Harrisburg University Of Science and Technology

Graduate Catalog

2019-2020

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CONTACT INFORMATION

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

Additional Location:
1500 Spring Garden Street, Suite 101
Philadelphia, PA 19130
717.901.5100, ext. 0127

Admissions
717.901.5101
Admissions@HarrisburgU.edu

Advancement Office
717.901.5103
Connect@HarrisburgU.edu

Finance & Administration
717.901.5105
BusinessOffice@HarrisburgU.edu

Financial Aid
717.901.5115
FinancialAid@HarrisburgU.edu

Information Technology
717.901.5106
HelpDesk@HarrisburgU.edu

Library
717.901.5188
Library@HarrisburgU.edu

Office of the President
717.901.5104
President@HarrisburgU.edu

Professional Development
717.901.5190
ProfessionalEd@HarrisburgU.edu

Records and Registration
717.901.5136
Registrar@HarrisburgU.edu

Student Services
717.901.5173
GradStudentServices@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 at 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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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 reaccredited 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-SEVIS) as an eligible institution for the Student and Exchange Visitor Information System (SEVIS) to enroll non-immigrant students.

The Master of Science in Project Management program is accredited by the Global Accreditation Center from the Project Management Institute, 14 Campus Boulevard, Newtown Square, PA (855-746-4849). The M.S. program in Project Management is one of only 110 programs around the world to achieve this accreditation. The Global Accreditation Center (GAC) for Project Management Education Programs is an independent academic accreditation body with policies, procedures, and standards for project, program, portfolio management and related programs.

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.

GRADUATE-DEGREE EDUCATION

ADMISSIONS

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.

Graduate Admission

Philosophy

Harrisburg University of Science and Technology seeks to admit graduate program students from a variety of backgrounds. The University considers many factors in the review of applicant files and generally admits the qualified individual who has completed a baccalaureate degree with related undergraduate coursework, or those who have a baccalaureate degree but possess related professional experiences or potential.

Graduate education focuses on individualized career advancement in high-growth and high-demand areas of study within science, technology, engineering, management, and mathematics disciplines. This is accomplished by making certain that each student is completely engaged to gain knowledge at an advanced level, is able to specialize or generalize knowledge and skills according to needs and interests and applies what is learned and researched to both practical and professional experience. This is also accomplished by involving corporate faculty members who bring a practical and academic perspective to the program and courses in the design, development and delivery of graduate education. This program is designed for working professionals focused on career advancement and who need flexibility of access and timeliness of content and delivery.

Graduate Admission Process

There is no application deadline. Graduate program applicants are 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).

Graduate Admission Requirements

Each applicant's candidacy will be evaluated once all admissions materials have been received. The graduate admission process requires the candidate to:

- complete the application online at www.HarrisburgU.edu/Apply;
- submit final official undergraduate transcript(s) from the college or university at which a baccalaureate degree was conferred, and any other institution of higher education attended (whether or not academic credit was earned);
- submit a personal goal statement including:
    - future goals: identify career/professional goals; and,
    - leadership or group contributions: describe examples of leadership experience in which you have significantly influenced others, helped resolve disputes, or contributed to group efforts over time;
- submit a hard copy resume or by email to Admissions@HarrisburgU.edu;
- see programs for additional admission requirements.

International Students

An international student planning to attend the University on a student (F-1) visa must satisfy the appropriate 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,
- scoring above average 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 Enforcement (DHS-USCIS-SEVP) as an eligible institution for the Student and Exchange Visitor Information System (SEVIS) to enroll non-immigrant students.

This approval allows an international student to apply for entry into the United States for study on an F-1 visa only after a complete application package is received 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 visa to confirm all identification information in SEVIS.

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

Graduate Non-Degree Students

Graduate Non-Degree Status Admission Process

Each applicant's candidacy will be evaluated once all admissions materials have been received. Offers of admission are made to qualified applicants on a rolling basis.

Complete the non-degree application online at www.HarrisburgU.edu/Apply or a paper application.

If required by a specific certificate or non-degree program, submit final official undergraduate transcript, providing evidence of completion of a bachelor's degree program.

Graduate Non-Degree Status Policies

An applicant should enroll under non-degree status when undecided about a graduate-level major or program, not interested in earning a master's degree, interested only in graduate-level professional development courses such as Educator Technology Clinics, or completing work with the intention of transferring the credit earned to another institution.

Non-degree applicants must have earned an undergraduate degree from an accredited institution. A student may apply no more than 12 graduate semester hours completed under non-degree status to a graduate degree program at the University. Non-degree status does not guarantee admission into a degree program. A student must maintain a 2.00 cumulative grade point average to remain enrolled.

An applicant whose native language is not English must submit his or her scores from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS). See following section for specifics.

Readmission

The Readmission Application Form is available at 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 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 graduate tuition, charges and policies listed in this publication are effective as of July 1, 2017 and are subject to change, without notice, by the University's Board of Trustees.

Admission Application Charge

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

Tuition Deposit

A non-refundable tuition deposit must be paid in advance of course registration for the initial semester of attendance.

Tuition – Semester Schedule

Tuition payment or satisfactory arrangement to pay tuition is due generally one week prior to the beginning of the semester. A graduate student is charged the semester hour rate multiplied by the number of semester hours enrolled. A program fee is also charged for certain program deliveries.

Graduate Tuition Schedule per Semester

Description	Charge
Tuition – all programs	$800 per credit hour
Program Fee	$500 per semester

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 who intends to seek federal 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 only 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

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. An Executive Format student is not eligible for a deferred payment plan.

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. The estimated cost for textbooks and other supplies per course is $175.

Prior Learning Assessment Charge

A student who submits an application for prior learning assessment is charged per semester hour amount of $350 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 processed for payment is returned by the issuing bank.

Campus ID Card Replacement Charge - Upon enrollment, a student receives, at no cost, a 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.

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.

Commencement Fee – A charge of $65 (the charge is based on the cost of the cap, gown, and tassel at time of graduation) will be assessed for the student participating in the Commencement Ceremony.

Transcript Requests – The official transcript request form is available on the Harrisburg University website or electronically submitted via MyHU. There will be a $10.00 charge per transcript requested by standard domestic delivery.

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 on the census date.

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 the 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. 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.

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 up to 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 after the 60 percent point in time 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. The refund order of Title IV, HEA program funds (as applicable to the student) is: Unsubsidized Direct Loans; Subsidized Direct Loans; Direct PLUS Loans; Federal Pell Grants; and, FSEOG.

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.

Official Withdrawal

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 from the University is encouraged to contact 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 the student will be unofficially withdrawn.

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 who 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 Records and Registration. There are serious Title IV, H&A federal student financial aid program implications for a student who unofficially withdraws.

STUDENT FINANCIAL AID PROGRAMS & POLICIES

The Office of Financial Aid assists qualified applicants who, without assistance, would otherwise be unable to pursue an advanced degree. The Free Application for Federal Student Aid (FAFSA) and resulting need analysis is used to apply for federal and state 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 or other costs and updates to the financial profile of the student.

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 Status: 6 or more semester hours
Half-time Status: 3 semester hours

Required enrollment status for federal direct loans is half-time. A non-degree student is not eligible for financial aid.

Aid Sources

Federal Direct Loan - A Federal Direct Loan (FDL) is available to eligible borrowers. Interest accrues on the unsubsidized loan while the student is enrolled. The borrower may opt to pay the interest as it accrues or allow it to accrue and capitalize. The unsubsidized loan is a non-need based loan program. The maximum Federal Direct Loan per academic year is $10,250 per semester for an eligible degree-seeking graduate student. An international student attending on an F-1 visa or an international student outside the U.S. enrolled in a distance education program are not eligible to borrow a Federal Direct Loan.

Federal PLUS Loan for Graduate Students – A degree-seeking graduate student may be eligible to borrow under the PLUS Loan Program, up to the cost of attendance minus other estimated financial assistance in the Federal Direct loan (FDL) program. The terms and conditions applicable to Parent PLUS loans also apply to Graduate/Professional PLUS loans. The requirements include a determination that the applicant does not have an adverse credit history. Repayment begins 60 days after the date of graduation, withdrawal, or enrollment status below half-time. The student must have applied for the annual loan maximum eligibility under the Federal Unsubsidized Direct Loan Program before applying for a Graduate/Professional PLUS loan. An international student attending on an F-1 visa or an international student outside the U.S. enrolled in a distance education program is not eligible to borrow a Federal PLUS Loan for Graduate Students.

Graduate Opportunity Grant – A full-time, degree-seeking student may be eligible for up to $2,000 of non-need-based aid assistance. The student must be full time (6 credits per semester) and reside in the United States. A student enrolled in the M.S. in ISEM or the M.S. in Analytics degree program is not eligible for this grant. An International Student attending on an F-1 visa is not eligible for this grant.

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	Job Training Agencies
Pennsylvania Office of Vocational Rehabilitation	Employer Sponsorship

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 financial aid.

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.

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 Financial Aid Eligibility (qualitative) - A student with a cumulative grade point average of 3.00 or higher is in satisfactory academic standing. If a student has a cumulative grade point average below 3.00 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 2-year, 6 semester programs consisting of 36 semester hours must be completed successfully within 3 years (i.e., 9 semesters, 54 semester hours) to maintain eligibility for federal financial aid program assistance throughout the program of study.

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

Total Earned Semester Hours ÷ Total Attempted Semester Hours = a percentage (%)

Students must complete their degree within 150% of the number of credits necessary to complete the educational program. As a result, students are required to be earning a minimum of 67% of their total cumulative attempted credits at the end of each payment period to remain in good satisfactory academic progress standing.

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 the following policy:

First Occurrence - Warning

Following the first semester in which the student does not meet the satisfactory academic progress standard, the student will automatically be placed in a financial aid warning status for the next semester. A letter will be issued advising the student of their financial aid warning status. No appeal is needed, but in coordination with the Office of Student Services, an academic plan may be required. The student remains eligible for financial aid program assistance during the warning semester.

Second Consecutive Occurrence – Probation

If, by the end of the warning semester, the student is not able to achieve satisfactory academic progress status, the student will not be able to receive financial aid for the next period of enrollment unless the student successfully appeals. A letter will be issued advising the student of their financial aid status, the effect of this status on the student's financial aid eligibility, and the steps the student must take to submit an appeal. If the appeal is approved, the student will be placed in a financial aid probation status for the next semester and will be eligible for financial aid during that semester. An academic plan will also be required during this semester.

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 warning semester, may file an appeal by submitting a letter outlining the nature of the appeal to the Financial Aid Office. 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.

If the financial aid appeal is denied, a second notice will be sent to the student advising them of the denial. If the appeal is approved, a semester of financial aid probation will be awarded. The student will be notified in writing their appeal was approved. The student must achieve satisfactory academic progress by the end of the financial aid probation semester.

If after the financial aid probation semester a student is still not making satisfactory academic progress, but is meeting the requirements of the academic plan, the student is eligible to continue to receive financial aid as long as the student continues to meet those requirements and is reviewed according to the requirements specified in the academic plan. A student becomes ineligible to receive federal funds when the student does not meet the requirements of the academic plan.

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 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. Written notification of financial aid ineligibility is mailed to a student at the most recently reported permanent address.

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

New Student Orientation

Orientation sessions precede each semester in order for the student to become familiar with the University, technology services, campus policies and procedures, and to obtain an individual course schedule. A new student entering the University is encouraged to view the orientation presentations available online on My HU.

Student Housing

The Office of Student Services can assist the student to find housing with the University's local Harrisburg partners.

Student Parking

Park UP Harrisburg (parkHarrisburg.com) operates the parking facilities in Harrisburg. Prices vary by facility. Check the website for specifics.

Health and Personal Counseling Services

Medical and counseling services are not provided on campus. A full-service hospital is located three city blocks from the University. For students in the Harrisburg area that can commute to campus and reside in Pennsylvania, short-term mental health services are available. Students should contact counseling@harrisburgu.edu. For students that do not reside in Pennsylvania or in a commutable distance to the physical campus, students may contact counseling@harrisburgu.edu for referral services in the student's location. More information can be found at the website: http://harrsiburgu.edu/counseling-services.

Accessibility 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 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 may contact the Office of Student Services to request accommodations.

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 and 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
    - online databases of articles from newspapers, magazines, and scholarly journals;
    - streaming multimedia such as documentaries and video learning courses;
    - electronic books; and
    - 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 the student, 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 check-out 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 or 717.901.5177 with questions.

Academic Advising

Academic advising can be a critical component of a student's education. Every graduate student is assigned to an academic advisor who is a faculty member. The advisor helps the student 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 assists the student to access resources and developing strategies when non-academic factors affect a student's ability to succeed.

Career Services

The student obtains career counseling from the academic advisor, the Office of Experiential Programs, and the Office of Workforce Development. The following services can be obtained by enrolled students and alumni: one-on-one career counseling, assessment inventories, program and career exploration, professional development resources, mock interviews, and resume review. For more information, contact 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 two tracks of semesters per twelve-month period: (Fall, Spring, Summer) and (Late Fall, Late Spring, Late Summer). Students cannot cross over between the two tracks. Each semester consists of fourteen weeks of classes.

