modern enterprises and discusses how decision support and expert systems tools can be used for effective decision making in organizations. Topics include artificial intelligence in a business context, business intelligence and business analytics, data mining, data warehousing, click stream mining, knowledge management, decision support and expert systems, artificial intelligence principles, neural networks, learning systems, and intelligent agents in a business context. Offered as needed.

**MEBA 480 Enterprise Architectures and Integration for a Global Economy** (3 semester hours)

Prerequisites: MEBA 310

Description: Modern digital enterprises are characterized by increased automation, mobile services, extended B2B operations with global business partners, and on-demand business services. The main issue in such enterprises is to architect and integrate a very wide range of services quickly and effectively. This course highlights the role of information and communication technologies, enterprise models, and emerging service oriented architectures (SOA) standards in developing flexible and integrated business architectures. Offered Spring Semester, even-numbered years.

**MEBA 482 Quantitative Methods in Managerial Decision-Making** (3 semester hours)

Prerequisites: ANLY 400 or MEBA 375

Description: This course studies the principles of data driven decision-making. Building predictive models using regression, decision trees, and neural networks are experimented. Calculating expected values and assessing risks is also covered. These topics are examined and discussed within the managerial practices of Evidence Based Management, Total Quality Management, and Six Sigma. The student also explores business modeling, data quality, and data governance. Offered Fall or Spring.

**MEBA 485 Marketing Analytics** (3 semester hours)

Prerequisites: MEBA 375

Description: This course covers marketing strategies and decisions using quantitative analysis and modeling. It introduces the student to analytics using marketing metrics and gives the student the tools to: research needs and wants of customers; measure brands and customer access and assets; perform regression analysis and design experiments to evaluate and optimize marketing campaigns; and, use the application of marketing analytics in online and offline marketing channels. Marketing analytics, using relevant statistical software packages like R, SAS, Python, tableau, Data Xu, etc., are demonstrated. The

student is exposed to systematic and analytical approaches in making marketing decisions. Integrated marketing communications, pricing, digital marketing and quantitative analysis are examined. Examples of topics include market segmentation, market response models, customer profitability, social media in marketing, paid search advertising, product recommendation systems, mobile geo-location analysis, media attribution models and resource allocations. Offered as needed.

**MEBA 488 Marketing Research (3 semester hours)**

Prerequisites: MATH 280, MEBA 375

Description: This course uses marketing research to make business decisions. The student identifies a marketing problem, collects marketing data regarding the stated problem, analyzes the collected data, interprets findings, presents implications and findings; and applies findings as proposed business actions. The student's research includes quantitative, qualitative and mixed method approaches; they collect data using questionnaires (close and open-ended), focus groups, panels, interviews (structured and unstructured) and to analyze and interpret the results. Offered as needed.

**MEBA 498 Project II (3 semester hours)**

Prerequisites: MEBA 298, an approved learning contract, permission of the Office of Experiential Programs, designation of an appropriate academic advisor

Description: This project must be in the student's program of study or concentration(s). It should demonstrate application of the skills, methods, and knowledge of the discipline to solve a problem or answer a question representative of the type to be encountered in the student's profession. As with Project I, this is undertaken with the close mentorship of a faculty member, and may involve a community partner. The ideal project has a clear purpose that builds directly upon the learning that occurs within the student's first project and internship. Offered as needed.

## MATHEMATICS (MATH)

**MATH 081 Prealgebra (3 semester hours)**

Prerequisite: Placement by assessment

Description: This course is offered to the student who needs additional preparation in algebra or who has been away from mathematics for several years. Subject areas to be covered include: arithmetic of whole numbers, fraction and decimals, ratios and percent's, and basic algebraic concepts. Math study skills are an integral part of this course. Prepares the student for College Algebra. *Credit does not count towards graduation requirements.* Offered each semester, annually.

**MATH 082 Prealgebra Recitation (0 semester hours)**

Prerequisites: IP grade in MATH 081

Description: This course is required for the student who earned a grade of *in progress* (IP) in MATH 081 in a previous semester. The student has the opportunity to complete topics presented in MATH 081 under the supervision of an instructor on a scheduled basis. Offered as needed.

**MATH 104 Special Topics (1 – 3 semester hours)**

Description: This course covers topics in Mathematics. Offered as needed.

**MATH 120 College Algebra (3 semester hours)**

Prerequisites: MATH 081, by assessment, or C or better

Description: This course is designed for the student with an elementary knowledge of algebra. Topics include properties of real numbers, problem-solving using equations and inequalities, algebraic functions, graphing, systems of equations and inequalities, polynomial functions and graphs, exponents and radicals, the binomial theorem, zeros of polynomials, inverse functions, and applications and graphs. Free on-line

graphing and calculating utilities are used in lieu of a graphing calculator. This course meets a total of 4 hours per week to permit active learning activities each week driven by student interests or needs. Offered each semester, annually.

**MATH 210 Discrete Mathematics I** (3 semester hours)

Prerequisites: MATH 120 or MATH 220

Description: This course provides the computer science student with an understanding of multiple mathematical concepts and methods, which shape the foundation of modern information science in a form that is relevant and useful. Discrete mathematics plays a fundamental role for computer science, which is similar to that played by calculus for physics and engineering. Many concepts in computer science are best understood from a perspective that requires expertise with mathematical tools and certain reasoning skills associated with mathematical maturity. The topics covered draw on current material from several mathematical disciplines: graph theory, mathematical logic, and set theory. Offered Fall Semester, annually.

**MATH 220 Calculus I** (3 semester hours)

Prerequisites: MATH 120 or MATH 280

Description: This course introduces techniques to evaluate limits and covers continuity, special trigonometric limits, absolute value limits and differentiation of algebraic, trigonometric, and logarithmic functions. The course explores intermediate value theorem, mean value theorem, and extreme value theorem. Other topics for exploration are application and formal definition of derivative average rate of change versus instantaneous rate of change, velocity, and the introduction of the definite integral and its applications. A graphing calculator is required for this course. Offered Fall Semester and Spring Semester, annually.

**MATH 260 Calculus II** (3 semester hours)

Prerequisites: MATH 220

Description: This course focuses on the exploration of differential calculus, the derivatives of all functions. An emphasis is placed on the rules of differentiation and their proofs. The course analyzes graphs of functions using the concept of derivative and its application and includes an introduction to integral calculus, integration properties, differential equations and notation. Problem solving is learned using elementary integration techniques, elementary trigonometric integration, and hyperbolic functions. A graphing calculator is required for this course. Offered Spring Semester and Summer Semester, annually.

**MATH 261 Calculus III** (3 semester hours)

Prerequisites: MATH 260

Description: This course develops vector algebra, the calculus of more than one variable; partial derivative; volume; surface and line integrals; the polar, cylindrical and spherical coordinate systems; and the theory of vector fields. It develops the theory of vector calculus and conservative vector fields which lead to the conservation laws of nature. In addition, the course fully treats the mathematical framework of defining geometry in three dimensions. Offered as needed.

**MATH 280 Introductory Statistics** (3 semester hours)

Prerequisites: MATH 120 or MATH 220

Description: This course covers elementary topics from the probability and statistics of both discrete and continuous random variables. Topics include independence and dependence, mean, variance and expectation, and distributions of random variables. Statistics is applied to hypothesis testing. This course provides the student with a broad, general knowledge and understanding of statistics. The emphasis of this course is on the utility and practical application of statistics rather than on the mathematical derivation of statistical principles. Offered each semester, annually.

**MATH 300 Experiment Design and Analysis** (3 semester hours)

Prerequisites: MATH 120 or equivalent

Description: This course is an introduction to applied design of experiments and the statistical analysis of scientific data. It provides a detailed development of specific parametric and non-parametric statistical procedures and their application to various experimental designs. This course is well-suited for a student to apply sound data analysis technique to experimental data. Key course objectives are: designing experimental procedures to obtain the desired information, application of the statistical procedures consistent with the design, and to draw meaningful inferences from the results. Offered Spring Semester, even-numbered years.

**MATH 310 Discrete Mathematics II** (3 semester hours)

Prerequisites: MATH 210 or MATH 260

Description: This course ensures that the computer science student reaches the level of mathematical maturity necessary for the study of Computer and Information Science. Topics covered draw on current material from the study of graphs, trees, relations, algorithms and models of computation. Offered Fall Semester, annually.

**MATH 365 Numerical Methods** (3 semester hours)

Prerequisites: MATH 210 or MATH 220

Description: This course covers the math methodologies that underlie the techniques of scientific computing and related numerical methods. Topics include: direct and iterative methods for linear systems, eigenvalue decompositions and factorizations, stability and accuracy of numerical algorithms, the IEEE floating-point standard, sparse and structured matrices, and linear algebra software. Other topics may include memory hierarchies and the impact of caches on algorithms, nonlinear optimization, numerical integration, FFTs, and sensitivity analysis. Problem sets will involve use of C++ programming language. The course is intensely practical with solved examples and graded exercises. Offered Spring Semester, annually.

**MATH 380 Mathematical Modeling** (4 semester hours)

Prerequisites: MATH 220

Description: This course involves applications of mathematics to real-world problems drawn from industry, research, laboratories, the physical sciences, engineering and scientific literature. Techniques used include parameter estimation, curve fitting, calculus, elementary probability, optimization, computer programming, and ordinary and partial differential equations. People routinely solve problems using estimation, probability, optimization, and simulation or modeling techniques without considering themselves mathematicians. This course broadens and strengthens the exposure of the interested student to applications of mathematics frequently seen in industry, science, and government. Offered Fall Semester, annually.

**MATH 381 Special Topics** (1 – 4 semester hours)

Description: This course covers topics in Mathematics. Offered as needed.

**NANOFABRICATION MANUFACTURING TECHNOLOGY (NANO)****NANO 211 Materials, Safety and Equipment Overview for Nanotechnology**

(3 semester hours)

Prerequisites: CHEM 161/162, MATH 120, and PHYSICS 210

Description: Nanofabrication processing equipment and materials handling procedures with a focus on safety, environment, and health issues. *Course available only at The Pennsylvania State University – University Park campus.* Offered each semester, annually.



**NANO 212 Basic Nanotechnology Processes** (3 semester hours)

Corequisites: NANO 211

Description: Step-by-step description of equipment and processes needed in top-down, bottom-up, and hybrid nanofabrication. *Course available only at The Pennsylvania State University – University Park campus.* Offered each semester, annually.

**NANO 213 Materials in Nanotechnology** (3 semester hours)

Corequisites: NANO 212

Description: The use of materials for nanotechnology as well as the unique material properties available at the nano-scale. *Course available only at The Pennsylvania State University – University Park campus.* Offered each semester, annually.

**NANO 214 Patterning for Nanofabrication** (3 semester hours)

Corequisites: NANO 212

Description: Lithographic process from substrate preparation to exposure; process from development through inspection; advanced optical lithographic techniques. *Course available only at The Pennsylvania State University – University Park campus.* Offered each semester, annually.

**NANO 215 Materials Modification in Nanotechnology Applications** (3 semester hours)

Corequisites: NANO 212

Description: Processing steps used in modifying material properties in nanofabrication.

*Course available only at The Pennsylvania State University – University Park campus.* Offered each semester, annually.

**NANO 216 Characterization, Testing of Nanofabricated Structures and Materials** (3 semester hours)

Corequisites: NANO 212

Description: Measurements and techniques essential for controlling device fabrication.

*Course available only at The Pennsylvania State University – University Park campus.* May substitute Project I. Offered each semester, annually.

**PHYSICS (PHYS)****PHYS 210 General Physics I** (4 semester hours)

Prerequisites: High School Physics and Algebra II

Description: This course provides an introductory treatment of classical Newtonian physics and covers kinematics in one and two dimensions, vector forces, Newton's laws of motion, uniform circular motion, work, conservation of energy, momentum and angular momentum, rotational kinematics and dynamics, and simple harmonic motion. Emphasis is placed on the application of basic concepts through mathematical problem-solving. Applications of physics to problems in medicine are presented and medical technology is highlighted throughout the course. Applications of elementary and differential and integral calculus to physics are introduced. Laboratory experiments provide experience with various measurement technologies and reinforce the theoretical concepts developed. Offered Fall Semester, annually.

**PHYS 215 Principles of Physics for Nanobiotechnology** (4 semester hours)

Prerequisites: MATH 120

Description: This course covers selected topics from the primary fields of physics including: Newton's mechanics, electromagnetism, optics, thermodynamics, and modern (atomic) physics with an emphasis on applications to nanobiotechnology. Algebraic equations are used throughout the course. Offered Spring Semester, annually.