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 with specific expectations for participation & feedback. (When	½ hour call = ½ learning hour

	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 relate to course objectives; to be	Research for 1 five-page project = 1 learning hour Research for 1 3-5-page paper = 1-2 learning hours

	shared with class in a designated manner.	
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 2019-2020 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 Change of Program form located on MyHU. A student that earned 24 credits or more toward their degree requirements cannot change degree programs without faculty advisor approval.

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 for certification purposes as either full-time or part-time. Full-time graduate student enrollment is 6 semester hours in a semester. Part-time status is assigned to any graduate student enrolled for fewer than 6 semester hours in a semester.

A non-degree graduate student must make a decision to remain a non-degree student or become a degree-seeking student after the student has completed 12 semester hours of coursework.

A degree-seeking graduate student must complete the degree within 6 years from the date first attended at the University.

A student who interrupts study with an interval of less than one year from the last day of the most recent semester or term attended may return to the University without having to apply for readmission.

Registration Process

All students complete registration on-line at MyHU/Academics. There are written and video registration instructions available on MyHU. The start and end dates appear on the Academic Calendar, which is posted on MyHU/Academics and www.HarrisburgU.edu.

Directed Studies

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 open to students with 24 or more credits completed.
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 3.25 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 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 on 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 being audited carries no academic credit but is recorded on the student's academic record. The student wanting to audit a course must notify Records & Registration in writing no later than the end of the Add/Drop Period. The per semester hour tuition rate applies to audited courses.

Class Attendance

Attendance is a critical part of a student's education. The student is expected to attend all classes when scheduled 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 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 contact the instructor to address the situation;
3. if the student fails to do so, the instructor will notify Records and Registration to recommend withdrawal of the student from the course.

Advanced Standing

A student may earn advanced standing at the University in one of three ways: transfer of credit from another institution, the awarding of credit for military training, or prior learning assessment. The parameters for doing so are:

- limit to twelve (12) credits of combination between six (6) graduate transfer credits and prior learning assessment (in any combination)
- limit to six (6) credits of transfer credits and/or prior learning assessment for the core (capstone courses not eligible)
- limit to six (6) credits of transfer credits and/or prior learning assessment for electives

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.

Transfer Credit – 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 Records and Registration and academic credit is posted to the student's permanent record. The following limitations apply:

- transfer credit is limited to six (6) semester hours from another graduate program;
- the credit must have been earned with final grades of "B" or higher;

- the credit must be reviewed by the student's program advisor and Records & Registration;
- the credit must have been earned no more than five (5) years prior to the student's initial enrollment date in Harrisburg University's program; and,
    - a course completed for Continuing Education Units (CEUs) is not eligible for transfer credit consideration.

Domestic –Academic credit earned for graduate work completed for a minimum grade of "B" or higher will be awarded if: 1) the course is a reasonable substitute of a University course or 2) the course(s) is considered graduate level work worthy of elective credit in the student's program of study.

International – A World Education Services (WES) transcript evaluation or Educational Credential Evaluation (ECE) transcript evaluation is required. If the original evaluation received by Records and Registration from one of these evaluators deems the student's prior work to be at the graduate-level and the quality of the completed work is assessed to be at the "B" 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, a semester hour value is assigned for each course being accepted. If the student completed courses which are evaluated to be at the graduate-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 an Off-campus Coursework Form at 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 Records and Registration who 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 Harrisburg University's Office of Records and Registration. If the approved course was completed with a final grade of "B" or higher, the semester hours earned from the course will be posted to the student's record at the University.

Prior Learning Assessment – The University may award graduate 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; and,
- the outcomes of graduate-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 Master of Science 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 not receive more than 6 semester hours related to the program based upon prior learning assessment.

The prior learning assessment process is a way to demonstrate to a mentor, who is an expert in the field, graduate-level knowledge in a particular course area. These 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 graduate-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 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 Harrisburg University.

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. It is important for the student to understand that life and learning experiences alone are an inadequate basis for the award of prior learning credit. To be eligible for prior learning assessment, the outcomes of the non-collegiate learning experience must be documented, be applicable to the student's program of study, be related to a course, and be assessed as being similar to or meeting the requirements of learning gained through college-level learning experiences.

Approval of prior learning credit must be made in writing from the academic advisor, the appropriate faculty member, and the Provost. Capstone credits are not eligible for prior learning assessment. A per semester hour charge is incurred by the student for the number of semester hours sought under prior learning assessment.

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

Curricular Practical Training

Curricular practical training (CPT) is an academically-related work and learning experience for international students studying in the United States on an F-1 visa. CPT is defined as alternative work-study, internship, cooperative education employment, or other type of practicum. CPT is a required component of each of the Master of Science degree programs offered at Harrisburg University.

An F-1 student must be authorized by a Designated School Official (DSO) prior to employment. A minimum of two (2) semesters of participation in an internship/work experience is required for each student while enrolled and attending the program. Immediate participation is required for the eligible student. A student with a pending I-539 Change of Status request or an individual that recently obtained an approved F-1 Change of Status following a B-1/B-2 or F-2 I-539 COS request may not participate in CPT immediately. The internship/work experience is an integral (essential) part of the established curriculum within each program of study, and immediate participation in CPT may commence at the beginning of the initial semester of enrollment if the required request for DSO approval and the employer offer letter are submitted timely. A student who has recently arrived in the U.S. within forty-five (45) days prior to a program start date will not be authorized to participate in CPT until at least one (1) semester of coursework has been successfully completed with a Cumulative Grade Point Average (CGPA) of 3.00 or better. An individual that recently obtained a F-1 Change of Status from B-1/B-2 or F-2 visa may not participate in CPT until at least one (1) semester of coursework has been successfully completed.

A first-time student at the master's degree level may only participate in 12 months (<364 days) of Full-Time CPT during the program of study to remain eligible for OPT. Upon completion, the student is then eligible to apply for Optional Practical Training (OPT) for an initial period of 12 months and a 24-month extension of OPT for the STEM-approved programs offered by the University. A student who has previously completed Optional Practical Training (OPT) at the master's degree level has exhausted OPT eligibility and is permitted to complete up to 24 months of CPT for the entire program of study.

A student's CPT internship experience or employment must relate to the program of study and may be part-time (20 or less hours per week) or full-time (21 to 40 hours per week).

Referred to as experiential learning, work experience permits the student to take lecture and textbook learning and apply that knowledge in a real-world setting to the workplace to research and prepare for the capstone Thesis or Applied Project.

CPT is available to the eligible student during the graduate degree program. Optional Practical Training (OPT) is a continuation of practical training employment for the eligible student that occurs following completion of the degree requirements of the program. OPT is optional and is available only once to an eligible student at each educational degree level. A student who has completed OPT at the master's level at a prior institution has exhausted OPT eligibility and may not re-apply for OPT through Harrisburg University.

Harrisburg University defines full-time enrollment status as six (6) semester hours of academic credit per semester in the Master of Science degree programs. An F-1 student must remain full-time throughout the entire program of study. A student enrolled on an F-1 visa may not register for more than one (1) online [distance learning] course each semester. A student who holds an H-1B or H-4 visa is permitted to take more than one course online each semester. Courses offered in the graduate program are not self-paced. Readings, writing assignments, and testing are often conducted weekly throughout the semester. All courses require 6 to 8 hours per week of study and applied project work outside of the classroom.

A completed CPT Verification Form signed by the employer and an employment Offer Letter are required to be submitted timely to the Office of International Students for participation in CPT. Following approval by a DSO, an updated active SEVIS Form I-20 is processed that should be presented to the site supervisor with the Cooperative Agreement. The period of eligible CPT employment is extended to the semester break periods, in accordance with University policy, if the student is pre-registered for any subsequent semester of enrollment.

Overview of Harrisburg University Graduate Studies

Graduate Education focuses on individualized career advancement in areas of study within the science, technology, engineering, and mathematics disciplines. The University's approach is based on an experiential model that allows the student to gain and apply knowledge and skills at an advanced level and to focus on an area of need or interest particular to the student. Faculty combine corporate and academic perspectives in the design, development, and delivery of graduate programs and courses. Programs are designed for working professionals focused on career advancement who can apply what is learned back to their workplace. Therefore, each course has multiple applied projects, work-related assignment, and each degree has a practicum requirement of all students.

Master of Science degree programs are offered in the following areas:

- Analytics
- Biotechnology
- Computer Information Sciences
- Healthcare Informatics
- Human-Centered Interaction Design
- Information Systems Engineering and Management
- Learning Technologies and Media Systems
- Next Generation Disruptive Technologies
- Nursing
- Pharmaceutical Sciences
- Project Management
- Techpreneurship

Harrisburg University's graduate programs are based on the following model:

- All M.S. degrees are granted for 36 semester hours (12 courses) of graduate work.
- Each MS program has 5 or 6 required courses that uniquely define the specific graduate program.
- There are a variety of graduate level courses that the students in any M.S. program may take as electives. This pool of electives may consist of a wide range of courses from different graduate-level programs.
- There is a 6-credit capstone/applied project/practicum or thesis requirement for all graduate degrees at the University. This practicum synthesizes the key concepts of the program and extends/applies these concepts to real life practical problems or research investigations. The capstone consists of two courses: a research methodology and writing course, and a Graduate Thesis or Applied Project or a Practicum required of specific programs. The courses leading up to this practicum experience combined with the practical work experience for students are required to complete the applied project. Students authorized by the University for CPT must take the applied project option within their specific degree program.

Graduation Requirements

A student must satisfy all of the following requirements to receive a Master of Science degree. Verification that the student has met the following requirements is made by Records and Registration.

1. At least 36 semester hours must be successfully completed.

2. A minimum cumulative grade point average of 3.00 is required for graduation from a Master of Science program and graduate certificate programs.

3. In order for any completed course to satisfy the 36 semester hours required, the course must be completed with a grade of "C" (2.00) or higher.

4. A student must earn a minimum of 30 semester hours in residence toward a Master of Science degree from the University. The number of semester hours that may be transferred from another institution's graduate program is six semester hours.

5. A degree student will demonstrate proficiencies in the field of study and the University's competencies through use of an ePortfolio or a similar technology or evidence-based approach.

6. A student must complete all requirements for the Master of Science degree within 6 years from the first day of attendance as a degree-seeking graduate student.

A candidate must apply for graduation after registering for the last semester of the anticipated completion date by submitting an Application for Graduation via MyHU.

A candidate for graduation must complete all requirements for the degree to be eligible to participate in Commencement. There is a $65 Commencement Fee for the graduate student.

Requirements for Earning a Second Master's Degree

A person who has earned a master's degree from HU or another accredited college or university may earn a second master'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 M.S. in Learning Technologies, the student cannot pursue a second M.S. in Learning Technologies).

2. The student must satisfactorily meet all graduation requirements for the second-degree program.

3. A minimum of 30 additional graduate course semester hours within the second degree's major must be successfully completed at HU.

4. No course already taken in the first-degree program may be repeated in the second degree.

5. Six credits may be transferred from the first master's degree to fulfill graduation requirements for the second master's degree. These will not count toward the 30-semester hour residency minimum.

Grades and Grading

Grades are awarded to each student for academic credit completed at the University. 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
B	Average achievement	3.00
C	Minimum achievement	2.00
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
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", "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 the 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 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 do not appear on the student's transcript.

Withdrawal (W) – This grade is recorded by 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 Records and Registration. The "WA" grade can be submitted at any time during the semester.

Withdrawal Fail (WF) – This grade is recorded by 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 Records and Registration when the instructor does not report a grade for the student for the course. 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 semesters completed at the University.

Calculation of the Semester Grade Point Average

Course	Sem. Hrs. Attempted	Grade	Numerical Value	Quality Points
Course A	3	A	4.00	12.00
Course B	3	B	3.00	9.00
Total	**6**			**21.00**

Total Quality Points = 21/6 = **3.5**

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 3 semester hours who earns a final grade of "A" in that course will earn 12 quality points for that course (3 semester hours x 4.0).*
2. Add the 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" 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.

Repeated Courses

A graduate student may repeat a course in which a final grade of "C" or below has been received. The original grade will remain on the student's academic record. After the course has been repeated, the most recent grade will be 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 Standing

A graduate student with a cumulative grade point average of 3.00 or higher is in satisfactory academic standing. A student whose cumulative grade point average falls below 3.00 is not in satisfactory academic standing and is placed on academic probation. If the cumulative grade point average is not raised to 3.00 or higher after attempting an additional 6 semester hours, the student is subject to academic dismissal.

Appeals – A student who is dismissed as a result of failure to meet satisfactory academic progress, may file an academic appeal 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 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.

If the academic appeal is denied, a second notice will be sent to the student advising that their appeal was denied. If the academic appeal is approved, a semester of academic probation will be awarded, and the student will be notified in writing that their appeal was approved. The student must achieve satisfactory academic progress by the end of the probation semester.

If after the academic probation semester a student is still not making satisfactory academic progress, but evidence is provided showing academic improvement, the cumulative grade point average has improved, and the required satisfactory academic progress grade point average can potentially be achieved within the maximum time frame limitation required by federal regulations then a second probation semester may be granted.