**PHYS 260 General Physics II** (4 semester hours)

Prerequisites: PHYS 210

Description: This course extends the study of classical physics and covers topics in electrostatics, magneto statics, electric circuits, electromagnetic waves, optics, interference and diffraction, and the quantum theories of atomic and nuclear physics. Mathematical problem-solving skills and applied problems in medical technology are emphasized. Applications of elementary and differential and integral calculus to physics are introduced. The course includes laboratory experiments to expose the student to advanced electronic and radiation measurement technologies and enhance the theoretical development of each topic. Offered Spring Semester, annually.

**PHYS 301 Physical Thermodynamics** (3 semester hours)

Prerequisites: CHEM 161-162, PHYS 260 and MATH 220

Description: This course is designed for the student who has an interest to apply knowledge gained in calculus, physics and chemistry to the study of thermodynamics and chemical equilibrium. Offered Fall Semester, odd-numbered years.

**PHYS 315 Quantum Mechanics and Spectroscopy** (3 semester hours)

Prerequisites: CHEM 220, PHYS 260 and MATH 260

Description: This course integrates knowledge gained in calculus and physics to atoms and molecules of chemistry. Quantum mechanical theory is introduced and applied to understand how electrons are arranged in atoms and molecules and ultimately studied using spectroscopy. Offered Spring Semester, even-numbered years.

**UNIVERSITY SEMINARS (SEMR)****SEMR 050 Academic Skills** (0 semester hours)

Prerequisites: None

Description: This course improves the student's opportunity for success in college-level work by teaching study habits in ten key areas: anxiety, attitude, concentration, information processing, motivation, selecting main ideas, self-testing, study aids, test strategies, and time management. Limited to the student on academic probation or financial aid appeal. Offered as needed.

**SEMR 100 Cornerstone** (1 semester hour)

Prerequisites: None

Description: This course meets throughout the semester and offers the mentorship of a faculty member in the transition of a first-year or transfer student. The course focuses on daily life at the University: academic requirements and resources, professional etiquette, student activities, and civic engagement. Offered Fall Semester and Spring Semester, annually.

**SEMR 200 Steppingstone** (1 semester hour)

Prerequisites: SEMR 100

Description: This course prepares the student for the subsequent components of experiential learning. It develops the depth and range of academic and professional skills in areas such as goal setting, time management, communication, interviewing, and career planning. The student is shown the value of and processes to plan and obtain mentorships, projects, and internships. This seminar also emphasizes the development of the civic engagement competency, and advances the planning and construction of the student's ePortfolio. At the conclusion of SEMR 200, the student should have a completed proposal for Project I and know how to plan for an Internship. Offered Fall Semester and Spring Semester, annually.

**SEMR 300 Keystone** (1 semester hour)

Prerequisites: SEMR 200

Corequisites: Project I

Description: This course focuses on the refinement of the student's academic and professional identity. It emphasizes the importance of the University competencies, and the ways to measure, apply, and communicate the successful attainment of them. It further prepares the student for the Internship by reviewing the ways in which an external experience fits into the program of study. If needed, the student is guided through the process of securing an internship. Students advance through active learning in the areas of civic engagement and teamwork, and further develop presentation skills. This seminar facilitates the successful completion of many subsequent components in the experiential program. Offered Fall Semester and Spring Semester, annually.

**SEMR 400 Capstone** (1 semester hour)

Prerequisites: SEMR 300, Internship, Project II

Description: The capstone challenges the student to reflect upon and integrate academic, experiential and co-curricular experiences in preparation for the workforce or graduate school. Assignments are designed to create a sense of culmination in the fourth year, and prepare students for the transition to life beyond the University. The student completes the ePortfolio to demonstrate the achievement of competencies and the program of study; this is of potential utility to employers or graduate schools as unique and specialized evidence of the individual student's abilities. Offered Spring Semester and Summer Semester, annually.

## **Five-Year Bachelor of Science/Master of Science Programs**

The five-year Bachelor of Science/Master of Science programs are designed to result in a baccalaureate degree in Analytics, Computer and Information Sciences, or Interactive Media and a master's degree in Analytics, Computer Information Sciences, Information Systems Engineering and Management, or Learning Technologies, respectively.

The student who demonstrates exceptional academic performance in the undergraduate Bachelor of Science program in Analytics, Computer and Information Sciences, or Interactive Media may be eligible to participate in one of the following accelerated dual-degree programs. These programs facilitate the student completing both degree programs in five years rather than the usual six.

<b>Bachelor of Science Program</b>	<b>Master of Science Program</b>
Analytics	Analytics with a concentration in Healthcare Analytics
Computer and Information Sciences with a concentration in Computer Science	Computer Information Sciences with a concentration in Computer Science
Computer and Information Sciences with a concentration in Cyber Security	Computer Information Sciences with a concentration in Cyber Security
Computer and Information Sciences with a concentration in Software Engineering and Systems Analysis	Information Systems Engineering and Management with a concentration in Software Engineering and Systems Development
Computer and Information Sciences with a concentration in Cyber Security	Information Systems Engineering and Management with a concentration in Information Security
Interactive Media	Learning Technologies

The following standards for admission to the program must be met by the end of the first semester of the third year of study:

- completion of at least 75 semester hours toward the Bachelor of Science degree with a minimum cumulative grade point average of 3.25;
- a minimum grade point average of 3.50 in all computer and information sciences and mathematics courses attempted; and
- completion of all computer and information sciences Core requirements for the bachelor of science degree.

The student should complete and submit the Graduate Education Application for Admission when 75 semester hours have been earned. Required supporting documents include: current academic transcript and a recommendation from the student's academic advisor.

In order to remain in the program, the student must maintain: 1) a minimum 3.25 cumulative grade point average and 2) a minimum 3.50 computer and information science and mathematics grade point average.

The Bachelor of Science degree in Analytics, Computer and Information Sciences, or Interactive Media is conferred when the student has completed the undergraduate requirements (expected to be the end of the fourth year). During this four-year period, the student is subject to the undergraduate policies, tuition

rates, financial aid regulations, academic policies and eligible for the student services described within the undergraduate education pages of this Catalog.

The Master of Science degree in Analytics, Information Systems Engineering and Management, or Learning Technologies is conferred when the student has completed the graduate requirements (expected to be the end of the fifth year). During this period, the student is subject to the graduate policies, tuition rates, financial aid regulations, academic policies, and eligible for the student services described within the graduate education pages of this Catalog.

### **Bachelor of Science in Analytics/Master of Science in Analytics with a concentration in Healthcare Analytics**

The undergraduate hours consist of: 1) 18 semester hours of Foundations courses, 2) 30 semester hours of General Education, 3) 13 semester hours of Experiential Learning, and 4) 50 semester hours of Analytics program courses. The graduate hours consists of: 1) 15 semester hours of ANLY core courses, 2) 6 semester hours of ANLY Experiential Learning, and 3) 15 semester hours of ANLY core and Healthcare Analytics courses.

#### **BS Analytics Requirements**

Complete all of the following courses – 50 semester hours:

ANLY 400	Analytics Tools and Techniques	(4)
ANLY 405	Predictive Modeling	(3)
ANLY 410	Data Warehousing and Mining	(3)
ANLY 415	Advanced Analytics and Reporting	(3)
CISC 120	Fundamentals of Computing	(4)
CISC 160	Data Structures	(4)
CISC 233	Essential Algorithms	(4)
CISC 340	Introduction to Artificial Intelligence	(4)
CISC 460	SQL Database Design & Implementation	(4)
CISC 491	SW Development Processes & Quality	(4)
GEND 400	The Entrepreneurial Mind	(3)
MATH 310	Discrete Mathematics II	(3)
MATH 380	Mathematical Modeling	(4)
MEBA 110	Introduction to eBusiness Management	(3)

#### **MS Analytics Requirements with a Concentration in Healthcare Analytics**

ANLY 515	Risk Modeling and Assessment	(3)
ISEM 525	Business Process Modeling and Workflow Systems	(3)
ISEM 541	Healthcare Systems	(3)
ISEM 542	Health Informatics and Information Systems	(3)
ISEM 545	Healthcare Data	(3)
MGMT 510	Business Strategy and Management Principles	(3)
PMGT 510	Principles of Project Management	(3)
ITPM 515	Business and Requirements Analysis Fundamentals	(3)
GRAD 695	Research Methodology and Writing	(3)
GRAD 699	Graduate Thesis	(3)
	Graduate Electives	(6)

**Recommended Sequence** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 220 Calculus I SEMR 100 Cornerstone  <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing COMM 110 Speech GEND 103 The Creative Mind II GEND 113 The Scientific Mind II MATH 260 Calculus II  <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 160 Data Structures ENGL 200 Advanced Composition and Technical Writing GEND 351 The Organizational Mind MATH 280 Introductory Statistics SEMR 200 Steppingstone  <b>Total semester hours = 17</b>	CISC 233 Essential Algorithms GEND 201 The Civic Mind MATH 310 Discrete Mathematics II MEBA 110 Introduction to eBusiness Management  <b>Total semester hours = 16</b>	ANLY 298 Project I <i>(or Fall Semester of the third year)</i>  <b>Total semester hours = 3</b>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 340 Introduction to Artificial Intelligence CISC 491 SW Development Processes & Quality MATH 380 Mathematical Modeling SEMR 300 Keystone  <b>Total semester hours = 13</b>	ANLY 400 Analytics Tools and Techniques ANLY 405 Predictive Modeling CISC 460 SQL Database Design & Implementation GEND 400 The Entrepreneurial Mind  <b>Total semester hours = 14</b>	ANLY 365 Internship <i>(or Spring Semester of the third year)</i>  <b>Total semester hours = 3</b>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
ANLY 410 Data Warehousing and Mining ANLY 498 Project II GEND electives ITPM 515 Business and Requirements Analysis Fundamentals * MGMT 510 Business Strategy and Management Principles * <b>Total semester hours = 15</b>	ANLY 415 Advanced Analytics and Reporting GEND 325 Consulting ISEM 541 Healthcare Systems * ISEM 525 Business Process Modeling SEMR 400 Capstone  <b>Total semester hours = 13</b>  <b>Bachelor of Science total semester hours = 120</b>	<i>optional</i>

\* Graduate courses (see Graduate Catalog for course descriptions)

**FIFTH YEAR (Graduate Student)**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
GRAD 695 Research Methodology And Writing (3)	ANLY 515 Risk Modeling and Assessment (3)	<i>optional</i>
GRAD Elective (3)	GRAD Elective (3)	
ISEM 545 Healthcare Data (3)	GRAD 699 Graduate Thesis (3)	
PMGT 510 Principles of Project Management (3)	ISEM 542 Health Informatics and Information Systems (3)	
<b>Total semester hours = 12</b>	<b>Total semester hours =12</b>	
	<b>Master of Science total semester hours = 36</b>	

**Bachelor of Science in Computer and Information Science with a concentration in Computer Science/Master of Science in Computer Information Science with a concentration in Computer Science**

The undergraduate hours consist of: 1) 18 semester hours of Foundations courses, 2) 30 semester hours of General Education, 3) 13 semester hours of Experiential Learning, and 4) 27 semester hours of Computer & Information Science program courses, and 5) 23 semester hours of Computer Science concentration courses. The graduate hours consists of: 1) 12 semester hours of MS CISC core courses, 2) 6 semester hours of MS CISC Experiential Learning, and 3) 18 semester hours of MS Computer Science courses.