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 situation informally. Students 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 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 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 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 Records and Registration within five (5) days of receipt. The committee's decision is final and is not subject to further appeal. 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, the student should approach the faculty member to resolve informally. All documentation should be saved. If at the time the final grade is insufficient, the student can file a formal appeal at that time.

Withholding of Records

Student records may be withheld by 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 Student Services 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.

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 complete the Withdrawal Form via MyHU. Should a student have any questions, please contact Records and Registration by telephone (717.901.5136), e-mail (Registrar@HarrisburgU.edu), or in person.

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.

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 of procedures in the event of a violation of the Standards of Academic Integrity.

Disciplinary/Academic Dismissal

The University reserves the right to exclude at any time a student whose academic record is unsatisfactory or 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 review 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 one's self). 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, for example, through the use of technology inside and outside of the classroom, and the applied 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 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.
- **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 personal advancement.

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. The University is committed to improve its program offerings by comparing student assessment outcomes to the program and course goals.

Competencies

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.

Structure of the Master of Science Degree Program

Graduate education focuses on individualized career advancement in areas of study within science, technology, engineering, and mathematics disciplines. The University's approach is based on an experiential model that allows the student to gain and apply knowledge and skills at an advanced level and to focus on an area of need or interest particular to the student. Faculty combine corporate and academic perspectives in the design, development, and delivery of graduate programs and courses. Programs are primarily designed for working professionals focused on career advancement.

Master of Science Degree Model

The curriculum requires a minimum of 36 earned semester hours to fulfill the Master of Science degree requirements. The courses are distributed in the following required areas: Core, Experiential, and Electives. Each requirement is detailed as follows:

Core Courses **15 or 18 semester hours**

Each Master of Science program has Core semester hours that uniquely define the specific program

Master of Science Degree programs are offered in the following areas:

- Analytics
- Biotechnology
- Computer Information Sciences
- Healthcare Informatics
- Human-Centered Interaction Design
- Information Systems Engineering and Management
- Learning Technologies and Media Systems
- Nursing
- Project Management
- Pharmaceutical Sciences
- Next Generation Disruptive Technologies
- Techpreneurship

Electives **12 or 15 semester hours**

Any graduate course from any graduate program not required by the program may be applied toward the elective requirement. This component of the program may be used to complete a concentration in a specific topic or may be used to individualize the student's program of study.

Experiential Courses **6 semester hours**

The experiential course sequence synthesizes the key concepts of the program extending and applying these concepts to real life practical problems or research investigations. It consists of two courses: a research methodology and writing course, and a Graduate Thesis or Applied Project.

Master of Science Degree **total of 36 semester hours**

ACADEMIC PROGRAMS

Graduate education focuses on individualized career advancement in areas of study within science, technology, engineering, and mathematics disciplines. The University's approach is based on an experiential model that allows the student to gain and apply knowledge and skills at an advanced level and to focus on an area of need or interest particular to the student. Faculty combines corporate and academic perspectives in the design, development, and delivery of graduate programs and courses. Programs are primarily designed for working professionals focused on career advancement.

Master of Science in Analytics

This 36-semester hour program prepares the student by providing depth in analytics during the first year and focused functional study during the second year that can be applied to any discipline or any interdisciplinary area. Data analysts are forging new relationships in virtually every discipline: business, healthcare, geology, mathematics and statistics, biology, chemistry, computer science, information systems and technology, engineering, psychology, behavioral science, operations research and more, in addition to potential interactions between these disciplines, using role-based interaction with information and analytics to enable highly- collaborative, data-driven organizations The graduate of this program enters the workforce prepared for the complex, information-intensive world.

The Analytics student will complete an individualized concentration.

Program Goals

ANMS graduates are able to:

- Identify and assess the opportunities, needs and constraints for data usage;
- Make clear and insightful analyses changing direction quickly as required by these analyses;
- Measure, evaluate, and explain the level of quality of a dataset and develop a plan to improve the quality;
- Work effectively in a team to develop data analytic solutions;
- Recognize and analyze ethical issues related to intellectual property, data security integrity, and privacy; and
- Communicate clearly and persuasively to a variety of audiences.

Graduates become data scientists and analysts in finance, marketing, operations, and business intelligence working groups that generate and consume large amounts of data.

Analytics Requirements - The following courses comprise the Master of Science in Analytics program - 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses – 15 semester hours:

ANLY 500	Analytics I: Principles and Applications	(3)
ANLY 502	Analytical Methods I	(3)

ANLY 506	Exploratory Data Analysis	
or		(3)
ANLY 512	Data Visualization	
ANLY 510	Analytics II: Principles and Applications	(3)
ANLY 545	Analytical Methods II	
or		(3)
ANLY 560	Functional Programming Methods for Analytics	

Complete the following experiential courses – 6 semester hours:

GRAD 695	Research Methodology and Writing	(3)
and		
ANLY 699	Applied Project in ANLY	
or		(3)
GRAD 699	Graduate Thesis	

Individualized
The Master of Science in Analytics student can choose electives totaling 15 credits from any graduate-level program. This option allows Analytic students to build their own customized specialization and concentrations.

Recommended Sequence for the Two-Year Master of Science in Analytics Program with an 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.

First Year

Fall Semester		Spring Semester		Summer Semester	
ANLY 500 Analytics I: Principles and Applications	3	ANLY 506 Exploratory Data Analysis Or ANLY 512 Data Visualization	3	ANYL 510 Analytics II: Principles and Applications	3
ANLY 502 Analytical Methods I	3	Elective	3	ANLY 545 Analytical Methods II Or ANLY 560 Functional Programming Methods for Analytics	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
Elective	3	Electives	3	ANLY 699 Applied Project in ANLY or GRAD 699 Graduate Thesis	3
GRAD 695 Research Methodology & Writing	3	Elective	3	Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Biotechnology

The 36-semester hour Master of Science degree in Biotechnology provides a comprehensive work-oriented curriculum that explores the industrial, medical, and regulatory underpinnings of the biotechnology field. The program offers a sound foundation in these multiple areas of biotechnology, while integrating the applied and innovative aspects of the science. With a focus on industry-relevant projects, case studies, and real-world scenarios, the program graduates are prepared with the skills and technical expertise to confidently cater to the needs of an ever-growing biotechnology sector.

This master's program prepares the student for biotechnology careers focusing on research and development, leadership, planning, management and marketing. The flexibility of the general degree allows student customization of the coursework to meet individual career goals. The program offers four different concentrations: biomanufacturing, medical biotechnology, biotechnology business and management, and an individualized program of study.

Program Goals

A successful student of the program gains the following skills (vary according to the degree/concentration taken):

- Research biotechnology concepts and developments to determine their relevance to applications in biotechnology;
- Evaluate research literature, emerging technologies, and commercial developments to design and/or develop innovative biotechnology applications and products;
- Work as part of a project team to plan and manage the production of an innovative biotechnology application or product;
- Analyze the global business environment of biotechnology industry including regulations and finance to make ethical decisions that meet the needs of the organization; and,
- Actively communicate and collaborate as part of the global community of biotechnology researchers and developers.

Biotechnology Requirements - The following courses comprise the Master of Science in Biotechnology – 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following core courses – 18 semester hours:

BTEC 502	Biomaterials	(3)
BTEC 508	Omics for Life Sciences	(3)
BTEC 522	Graduate BTEC Seminar	(3)
BTEC 540	Biostatistics	(3)
BTEC 550	Instrumentation for BTEC Industry	(3)
BTEC 560	Design of Experiment	(3)

Complete the following experiential courses – 6 semester hours:

GRAD 695	Research Methodology & Writing	(3)
and		
BTEC 699	Applied Project in BTEC	
or		(3)
GRAD 699	Graduate Thesis	

Complete one of the following concentrations – 12 semester hours:

Biomanufacturing:

BTEC 618	Principles of Bioprocessing	(3)
BTEC 650	Fermentation Technologies	(3)
BTEC 655	Industrial Enzymes and Proteins	(3)
BTEC 675	Innovation/Improvisation in R&D	(3)
BTEC 698	Graduate Internship in BTEC	(3)
GRAD Elective*		(3)

Medical Biotechnology:

BTEC 610	Advanced Topics in Drug Discovery and Delivery	(3)
BTEC 615	Biomedical Devices and Prototyping	(3)
BTEC 620	Emerging Trends in Diagnostics	(3)
BTEC 625	Pharmacogenomics	(3)
BTEC 630	Cancer Biotechnology	(3)
BTEC 635	Clinical Pharmacology	(3)
BTEC 640	Trends in Regenerative Medicine	(3)
BTEC 698	Graduate Internship in BTEC	(3)
GRAD Elective*		(3)

Biotechnology Business and Management:

BTEC 612	Regulatory Affairs in Life Science	(3)
BTEC 622	Principles of Accounting and Finance	(3)
BTEC 634	Healthcare Economics: Fundamentals for Providers and Biotech Professionals	(3)
BTEC 672	Legal Affairs and Policies for Life Science Industry	(3)
BTEC 675	Innovative & Improvisation in Research & Development	(3)
MGMT 510	Principles of Management	(3)
GRAD Elective*		(3)

Individualized

The Master of Science in Biotechnology student can choose electives totaling up to 12 credits from Information Systems Engineering and Management, Project Management, and Healthcare Informatics programs at Harrisburg University: This option allows the BTMS student to build their own customized specialization and concentrations.

* Student can choose a course from any of the Master of Science programs.

Recommended Sequence for the Two-Year Master of Science in Biotechnology with a Concentration in Biomanufacturing - The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 502 Biomaterials	3	BTEC 540 Biostatistics	3	BTEC 550 Instrumentation for BTEC Industry	3
Biomanufacturing Elective	3	Biomanufacturing Elective	3	Biomanufacturing Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 508 Omics for Life Sciences	3	BTEC 522 Graduate BTEC Seminar	3	BTEC 560 Design of Experiment	3
Biomanufacturing Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis Or BTEC 699 Applied Project in BTEC Or BTEC 698 Biotechnology Graduate Internship	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Two-Year Master of Science in Biotechnology with a Concentration in Medical Biotechnology - The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 502 Biomaterials	3	BTEC 540 Biostatistics	3	BTEC 550 Instrumentation for BTEC Industry	3
Medical Biotechnology Elective	3	Medical Biotechnology Elective	3	Medical Biotechnology Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 508 Omics for Life Sciences	3	BTEC 522 Graduate BTEC Seminar	3	BTEC 560 Design of Experiment	3
Medical Biotechnology Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis Or BTEC 699 Applied Project in BTEC Or BTEC 698 Biotechnology Graduate Internship	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Two-Year Master of Science in Biotechnology with a Concentration in Biotechnology Business and Management -

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

First Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 502 Biomaterials	3	BTEC 540 Biostatistics	3	BTEC 550 Instrumentation for BTEC Industry	3
Biotechnology Business & Management Elective	3	Biotechnology Business & Management Elective	3	Biotechnology Business & Management Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 508 Omics for Life Sciences	3	BTEC 522 Graduate BTEC Seminar	3	BTEC 560 Design of Experiment	3
Biotechnology Business & Management Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis Or BTEC 699 Applied Project in BTEC Or BTEC 698 Biotechnology Graduate Internship	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Two-Year Master of Science in Biotechnology with an 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.

First Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 502 Biomaterials	3	BTEC 540 Biostatistics	3	BTEC 550 Instrumentation for BTEC Industry	3
Graduate Elective	3	Graduate Elective	3	Graduate Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
BTEC 508 Omics for Life Sciences	3	BTEC 522 Graduate BTEC Seminar	3	BTEC 560 Design of Experiment	3
Graduate Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis Or BTEC 699 Applied Project in BTEC Or BTEC 698 Biotechnology Graduate Internship	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Computer Information Sciences

The 36-semeter hour Master of Science degree in Computer Information Sciences provides a challenging opportunity of pursuing a versatile course of study reflecting the student's desire, background and future responsibilities. The program includes a variety of specialties that are covered in depth to probe the frontiers of scientific and engineering knowledge in the domain. A graduate of the program is able to integrate computational, interpersonal and team skills, to secure a professional employment or pursue a doctoral degree in the field.

The Master of Science degree in Computer Information Sciences also provides the student with solid foundations of scientific and practical tools and methodologies to computation, its applications and emerging trends, in a variety of subdomains, to probe the frontiers of scientific and engineering knowledge in the industry. The student explores approaches including computing systems architecture, mathematical and data structures techniques for modeling simulation of complex systems; cluster computing and collaborative software development, and efficient methods for organizing, exploring, visualizing, processing and analyzing very large data sets.

Program Goals

A successful student of the program gains the following skills (vary according to the degree/concentration taken):

- Recognize the necessity for conducting theoretical and empirical analysis;
- Master at least one knowledge area or sub-area from the body of knowledge to at least the Bloom Synthesis level;
- Adapt to rapidly changing technology, advanced learning, and entrepreneurship qualities;
- Have strong scientific communication skills;
- Possess excellent teamwork skills;
- Adhere to the ethical standards and moral obligations as a condition of their membership in the profession; and,
- Employ concepts that promote local and global systems for quality of life.