**BS CISC Requirements (27 semester hours)**

- CISC 120 Fundamentals of Computing (4)
- CISC 160 Data Structures (4)
- CISC 211 Computer organization & Architecture (4)
- CISC 225 Information System Design And Analysis (4)
- CISC 233 Algorithms Design & Analysis (4)
- CISC 301 Operating Systems (4)
- Math 310 Discrete Math II (3)

**BS Computer Science Concentration Requirements (23 semester hours)**

- CISC 340 Principals of Artificial Intelligence (4)
- CISC 399 Formal Languages and Automata (4)
- CISC 400 Computer Graphics (4)
- CISC 433 Elements of Computing Systems I (4)
- CISC 444 Elements of Computing Systems II (4)
- CISC 499 Industry Software Ethics (3)

**MS CISC Requirements (12 semester hours)**

- CISC 530 Computer Architecture (3)
- CISC 600 Scientific Computing I (3)
- CISC 661 Principles of Cybersecurity & Cyber Warfare (3)

- CISC 520 Data Engineering & Mining
- or
- CISC 525 Big Data Architecture
- or
- CISC 560 Secure Computer Systems (3)
- or
- CISC 612 Elements of Computer Systems
- or
- CISC 620 Principles of Machine Learning

**MS Computer Science Concentration Requirements** (18 semester hours)

- CISC 601 Scientific Computing II (3)
- CISC 603 Theory of Computation (3)
- CISC 610 Data Structures & Algorithms (3)
- CISC 611 Network Operating Systems (3)
- CISC 614 Computer Simulation (3)
- Elective\* (3)

**MS Experiential Learning** (6 semesters hours)

- GRAD 695 Research Methodology and Writing (3)
- GRAD 699 Graduate Thesis (3)

**Recommended Sequence** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition (3) or ENGL 106 Academic Writing and Critical Thinking (3)	CISC 120 Fundamentals of Computing (4) COMM 110 Speech (3) GEND 103 The Creative Mind I (3)	<i>optional</i>
GEND 112 The Scientific Mind I (3)	GEND 113 The Scientific Mind II (3)	
MATH 120 College Algebra (3) SEMR 100 Cornerstone (1)	MATH 280 Intro Statistics (3)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 16</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 200 Advanced Composition and Technical Writing (3)	CISC 211 Computer Organization & Architecture (4) GEND 201 The Civic Mind (6)	<i>optional</i>
CISC 160 Data Structures (4) CISC 233 Essential Algorithms (4)	MATH 310 Discrete Mathematics II (3)	
MATH 210 Discrete Math I (3) SEMR 200 Steppingstone (1)	CISC 225 Info System Design & Analysis (4)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 17</b>	



**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 301 Operating Systems (4)	GEND 351 The Organizational Mind (6)	<i>optional</i>
CISC 340 Introduction of Artificial Intelligence (4)	CISC 399 Formal Languages & Automata (4)	
CISC 433 Elements of Computing Systems I (4)	CISC 444 Elements of Computing Systems II (4)	
SEMR 300 Keystone (1)	CISC 365 Internship (3)	
CISC 298 Project I (3)		
<b>Total semester hours = 16</b>	<b>Total semester hours = 17</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 400 Computer Graphics (4)	CISC 560 Secure Computer Sys (3)	<i>optional</i>
CISC 530 Computer Architecture* (3)	CISC 499 Industry Software Ethics (3)	
SEMR 400 Capstone (1)	GEND Electives (6)	
CISC 600 Scientific Computing I* (3)	CISC 661 Principles of Cyber Security & Cyber Warfare* (3)	
CISC 498 Project II (3)		
<b>Total semester hours = 14</b>	<b>Total semester hours = 15</b>	
	<b>Bachelor of Science total semester hours = 123</b>	

\*Graduate courses (see Graduate Catalog for course descriptions)

**FIFTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 610 Data Structures & Algorithms (3)	CISC 620 Principles of Machine Learning (3)	
CISC 601 Scientific Computing II (3)	CISC 611 Network Operating Systems (3)	
GRAD 695 Research Methodology & Writing (3)	CISC 603 Theory of Computation (3)	
GRAD Elective (3)	GRAD 699 Graduate Thesis (3)	
<b>Total semester hours = 12</b>	<b>Total semester hours = 12</b>	
	<b>Master of Science total semester hours = 36</b>	

**Bachelor of Science in Computer and Information Science with a concentration in Cyber Security/Master of Science in Computer Information Science with a concentration in Cyber Security**

The undergraduate hours consist of: 1) 18 semester hours of Foundations courses, 2) 30 semester hours of General Education, 3) 13 semester hours of Experiential Learning, and 4) 27 semester hours of Computer & Information Science program courses, and 5) 23 semester hours of Cyber Security concentration courses. The graduate hours consist of: 1) 15 semester hours of MS CISC core courses, 2) 6 semester hours of MS CISC Experiential Learning, and 3) 15 semester hours of MS Cyber Security courses.

**BS CISC Requirements (27 semester hours)**

CISC 120 Fundamentals of Computing	(4)
CISC 160 Data Structures	(4)
CISC 211 Computer organization & Architecture	(4)
CISC 233 Algorithms Design & Analysis	(4)
CISC 225 Information System Design And Analysis	(4)
CISC 301 Operating Systems	(4)
Math 310 Discrete Math II	(3)

**BS Cyber Security Concentration Requirements (23 semester hours)**

CISC 320 Computer Forensics	(4)
CISC 330 Computer Networks	(4)
CISC 333 Defensive Programming	(4)
CISC 370 Ethical Hacking Lab	(4)
CISC 440 Wireless Security Management	(4)
CISC 499 Industry Software Ethics	(3)

**MS CISC Requirements (15 semester hours)**

CISC 530 Computer Architecture	
CISC 600 Scientific Computing I	(3)
CISC 610 Data Structures & Algorithms	(3)
CISC 661 Principles of Cybersecurity & Cyber Warfare	(3)
CISC 520 Data Engineering & Mining	(3)
or	
CISC 525 Big Data Architecture	
or	
CISC 560 Secure Computer Systems	(3)
or	
CISC 612 Elements of Computer Systems	
or	
CISC 620 Principles of Machine Learning	

**MS Cyber Security Concentration Requirements (15 semester hours)**

CISC 662 Ethical Hacking Development Lab	(3)
CISC 663 Cyber Risk Assessment & Management	(3)
CISC 664 Advanced Digital Forensics	(3)
CISC 665 Biometric Security Systems	(3)
Elective*	(3)
GRAD 695 Research Methodology and Writing	(3)
GRAD 699 Graduate Thesis	(3)

**Recommended Sequence** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra SEMR 100 Cornerstone <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing COMM 110 Speech GEND 103 The Creative Mind II GEND 113 The Scientific Mind II MATH 280 Intro Statistics <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 200 Advanced Composition and Technical Writing CISC 160 Data Structures CISC 233 Essential Algorithms MATH 210 Discrete Math I SEMR 200 Steppingstone <b>Total semester hours = 15</b>	CISC 211 Computer Organization & Architecture CISC 225 Info System Design & Analysis GEND 201 The Civic Mind MATH 310 Discrete Mathematics II <b>Total semester hours = 17</b>	<i>optional</i>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 301 Operating Systems CISC 320 Computer Forensics CISC 330 Computer Networks SEMR 300 Keystone CISC 298 Project I <b>Total semester hours = 16</b>	GEND 351 The Organizational Mind CISC 333 Defensive Programming CISC 530 Computer Architecture* CISC 365 Internship <b>Total semester hours = 16</b>	<i>optional</i>

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 370 Ethical Hacking (4)	CISC 440 Wireless Security Management (4)	<i>optional</i>
SEMR 400 Capstone (1)	CISC 499 Industry Software Ethics (3)	
CISC 600 Scientific Computing I* (3)	GEND Electives (6)	
CISC 498 Project II (3)	CISC 661 Principles of Cyber Security & Cyber Warfare* (3)	
CISC 560 Secure Computer Systems* (3)		
<b>Total semester hours = 14</b>	<b>Total semester hours = 16</b>	
	<b>Bachelor of Science total semester hours = 123</b>	

\* Graduate courses (see Graduate Catalog for course descriptions)

**FIFTH YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 610 Data Structures & Algorithms (3)	CISC 664 Advanced Digital Forensics (3)	
CISC 662 Ethical Hacking Development Lab (3)	CISC 665 Biometric Security Sys (3)	
CISC 663 Cyber Risk Assessment & Management (3)	GRAD Elective (3)	
GRAD 695 Research Methodology & Writing (3)	GRAD 699 Graduate Thesis (3)	
<b>Total semester hours = 12</b>	<b>Total semester hours = 12</b>	
	<b>Master of Science total semester hours = 36</b>	

**Bachelor of Science in Computer and Information Sciences with a Concentration in Software Engineering and Systems Analysis/Master of Science in Information Systems Engineering and Management with a Concentration in Software Engineering and Systems Development**

The undergraduate hours consist of: 1) 18 semester hours of Foundation courses, 2) 30 semester hours of General Education, 3) 13 semester hours of Experiential Learning, 4) 20 semester hours of CISC Core courses, and 5) 27 semester hours of Software Engineering and Systems Analysis concentration courses. The graduate hours consist of: 1) 15 semester hours of ISEM core courses, 2) 6 semester hours of ISEM Experiential Learning, and 3) 15 semester hours of ISEM Software Engineering and Systems Development courses.

**Computer and Information Science Requirements with the Software Engineering and System Analysis Concentration**

Complete all of the following Core courses - 27 semester hours:

CISC 120	Fundamentals of Computing	(4)
CISC 160	Data Structures	(4)
CISC 211	Computer organization & Architecture	(4)
CISC 233	Essential Algorithms	(4)
CISC 225	Information System Design And Analysis	(4)
CISC 301	Operating Systems	(4)
MATH 310	Discrete Mathematics II	(3)

**Software Engineering and System Analysis Concentration:**

CISC 340	Introduction to Artificial Intelligence	(4)
CISC 397	Principle of SW Eng & System Analysis	(4)
CISC 400	Computer Graphics	(4)
CISC 460	SQL Database Design & Implementation	(4)
CISC 491	SW Development Processes and Quality	(4)
CISC 499	Industry Software Ethics	(3)

**Information Systems Engineering and Management Requirements with the Software Engineering and Systems Development Concentration**

Complete all of the following Core courses – 15 semester hours:

ISEM 500	Strategic Information Systems Planning, Engineering & Management	(3)
ISEM 502	User-Centered Design	(3)
ISEM 540	Architectures and Integration of Modern Enterprises	(3)
MGMT 510	Business Strategy and Management Principles	(3)
MGMT 511	Digital and Global Organizations	(3)

Complete the following Experiential courses – 6 semester hours:

- GRAD 695 Research Methodology and Writing (3)
- and
- ISEM 699 Applied Project in ISEM (3)
- or
- GRAD 699 Graduate Thesis (3)

Complete the following concentration courses – 15 semester hours:

- CISC 510 Object-Oriented Software Engineering (3)
- CISC 520 Data Engineering and Mining (3)
- CISC 530 Computer Architecture for Software Engineers (3)
- CISC 540 Agile Software Development (3)
- CISC 550 Software Engineering in Mobile Computing (3)

With the permission of the graduate academic advisor, the student may substitute another CISC or ISEM graduate course for one of the above concentration courses.

**Recommended Sequence** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition (3) or ENGL 106 Academic Writing and Critical Thinking (3) GEND 102 The Creative Mind I (3) GEND 112 The Scientific Mind I (3) MATH 120 College Algebra (3) or MATH 220 Calculus I (3) SEMR 100 Cornerstone (1) <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing (4) COMM 110 Speech (3) GEND 103 The Creative Mind II (3) GEND 113 The Scientific Mind II (3) MATH 280 Intro Statistics (3)  <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 160 Data Structures (4) ENGL 200 Advanced Composition and Technical Writing (3) GEND 351 The Organizational Mind (6) MATH 210 Discrete Mathematics I (3) SEMR 200 Steppingstone (1) <b>Total semester hours = 17</b>	CISC 211 Computer Organization & Architecture (4) CISC 225 Info System Design & Analysis (4) GEND 201 The Civic Mind (6) MATH 310 Discrete Mathematics II (3)  <b>Total semester hours = 17</b>	CISC 298 Project I (3) <i>(or Fall Semester of the third year)</i>  <b>Total semester hours = 3</b>

**THIRD YEAR**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
CISC 210 Communications Networks (4)	CISC Elective (4)	CISC 365 Internship (3)
CISC 301 Operating Systems (4)	CISC 491 SW Development Processes & Quality (4)	<i>(or Spring Semester of the third year)</i>
CISC 340 Introduction to Artificial Intelligence (4)	CISC 460 SQL Database Design & Implementation (4)	
SEMR 300 Keystone (1)		
<b>Total semester hours = 13</b>	<b>Total semester hours = 12</b>	<b>Total semester hours = 3</b>

**FOURTH YEAR**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
CISC 498 Project II (3)	CISC 520 Data Engineering and Mining * (3)	<i>optional</i>
CISC Elective (4)	GEND electives (6)	
CISC 510 Object-Oriented Software* (3)	GRAD 695 Research Methodology and Writing * (3)	
ISEM 500 Strategic Information Systems Planning, Engineering and Management * (3)	SEMR 400 Capstone (1)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 13</b>	
	<b>Bachelor of Science total semester hours = 120</b>	

\* Graduate courses (see Graduate Catalog for course descriptions)

**FIFTH YEAR (Graduate Student)**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
CISC 530 Computer Architecture for Software Engineers (3)	CISC 550 Software Engineering in Mobile Computing (3)	<i>optional</i>
CISC 540 Agile Software Development (3)	ISEM 540 Architectures and Integration of Modern Enterprises (3)	
ISEM 502 User-Centered Design (3)	MGMT 510 Business Strategy and Management Principles (3)	
MGMT 511 Digital and Global Organizations (3)	GRAD 699 Graduate Thesis or ISEM 699 Applied Project in ISEM (3)	
<b>Total semester hours = 12</b>	<b>Total semester hours = 12</b>	
	<b>Master of Science total semester hours = 36</b>	

**Bachelor of Science in Computer and Information Sciences with a Concentration in Cyber Security/Master of Science in Information Systems Engineering and Systems Development with a Concentration in Information Security**

The undergraduate hours consist of: 1) 18 semester hours of Foundation courses, 2) 30 semester hours of General Education, 3) 13 semester hours of Experiential Learning, 4) 20 semester hours of CISC Core courses, and 5) 27 semester hours of Computer and Information Security concentration courses. The graduate hours consist of: 1) 15 semester hours of ISEM core courses, 2) 6 semester hours of ISEM Experiential Learning, and 3) 15 semester hours of ISEM Information Security courses.