Computer Information Sciences Requirements: The following courses comprise the Master of Science in Computer Information Sciences – 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following core courses – 15 semester hours:

CISC 520	Data Engineering & Mining	(3)
CISC 525	Big Data Architecture	(3)
CISC 530	Computing Systems Architecture	(3)
CISC 603	Theory of Computation	(3)
CISC 610	Data Structures & Algorithms	(3)

Complete the following experiential courses – 6 semester hours:

GRAD 695	Research Methodology & Writing	(3)
and		
CISC 699	Applied Project in CISC	
or		(3)
GRAD 699	Graduate Thesis	

Complete one of the following concentrations (15 semester hours):

Scientific Computing:

CISC 600	Scientific Computing I	(3)
CISC 601	Scientific Computing II	(3)
CISC 614	Computer Simulation I	(3)
Elective*		
or		(3)
CISC 681	Special Topics in Scientific Computing	
Elective*		
or		(3)
CISC 691	Current Topics in Scientific Computing	

Software Engineering & Software Testing:

CISC 592	Software Architecture and Microservices	(3)
CISC 593	Software Verification and Validation	(3)
CISC 594	Software Testing Principles and Techniques	(3)
Elective*		
or		(3)
CISC 682	Special Topics in Software Engineering	
Elective*		
or		(3)
CISC 692	Current Topics in Software Engineering	

Cyber Security:

CISC 661	Principles of Cybersecurity & Cyber Warfare	(3)
CISC 662	Ethical Hacking Development Lab	(3)
CISC 663	Cyber Risk Assessment & Management	(3)
Elective*		
or		(3)
CISC 683	Special Topics in Cyber Security	
Elective*		
or		(3)
CISC 693	Current Topics in Cyber Security	

* Student can choose a course from any of the Master of Science programs.

Recommended Sequence for the Two-Year Master of Science in Computer Information Sciences Program with a concentration in Scientific Computing – The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Concentration in Scientific Computing					
Fall Semester		**Spring Semester**		**Summer Semester**	
CISC 530 Computing Systems Architecture	3	CISC 520 Data Engineering & Mining	3	CISC 601 Scientific Computing II	3
CISC 610 Data Structures & Algorithms	3	CISC 600 Scientific Computing I	3	CISC 603 Theory of Computation	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		**Spring Semester**		**Summer Semester**	
CISC 525 Big Data Architecture	3	Elective or CISC 691 Current Topics in Scientific Computing	3	Elective or CISC 681 Special Topics in Scientific Computing	3
CISC 614 Computer Simulation	3	GRAD 695 Research Methodology & Writing	3	GRAD 699 Graduate Thesis or CISC 699 Applied Project in Computer Science	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Two-Year Master of Science in Computer Information Sciences Program with a concentration in Software Engineering & Software Testing – The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Concentration in Software Engineering and Software Testing					
Fall Semester		**Spring Semester**		**Summer Semester**	
CISC 530 Computing Systems Architecture	3	CISC 520 Data Engineering & Mining	3	CISC 593 Software Verification and Validation	3
CISC 610 Data Structures & Algorithms	3	CISC 592 Software Architecture and Microservices	3	CISC 603 Theory of Computation	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		**Spring Semester**		**Summer Semester**	
CISC 525 Big Data Architecture	3	Elective or CISC 692 Current Topics in Software Engineering	3	Elective or CISC 682 Special Topics in Software Engineering	3
CISC 594 Software Testing Principles and Techniques	3	GRAD 695 Research Methodology & Writing	3	GRAD 699 Graduate Thesis or CISC 699 Applied Project in Computer Science	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Two-Year Master of Science in Computer Information Sciences Program with a concentration in Cyber Security –

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

First Year

Concentration in Cyber Security					
Fall Semester		**Spring Semester**		**Summer Semester**	
CISC 530 Computing Systems Architecture	3	CISC 520 Data Engineering & Mining	3	CISC 603 Theory of Computation	3
CISC 610 Data Structures & Algorithms	3	CISC 661 Principles of Cyber Security & Cyber Warfare	3	CISC 662 Ethical Hacking Development Lab	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		**Spring Semester**		**Summer Semester**	
CISC 525 Big Data Architecture	3	Elective or CISC 693 Current Topics in Cyber Security	3	Elective or CISC 683 Special Topics in Cyber Security	3
CISC 663 Cyber Risk Assessment & Management	3	GRAD 695 Research Methodology & Writing	3	GRAD 699 Graduate Thesis or CISC 699 Applied Project in Computer Science	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Healthcare Informatics

The 36-semester hour graduate program in Healthcare Informatics provides clinicians with knowledge and experience that allows them to function as valued team members selecting, installing, adopting, employing, evaluating, and optimizing healthcare-related IT systems, such as Electronic Medical Records (EMRs), in today's healthcare delivery systems. The clinical objectives of healthcare informatics are to enhance individual and population health outcomes, improve patient care, and strengthen the clinician-patient relationship. This program emphasizes translational, communication and interpersonal skills during the selection, implementation, and optimization of healthcare IT systems while providing a solid base in informatics practice, analytics tools, and the management, capture, analysis, and governance of healthcare data. These skills are necessary for effective change management of healthcare providers, for knowledge management in the institution, and for effective communication of key information and insights to both colleagues and senior decision makers.

Program Goals

A successful student of the program gains the following skills (vary according to the degree/concentration taken):

- Lead healthcare information technology teams to analyze healthcare-related IT systems;
- Evaluate today's analytic tools to select the appropriate tools for data analyses;
- Lead healthcare information technology teams to develop innovative techniques;
- Leverage insights from analysis of healthcare data and evaluation of the socio-political; environment to devise programs aimed at improving the health of the community; and,
- Apply appropriate principles to create clear and effective communications for a variety of audiences.

Healthcare Informatics Requirements: The following courses comprise the Master of Science in Healthcare Informatics – 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following core courses – 15 semester hours:

HCIN 500	Healthcare Informatics	(3)
HCIN 515	Essential Informatics Skills I	(3)
HCIN 520	Essential Informatics Skills II	(3)
HCIN 545	Healthcare Data	(3)
HCIN 550	Introduction to Healthcare Analytics	(3)

Complete the following experiential courses – 6 semester hours:

GRAD 695	Research Methodology & Writing	(3)
and		
HCIN 699	Applied Project in HCIN	
or		(3)
GRAD 699	Graduate Thesis	

Complete 15 credit hours of graduate-level courses, with the approval of the student's faculty advisor, from the Harrisburg University course catalog. This allows the student to obtain educational experiences that apply directly to personal interests and goals within the broad scope of healthcare informatics. The following courses are likely to be among those selected (15 semester hours):

Individualized Concentration:

ANLY 500	Analytics I: Principles and Applications	(3)
ANLY 506	Exploratory Data Analysis	(3)
ANLY 510	Analytics II: Principles and Applications	(3)
ANLY 512	Data Visualization	(3)
ANLY 515	Risk Modeling and Assessment	(3)
ANLY 525	Quantitative Decision-Making	(3)
BTEC 634	Healthcare Economics: Fundamentals for Providers and Biotech Professionals	(3)
CISC 520	Data Mining and Engineering	(3)
CISC 525	Big Data Architecture	(3)
ISEM 500	Strategic IS Planning, Engineering & Management	(3)
ISEM 501	Information & Communication Technologies (ICT) Principles	(3)
ISEM 525	Business Process Modeling and Workflow Systems	(3)
ISEM 541	Healthcare Systems	(3)
ISEM 565	Business Intelligence and Decision Support Systems	(3)
MGMT 510	Business Strategy and Management Principles	(3)
MGMT 511	Digital and Global Organizations	(3)
MGMT 520	Professional Communication	(3)
MGMT 560	Organizational Leadership	(3)
PMGT 510	Project Management	(3)
PMGT 540	Planning and Executing Projects	(3)

Recommended Sequence for the Two-Year Master of Science in Healthcare Informatics with an 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.

First Year

Fall Semester		Spring Semester		Summer Semester	
HCIN 500 Healthcare Informatics	3	HCIN 545 Healthcare Data	3	HCIN 520 Essential Informatics Skills II	3
ISEM 541 Healthcare Systems Or Elective	3	HCIN 515 Essential Informatics Skills I	3	HCIN 550 Introduction to Healthcare Analytics	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
Elective	3	Elective	3	Elective	3
Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis Or HCIN 699 Applied Project in Healthcare Informatics	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Certificate in Healthcare Informatics from Harrisburg University

This 15-semester hour graduate certificate program in Healthcare Informatics prepares the student with the basics of healthcare informatics in order to function effectively as project champions for healthcare information technology implementations and other basic informatics functions. A student may complete this program as a non-degree graduate student or as a Master of Science degree-seeking student.

Complete all of the following courses – 15 semester hours:

HCIN 500	Healthcare Informatics	(3)
HCIN 545	Healthcare Data	(3)
HCIN 515	Essential Informatics Skills I	(3)
HCIN 520	Essential Informatics Skills II	(3)
HCIN 550	Introduction to Healthcare Analytics	(3)

Master of Science in Human-Centered Interaction Design

The 36-semester hour graduate program in Human-Centered Interaction Design is designed to promote the human-centered collaborative mindsets that are required for careers in the research, specifications, and development of technologically-driven experiences. The program is interdisciplinary, bringing together the application of knowledge drawn from the social and behavioral sciences, information science, software engineering and project management. The student is taught a balance of theories, methods, skills, and processes.

Additional Requirements for Admission to Human-Centered Interaction Design - Completion of a bachelor's degree in a social science.

The Masterclass

To scaffold the bridge between existing training and experience, and the new design-focused interactive field, the HCID program will employ a unique introductory approach to intensive skill and knowledge building approach called Masterclass. The Masterclass functions as a pre-entry exposure and training certificate program. It will serve two functions:

- Expose and introduce existing degree holds to the history, perspectives, contexts, and methods that form the foundations of Design practice; and
- Evaluate each new cohort interest in and capacity for interdisciplinary creative thinking and digital medial production.

The student from non-interactive, non-business backgrounds will undertake the Masterclass (non-credit bearing). If the student achieves a satisfactory grade, the student will be admitted to the HCID program. If the student does not meet the standards, the student will be given a professional certificate in HCID.

Program Goals

- Design and produce engaging interventions facilitated by digital technologies;
- Communicate effectively across diverse populations and media;
- Structure HCID conceptual possibilities to create solutions to human problems;
- Reflect on role as designer and professional; and
- Effectively research people, document problems, and determine research relevance.

Human-Centered Interaction Design - The following courses comprise the Master of Science in Human-Centered Interaction Design - 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses – 18 semester hours:

IMED 500	Design Perspectives	(3)
IMED 504	Methods for Design Research	(3)
IMED 510	Human Sociotechnical Interactions	(3)
IMED 520	Users & Populations	(3)
IMED 540	Design Tools & Processes	(3)
IMED 570	Designing Patterns & Contexts	(3)

Complete the following experiential courses – 6 semester hours:

IMED 695	Design Research Studio	(3)
GRAD 699	Graduate Thesis	(3)

Complete the following concentration:

Individualized Concentration:
The Master of Science in Human-Centered Interaction Design student must take 12 elective credits (9 credits of existing courses with advisor consultation/approval and a 3 credit IMED 680 Special Topics course). Existing course offerings across Harrisburg University's master's degree programs will provide the student with opportunities to deepen their skills and knowledge of cognate areas in Analytics, Healthcare IT, E-Business, and IS/IT Management, dependent on the student's interest. Upon acceptance to the program, the student will receive one-on-one advising to craft an appropriate program of study that balances the core focus in HCID, with complementary training from other Harrisburg University graduate programs. The intent is to provide the student with personally relevant training in subject and skill areas that align to the student's career goals.

Recommended Sequence for the Two-Year Master of Science in Human-Centered Interaction Design Program -

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

First Year

Fall Semester		Spring Semester		Summer Semester	
IMED 500 Design Perspectives	3	IMED 520 Users & Populations	3	IMED 540 Design Tools & Processes	3
IMED 504 Methods for Design Research	3	IMED 510 Human Sociotechnical Interactions	3	Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
IMED 570 Designing Patterns & Contexts	3	IMED 695 Design Research Studio	3	GRAD 699 Graduate Thesis	3
Elective	3	Elective	3	IMED 680 Special Topics	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Information Systems Engineering and Management

The 36-semester hour graduate program in Information Systems Engineering and Management (ISEM) is designed to educate the leaders who can plan, engineer and re-engineer, and manage the systems needed to support the modern digital enterprises. Graduate studies in ISEM cut across the following three active areas of work:

- Information Systems – latest technologies and approaches (e.g. web-based components, mobile computing and wireless communications, business intelligence, and emerging technologies);
- Systems Engineering – systems thinking and emphasis on systems instead of individual components; enterprise architectures consisting of people, processes and technologies; and
- Management – business strategies, entrepreneurship, planning integration, security, governance, global enterprises, and agile enterprises.

ISEM is a flexible and interdisciplinary program that emphasizes the enterprise architecture, planning and management issues at global levels. An ISEM student may specialize in the following areas: digital government, digital health, entrepreneurship, information security, software engineering and systems development as part of their individualized concentration.