**Computer and Information Science Requirements with a Cyber Security Concentration**

Complete all of the following Core courses - 27 semester hours:

CISC 120	Fundamentals of Computing	(4)
CISC 160	Data Structures	(4)
CISC 211	Computer organization & Architecture	(4)
CISC 225	Information System Design And Analysis	(4)
CISC 233	Essential Algorithms	(4)
CISC 301	Operating Systems	(4)
MATH 310	Discrete Mathematics II	(3)

**Cyber Security Concentration**

CISC 320	Computer Forensics	(4)
CISC 330	Computer Networks	(4)
CISC 333	Defensive Programming	(4)
CISC 370	Ethical Hacking	(4)
CISC 440	Wireless Security Management	(4)
CISC 499	Industry Software Ethics	(3)

**Information Systems Engineering and Management Requirements with the Information Security Concentration**

Complete all of the following Core courses – 15 semester hours:

ISEM 500	Strategic Information Systems Planning, Engineering & Management	(3)
ISEM 502	User-Centered Design	(3)
ISEM 540	Architectures and Integration of Modern Enterprises	(3)
MGMT 510	Business Strategy and Management Principles	(3)
MGMT 511	Digital and Global Organizations	(3)

Complete the following Experiential courses – 6 semester hours:

GRAD 695	Research Methodology and Writing	(3)
and		
ISEM 699	Applied Project in ISEM	(3)
or		
GRAD 699	Graduate Thesis	(3)



**Information Security Concentration:**

CISC 560	Secure Computer Systems	(3)
CISC 570	Advanced Database Security	(3)
CISC 580	Advanced Network Security	(3)
CISC 590	Information Security Project	(3)
ISEM 550	Information Security Management	(3)

With the permission of the graduate academic advisor, the student may substitute another CISC or ISEM graduate course for one of the above concentration courses.

**Recommended Sequence** – The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
ENGL 105 College Composition or ENGL 106 Academic Writing and Critical Thinking GEND 102 The Creative Mind I GEND 112 The Scientific Mind I MATH 120 College Algebra or MAT 220 Calculus I SEMR 100 Cornerstone <b>Total semester hours = 13</b>	CISC 120 Fundamentals of Computing COMM 110 Speech GEND 103 The Creative Mind II GEND 113 The Scientific Mind II MATH 280 Introductory Statistics or MATH 260 Calculus II <b>Total semester hours = 16</b>	<i>optional</i>

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 210 Communications Networks ENGL 200 Advanced Composition and Technical Writing GEND 351 The Organizational Mind MATH 210 Discrete Mathematics I SEMR 200 Steppingstone <b>Total semester hours = 17</b>	CISC 330 Computer Networks CISC 333 Defensive Programming GEND 201 The Civic Mind MATH 310 Discrete Mathematics II <b>Total semester hours = 17</b>	CISC 298 Project I <i>(or Fall Semester of the third year)</i> <b>Total semester hours = 3</b>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
CISC 301 Operating Systems CISC 350 Database Security Management CISC 370 Ethical Hacking SEMR 300 Keystone <b>Total semester hours = 13</b>	CISC 320 Computer Forensics CISC 450 Risk Management and Security Analysis CISC Elective <b>Total semester hours = 12</b>	CISC 365 Internship <i>(or Spring Semester of the third year)</i> <b>Total semester hours = 3</b>

**FOURTH YEAR**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
CISC 440 Wireless Security Management (4)	CISC 560 Secure Computer Systems * (3)	<i>optional</i>
CISC 498 Project II (3)	GEND electives (6)	
ISEM 500 Strategic Information Systems Planning, Engineering and Management * (3)	GRAD 695 Research Methodology and Writing * (3)	
ISEM 550 Information Security Management * (3)	SEMR 400 Capstone (1)	
<b>Total semester hours = 13</b>	<b>Total semester hours = 13</b>	

\* Graduate courses (see Graduate Catalog for course descriptions)

**FIFTH YEAR (Graduate Student)**

<b>Fall Semester</b>	<b>Spring Semester</b>	<b>Summer Semester</b>
CISC 570 Advanced Database Security (3)	CISC 580 Advanced Network Security (3)	<i>optional</i>
CISC 590 Information Security Project (3)	ISEM 540 Architectures and Integration of Modern Enterprises (3)	
ISEM 502 User-Centered Design (3)	MGMT 510 Business Strategy and Management Principles (3)	
MGMT 511 Digital and Global Organizations (3)	GRAD 699 Graduate Thesis (3)	
<b>Total semester hours = 12</b>	<b>Total semester hours = 12</b>	
	<b>Master of Science total semester hours = 36</b>	

## **Bachelor of Science in Interactive Media/Masters of Science in Learning**

**Technologies** –The undergraduate hours consist of: 1) 18 semester hours of Foundation courses, 2) 30 semester hours of General Education, 3) 13 semester hours of Experiential Learning, and 4) 47 semester hours of IMED Core courses. The graduate hours consist of: 1) 15 semester hours of LTMS core courses, 2) 6 semester hours of LTMS Experiential Learning, and 3) 15 semester hours of Graduate elective courses.

**Interactive Media Requirements** - This program requires a total of 47 semester hours. The semester hour value of each course appears in parentheses ().

Complete all of the following Interactive Media Core courses – 47 semester hours:

IMED 110	Introduction to Digital Design	(2)
IMED 170	Visual Design Fundamentals	(4)
IMED 205	Critical Game Studies	(2)
IMED 240	Interactive Media I	(4)
IMED 250	Video Production I	(2)
IMED 290	Game Analysis Laboratory	(1)
IMED 300	3D Modeling I	(3)
IMED 310	3D Modeling II	(3)
IMED 340	Interactive Media II	(4)
IMED 385	Game Design	(3)
IMED 400	Interactive Studio	(4)
CISC 120	Fundamentals of Computing	(4)
COMM 225	Cinema Studies	(2)
ENGL 310	Creative Writing	(3)
MEBA 210	Introduction to Internet and Web Technologies	(3)
PMGT 510	Principles of Project Management	(3)

**Learning Technologies Requirements** - The following courses comprise the Learning Technologies Master of Science program- 36 semester hours. The semester value of each course appears in parentheses ().

Complete all of the following Core courses - 15 semester hours

LTMS 500	Macro Instructional Design	(3)
LTMS 510	Learning Technologies and Solutions	(3)
LTMS 514	Media, Selection, Design and Production	(3)
LTMS 518	eLearning Development	(3)
LTMS 525	Learning Theories & Instructional Strategies	(3)

Complete the following Experiential courses - 6 semester hours

GRAD 695	Research Methodology and Writing	(3)
	and	
GRAD 699	Graduate Thesis	
	or	
LTMS 698	Learning Technologies Internship	(3)
	or	
LTMS 699	Learning Technologies Applied Project	

Concentration courses – 15 semester hours

Many professionals are generalists in the field and the student may select an individualized general approach to LTMS program via the elective semester hours. As the profession evolves and new techniques and technologies create new opportunities, there are benefits to developing skills in a concentrated area. The Learning Technologies program offers concentrations that allow focus of elective coursework on a specific career outcome.

Details on these concentrations can be found in the Master of Science in Learning Technologies in the Graduate Education section of this document.

- Games & Simulations
- Instructional Technology
- Instructional Design
- Instructional Development
- Individualized

**Recommended Sequence** - The sequence that appears below was developed based upon the availability of specific courses each semester and the successful completion of course prerequisites.

**FIRST YEAR**

Fall Semester	Spring Semester	Summer Semester
GEND 102 Creative Mind I (3)	IMED 110 Digital Design Seminar (2) <i>optional</i>	
GEND 112 Scientific Mind I (3)	CISC 120 Fundamentals of Computing (4)	
ENGL 105 College Composition (3)	Or COMM 110 Speech (3)	
ENGL 106 Advanced Writing and Critical Thinking (3)	GEND 103 The Creative Mind II (3)	
MATH 120 College Algebra (3)	GEND 113 The Scientific Mind II (3)	
SEMR 100 Cornerstone (1)		
<b>Total semester hours = 13</b>	<b>Total semester hours = 15</b>	

**SECOND YEAR**

Fall Semester	Spring Semester	Summer Semester
COMM 225 Cinema Studies (2)	IMED 240 Interactive Media I (4)	IMED 298 Project I (3)
IMED 170 Visual Design Fundamentals (4)	IMED 250 Video Production (2)	<i>(or Spring Semester of the second year)</i>
IMED 205 Critical Game Studies (2)	IMED 290 Game Analysis Lab (1)	
MATH 280 Introduction to Statistics (3)	ENGL 200 Advanced Composition And Technical Writing (3)	
MEBA 210 Intro to Internet and Web Technologies (3)	GEND electives (3)	
SEMR 200 Steppingstone (1)		
<b>Total semester hours = 15</b>	<b>Total semester hours = 13</b>	<b>Total semester hours = 3</b>

**THIRD YEAR**

Fall Semester	Spring Semester	Summer Semester
IMED 300 3D Modeling (3)	IMED 340 Interactive Media II (4) <i>optional</i>	
IMED 385 Game Design (3)	IMED 310 3D Modeling II (3)	
ENGL 310 Creative Writing (3)	IMED 365 Internship (3)	
MATH 210 Discrete Mathematics I (3)	GEND 201 The Civic Mind (6)	
Electives (3)		
SEMR 300 Keystone (1)		
<b>Total semester hours = 16</b>	<b>Total semester hours = 16</b>	

**FOURTH YEAR**

Fall Semester	Spring Semester	Summer Semester
IMED 498 Project II (3)	IMED 400 Interactive Studio (4)	LTMS Concentration Electives (9)
GEND 351 The Organizational Mind (6)	GEND elective (3)	
PMGT 510 Principles of Project Management * (3)	LTMS 514 Media Selection, Design and Production * (3)	
LTMS 500 Macro Instructional Design * (3)	LTMS 518 eLearning Development * (3)	
	SEMR 400 Capstone (1)	
<b>Total semester hours = 15</b>	<b>Total semester hours = 14</b>	
	<b>Bachelor of Science total semester hours = 120</b>	

\* Graduate courses (see Graduate Catalog for course descriptions)

**FIFTH YEAR (Graduate Student)**

Fall Semester	Spring Semester	Summer Semester
LTMS 525 Learning Theories and Instruction Strategies (3)	LTMS 510 Learning Technologies and Solutions (3)	<i>optional</i>
GRAD 695 Research Methodology and Writing (3)	GRAD 699 Graduate Thesis (3)	
LTMS Concentration Electives (3)	Or LTMS 698 Learning Technologies Internship (3)	
	or LTMS 699 Learning Technologies Applied Project	
<b>Total semester hours = 9</b>	<b>Total semester hours = 6</b>	
	<b>Master of Science total semester hours = 36</b>	

## **PROFESSIONAL AND CONTINUING EDUCATION**

Professional and Continuing Education is responsible for all contracted training, non-credit certificates, and professional development offerings for employers and working professionals. The professional development offerings through Harrisburg University provide specific and advanced skills training and certificates within the University's mission of science and technology.