Program Goals

ISEM graduates are able to:

- Formulate and implement business strategies;
- Articulates knowledge of various system components associated with digital enterprises;
- Recognizes the interrelationship between various system components; and
- Formulates the design and planning processes involving information, engineering, and management systems.
- Leads the management for primary operational functions within modern enterprises.

Information Systems Engineering and Management Requirements - The following courses comprise the Master of Science in Information Systems Engineering and Management program - 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses – 15 semester hours:

ISEM 500	Strategic Information Systems Planning, Engineering & Mgmt	(3)
ISEM 540	Architectures and Integration of Modern Enterprises	(3)
MGMT 510	Business Strategy and Management Principles	(3)

Choose one of the following courses – 3 semester hours:

CISC 510	Object-Oriented Software	
ISEM 502	User-Centered Design	
ISEM 530	Analysis and Design of Modern Information Systems	(3)
ISEM 565	Business Intelligence and Decision Support Systems	
LTMS 531	Designing Serious Games and Simulations	

Choose one of the following courses – 3 semester hours:

ANLY 500	Analytics I: Principles and Applications	
MGMT 511	Digital and Global Organizations	(3)
PMGT 510	Principles of Project Management	

Complete the following experiential courses – 6 semester hours:

GRAD 695	Research Methodology and Writing	(3)
and		
ISEM 699	Applied Project in ISEM	
or		(3)
GRAD 699	Graduate Thesis	

Complete the following Concentration (15 semester hours):

Individualized Concentration:

The Master of Science in Information Systems Engineering and Management student can choose courses totaling 15 semester hours of credit from any of the graduate programs at Harrisburg University. This option allows the ISEM student to build their own customized specializations and concentrations. Although the ISEM student can take any courses from any graduate program, they are encouraged to choose electives that focus on their professional area of interest. In addition, the ISEM student is expected to use the concepts learned in these electives to strengthen their capstone courses. Suggested elective courses that focus on areas such as Analytics, Business Intelligence, Digital Enterprises, Digital technologies, Information Security and many others are listed in the "ISEM Student Guide available at www.ngecenter.org (ISEM Corner) and or by contacting your ISEM advisor or the program lead.

Recommended Sequence for the Two-Year Master of Science in Information Systems Engineering and Management Program - The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Fall Semester		Spring Semester		Summer Semester	
ISEM 500 Strategic Information Systems Planning	3	ISEM 540 Architecture and Integration of Modern Enterprises	3	ANLY 500 Analytics I: Principles and Applications or MGMT 511 Digital and Global Organization or PMGT 510 Principles of Project Management	3
MGMT 510 Business Strategy and Management Principles	3	Concentration Elective	3	CISC 510 User-Centered Design or ISEM 502 User-Centered Design or ISEM 530 Analysis and Design of Modern Information Systems or ISEM 565 Business Intelligence and Decision Support Systems or LTMS 531 Designing Serious Games and Simulations	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
Concentration Elective	3	GRAD 695 Research Methodology and Writing	3	ISEM 699 Applied Project in ISEM or GRAD 699 Graduate Thesis	3
Concentration Elective	3	Concentration Elective	3	Concentration Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Post-Master Certificate - Advanced Studies in Smart Enterprises

The purpose of this certificate is to allow a student with an Information Systems Management and Engineering master's degree to further their knowledge in chosen areas. In particular, the student will be able to pursue areas of interest both within and outside of ISEM to create a tailored body of knowledge at a higher level of achievement than the master's degree. The student will be able to use this knowledge in pursuit of career choices and in additional educational pursuits.

Program Goals

The student completing the Advanced Studies in Smart Enterprises Certificate will be able to:

- Articulate knowledge of various system components associated with digital enterprises;
- Recognize the interrelationship between various system components; and,
- Formulate the design and planning processes involving information, engineering, and management systems.

Advanced Studies in Smart Enterprises Certificate Requirements – The following courses comprise the Advanced Post-Masters Certificate in Digital Enterprises program – 18 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all the following courses – 18 semester hours:

ISEM 775	Advanced Design Project	(3)
ISEM	600-700 level course	(3)
Any other graduate course		(12)

Recommended Sequence for the One-Year Advanced Studies in Smart Enterprises Certificate – The sequence that appears below is based upon the availability of specific courses each semester and the successful completion of course prerequisites.

FIRST YEAR

Fall Semester		**Spring Semester**		**Summer Semester**	
500-600 Level Elective	3	600-700 Level ISEM Course	3	ISEM 775 Advanced Design Project	3
500-600 Level Elective	3	500-600 Level Elective	3	500-700 Level Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Learning Technologies and Media Systems

The Learning Technologies and Media Systems is a 36-semester hour program that provides the student with leading-edge approaches and skills to aid in the application of existing and emerging learning technologies in a variety of learning environments. The innovative, applied learning technologies program provides the student with immediate career benefits while preparing for anticipated industry needs. The LTMS program supports learning outcome advancements in business and education by cultivating learning leaders with a foundation in instructional design, learning theory, technology application, an understanding of critical issues and an advanced vision for technology-supported learning.

Program Goals

LTMS graduates are able to:

- Analyze performance improvement opportunities to determine appropriate solutions;
- Create engaging learning solutions to improve performance;
- Evaluate the effectiveness and efficiency of learning solutions; and,
- Achieve the management of knowledge through digital communication.

Learning Technologies Requirements-The following courses comprise the Learning Technologies and Media Systems program - 36 semester hours. There are 15 semester hours of required core courses, 15 semester hours of open electives or concentration-based electives and 6 semester hours of an experiential component. The semester hour 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	

Complete one of the following Concentrations (15 semester hours):

Instructional Technology:

LTMS 520	Learning Evaluation & Assessment	(3)
LTMS 530	Managing Technology Resources	(3)
LTMS 600	Implementing Web 2.0 in the Classroom	(3)
LTMS 608	Course Management Systems	(3)
LTMS 615	Coordinating the Learning Technology Infrastructure	(3)

It is possible to earn an Instructional Certificate in Instructional Technology K – 12 while completing the instructional technology concentration of the LTMS Master of Science program. See the certification requirements at the end of this section.

Instructional Design:

LTMS 520	Learning Evaluation & Assessment	(3)
LTMS 614	Social Learning in the Organization	(3)
LTMS 635	eLearning Authoring Systems	(3)
LTMS 636	Micro Instructional Design	(3)
LTMS 609	Synchronous Facilitation	(3)
	or	
LTMS 645	Visual Representation for Learning and Communication	(3)

Instructional Development:

LTMS 611	Extensible Languages for Development	(3)
LTMS 619	Enterprise Applications for eLearning	(3)
LTMS 625	Learning Management & Content Management Systems	(3)
LTMS 635	eLearning Authoring Systems	(3)
LTMS 680	Advanced eLearning Development	(3)

Games and Simulations:

LTMS 531	Designing Games & Simulations	(3)
LTMS 532	Developing Games & Simulations	(3)
LTMS 533	3D Modeling & Design	(3)
LTMS 534	Development for Virtual Worlds	(3)
LTMS 611	Extensible Languages for Development	(3)

Integration and Leadership:

PMGT 510	Principles of Project Management	(3)
LTMS 612	Integrating Learning Technologies with HR Functions	(3)
	or	
LTMS 530	Managing Technology Resources	(3)
LTMS 602	Learning Technology Evaluation, Selection and Implementation	(3)
	or	
LTMS 520	Learning Evaluation and Assessment	(3)
LTMS 625	Learning Management & Content Management Systems	(3)
LTMS 613	Data Protection in Learning Solutions	(3)

Individualized Concentration:
The Learning Technologies and Media Systems student can choose courses totaling 15 semester hours from any of the Master of Science programs.

Recommended Sequence for the Two-Year Master of Science in Learning Technologies Program - The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Fall Semester		Spring Semester		Summer Semester	
LTMS 500 Macro Instructional Design	3	LTMS 514 Media Selection, Design and Production	3	LTMS 518 eLearning Development	3
LTMS 510 Learning Technologies and Solutions	3	LTMS 525 Learning Theories and Instructional Strategies	3	Concentration Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis or LTMS 698 Learning Technologies Internship or LTMS 699 Learning Technologies Applied Project		Concentration Electives	3
Concentration Elective	3	Concentration Elective	3	Concentration Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Three-and-One-Half Master of Science in Learning Technologies Program - The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Fall Semester		Spring Semester		Summer Semester	
LTMS 500 Macro Instructional Design	3	LTMS 510 Learning Technologies and Solutions	3	Concentration Electives	3
Total Semester Hours	**3**	**Total Semester Hours**	**3**	**Total Semester Hours**	**3**

Second Year

Fall Semester		Spring Semester		Summer Semester	
LTMS 525 Learning Theories and Instructional Strategies	3	LTMS 514 Media Selection, Design and Production		Concentration Electives	3
Total Semester Hours	**3**	**Total Semester Hours**	**3**	**Total Semester Hours**	**3**

Third Year

Fall Semester		Spring Semester		Summer Semester	
LTMS 518 eLearning Development	3	Concentration Electives	3	Concentration Electives	3
Total Semester Hours	**3**	**Total Semester Hours**	**3**	**Total Semester Hours**	**3**

Fourth Year

Fall Semester		Spring Semester		Summer Semester	
GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis or LTMS 698 Learning Technologies Internship or LTMS 699 Learning Technologies Applied Project	3		
		Concentration Electives	3		
Total Semester Hours	**3**	**Total Semester Hours**	**6**		

Pennsylvania Department of Education Instructional Certificate Program in Instructional Technology K - 12

The 24-semester hour graduate program in Instructional Technology prepares the student for the Pennsylvania Department of Education's instructional certificate in instructional technology K – 12. A student may complete this program as a non-degree graduate student or as a Master of Science degree-seeking student.

Complete all of the following courses – 24 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 and Instructional Strategies	(3)
LTMS 530	Managing Technology Resources	(3)
LTMS 615	Coordinating the Learning Technology Infrastructure	(3)
LTMS 697	LTMS ePortfolio	(0)
LTMS 698	Learning Technologies Internship	(3)

Certificate in Instructional Design from Harrisburg University

This 15-semester hour graduate certificate program in Instructional Design prepares the student with the skills, knowledge, and abilities needed to succeed in a career in the training industry. A student may complete this program as a non-degree graduate student or as a Master of Science degree-seeking student.

Complete all of the following courses – 15 semester hours:

LTMS 500	Macro Instructional Design	(3)
LTMS 518	eLearning Development	(3)
LTMS 531	Designing Games and Simulations	(3)
LTMS 520	Learning Evaluation and Assessment	(3)
LTMS 525	Learning Theories and Instructional Strategies	
or		(3)
LTMS 540	The Instructional Designer as Entrepreneur	

Master of Science in Next Generation Disruptive Technologies

This 36-semester hour Master of Science degree in Next Generation Disruptive Technologies concentrates on next generation of technologies that could cause major disruptions in the way we live and work. Blockchain technology is the focus of this program at present because it is recognized worldwide as a serious disruptive force in history of money as well as ledger technologies. In a short period, hundreds and thousands of blockchains have emerged to address multiple problems in financial, business, social, and even political arenas.

Program Goals

The student graduating with a Master of Science in Next Generation Disruptive Technologies program will be able to:

- Recognize the necessity for conducting theoretical and empirical analysis;
- Adapt to rapidly changing technology, advanced learning, and entrepreneurship qualities; and,
- Master Blockchain as one specific type of disruptive technology.

Disruptive Technologies Requirements – The following courses comprise the Master of Science in Next Generation Disruptive Technologies – 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following core courses – 15 semester hours:

ISEM 500	Strategic Information Systems Planning, Engineering and Management of Enterprises	(3)
ISEM 540	Enterprise Architecture and Integration	(3)
ISEM 515	Commercialization of New Technologies	
or		(3)
ISEM 528	Industry Analysis and Technology Patterns	
NGDT 585	Principles of Software Architecture Patterns	(3)

Choose one of the following courses – 3 semester hours

CISC 595	Software Architecture Pattern Design & Implementation	
ISEM 501	Information and Communication Technologies Principles	
PMGT 510	Principles of Project Management	
ANLY 500	Analytics I: Principles and Applications	(3)
CISC 504	Principles of Programming Languages	
CISC 610	Data Structures and Algorithms	
Any other graduate core course		

Complete the following experiential courses – 6 semester hours:

GRAD 695	Research Methodology and Writing	(3)
NGDT 699	Applied Project in Disruptive Technologies	
or		(3)
GRAD 699	Graduate Thesis	

Complete 15 semester hours from the following concentration:

Blockchain:

NGDT 520	Foundations of Blockchain	(3)
NGDT 525	Evolution of Crypto Assets and Tokens	(3)
NGDT 534	Implementing Smart Contract and DApps	(3)
NGDT 540	Industry Blockchain and Blockchain-as-a-Service	(3)
NGDT 545	Major Blockchain Trade-offs and Choices	(3)
NGDT 560	Internet of Money and Future of Blockchains	(3)

Recommended Sequence for the Two-Year Master of Science in Next Generation Disruptive Technologies Program with a Blockchain Concentration –

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

FIRST YEAR

Fall Semester		Spring Semester		Summer Semester	
ISEM 500 Strategic Information Systems Planning	3	ISEM 540 Enterprise Architecture and Integration	3	ISEM 515 Commercialization of New Technologies Or ISEM 528 Industry Analysis and Technology Patterns	3
NGDT 520 Foundations of Blockchain	3	NGDT 525 Evolution of Crypto Assets and Tokens	3	NGDT 585 Principles of Software Architecture Patterns	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

SECOND YEAR

Fall Semester		Spring Semester		Summer Semester	
Core Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis Or NGDT 699 Applied Project in Disruptive Technologies	3
Concentration Elective	3	Concentration Elective	3	Concentration Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Nursing

The 36-semester hour Master of Science degree in Nursing consists of advanced training in evidence-based practices, quality improvement, process improvement, and best practices in nursing education. The program is designed to support improvements and innovations in nursing for the current American healthcare system. Course offerings in this program will give students a broad understanding of diverse topics in current trends in nursing. These include the promotion of evidence-based practice, the strengthening of interprofessional communication, and an overall mindset of professional development. The program will prepare nurses for careers in clinical and non-clinical healthcare settings. After completing the program, graduates will be eligible and equipped to take the Clinical Nurse Leader (CNL) or the Certified Nurse Educator (CNE) certification exam.