The University works with various organizations to develop a wide range of professional development solutions and programs that include:

- non-credit training events, series, and certificates;
- on-site and off-site credit-based offerings short of a degree such as workshops, institutes, clinics, concentrations, and specializations;
- on-site degree program; and
- academic program evaluation for employer training.

The University partners with various outside agencies including, but not limited to: corporations, government agencies, and school districts to develop customized solutions that contribute to professional development of the existing workforce. In particular, the University's professional development offerings serve:

- science, technology, and management professionals;
- educators and administrators; and
- senior staff responsible for innovation and decision-making.

All professional development programs follow the University's commitment to applied, experiential, and competency-based training and education. They focus on enhancing the ability of professionals to apply what they have learned immediately (and over the long term) to their jobs and careers.

Because the programs offered are demand-driven and change from year to year, up-to-date information on the current offerings is posted online at <https://professionaled.harrisburgu.edu>.

For more information on customized trainings or the calendar of upcoming professional development, contact [ProfessionalEd@HarrisburgU.edu](mailto:ProfessionalEd@HarrisburgU.edu) or call 717.901.5190.

## **UNIVERSITY ADMINISTRATION**

Harrisburg University of Science and Technology is a private, not-for-profit organization providing instruction, research, and service to the community. The University is governed by a Board of Trustees. The immediate regulation and direction of the academic, research, and service activities of the University are delegated by the Board of Trustees to the President and the faculty of the University.

### **Board of Trustees**

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<b>Faculty</b> (Faculty list is updated in the first edition of the catalog each academic year)			
Iheb	Abdellatif	Assistant Professor	Information Sciences Engineering & Management
Nushwan	Al-Nakash	Assistant Professor	Computer & Information Sciences
Christine	Altieri	Assistant Professor	English
Mark	Alwine	Lecturer	Applied Mathematics
Billie	Anderson	Professor	Analytics
Farooq	Anjum	Associate Professor	Information Systems Engineering & Management
Siamak	Aram	Assistant Professor	Analytics
Nathaniel	Ashby	Assistant Professor	Cognitive Analytics
Akeisha	Belgrave	Assistant Professor	Applied Mathematics
Samuel	Benigni	Assistant Professor	Physics
Jennifer	Booker	Associate Professor	Computer & Information Sciences
Kelly	Boudreau	Assistant Professor	Interactive Media Theory & Design
Barry	Boyer	Lecturer	Project Management
Pavlo	Buryi	Assistant Professor	Economics
Sangwhan	Cha	Assistant Professor	Computer Science
Chad	Chu	Lecturer	Computer & Information Sciences
Mark	Crider	Executive Director of Nursing	Nursing
Saeed	Esmaili-Sardari	Associate Professor	Information Systems Engineering & Management & Computer & Information Sciences
Rachel	Fogle	Assistant Professor	Biological Sciences
Randolph	Ford	Professor	Analytics
Scott	Foulkrod	Associate Professor	Philosophy and Legal Studies
Robert	Furey	Professor & Associate Provost	Integrative Sciences
Mina	Gabriel	Lecturer	Computer & Information Sciences
Barbara	Geisler	Assistant Professor	Project Management
Melissa	Gettys	Lecturer	General Education Studies
Brian	Grey	Lecturer	Computer & Information Sciences.
Philip	Grim, II	Lecturer	Computer & Information Sciences
Andrew	Hacker	Cybersecurity Expert in Residence	
Marvine	Hamner	Professor	Analytics
Edgar	Harrell	Entrepreneur in Residence	
Kevin	Huggins	Professor	Computer & Information Sciences and Analytics
Richard	Jackson	Associate Professor	Integrative Sciences
Ron	Jones	Lecturer	Cybersecurity
Chintan	Kanadia	Instructor	Computer & Information Sciences
Richard	Kordel	LTMS Program Lead & Instructor	Learning Technologies
Jonathon	Korn	Visiting Lecturer	Computer Science & Analytics
Jay	Liebowitz	Distinguished Chair of Applied Business and Finance	Management & eBusiness and Information Systems Engineering & Management
Joy	Mackey	Lead for Harrisburg University – Philadelphia	General Education Studies
Joe	Malak	Assistant Professor	Project Management
Panakkal	Mathew	Assistant Professor	Mathematics & Analytics
John	McKnight	Assistant Professor	Sociology of Emerging Technologies



Thomas	McManus	Associate Professor	Director of Learning Technologies & Professional Development; Center for Innovative Teaching & Learning
Glenn	Mitchell	Professor	Healthcare Informatics
Andrea	Nagy	Visiting Assistant Professor	Analytical Chemistry
Mehdi	Noorbaksh	Professor	International Affairs and Business
Stanley	Nwoji	Assistant Professor	Business and Entrepreneurship
Anthony	Ortega	Production Coordinator	
Stephen	Onu	Assistant Professor	Project Management
Charles	Palmer	Associate Professor and Coordinator of Interactive Media	Multimedia Arts
Luis	Paris	Associate Professor	Computer & Information Sciences
Mrunalini	Pattarkine	Professor	Biotechnology
Stephen	Penn	Associate Professor	Analytics & Management & eBusiness
Tamara	Peyton	Assistant Professor	Social Computing & HCI
Robert	Pittman	Assistant Professor	Systems Engineering
Wouter	Popelier	Lecturer	Information Systems Engineering and Management
Christine	Proctor	Assistant Professor	Biology & Ecology
John	Quigley	Director for the Center for Environment, Energy and Economy & Lecturer	Sustainability
Mandana	Rezaeiahari	Assistant Professor	Analytics
Kirsten	Richards	Assistant Professor	Information Systems Engineering and Management and Computer Science
Timothy	Richards	Assistant Professor	Information Systems Engineering and Management and Computer Science
Roozbeh	Sadeghian	Assistant Professor	Data Analytics
Catharine	Santai	Associate Professor	Integrative Sciences
Albert	Sarvis	Assistant Professor	Geospatial Technology
Majid	Shalan	Associate Professor	Computer & Information Sciences
Charles	Shearrow	Associate Professor	Advanced Manufacturing
Thomas	Sheives	Associate Professor	Project Management
Caleb	Smith	Lecturer	General Education Studies
Bellur	Srikar	Assistant Professor	Data Analytics
Doaa	Taha	Visiting Professor	Analytics
Doug	Taylor	Professor	Biotechnology
A. Michael	Theilacker	Lecturer	Applied Mathematics
Shane	Tomblin	Associate Professor	Enterprise Engineering and Healthcare Informatics
Amjad	Umar	Professor	Information Systems Engineering & Management
Ru	Wideman	Associate Professor	General Education
Scott	Wright	Associate Professor	Project Management & Environmental Sciences
Daqing	Yun	Assistant Professor	Computer & Information Sciences
<b>Corporate Faculty</b> (Corporate Faculty list is updated in the first edition of the catalog each academic year based on the previous academic year)			
Chaza	Abdul		Analytics
Archie	Addo		Project Management
Tolani	Adebanjo		General Education

Adetoun	Adeniji-Adele	General Education
Shailaja	Agrawal	Biotechnology
Mani	Akella	Computer & Information Sciences
Muazzam	Ali	Computer & Information Sciences
Eric	Allen	Project Management
Naveen	Allu	Information Systems Engineering & Management
Michael	Anderson	Management & e-Business
Paul	Arendt	General Education
John	Badovinac	General Education
Feyzi	Bagirov	Analytics
Harshawardhan	Bal	Integrative Sciences
Robert	Barna	General Education
Kathryn	Barone	Project Management
Linda	Beck	General Education
Lynda	Bell	General Education & Integrative Sciences
Lauriana	Blessing	General Education
Karl	Bopp	Project Management
Scott	Bostjancic	Learning Technologies
Sherry	Bowman	Analytics
Richard	Bradley	Project Management
Faith	Bradley	Analytics
Michael	Brown	Analytics
Kevin	Cagno	Interactive Media
Dabis	Camero-Alzate	Computer & Information Sciences
Shawn	Canady	Learning Technologies
Aginah	Chambers	Project Management
John	Clark	Project Management
Janine	Clarke	Information Systems Engineering & Management
Benjamin	Cohen	Analytics
Jeffrey	Corcoran	Integrative Sciences
Joseph	Deklinski	Project Management
Katherine	Di Crocco	Project Management
John	Doyle	Project Management
Warren	Dutka	Project Management
Mike	Eck	General Education
Ahmed	ElArabawy	Information Systems Engineering & Management
Jeff	Fetterman	Project Management
William	French	Information Systems Engineering & Management
Stephen	Fries	Project Management & Management & e-Business
Cicek	Gercel-Taylor	Integrative Sciences
Marian	Gigliotti	Learning Technologies
Gordon	Goodrow	Integrative Sciences
Clifford	Graham	Project Management
Russell	Green	Geography/Geospatial Imaging
Janita	Haastrup	Project Management
Hannah	Hartwell	Learning Technologies
Paul	Harvey	Project Management
Nathaniel	Hench	Project Management

Graham	Hetrick	Integrative Sciences
Pamela	Higgins	Integrative Sciences
Alan	Hitch	Analytics
Elizabeth	Hockley	General Education
Anwar	Husain	Analytics
Javid	Huseynov	Analytics
Nayeem	Islam	General Education
Johnathan	Jackson	Project Management
Daniel	Jensen	Project Management
Louis	Jordan	Project Management
Janelle	Junkin	General Education
Angela	Kern	Computer & Information Sciences
Rizwan	Khan	Project Management
Jay	Kirssin	Interactive Media
Ryan	Korn	General Education
Matthew	Korn	Analytics
Patricia	Kowalczyk	Project Management
Michelle	Krill	Learning Technologies
Ying	Lin	Computer & Information Sciences
Mohammed	Lskaafi	Analytics
Karen	Lubrecht	Learning Technologies
Elizabeth	MacDougall	Analytics
Jacquelyn	Maddox	Biotechnology, Integrative Sciences, General Education
Edmund	Maher	Analytics
Francis	Manning	Project Management
Spencer	Martin	Information Systems Engineering & Management
Rebecca	Mayberry	Integrative Sciences
Umair	Mazhar	Project Management
Melissa	McCoy	Project Management
Renata	McFadden	Computer & Information Sciences
Cherlyn	McIntee	Project Management
Jennifer	McNamara	Learning Technologies
Bernardo	Mesa	General Education & Integrative Sciences
Arnold	Miles	Analytics
Tyler	Milfeld	Management & eBusiness
Bradley	Mitchell	Project Management
Kapila	Molri	Computer & Information Sciences
Michele	Mont	Project Management
Terry	Moon	Analytics
R. Mark	Moore	Learning Technologies & Project Management
Donald	Morgan	Project Management
Don	Morton	Computer & Information Sciences
Ali	Motamedi	Analytics
Brian	Myers	Project Management
Martin	Negron	Analytics
Mavis	Nimoh	General Education
Renee	Norris-Jones	Management & e-Business
Matthew	North	Information Systems Engineering & Management

Matthew	Novak	Interactive Media
Donald	O'Hara	Information Systems Engineering & Management
Obinna	Okoye	Information Systems Engineering & Management
Stephen	Oliver	Learning Technologies
Stephanie	Orndorff	Geography/Geospatial Imaging
Anthony	Ortega	Interactive Media
Karma	Pace	Integrative Sciences
Madhukiran	Parvathaneni	Biotechnology
Luke	Peterschmidt	Interactive Media
Michael	Pierorazio	Project Management
Christopher	Plummer	Graduate Studies & Project Management
Kevin	Purcell	Analytics & Integrative Sciences
Frances	Quinones	Project Management
Scott	Rainey	Project Management
Alexander	Rajis	Project Management
Michael	Ramsey	Information Systems Engineering & Management
Susan	Ranck	Biotechnology
Nicole	Reigelman	Project Management
Ralph	Reilly	Information Systems Engineering & Management
Jennifer	Reiner	Information Systems Engineering & Management
Robert	Roadcap	Project Management
Gerald	Robinson	Project Management
Aaron	Rock	General Education
Eduardo	Rodriguez	Information Systems Engineering & Management
Jason	Scott	Analytics
Olga	Scrivner	Analytics
Philip	Sedhom	Project Management
John	Sell	Analytics
John	Sharp	Project Management
Carolyn	Shaw	Project Management
Eric	Simeon	Management & e-Business
Raghu	Sinha	Biotechnology
Rick	Smith	Project Management
Baba	Sontyana	Project Management
Dawn	Spaar	Management & e-Business
Robert	St. Thomas	Information Systems Engineering & Management
Bryan	Stambaugh	Project Management
Sandra	Stoner	General Education
Robert	Sweeney	Project Management
Paraminder	Talwar	Project Management
Cindy	Thatcher	Learning Technologies
Ikwukananne	Udechukwu	Project Management
Bongyong	Uh	Analytics
Albert	Unrath	Learning Technologies
Satish	Upadhyay	Project Management
Edward	Uravic	Project Management
Vicki	Villone	Project Management & General Education
Brenda	Webber	Project Management

Glenn	Williams	Computer & Information Sciences & Interactive Media
Richard	Wirth	Information Systems Engineering & Management
Kimberly	Witzig	General Education
Michael	Wright	Information Systems Engineering & Management
<b>Administration/Staff</b> (Administration/Staff list is updated on the first edition of the catalog each academic year)		
Ben	Allatt	Associate Vice President of Human Resources
Debra	Althoff	Associate Registrar
Meera	Anilkumar	Student Account Representative
Melissa	Bailey	International Student Coordinator and DSO
Jacqueline	Barnett	Attorney and In-House Counsel
Laurie	Barrow	Director of Undergraduate Admissions
Fay	Baxter	Assistant Registrar
Diane	Bertinetti	Executive Assistant to the President
Lauri	Blessing	Experiential Learning Coordinator
Jason	Brandt	Database Engineer
Ben	Buckley	Security Officer
Sruthy	Chitturi	International Admissions Counselor
Mark	Crider	Executive Director of Nursing
Eric	Darr	President and Chief Executive Officer
Justin	Detig	Manager of Online Learning Technologies
Connor	DeStefano	Undergraduate Admissions Recruiter
Lauren	Edgell	Director of Online Learning Technologies & Professional Development
Bob	Ensminger	Night Shift Porter
Douglas	Firestone	Chief of Staff
Erika	Firestone	International Student Coordinator and DSO
Stephanie	Foster	International Student Coordinator and DSO
Vincent	Frank	Director of Financial Aid Services
John	Friend	Associate Vice President of Secondary School Programs & Partners
Carol	Gima	Registration Assistant
Yuliya	Goss	University Administrative Assistant
Keith	Green	Director of Institutional Compliance and Reporting/SEVIS PDSO
Sabrina	Guzy	International Student Coordinator and DSO
Laurel	Harris	Human Resources Specialist
Erin	Hill	Executive Recruiter
Jeff	Hoffman	Web Developer
Brian	Humphrey	Manager of University & Community Partnerships
Steven	Infanti	Associate Vice President for Admissions, Communications & Marketing and Alumni Relations
Nayeem	Islam	Associate Director of Student Life
Laurel	Jones	International Student Coordinator and DSO
Jayne	Keller	Manager, Technology Services
Sireesha	Kollipara	International Student Support Specialist
Ryan	Korn	Director of Secondary School Services, Programs & Partnerships
Megan	Kreiser	Director of Development & Event Planning
Craig	Lewis	Geospatial Technology Center Lab Manager

Lauren	Lewis	Program Coordinator
Kelly	Logan	Vice President for Strategic Workforce Development and University Centers
Becky	Low	Graduate Program Coordinator
Michelle	Mafnas	Program Coordinator
Beverly	Magda	Associate Provost for Corporate Partnerships
Bilita	Mattes	Provost and Chief Academic Officer
Duane	Maun	Vice President for Finance and Chief Financial Officer
Ryan	Maun	Staff Accountant
Thomas	McManus	Director of Learning Technologies & Professional Development
Jasmin	McMillon	Transfer Admissions Recruiter, Philadelphia
Shruthi	Mekala	International Student Services Coordinator
Teri	Mickle	Assistant Registrar
Alisha	Mills	Academic Success Center Coordinator
Rhonda	Mitchell	Day Porter
Melissa	Morgan	Director of Student Services
Brian	Morris	Admissions Counselor
Scott	Morrison	Security Desk Attendant
Christopher	Mowl	Assistant Director of Financial Aid
Sandra	Nelson	Registrar
Danelle	Nolt	Residence Life Coordinator
Christian	Perry	Admissions Counselor
Andy	Petroski	New Product Development Consultant
Alex	Pitzner	Associate VP & Chief Information Officer
Michael	Platt	Systems Administration Analyst
Jason	Popp	Database Administrator
Kristie	Postorino	Licensed Professional Counselor
Preetha	Ram	Chief Academic Expansion Officer & Associate Provost for International Affairs
Emily	Reed	Assistant Resources Librarian
Aaron	Rock	Assistant Director of Student Success
David	Runyon	University Librarian
Nigel	Salmon	Intake Specialist
Manny	Sanchez	Graduate Program Director
Karen	Scharein	Admissions Data & Communications Specialist
Danielle	Schaufert	Undergraduate Admissions Recruiter
Chad	Smeltz	eSports Program Director
Courtney	Smith	Assistant Data & Communications Specialist
Jordan	Snavely	Undergraduate Admission Recruiter - Philadelphia
Dawn	Spaar	Director of Adult and Professional Studies
Aaron	Spina	Admissions Counselor
Keith	Thomas	AV Engineer
Matt	Thomas	Transfer Admissions Recruiter
Eric	Veronikas	Communication Liaison
Jeremy	Walmer	Financial Accounts and Payroll Manager
Geoffrey	Wang	eSports Head Coach
Penny	Weidner	Director of Assessment
Jasmine	Wilson	Student Activities Coordinator

## **UNIVERSITY POLICIES AND DISCLOSURES**

These are some University policies that guide the conduct of the student, faculty, and staff. Additional details can be found in the [Student Handbook](#), [Faculty Handbook](#), and [Employee Handbook](#).

### **Family Educational Rights Privacy Act (FERPA) Policy**

The University collects a considerable amount of information about each student during the period of enrollment. Almost all this information is contained in records protected by the Family Educational Rights Privacy Act (FERPA), a federal statute signed into law in 1974. Under this law, a student has the right to review the records and to challenge anything in them that is perceived to be inaccurate or misleading. FERPA regulations also stipulate that the University cannot release information from the student's records to anyone but the student without the student's written consent, except to the extent that the FERPA policy authorizes disclosure without consent.

University officials may disclose education records and information to parents or others without consent of the student under certain circumstances:

- During a health or safety emergency to protect the student or other individuals;
- Any record to the parent when the student is a dependent for federal income tax purposes;
- Law enforcement unit records, including outside law enforcement authorities;
- Parental information when a student under 21 has violated any law or university policy; and, concerning the use or possession of alcohol or a controlled substance

**Directory Information Policy** - The University may disclose directory information about the student unless the student specifically informs the University in writing that this type of information should **not** be released. Directory information includes:

- student's name
- address
- e-mail address
- telephone number(s)
- class year, program of study
- enrollment status
- dates of attendance
- degree(s) and/or awards received
- photograph
- previous educational institution attended
- participation in officially recognized University activities

For additional information on the FERPA policy see <https://www2.ed.gov/policy/gen/reg/ferpa/index.html>

### **Campus Crime and Security Disclosure**

The Campus Security Policy and Campus Crime Statistics Act (the Jeanne Clery Act) requires the distribution of an annual security report on or before October 1 to all current faculty, staff, and students and notice of its availability to prospective students, faculty, and staff. The annual security report includes statistics for the previous three years concerning reported crimes that occurred on campus or property owned or controlled by the University, and on public property immediately adjacent to and accessible

from the campus. The report also includes institutional policies concerning campus security, such as: crime prevention, the reporting of crimes, sexual assault, timely warning, and other matters. This report is available on the University website or the U.S. Department of Education website at <http://ope.ed.gov/security>.

## **Electronic Mail Communication Policy**

**Policy Statement** - Unless otherwise prohibited by law, the University may send official communications to faculty, staff and students by e-mail to an account assigned by the University with the full expectation that such e-mails will be read by the recipient on a frequent and consistent basis and in a timely fashion.

**Reason for Policy** - The University must be able to communicate quickly and efficiently with faculty, staff, and enrolled students in order to conduct official University business. E-mail is an available and appropriate medium for such communication. Official communications may include policy announcements, registration and billing information, regulatory compliance disclosures, emergency notifications, and other information of a critical or timely nature. Faculty, staff and students may not opt out from receiving official University e-mail communications.

**Assignment of E-mail Accounts** - Students and employees are assigned an account in the HarrisburgU.edu domain. The account is designated as the "[FiLlastname@HarrisburgU.edu]" or "[Student FiMiLlastname]@My.HarrisburgU.edu" e-mail account. [The addressee protocol may vary slightly in the event of Initials/Name duplication]. The e-mail account is generated by the Office of Technology Services and may not be changed without University approval. University communications that are sent by e-mail will be sent to the University-supported e-mail account.

**Responsibilities** - Faculty, staff, and students are expected to review messages received through the University-supported e-mail account on a frequent and consistent basis. Communications may be time-critical. Individuals shall use the e-mail account for all University-related e-mail communications. Faculty shall use the University-supported account for e-mail communication with a student and, conversely, the student shall respond to faculty communications or requests using the University-supported e-mail account.

**Forwarding of E-mail** – An individual who chooses to forward e-mail received on a Harrisburg University e-mail account to a different e-mail address risks loss of data integrity. The University is not responsible for e-mail, including attachments, forwarded to any e-mail address not supported by the University.

## **Third-Party, Web-Based [Cloud] Computer Records Policy**

**Policy Statement** - It is the policy of Harrisburg University of Science and Technology that any and all user-generated content developed during the use of third-party, web-based (referred to as "cloud-based") technologies used in the classroom or coursework, which could include cloud-based instructional tools, cloud-based teaching and learning environments, and cloud-based server storage, is the property of the individual faculty, student, or staff who developed the content and that the University is not responsible, and shall be held harmless, for any theft, damage, manipulation or loss that may be incurred as a result of the failure by the third party to properly maintain or safeguard that content.

**Reason for Policy** - The University encourages and supports the use of new instructional tools and emerging technologies in open, digital teaching and learning environments. The use of web-based applications and cloud-based storage also bring new concerns about intellectual property and privacy.



The Family Educational Rights and Privacy Act of 1974 (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is the federal law that protects the privacy of a student's education records. Generally, any work related to a course or program of study created by the individual is considered a part of the "student's education record." Accordingly, any work related to a course or program of study should not include personally identifiable information of the individual. Examples of "personally identifiable information" are: an individual's full name (if not common), Social Security number, date of birth, birthplace, face or fingerprints, credit card numbers, driver's license number, vehicle registration plate number, digital identity, or grades. Any of these data, when combined with other personal information, may identify an individual. Users of third-party, web-based technologies are strongly cautioned to avoid posting personally identifiable information in any computerized application.

A license agreement permits the University to provide access through its servers for the student to utilize the Microsoft *SkyDrive* cloud-based computer server storage utility to store the student's ePortfolio during the period of enrollment in a program of study. The University requires that each degree-seeking undergraduate student develop an ePortfolio. An ePortfolio is defined as: *An organized, media-rich collection of documents, videos, and other exhibits that allows the student to demonstrate competence to a multitude of audiences.* Additionally, faculty, students, or staff are provided access to and use other web-based technologies and social media where user-generated content is stored.

The individual user of a third-party, web-based technology application, when establishing an account, is required to agree to the conditions of a Terms of Service or End-User Agreement, whereby the individual user accepts full responsibility for all content maintained in the application. Furthermore, the user agrees to a condition that, in no event will the software manufacturer be liable for any damages, whether direct, indirect, special, incidental, economic, compensatory, or consequential, arising out of the use of or inability to use the software or user documentation. Accordingly, the user is solely and exclusively responsible for any and all content.

**Action Subsequent to Completion of a Program of Study or Termination of a Period of Employment** - Any and all documents, videos, and other exhibits accumulated in an ePortfolio or other file, folder or collection by an individual who utilizes a third-party, cloud-based application or storage utility during a program of study or period of employment will no longer be accessible through the University's servers following the completion of the program of study or termination of a period of employment. Direct access to the materials held by the provider is conditional upon the Terms of Service or End-User Agreement accepted by the individual when the account was established.