Additional Requirements for Admission to the MS in Nursing

The following are requirements in addition to those that are part of the general graduate admissions requirements:

- Completion of a bachelor's degree in Nursing
- Two Letters of Recommendation

Program Goals

A successful student of the program gains the following skills (vary according to the degree/concentration taken):

- Demonstrate Collaboratory practice expected of all healthcare professionals
- Produce a life-long learning plan specific to career advancement and maintaining credentials
- Utilize evidence-based research to guide healthcare clinical and operation decisions
- Design and evaluate frameworks required to implement healthcare initiatives
- Adhere to regulatory practices associated with the healthcare industry

Nursing Requirements: The following courses comprise the Master of Science in Nursing – 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all of the following core courses – 18 semester hours:

HCIN 500	Healthcare Informatics	(3)
NURS 510	Foundational Concepts for Master Prepared Nurses	(3)
NURS 515	Quality and Safety	(3)
NURS 520	Healthcare Policy	(3)
NURS 540	Advanced Research Methods and Evidenced-Based Practices	(3)
NURS 550	Advanced Pathophysiology/Pharmacology and Health Assessment	(3)

Complete the following experiential courses – 6 semester hours:

NURS 695	Nursing Practicum I	(3)
and		
NURS 699	Nursing Practicum II	(3)

Complete one of the following concentrations (12 semester hours):

Clinical Nurse Leader:

NURS 605	Foundations for the Clinical Nurse Leader I	(3)
NURS 610	Foundations for Clinical Nurse Leader II	(3)
NURS 630	Epidemiology in Action: Tracking Health & Disease	(3)
NURS 635	Clinical Nurse Leader Evaluation of Health Outcomes	(3)

Nurse Educator:

NURS 620	Theoretical Foundation in Nursing Education	(3)
NURS 625	Curriculum Development	(3)
NURS 640	Nursing Research and Evidence-Based Teaching Models	(3)
NURS 645	Assessment and Evaluation in Education	(3)

Recommended Sequence for the Two-Year Master of Science in Nursing Program with a Clinical Nurse Leader Concentration – The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Clinical Nurse Leader Concentration					
Fall Semester		**Spring Semester**		**Summer Semester**	
Session 1		***Session 1***		***Session 1***	
NURS 510 Foundational Concepts for Master Prepared Nurses	3	HCIN 500 Healthcare Informatics	3	NURS 540 Advanced Research Methods and Evidenced-Based Practices	3
Session 2		***Session 2***		***Session 2***	
NURS 515 Quality and Safety	3	NURS 520 Healthcare Policy	3	NURS 550 Advanced Pathophysiology/Pharmacology and Health Assessment	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		**Spring Semester**		**Summer Semester**	
Session 1		***Session 1***		***Session 1***	
NURS 605 Foundations for the Clinical Nurse Leader I	3	NURS 630 Epidemiology in Action: Tracking Health & Disease	3	NURS 695 Nursing Practicum I	3
Session 2		***Session 2***		***Session 2***	
NURS 610 Foundations for Clinical Nurse Leader II	3	NURS 635 Clinical Nurse Leader Evaluation of Health Outcomes	3	NURS 699 Nursing Practicum II	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Two-Year Master of Science in Nursing Program with a Nurse Educator Concentration – The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Nurse Educator Concentration					
Fall Semester		**Spring Semester**		**Summer Semester**	
Session 1		***Session 1***		***Session 1***	
NURS 510 Foundational Concepts for Master Prepared Nurses	3	HCIN 500 Healthcare Informatics	3	NURS 540 Advanced Research Methods and Evidenced-Based Practices	3
Session 2		***Session 2***		***Session 2***	
NURS 515 Quality and Safety	3	NURS 520 Healthcare Policy	3	NURS 550 Advanced Pathophysiology/Pharmacology and Health Assessment	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		**Spring Semester**		**Summer Semester**	
Session 1		***Session 1***		***Session 1***	
NURS 620 Theoretical Foundation in Nursing Education	3	NURS 640 Nursing Research and Evidence-Based Teaching Models	3	NURS 695 Nursing Practicum I	3
Session 2		***Session 2***		***Session 2***	
NURS 625 Curriculum Development	3	NURS 645Assessment and Evaluation in Education	3	NURS 699 Nursing Practicum II	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Pharmaceutical Sciences

This 36-semester hour Master of Science degree program in Pharmaceutical Sciences at Harrisburg University consists of advanced training in characterizing drug action and disposition. Courses offered in this program will give students a broad understanding of diverse topics in pharmaceutical science that range from established paradigms to emerging technology and applications. Scientific communication and professional development are stressed in the curriculum and reinforced through coursework and independent study. Graduates may seek a career in research, industry, or continuing to a doctoral program in health sciences or healthcare. Classes that focus on genomics and biopharmaceutics will give students perspectives on aspects of personalized medicine. This diverse curriculum will prepare graduates for careers in the expanding personalized medicine and biotechnology sectors, as well as in more traditional roles in the pharmaceutical industry. The elective options allow the student to individualize their own coursework based on their career goals.

Additional Requirements for Admission to the MS in Pharmaceutical Sciences

The following are requirements in addition to those that are part of the general graduate admissions requirements:

- Bachelor's degree in a biological or life science
- Minimum GPA: 3.2
- Undergraduate academic requirements by content area:
  - Organic Chemistry: 8 credit hours
  - General Chemistry: 4 credit hours
  - General Biology: 4 credit hours
  - General Physics: 4 credit hours
  - Precalculus or higher math: 3 credit hours

Program Goals

- Graduates of the Master of Science in Pharmaceutical Sciences program will be able to:
- Analyze the role of core content areas in pharmaceutical science in the industrial, clinical, and regulatory spheres;
- Recommend and apply established models to predict drug dispositions in patients as part of a multidisciplinary team;
- Design strategies using scientific approaches to accomplish set pharmaceutical goals in an industry or regulatory setting;
- Evaluate primary literature relevant to pharmaceutical sciences and use that literature to solve diverse problems in pharmaceutical science; and,
- Effectively communicate pharmaceutical science information and issues from around the world, orally and written, to individuals with scientific and non-scientific backgrounds.

Pharmaceutical Sciences Requirements – The following courses comprise the Master of Science in Pharmaceutical Sciences – 36 semester hours. The semester hour value of each course appears in parentheses ( ).

Complete all the following core courses – 18 semester hours:

BTEC 625	Pharmacogenomics	(3)
BTEC 635	Clinical Pharmacology	(3)
PHAR 520	Pharmacokinetics and Pharmacodynamics	(3)
PHAR 525	Drug Metabolism	(3)
PHAR 540	Drug Transport	(3)
PHAR 690	Ethics and Trends in Pharmaceutical Science	(3)

Complete the following experiential courses – 6 semester hours:

GRAD 695	Research Methodology and Writing	(3)
PHAR 699	Applied Project in Pharmaceutical Sciences	
	or	(3)
GRAD 699	Graduate Thesis	

Complete 12 semester hours from the following electives:

BTEC 508	Omics for Life Sciences	(3)
BTEC 540	Biostatistics	(3)
BTEC 610	Advanced Topics in Drug Discovery and Delivery	(3)
BTEC 612	Regulatory Affairs in Life Science Industries	(3)
BTEC 634	Healthcare Economics	(3)
MATH 510	Applied Statistical Methods	(3)

Recommended Sequence for the Two-Year Master of Science in Pharmaceutical Sciences – The sequence that appears below is based upon the availability of specific courses each semester and the successful completion of course prerequisites.

FIRST YEAR

Fall Semester		Spring Semester		Summer Semester	
PHAR 520 Pharmacokinetics and Pharmacodynamics	3	BTEC 625 Pharmacogenomics	3	PHAR 525 Drug Metabolism	3
BTEC 635 Clinical Pharmacology	3	PHAR 540 Drug Transport	3	Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

SECOND YEAR

Fall Semester		Spring Semester		Summer Semester	
Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis Or PHAR 699 Applied Project in PHAR	3
Elective	3	Elective	3	PHAR 690 Ethics and Trends in Pharmaceutical Science	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Master of Science in Project Management

The 36-semester hour graduate program in Project Management provides each student with a focused, applied and rigorous experience in creating, developing, implementing and assessing projects and the resulting products. To produce a high-quality product or service on time and to the specifications of a client, the skills and knowledge of a typical subject matter expert are not enough. The complexities of modern product development and project management require a professional with specific technical knowledge with strong project management and leadership skills. This program of study leads to a Master of Science degree that prepares the student for career advancement in the field of project management and for positions such as project manager, project coordinator, lead project engineer, enterprise project manager or information technology project manager.

Program Goals

PMGT graduates are able to:

- Demonstrate the applied knowledge and technical expertise in the management of a single project to meet stakeholder needs within constraints and aligned with traditional project management frameworks with industry standard artifacts;
- Demonstrate the applied knowledge and technical expertise in the management of a single team to meet stakeholder needs within constraints and aligned with agile project management frameworks with industry best practices;
- Demonstrate professional behavior by showing how successful project management will use stakeholder engagement, communication, leadership, and teamwork that is ethical, and culturally aware; and,
- Demonstrate strategic financial and organizational contextual awareness and insight by linking key stakeholder objectives to sustainable competitive strategies required to deliver value across operational functions using traditional and agile techniques.

Project Management Requirements – Master of Science in Project Management program is a 36-semester hour program that consists of required core courses (18 semester hours), required project or thesis courses (6 semester hours), and electives from a wide range of management and technology courses (12 semester hours). The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses –18 semester hours:

MGMT 520	Professional Communication	(3)
MGMT 560	Organizational Leadership	(3)
PMGT 510	Principles of Project Management	(3)
PMGT 530	Procurement, Contracts & Risk Management	(3)
PMGT 540	Planning and Executing Projects	(3)
PMGT 570	Agile Project Management with Scrum	(3)

Complete the following Experiential courses – 6 semester hours:

GRAD 695	Research Methodology and Writing	(3)
and		
PMGT 699	Applied Project in PMGT	
or		(3)
GRAD 699	Graduate Thesis	

Complete one of the following concentrations (12 semester hours):

Agile Lean Concentration:

PMGT 572	Agile Scrum Applied Projects	
or		(3)
PMGT 573	Scaling Agile for the Enterprise	
PMGT 574	Agile Lean Product Development	(3)
PMGT 576	Agile Lean Transformational Leadership	(3)
PMGT Elective		(3)

Individualized Concentration:
The Master of Science in Project Management student can choose courses totaling 12 semester hours from any of the following Master of Science programs: Analytics, Computer Information Sciences, Information Systems Engineering and Management, Learning Technologies, or Project Management.

Recommended Sequence for the Two-Year Master of Science in Project Management Program -

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

First Year

Fall Semester		Spring Semester		Summer Semester	
PMGT 510 Principles of Project Management	3	PMGT 540 Planning and Executing Projects	3	PMGT 530 Procurement, Contracts & Risk Management	3
MGMT 520 Professional Communication	3	MGMT 560 Organizational Leadership	3	PMGT 570 Agile Project Management with Scrum	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
PMGT 580 Project Management Offices or Program Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis or PMGT 699 Applied Project in Project Management	3
Concentration Electives	3	Concentration Electives	3	Concentration Electives	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Recommended Sequence for the Two-Year Master of Science in Project Management Program with a concentration in Agile Lean - The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Fall Semester		Spring Semester		Summer Semester	
PMGT 510 Principles of Project Management	3	PMGT 540 Planning and Executing Projects	3	PMGT 530 Procurement, Contracts & Risk Management	3
MGMT 520 Professional Communication	3	MGMT 560 Organizational Leadership	3	PMGT 570 Agile Project Management with Scrum	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
PMGT 580 Project Management Offices or ITPM 515 Business and Requirements Analysis Fundamentals or Elective	3	GRAD 695 Research Methodology and Writing	3	GRAD 699 Graduate Thesis or PMGT 699 Applied Project in Project Management	3
PMGT 572 Agile Scrum Applied Projects or PMGT 573 Scaling Agile for the Enterprise	3	PMGT 574 Agile Lean Product Development	3	PMGT 576 Agile Lean Transformational Leadership	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Certificate in Project Management

This 18-semester hour certificate program is designed for an individual with a goal of obtaining a Certificate in Project Management and an industry certification from the Project Management Institute [either Project Management Professional (PMP), or Certified Associate Project Manager (CAPM)]. The Certificate in Project Management requires 18 semester hours in Project Management, a non-credit PMP preparation course, and the successful completion of the PMP exam or CAPM exam. A student may complete this program as a non-degree graduate student or as a Master of Science degree-seeking student. The student has one year following the completion of the coursework to take the PMP exam.