### **Equal Opportunity**

The University is committed to assuring equal opportunity to all persons and does not discriminate on the basis of race, creed, color, gender, age, religion, national origin, veteran or handicap status, or sexual orientation in its educational programs, activities, admissions, or employment practices as required by Title IX of the Educational Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, Title VI of the Civil Rights Act of 1964, and other applicable statutes. Inquiries concerning Title IX, Section 504, compliance and information regarding campus accessibility, may be referred to the Americans with Disabilities Act (ADA) Coordinator. Students seeking ADA accommodations should contact the Office of Student Services. Faculty and staff seeking accommodations should contact the Office of Human Resources.

### **Non-Discrimination Grievance Procedure - Federal**

Title IX of the Education Amendments of 1972 prohibits discrimination based on sex in educational programs and activities that receive federal financial assistance. To ensure compliance with Title IX and other federal and state civil rights laws, Harrisburg University of Science and Technology has developed internal policies that prohibit discrimination and sexual misconduct based on sex, such as sexual

misconduct and sexual violence. A copy of the Title IX non-discrimination procedure is available upon request.

### **Sexual Misconduct Policy**

Harrisburg University's Sexual Misconduct Policy is located in the Student Handbook.

### **Non-Discrimination Policy - State**

**The Pennsylvania Fair Educational Opportunities Act** provides student access to benefits and services of the University and prohibits discrimination without regard to race, color, gender, religious creed, ancestry, national origin, sexual orientation, age, civil union, marital status, veteran status, handicap or disability, perceived handicap or disability, relationship or association with an individual with a handicap or disability, use of a guide or support animal, and/or handling or training of support or guide animals. This commitment includes, but is not limited to, admissions, course offerings, transfer of credit, financial aid, scholarships, student employment, internships, educational and social programs, and student advisement and counseling.

**Any complaint of an alleged act of discrimination must be filed within 180 days of the incident by contacting the PA Human Relations Commission located at 1101-1125 Front Street, 5<sup>th</sup> Floor, Harrisburg, PA 17104-2515 (717) 787-9784.**

### **Emergency Notification System Policy**

The University's emergency notification service (ENS), the "e2Campus" system, is used to communicate with subscribers through voice, text, and email messages, as deemed appropriate in the event of an emergency. All University students, faculty, and staff are strongly encouraged to subscribe. Each subscriber can designate up to three contact numbers and specify text and/or voice messages. The Quick Test feature enables the user to send a test message to your wireless device. The Emergency Notification Service is designed for use with portable devices and is only one aspect of a layered approach to notifying the University community of emergencies.

### **Peer-to-Peer ("P2P") File Sharing Information Technology Disclosure**

#### **Introduction**

The Higher Education Act of 1965, as amended, under Title IV, Section 285(a)(1)(P) and Section 487(a)(29), effective August 14, 2008, requires the disclosure to users of information technology resources that Harrisburg University of Science and Technology has developed a plan to combat the unauthorized distribution of copyrighted material (including the use of technology-based deterrents) and will, to the extent practicable, offer alternatives to illegal downloading. The illegal distribution of copyrighted material is prohibited and may subject an individual to criminal or civil penalties.

The "Digital Millennium Copyright Act of 1998" (DMCA) states that copyrighted information is protected and that it is illegal to download, upload, or distribute that information in any fashion. The provisions of this law specify a process to deal with any claimed infringement.

#### **Plans to "Effectively Combat" Unauthorized Distribution of Copyrighted Material**

P2P traffic is identified via the Intrusion Prevention System (IPS) that is integrated within the University's Cisco ASA 5500 security appliance. In most cases, a client's connection to the network will be dropped when typical P2P traffic is sensed.

This intrusion system covers the known protocols that popular P2P clients - such as Torrents, Limewire, Bearshare, Kazaa, etc. - utilize to establish connections to potentially transfer files containing copyrighted material. Additionally, the ability for the student to pass files over the Wireless LAN between laptops has been shut down.

### **Compliance**

Harrisburg University reserves the right to capture, preserve, and/or inspect any information transmitted through, stored on, or used on any IT resource.

### **Identification of Copyrighted Material Violation and Action Taken**

The designated agent to receive notification of a claimed infringement, in accordance with the provisions of the Digital Millennium Copyright Act, is:

Keith A. Green  
Director of Institutional Research & Compliance  
326 Market Street  
Harrisburg, PA 17101  
(717) 901-5123  
[KGreen@HarrisburgU.edu](mailto:KGreen@HarrisburgU.edu)

If an infringement claim is submitted to the University by a complainant, appropriate action will be taken to identify the student, faculty, or staff member involved in the complaint.

Written notice to the involved individual via email requires the removal of the copyrighted files or documents from the computer containing the material within 72 hours of the formal notice. A reply confirmation is required when corrective action has been taken to remove the illegal files, documents, or other material.

Upon receipt of the material removal confirmation, the designated agent notifies the complainant of the institutional resolution.

If an individual involved in the complaint fails to take the requested corrective action within 72 hours, access to the Harrisburg University network will be deactivated. Reactivation to the network can only occur at such time that it is confirmed that corrective action was taken.

### **Penalties for Copyright Infringement**

Copyright infringement is the act of exercising, without permission or legal authority, one or more of the exclusive rights granted to the copyright owner under section 106 of the Copyright Act (Title 17 of the United States Code). These rights include the right to reproduce or distribute a copyrighted work. In the file-sharing context, downloading or uploading substantial parts of a copyrighted work without authority constitutes an infringement.

Penalties for copyright infringement include civil and criminal penalties. In general, anyone found liable for civil copyright infringement may be ordered to pay either actual damages or "statutory" damages affixed at not less than \$750 and not more than \$30,000 per work infringed. For "willful" infringement, a court may award up to \$150,000 per work infringed. A court can, in its discretion, also assess costs and attorneys' fees. For details, see Title 17, United States Code, Sections 504, 505.

Willful copyright infringement can also result in criminal penalties, including imprisonment of up to five years and fines of up to \$250,000 per offense.

For more information, please see the Web site of the U.S. Copyright Office at [www.copyright.gov](http://www.copyright.gov), especially the FAQ's at [www.copyright.gov/help/faq](http://www.copyright.gov/help/faq).

### **Procedure to Update and/or Amend**

Harrisburg University of Science and Technology reserves the right to update or amend this document to reflect university policy or procedural changes and/or state or federal law.

### **Campus ID Card Policy**

The Campus ID Card serves as the University's student/faculty/staff ID card, provides access to campus buildings and events, and serves as the Library card.

While on campus, the Campus ID Card must be visible at all times and presented upon request to any faculty member, staff, security personnel, or contracted security personnel.

The Campus ID Card is the property of Harrisburg University of Science and Technology and all policies and procedures must be observed to retain the privilege of use. The card is not transferable and is only to be used by faculty, staff, a currently-registered student, and other authorized persons.

The Campus ID Card must be surrendered to the University upon deactivation. A fee may be assessed for any Campus ID Card that is not returned at the end of the expected period of use.

#### Campus Card Types

There are two versions of the Campus ID Card:

- Campus ID Card: card contains photo identification, student/employee ID number; and,
- Access-Only Campus ID Card: card without photo identification (typically for the short-term student or visitor).

#### Campus Card Usage

The primary purpose of the Campus ID Card is to provide easy identification of the cardholder and to permit access to permitted areas of the University campus. The Campus ID Card also serves as a library card. It is the responsibility of the cardholder to report suspected lost or stolen cards immediately.

#### Campus Card Activation

The Campus ID Card is activated for faculty and staff following formal contractual employment or position appointment.

The Campus ID Card is activated for a student following admission to the University, payment of the required tuition deposit, and completion of course registration for the semester or other term.

#### Campus Card Deactivation

The Campus ID Card is deactivated for faculty and staff following formal cancellation of contractual employment or resignation or termination from the position appointment.

The Campus ID Card is deactivated for a student following a determination of withdrawal, dismissal, graduation or other completion of a scheduled period of enrollment.

## **Student Grievance Policy**

A situation, circumstance or incident may occur where a student concludes that they have incurred egregious harm as the direct result of an action caused by a member of the faculty or staff. A student in this circumstance may file a formal grievance against a faculty or staff member of the University to seek administrative redress. Examples of adverse behaviors include, but are not limited to: violation of confidentiality; offensive remarks as a deliberate insult individually, in the company of others, or in the classroom; racist or sexist remarks and/or attitudes; inappropriate sexual contact, not limited to sexual intercourse; or, inappropriate relationships with the student which cause conflict of interest for either the student or faculty or staff.

A student who is compelled to submit a grievance must obtain a Student Grievance Form from the Office of Records and Registration. The form must be completed with an explanation of the facts of the allegation, and attach to it any and all documents, testimonies or petitions supporting the student's position as evidence. The completed grievance form should be submitted promptly to the Director of Institutional Compliance.

A grievance cannot be filed on behalf of another person. Grievances may not be used to challenge academic or other policies or procedures of general applicability.

Additional information may be requested from the student while the grievance is being considered. The alleged faculty or staff person is interviewed and asked to sign an affidavit stating facts relative to the alleged incident. Following consultation with the Office of the Provost, a decision shall be rendered by the Director of Institutional Compliance within five (5) business days of the grievance submission. The student then receives a determination letter.

If the student does not receive a satisfactory remedy relative to the grievance, the student may request further review by a Grievance Committee which consists of: the Director of Institutional Compliance, who shall act as the Committee Chair, an administrator designated by the Provost, the Chair of the Faculty of the Whole, a member of the Office of Student Services, and a student representative that has no previous knowledge of the matter to be considered. The request for review by the Grievance Committee must be submitted in writing to the Director of Institutional Compliance. Formal rules of evidence will not apply, and the panel may consider any evidence considered relevant and reliable. A student is permitted to have a representative to assist them during the proceeding; however, the representative may not be an attorney.

The student will be advised of the date and time of the Grievance Committee meeting so that he or she may participate. The Committee shall deliberate and reach a decision on the grievance in closed session and render its recommendation regarding the grievance within ten (10) days of its meeting. The student will be notified promptly of the Committee's recommendation.

If a student wishes to appeal the decision of the Grievance Committee, he or she must submit a written request to the Provost within five (5) business days after formal notification of the Committee's decision. The Provost's Office will review all of the relevant materials of the matter and notify the student of a final decision within five (5) business days of the appeal submission.

Grievances relating to the alleged denial of access to the benefits and services of the University as a result of discrimination on the basis of gender, race, color, creed, religion, national origin, sexual orientation, age, ancestry, disability, civil union, marital or veteran status should be presented in writing to the Affirmative Action Officer within 30 days of the alleged discrimination. The Affirmative Action Officer will review the written complaint and meet with the individual filing it. After reviewing all the facts and utilizing legal counsel, if appropriate, the Affirmative Action Officer will determine if corrective action is required. The student bringing the complaint will be promptly notified in writing of the determination. If corrective action is required, it will be initiated within 30 days of the determination of the grievance.

## Acceptable Use of Information Technology Policy

### **Introduction**

Harrisburg University offers comprehensive academic programs that emphasize science and technology. Access to information technology is essential to the pursuit and achievement of the University's instructional, research, administrative and service missions. As such, the use of information technology is a privilege and all members of the University community are expected to be responsible and ethical users of information technology. This policy applies to all technology acquired by or on behalf of Harrisburg University (wherever used) and all technology (however acquired) used on any Harrisburg University resources<sup>1</sup>.

### **Purpose**

This policy:

- A. Promotes the responsible and ethical use of computing, information resources, and/or communication systems, collectively known as "information technology" but hereafter known as "IT," administered by the Office of Information Services (OIS).
- B. Defines the rights, responsibilities, and standards of conduct for its faculty, administrators, staff, students, and other authorized users with regard to the use of IT.
- C. Explains the appropriate procedures for enforcing any and all misuse of the University's IT resources and outlines appropriate disciplinary procedures for violating these rules.