Complete all of the following courses – 18 semester hours:

MGMT 520	Professional Communication	(3)
MGMT 560	Organizational Leadership	(3)
PMGT 510	Principles of Project Management	(3)
PMGT 530	Procurement, Contracts & Risk Management	(3)
PMGT 540	Planning and Executing Projects	(3)
PMGT 570	Agile Project Management with Scrum	(3)
PMGT 697	PMP/CAPM Exam Preparation	(0)

Certificate in Agile Lean

This 12-semester hour certificate program is designed for the student with a desire to understand the principles and practices of Agile Lean with the goal of obtaining a Certificate in Agile Lean. This concentration will provide the student with a thorough understanding and application of Agile Lean frameworks used in the project management and product development domains. Starting with an Agile Project Management with Scrum course, the certificate then expands to include an experiential course of applying Scrum to actual projects, conducting new product development with Agile Lean, and leading Agile Lean transformations in organizations. The Certificate in Agile Lean requires 12 semester hours in Agile Lean and successfully complete (pass) one or more industry certifications (i.e., PSM I – Professional Scrum Master or PSPO – Professional Scrum Product Owner from Scrum.org., or similar certification). A student may complete this program as a non-degree graduate student or as a Master of Science degree-seeking student.

Complete all of the following courses – 12 semester hours:

PMGT 570	Agile Project Management with Scrum	(3)
PMGT 572	Agile Scrum Applied Projects	
or		(3)
PMGT 573	Scaling Agile for the Enterprise	
PMGT 574	Agile Lean Product Development	(3)
PMGT 576	Agile Lean Transformational Leadership	(3)

Master of Science in Techpreneurship

This 36-semester hour Master of Science in Techpreneurship combines technology, innovation, and entrepreneurship. The student explores the skillsets to build start-ups or innovate new products or processes in an existing organization. The student is taught to create, recognize, and support innovation in any environment. The student is introduced to the process technologies entrepreneurs use to start and scale high growth companies. Techpreneurship is a flexible program that allows the student to choose elective courses from any existing graduate program to leverage their previous education and work experience. This program provides access to a network of practicing mentors who may share their experience and provide guidance to the student.

Program Goals

TCMS graduates are able to:

- Start, own, and manage successful innovative and technology-intensive start businesses;
- Embrace innovation to capitalize economic benefits and to serve as a positive factor in social change;
- Leverage modern technologies to gain competitive advantage in the business world;
- Become leaders and effective members of the business community; and
- Develop communication skills and the ability to interact with others.

Techpreneurship Requirements – Master of Science in Techpreneurship program is a 36-semester hour program that consists of required core courses (15 semester hours), required project or thesis courses (6 semester hours), and electives from a wide range of management and technology courses (15 semester hours). The semester hour value of each course appears in parentheses ( ).

Complete all of the following Core courses –15 semester hours:

ENTP 500	Entrepreneurship and Innovation	(3)
ENTP 510	Entrepreneurship: From Traction to Scale	(3)
ENTP 520	Economics of Innovation	(3)
ENTP 530	Financial Sustainability	(3)
ISEM 500	Strategic Information Systems Planning, Engineering & Management	(3)

Complete the following Experiential courses – 6 semester hours:

GRAD 695	Research Methodology and Writing	(3)
and		
ENTP 699	Applied Project in Techpreneurship	
or		(3)
GRAD 699	Graduate Thesis	

Complete the following concentration – 15 semester hours:

Individualized Concentration:
The Master of Science in Techpreneurship student can choose courses totaling 15 semester hours from any Harrisburg University Master of Science program.

Recommended Sequence for the Two-Year Master of Science in Techpreneurship Program - The sequence that appears below is based upon the availability of specific courses in each semester and the successful completion of course prerequisites.

First Year

Fall Semester		Spring Semester		Summer Semester	
ENTP 500 Entrepreneurship and Innovation	3	ISEM 500 Strategic Information Systems Planning, Engineering and Management	3	ENTP 510 Entrepreneurship: From Traction to Scale	3
Elective	3	Elective	3	Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

Second Year

Fall Semester		Spring Semester		Summer Semester	
ENTP 520 Economics of Innovation	3	ENTP 530 Financial Sustainability	3	ENTP 699 Applied Project in TCMS or GRAD 699 Graduate Thesis	3
GRAD 695 Research Methodology and Writing	3	Elective	3	Elective	3
Total Semester Hours	**6**	**Total Semester Hours**	**6**	**Total Semester Hours**	**6**

GRADUATE COURSE DESCRIPTIONS

ANALYTICS

ANLY 500 Analytics I: Principles and Applications (3 semester hours)
Prerequisites: MATH 220 and MATH 280
Corequisites: ANLY 502
Description: The first course in analytics covers the core concepts and applications of analytics. The student is introduced to the main concepts and tools of analytics including descriptive, predictive, and prescriptive analytics. During the course, the student uses a variety of statistical and quantitative methods, computational tools, and predictive models to make data-driven decisions. By the end of the course, the student will apply the concepts to real work projects where, by asking some questions about an issue or situation, use analytical tools to respond to it, and present it to technical and layperson audiences.

ANLY 502 Analytical Methods I (3 semester hours)
Prerequisites: None
Description: This course reviews the fundamental mathematics required to be successful in the analytics program. It is designed to strengthen the mathematical abilities while addressing the requirements for coding/scripting. It presents the mathematical topics as coding/scripting problems. This is intended to further strengthen the ability to develop the subroutines/codes/scripts that are also necessary in an analytics career.

ANLY 505 Modeling, Simulation and Game Theory (3 semester hours)
Prerequisites: MATH 220 and MATH 280
Description: This course covers the basic principles of mathematical modeling, Monte Carlo simulations, and gamification in modern enterprises. The course draws upon interdisciplinary source material, real-world case studies, and production game environments to identify effective analytical models, strategies, techniques, and metrics for the application of games to business. It also identifies a number of significant pitfalls to the successful implementation of gamification techniques, notably legal and ethical issues, the difficulty of making things fun, and the problems with implementing radical change in established firms. The course's emphasis is on how Big Data can be used to support the analytical models, simulations and games.

ANLY 506 Exploratory Data Analysis (3 semester hours)
Prerequisites: None
Description: Exploratory data analysis plays a crucial role in the initial stages of analytics. It comprises the pre-processing, cleaning, and preliminary examination of data. This course provides instruction in all aspects of exploratory data analysis. It reviews a wide variety of tools and techniques for pre-processing and cleaning data, including big data. It provides the student with practice in evaluating and plotting/graphing data to evaluate the content and integrity of a data set.

ANLY 510 Analytics II: Principles and Applications (3 semester hours)
Prerequisites: ANLY 500 and ANLY 502
Description: This course takes an applied perspective and provides the statistical tools and analytic thinking techniques needed to: formulate a clear hypothesis, determine the most efficient method to obtain required data, determine and apply the proper statistical techniques to the resulting data, and effectively convey the results to both experts and laypersons. The course begins with a review of the descriptive analytics concepts (i.e., sampling, and statistical inferences) introduced in ANLY 500 as well

as general conventions regarding experimentation and research. It then progresses to predictive and prescriptive analytics techniques such as regression and forecasting that can be used to predict future events. Later sessions focus on issues related to lack of experimental control (e.g., quasi-experimental design and analysis). The course culminates with a research project in which the student applies the concepts learned to their own research interests.

ANLY 512 Data Visualization (3 semester hours)
Prerequisites: ANLY 500
Description: The visualization and communication of data is a core competency of analytics. This course takes advantage of the rapidly evolving tools and methods used to visualize and communicate data. Key design principles are used to reinforce skills in visual and graphical representation.

ANLY 515 Risk Modeling and Assessment (3 semester hours)
Prerequisites: ANLY 500
Description: This course focuses on risk management models and tools and the measurement of risk using statistical and stochastic methods, hedging, and diversification. Examples of this are insurance risk, financial risk, and operational risk. Topics covered include estimating rare events, extreme value analysis, time series estimation of external events, axioms of risk measures, hedging using financial options, credit risk modeling, and various insurance risk models.

ANLY 520 Sentiment Analytics (3 semester hours)
Prerequisites: ANLY 500
Description: Web technologies based on text and Natural Language Processing (NLP) are becoming the bone structure of the cloud. Phones and handheld computers support predictive text and handwriting recognition; web search engines give access to information locked up in unstructured text; machine translation allows us to retrieve texts written in Chinese and read them in Spanish. By providing more natural human-machine interfaces, and more sophisticated access to stored information, text language processing has come to play a central role in the multi-lingual information society. This course provides a highly accessible introduction to the field of text mining and computational linguistics. The course is intensely practical; it uses R and/or Python programming language together with fully worked examples and graded exercises.

ANLY 525 Quantitative Decision-Making (3 semester hours)
Prerequisites: ANLY 515
Description: Decision-making in business today requires the use of all resources, particularly information. Analytics supports decision-making quantitatively by applying information received from multiple sources. This course provides the foundation for quantitative decision-making using a rational, coherent approach and includes decision-making principles and how they are applied to business challenges today.

ANLY 530 Machine Learning I (3 semester hours)
Prerequisites: ANLY 510
Description: This course introduces the student to machine learning. It provides the student with the cognitive, mathematical and analytical foundation required for machine learning. It also provides the student with a broad overview of machine learning, including topics from data mining, pattern recognition and supervised and unsupervised learning. This course prepares the student for the complex, higher-level topics in Machine Learning II.

ANLY 535 Machine Learning II (3 semester hours)
Prerequisites: ANLY 530
Description: Machine Learning II considers complex, high-level topics in machine learning. It builds on the foundation provided by Machine Learning I to develop algorithms for supervised and unsupervised

machine learning, to study and develop artificial neural networks, to study, develop and evaluate systems for pattern recognition and to consider trade-offs in models, for example, balancing complexity (e.g. volume, variety and velocity of big data) and performance.

ANLY 540 Analysis of Human Language (3 semester hours)
Prerequisites: None
Description: Over 80% of the content held on big data systems is in the form of unstructured data. The vast majority of the unstructured data is human language. Presently, the prevailing techniques employed to analyze this data are at the levels of word and short phrase analysis, such as those found in the Sentiment Analytics course. This course will move beyond these levels and introduce the student to advanced techniques used in computational linguistics and natural language processing.

ANLY 545 Analytical Methods II (3 semester hours)
Prerequisites: ANLY 502
Description: This course provides student with exposure to an expanded range of analytical methods. This includes additional functions, e.g. the logit function, additional distributions, e.g. Poisson distribution, and additional analysis techniques, e.g. those included in the study of discrete structures such as combinatorics. Particular attention is paid to analytics relevant to disciplines in the social sciences. Also included are survey design, development and (survey data) analysis.

ANLY 560 Functional Programming Methods for Analytics (3 semester hours)
Prerequisites: None
Description: This course provides the student with the required knowledge and skills to handle and analyze data using a variety of programming languages as well as a variety of programming tools and methods. Depending on current industry standards, the student will be provided with the opportunity to develop knowledge and skills in programming environments such as R, Octave, and Python. In addition, the student is introduced to current industry standard data analysis packages and tools such as those in Matlab, SAS or SPSS.

ANLY 580 Special Topics (3 semester hours)
Prerequisites: None
Description: This course explores a topic or collection of topics of special interest that is timely and in response to critical or emerging topics in the broad field of analytics.

ANLY 585 Research in Analytics (3 semester hours)
Prerequisites: None
Description: This program cultivates and supports research partnerships between the student, faculty and other researchers. It provides the student with the opportunity to work on cutting-edge research. Research projects can be at any appropriate and approved level; introductory, participatory or expert. Each project requires an approved proposal, periodic status reports and a final written report with a presentation prepared by the student in collaboration with the research supervisor.

ANLY 600 Optimized Analytics (3 semester hours)
Prerequisites: ANLY 510
Description: This course introduces the fundamental tool in prescriptive analytics. Optimization is the process of selecting values of decision variables that minimize or maximize some quantity of interest. Optimization models have been used extensively in operations and supply chains, finance, marketing, and other disciplines to help managers allocate resources more effectively and make lower cost or more profitable decisions.

ANLY 610 Analytical Methods III (3 semester hours)
Prerequisites: ANLY 560 or ANLY 545
Description: This course provides the student with exposure to the theoretical background for advanced analytical topics and methods. Topics include unstructured data/information and big data. For example, the theoretical background required for the integration of data mining and text analytics or text mining are explored. Additional topics could include the implementation and use of data lakes and ontology evaluation.