### **Responsibilities**

- D. It is the responsibility of the University faculty, administrators, staff, or student workers to communicate this policy and its contents to any and all users of IT at, or in affiliation with, Harrisburg University. Not being aware of any part of this policy does not excuse the individual from being responsible for its contents.
- E. The Harrisburg University OIS is responsible for the following:
  - i. Maintaining user accountability requirements including user identification and authentication, account administration, and password integrity.
  - ii. Making every effort to protect the privacy of users and confidentiality of data<sup>2</sup>.
  - iii. Ensuring fair access to IT.
  - iv. Developing and implementing security policies and standards.
- F. All Harrisburg University IT users are responsible for the following:
  - i. Acting in a responsible, ethical, and legal manner in the use of IT. As such, this use of IT implies consent with any and all applicable university policies and regulations.
  - ii. Using IT for authorized university business only. Excessive use of any IT resource for personal use is prohibited.
  - iii. Safeguarding data including personal information and passwords.
  - iv. Recognizing the limitations to privacy afforded by electronic services.
  - v. Respecting other users and their expectation of privacy, confidentiality, and freedom of expression.

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<sup>1</sup>Computers, computer systems, networks, electronic communications systems, institutional or third-party cloud data storage media, facilities, peripherals, servers, routers, switches, equipment, software, files, or accounts.

<sup>2</sup> While Harrisburg University recognizes the importance of (and makes every attempt to achieve) privacy, the University cannot promise privacy of information stored on, or sent through, university-owned systems or resources except for certain information pertaining to student records, research, or other proprietary or patentable materials.

- vi. Taking precautions to prevent the initial occurrence and/or spread of computer viruses. Therefore, network connected resources must utilize university-approved anti-virus software.
- vii. Avoiding any unauthorized or illegal use of IT. This includes but is not limited to the transmission of abusive or threatening material, spam, or communications prohibited by state or federal laws.
- viii. Using IT in compliance with applicable license and purchasing agreements. Each user is individually responsible for reading, understanding, and adhering to all licenses, notices, and agreements in connection with IT which he or she uses.

### **Compliance**

- G. Harrisburg University reserves the right to capture, preserve, and/or inspect any information transmitted through, stored on, or used on any IT resource without notice but especially when:
  - i. There is reasonable cause a user has violated this policy.
  - ii. A user or an account appears to be engaged in unusual activity.
  - iii. It is necessary to protect the integrity, security, or functionality of IT resources.
  - iv. It is necessary to protect the University from liability.
  - v. It is permitted or required by law.

### **Enforcement and Disciplinary Procedures**

- H. Any user who violates any part of this policy may be subject to the following:
  - i. Suspension or revocation of the user's computer account and/or suspension or revocation of access to the University's IT resources.
  - ii. Disciplinary action as described in Harrisburg University's Student Handbook which may include suspension, dismissal, or expulsion from the University.
  - iii. Disciplinary procedures outlined in Harrisburg University's Faculty Handbook or any other documents outlining conduct for faculty, staff, administration, or student employees which may include termination of employment or other disciplinary action.
  - iv. Civil or criminal prosecution under federal and/or state law. Noncompliance with certain provisions of this policy may incur penalties under such laws which may include fines, orders of restitution, and imprisonment.
  - v. Re-instatement of computer privileges shall be examined on a case-by-case basis.

### **Procedure to Update and/or Amend**

Harrisburg University reserves the right to update and/or amend this document to reflect university policy changes and/or state or federal law.

### **Credit Card Policy**

The University is in compliance with state requirements for policies related to the marketing of credit cards on campus (Senate bill 157 session 2003 article xx111-A, Section 2301-A).

The Board of Trustees of the University adopted the following statement related to credit card solicitation on October 13, 2004:

“Harrisburg University prohibits the marketing of all forms of credit cards on university property and prohibiting credit card marketers from offering gifts to a student in exchange for completing a credit card application.”

## **Intellectual Property Policy**

### *Purpose*

The policy reflects the following goals:

To create an environment that encourages the generation of new knowledge by faculty, staff, and the student;

To facilitate wide transfer of useful inventions, ideas, and writings to society;

To motivate the development and dissemination of intellectual property by providing appropriate financial rewards to creators and the University, and administrative assistance to creators; and,

To ensure that the financial return from the development of intellectual property does not distort ethical decisions and operations of the University in a manner contrary to the mission of the University.

### *Definitions*

Terms used in this document are defined in this section. These definitions may not necessarily conform to customary usage.

**Intellectual Property** includes any patentable invention, any copyrightable subject matter, or trade secret. It also includes works of art, inventions, discoveries, or creations that might normally be developed on a proprietary basis.

**University** means Harrisburg University of Science and Technology.

**Student** means any full-time or part-time graduate or undergraduate student, regardless of whether the student receives financial aid from the University or from outside sources. It is the responsibility of a student who is also an employee of an outside entity to resolve any conflicts between this policy and provisions of agreements with the employer prior to beginning any undertaking at the University that will involve the development of intellectual property.

**Faculty** means a person employed for pay at the University who has received a teaching appointment, plus instructors who have faculty appointments of various types.

**Staff** means any employee of the University other than students and faculty as defined above. If a student is also a part-time university employee, that person is considered as staff with regard to intellectual property developed as a result of employment, and as a student with regard to other intellectual property. A full-time non-faculty employee who is also taking one or more courses is considered to be staff. Visitors to the University who make substantial use of university resources are considered as staff with respect to any intellectual property arising from such use.

**Creator** means any person (or persons) who create an item of intellectual property.

**Net proceeds to the University** means all proceeds received by the University on intellectual property that it assigns, sells or licenses, minus any application, litigation, interference, or marketing costs directly attributable to the intellectual property being licensed. Deducted costs shall be reasonable and fair, and shall be properly disclosed; the sources and amounts of compensation shall also be properly disclosed.

**Net proceeds to the creator** means all proceeds received by the creator from intellectual property owned that is sold, assigned, or licensed, less the costs of application, legal protection, or litigation, interference, travel and other marketing costs directly attributable to the intellectual property being exploited. Such net proceeds do not include compensation legitimately received by the creator for consulting services or interest or other return on invested labor or capital. Deducted costs shall be reasonable and fair and shall be properly disclosed; the sources and amounts of compensation shall also be properly disclosed.



**Substantial use of university facilities** means extensive unreimbursed use of major university laboratory, computational facilities, or human resources. The use of these facilities must be important to the creation of the intellectual property; merely incidental use of a facility does not constitute substantial use, nor does extensive use of a facility commonly available to all faculty or professional staff (such as libraries and offices), nor does extensive use of a specialized facility for routine tasks. Use will be considered "extensive" and facilities will be considered "major" if similar use of similar facilities would cost the creator more than \$5000 (five thousand dollars) if purchased or leased in the public market. Creators wishing to directly reimburse the University for the use of its facilities must make arrangements to do so before the level of facilities usage for a particular intellectual property becomes substantial.

#### *Policy Provisions*

This section states the policies concerning ownership of intellectual property created at the University. In order of precedence, ownership of intellectual property shall be as follows:

#### **1. Externally Sponsored Work**

**Ownership Provisions:** Intellectual property created as a result of work conducted under an agreement between an external sponsor and the University that specifies the ownership of such intellectual property shall be owned as specified in said agreement.

#### **2. Internally Sponsored Work**

**Ownership Provisions:** When the University provides funds or facilities for a particular project to the extent of substantial use, it may also choose to designate itself as sponsor of that work. The University may declare itself the owner of intellectual property resulting from said work. In such cases the University must specify in advance the disposition of any intellectual property rights arising from the project. If such ownership provisions are not in place, the University will not go into contract with researcher.

#### **3. Individual Agreements**

**Ownership Provisions:** Intellectual property, which is the subject of a specific agreement between the University and the creator(s) thereof, shall be owned as provided in said agreement. Such agreements by the University and the faculty are encouraged.

#### **4. Intellectual Property Created Within Scope of Employment**

**Ownership Provisions:** Intellectual property created by university employees who were employed specifically to produce particular intellectual property shall be owned by the University if said intellectual property was created within the normal scope of employment. Computer programs written on the job by staff computer programmers would fall under this provision. **5. Public Dedication**

**Ownership Provisions:** Except when limited by the above, the creator of any intellectual property may choose to place his or her creation in the public domain. In such cases both the creator and the University waive all ownership rights to said property.

#### **6. In General**

Unless governed by the above, ownership of intellectual property created at the University shall be determined as follows:

##### **A. Traditional Rights Retained**

**Ownership Provisions:** In keeping with establishing academic traditions at the University, the creator retains all rights to the following types of intellectual property, without limitation: books

(including textbooks), educational courseware, articles, pictorial and graphic works, audio-visual works, and sound recordings, regardless of the level of use of university facilities. This provision does not include computer software (other than educational courseware) or databases.

#### **B. No Substantial Use of University Facilities**

**Ownership Provisions:** The creator owns all intellectual property created without substantial use of university facilities, including intellectual property rights in computer software and databases.

#### **C. Substantial Use of University Facilities - No External or Internal Sponsorship**

Ownership of intellectual property created with substantial use of university facilities, but not directly arising from externally sponsored work, or from work for which the University has declared itself as sponsor, shall be determined as set forth hereinafter depending on whether the creator or the University develops said property.

##### **i. Development by Creator**

**Ownership Provisions:** The creator originally owns intellectual property created with substantial use of university facilities but no external or internal sponsorship, and retains said ownership by commercial development of said property subject to the following: (i) the University shall receive 15% (fifteen percent) of the net proceeds to the creator above \$25,000 (twenty-five thousand dollars) from all sources (in the case of patents and copyrights, this provision shall be limited to the life of the patent or copyright), and (ii) the University shall receive a perpetual, non-exclusive, non-transferable, royalty free license to use said intellectual property. In the case of software, this license includes access by specified university personnel to the source listings, and the University shall require each person to whom a disclosure is made to execute in advance a binding confidentiality agreement in favor of and enforceable by the creator. If the intellectual property is created solely by a student or students, the creator is exempt from the obligation to pay to the University a fraction of his net proceeds, but not from the provision of this paragraph for a non-exclusive license to the University.

##### **ii. Development by the University**

**Ownership Provisions:** When intellectual property is created with substantial use of university facilities, but not directly arising from sponsored research, the creator will originally retain the rights to the property, provided that he desires to commercially develop the property himself or to make it available to the public. If, however, the creator elects not to commercially develop same or fails to show diligence in pursuing such development, then the ownership rights to that property may be acquired by the University.

#### **D. Substantial Use of University Facilities - External or Internal Sponsorship**

Ownership of intellectual property created with substantial use of university facilities and directly arising from work sponsored under an agreement between an external sponsor and the University, or from work for which the University has declared itself a sponsor, but for which neither the external sponsor nor the University have specified the ownership of resulting intellectual property shall be determined as set forth hereinafter depending on whether the creator or the University develops said property.

##### **i. Development by University**

**Ownership Provisions:** The University originally owns intellectual property created with substantial use of university facilities provided by an external agreement or internal university

sponsorship and retains said ownership by commercial development of said property, subject to the following: in all cases, the creator shall receive 50% (fifty percent) of the net proceeds to the University.

#### ii. Development by Creator

**Ownership Provisions:** When intellectual property is created with substantial use of university facilities provided by external or internal sponsorship, the University will originally retain the rights to the property, provided that it desires to commercially develop the property or to make it available to the public. If, however, the University elects not to commercially develop the same or fails to show diligence in such development, the ownership rights to that property may be acquired by the creator.

#### E. Consulting Agreements

**Ownership Provisions:** Work done by individuals as consultants to outside firms is presumed not to involve unreimbursed substantial use of university facilities, and the rights to intellectual property created under consulting agreements are retained by the outside firms or the individual as specified by the terms of the consulting agreement.

#### *General Procedures*

The creator of any intellectual property that is or might be owned by the University under this policy is required to make reasonably prompt written disclosure of the work to the University's Provost, and to execute any document deemed necessary to perfect legal rights in the University and enable the University to file patent applications and applications for copyright registration when appropriate. This disclosure to the Provost should be made at the time when legal protection for the creation is contemplated, and it must be made before the intellectual property is sold, used for profit, or disclosed to the public. Whenever legal protection for intellectual property is anticipated all persons engaged in such creative activity are encouraged to keep regular notebooks and records.

Whenever the University undertakes commercial development it shall do so, if possible, in a fashion that provides for the widest possible dissemination, avoiding suppression of inventions from which the public might otherwise benefit, providing for non-exclusive licensing at reasonable royalties, and giving consideration to more favorable or royalty-free licensing to non-profit charitable institutions, minority businesses or enterprises in developing countries.

The University's share of any proceeds under this policy will be used to reimburse the University for its expenses for commercial development of intellectual property. Any additional return to the University will be used to further the academic purposes of all disciplines of the University community.