ANLY 699 Applied Project in Analytics (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of analytics. A faculty member will supervise this study.

BIOTECHNOLOGY

BTEC 502 Biomaterials (3 semester hours)
Prerequisite: None
Description: There is a constant need for new biomaterials in life sciences to support novel technologies. This course is designed to introduce the student to the various classes of biomaterials currently in use and their application in selected subspecialties of medicine/industrial processes. The student will learn about the concepts behind developing materials for use in medical or industrial biotechnology field. The student will gain an understanding of material properties, various biological responses to materials, and the clinical context of their use. Aspects of manufacturing processes, cost, sterilization, packaging, and regulatory issues will be addressed.

BTEC 508 Omics for Life Sciences (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: Studies on cataloging and characterization of genome and proteome are on the forefront of research. Recently, there has been a considerable amount of work happening with genome and proteome data for selective manipulation of metabolic pathways, the metabolomics. All three fields are aggressively used in several areas for innovation in diagnostics, biomanufacturing, biomarker studies, and drug discovery to name a few. This course covers the basics of these three "omics" fields from the standpoint of using the information for developing new biotechnologies, especially in personalized medicine. The significance of next generation sequencing will be covered.

BTEC 522 Graduate BTEC Seminar (3 semester hours)
Prerequisite: None
Description: This course introduces the student to fundamental topics in innovation, regulatory practices and ethics for various biotechnology industries and communities. The intention is to allow the student to learn about these diverse but inter-related areas that coalesce science and business disciplines. With the help of industry experts, case studies, and current literature, the student explores the interrelationship of these areas for creating productive collaborations within biotechnology industry with respect to compliance, innovation, and ethical decision-making.

BTEC 540 Biostatistics (3 semester hours)
Prerequisite: Undergraduate level Math or by permission of the instructor
Description: This course introduces statistical concepts and analytical methods as applied to data encountered in biotechnology and biomedical sciences. It emphasizes the basic concepts of experimental design, quantitative analysis of data, and statistical inferences. Topics include probability

theory and distributions, population parameters and their sample estimates, descriptive statistics for central tendency and dispersion, hypothesis testing and confidence intervals for means, variances, and proportions, the chi-square statistic, categorical data analysis, linear correlation and regression model, and analysis of variance. The course provides the student a foundation to evaluate information critically to support research objectives and product claims and to gain better understanding of statistical design of experimental trials for biological products/devices.

BTEC 550 Instrumentation in Biotechnology Industry (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: Instrumentation and application of various equipment is central to research and commercial production in the biotechnology industry. This course will familiarize the student with which instruments are used for which biotechnology applications and their principles of operation and limitations. Different biomolecules require different and customized protocols for isolation, purification, and characterization. The course offers an overview of instruments such sonicator, ultracentrifuges, spectrophotometers, etc. The course also covers the significance of instrument validation and calibration.

BTEC 560 Design of Experiment (3 semester hours)
Prerequisite: BTEC 540 or by permission of instructor
Description: This course allows the student to design an experiment and learn methodology for data analysis. Components such as major characteristics of a scientific experiment, running statistical analyses to perform various tests to check validity of the data would be covered. In a case-based manner, the student works on design of an experimental protocol for an assigned conceptual research project. Trouble-shooting strategies and analyzing data sets would be covered.

BTEC 610 Advanced Topics in Drug Discovery and Delivery (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: This course introduces the student to the planning and preparatory phase skills required to develop potential new drugs and biologics efficiently. The student gains a thorough appreciation of FDA regulations and guidelines. It is known that in the drug discovery sector, it is important to plan before the proceeding to the development phase. With emphasis on the process, the course focuses on the final analysis and report before developing the protocols. Other important aspects of drug development covered in the course are preclinical investigations; new drug application (NDA) or biologic license application (BLA) format and content; clinical development plans; product and assay development; the Investigational New Drug (IND) process; and trial design, implementation, and management. Lastly, the course provides an overview of trending concepts such as controlled and targeted drug delivery.

BTEC 612 Regulatory Affairs in Life Science Industries (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: Regulatory affairs (RA) are rules and regulations that oversee and govern product development and post-approval marketing in the life sciences. For US companies, Food and Drug Administration (FDA) establishes and oversees the applicable regulations under several statutes, partnerships with legislators, patients, and customers. The commercializable products for the Biotechnology sector can be food, drugs, biologics, or medical devices. Each type is regulated by a different center within the FDA. This course provides an overview of RA, and its effect on product development. The course covers RA history, various regulatory agencies, methods to access regulatory information, procedures for drug submissions, biologics submissions, and medical device submissions. It also addresses Good Laboratory Practices (GLP), Good Manufacturing Practices (GMP), and FDA

inspections. The course includes guest lectures, actual case studies and real world scenarios. As a course project, the student creates a conceptual submission document for a hypothetical drug/biologic/medical device approval.

BTEC 615 Biomedical Devices and Prototyping (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or any other relevant field or by permission of instructor
Description: This course familiarizes the student with basic principles of biosensors design and applications. Biomedical devices such as Biosensors are one of the most innovative, complex, and fastest growing area of biotechnology today; the interface between biotechnology, nanotechnology and micro-electronics industries. The course covers a variety of biosensors based on whole cells, nucleic acids, proteins, antibodies and enzymes as well as new and emerging technologies related to designing, fabricating, and applying multi-array biochips and micro-fluidic systems (lab-on-the-chip). Practical applications of this technology in health care, environment, medical diagnostics, defense and other areas are explored.

BTEC 618 Principles of Bioprocessing (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or any other relevant field or by permission of instructor
Description: Bioprocessing deals with the isolation, purification, and characterization of industrial bio-products. This course prepares the student with skills needed in bioprocessing procedures used in industry. Fundamental scientific principles underlying the recovery, purification and formulation of biomolecules, especially proteins, or other industrial bio-products are covered. Identification or delineation of key chemical and physical properties of biomolecules that impact downstream processing and formulation development are emphasized. Introduction to analytical and small-scale purification procedures exposes the student to key scientific principles and small-scale unit operations.

BTEC 620 Emerging Trends in Diagnostics (3 semester hours)
Prerequisite: None
Description: This course provides an overview of the fundamental principles of molecular diagnostics and explores the use of molecular techniques in the diagnosis of disease/infection/contaminants. Diagnostics has impacted several fields such as human health, environment, and food and agriculture. Development of novel diagnostics technologies have depended on discovery of biomarkers for multiple applications in fields such as drug discovery, drug delivery, and diagnostics in general. Topics covered in this course include: biomarkers, protein and nucleic acid structure-function, identification and amplification techniques used in infectious disease diagnosis, components of a molecular diagnostics, companion diagnostics, and evaluation of controls to validate results obtained. This course allows innovative use of current literature and technology with an entrepreneurship element. The student has an opportunity to use course material and available technology to design a conceptual assay/device for a chosen target and integrate it into a conceptual course project assignment.

BTEC 622 Principles of Accounting and Finance (3 semester hours)
Prerequisite: None
Description: This course is offered to expose the student to a basic introduction to principles of accounting and finance for the life science industry. Accounting and finance take different shades when one compares revenues for giants like Target with that for a pharma company. The student studies life science companies and their accounting procedures. Impact of significant adjustments and estimates on revenue counting, health insurance, managed care, and governmental contracts is covered. Also covered are accounting practices related to multi-round private financing and IPO timing for start-ups. The student is taught the basics of money management, the language and vocabulary of finance, how to communicate scientific concepts to potential investors, and how to generate fiscal plans/milestones. Course activities enable the student to create and analyze financial documents such as a term sheet, a

contract and a balance sheet. The student is also presented the concepts of financial risk and the time value of money. This course will use real company scenarios and case studies from life sciences companies.

BTEC 625 Pharmacogenomics (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: The genetic basis of variability in drug response can contribute to drug efficacy and toxicity, adverse drug reactions and drug-drug interactions. Healthcare professionals need an understanding of the genetic component of patient variability to deliver effective individualized pharmaceutical care. This course offers an introduction to the evolution of pharmacogenetics/pharmacogenomics, the human genome and modern applications of DNA information related to diagnostics, drugs and therapeutics. Emphasis is placed on concepts and methodologies for using an individual's genetic make-up to determine that individual's predisposition towards diseases and ability to respond to drugs. Understanding of the basics of pharmacogenomics enables the student to better understand and manage the new genomics based tools and make best treatment choices.

BTEC 630 Cancer Biotechnology (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: Cancer has a huge impact on our society and is one of the major factors driving biomedical research related to various areas such as imaging, diagnosis, and therapy. This course provides a comprehensive overview of the molecular biology and genetic basis of cancer. Biotechnological research on the molecular mechanisms of cancer has resulted in more effective treatments, sensitive diagnostic procedures and strategies for prevention. The course covers topics such as mutations leading to deregulation of programmed cell death, their impact on cell proliferation, and cell differentiation. Cancer and medical intervention is also reviewed. It allows the student to study traditional treatment methods and new treatment protocols for cancer therapies. The challenges of early diagnostics are also covered.

BTEC 634 Healthcare Economics: Fundamentals for Providers and Biotech Professionals (3 semester hours)
Prerequisite: None
Description: Patients, healthcare providers and biotech industry professionals all have an interest in the best possible medical care, but healthcare services and products come at a cost. This course explores economics of topics that impact the cost of healthcare as we know it today, and how the healthcare technologies of the future will be funded. Additional questions, such as who pays and who gets access when healthcare is in limited supply, are discussed. Among the factors explored are market dynamics, public policy, technology, reimbursements and workforce and patient choices. Case studies, course papers, and group discussions are used to offer the course content in an engaging and interactive mode. This course requires no previous study of finance or economics.

BTEC 635 Clinical Pharmacology (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: Clinical pharmacology deals with drug development and drug utilization in therapeutics. This course covers the advancements regarding drug action and efficacy. Concepts of pharmacokinetics, drug metabolism and transport, pharmacogenetics, assessment of drug effects, and drug therapy in special populations are explored. Expert knowledge is shared about drug development and content specialization needed to stay competitive and build opportunity for career options.

BTEC 640 Trends in Regenerative Medicine (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: Tissue engineering (TE) and regenerative medicine (RM) are geared towards developing biological substitutes that restore, maintain, or improve damaged tissue and organ functionality. While tissue engineering and regenerative medicine have hinted at much promise in the last several decades, significant research is still required to provide exciting alternative materials to finally solve the numerous problems associated with traditional implants. This course covers relevant biological, engineering, clinical, legal, regulatory and ethical principles and perspectives to understand the basics of RM. This course also introduces the student to the current state of the RM field, global market trends and opportunities and challenges in process development, manufacturing, and commercialization.

BTEC 650 Fermentation Technologies (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: Fermentation technology focusses on use of recombinant microorganisms for several industrial processes, i.e. biomanufacturing. This course requires the student to conceptually design a process for biomanufacturing a target product. This includes the basics of strain selection, development, and process optimization. Application of strain morphology, physiology and DNA sequence- based methods are analyzed for industrial processes. The student studies microbial metabolism and its significance to the manufacturing process. Fundamentals of microbial growth, growth stoichiometry, types of growth media (defined, semi-defined, complex) and media optimization are covered. The course provides an overview of fermenter design concepts and operational principles for a fermentation process using bioreactors.

BTEC 655 Industrial Enzymes and Proteins (3 semester hours)
Prerequisite: Bachelor of Science degree in Biotechnology, Life Science or other relevant field or by permission of instructor
Description: There is significant commercial activity in the biomanufacturing sector. Key products include vaccines, antibiotics, or various industrial enzymes. The basics of recombinant DNA (rDNA) principles in modification, selection, and application of recombinant microbial strains for industrial enzyme and protein production are studied. Theoretical foundations of microbial production and detection of recombinant protein products such as enzymes, hormones, and antibiotics are covered. The course provides an overview of basic methodologies involved in genetic manipulation of microbes to produce recombinant peptides and proteins. This would focus on use of plasmids, role of promoters and its use in control of gene expression with the end goal of generating enzymes and whole cells for industrial catalytic processes.

BTEC 672 Legal Affairs and Policies for Life Science Industry (3 semester hours)
Prerequisite: None
Description: This course provides the student an overview of key legal concepts and policies that govern research, development and commercial activities within the biotech industry. The course is structured from a company's perspective and introduces the student to topics and strategies critical to management while considering new topics and products. Selected cases, videos of speeches, and assigned readings illustrate how the laws that provide protection of society and promotion of social goals operate. Procedures that allow navigating the middle ground while dealing with competition in the biotech and pharma industry would be covered as well. This course requires no previous legal study.

BTEC 675 Innovation and Improvisation in Research and Development (3 semester hours)
Prerequisite: None
Description: This course prepares the student for the research and development sector. The student develops creative problem-solving abilities and other skills necessary for innovative approaches in managing research and development units. The resolution of conflicts between Research and Development, manufacturing, and marketing in a high technology firm are studied. The student explores various coping strategies, ways to maintaining entrepreneurial spirit and encourage innovation as the company develops into a formal administrative organization, identify R &D issues and strategies to resolve them. Mass production techniques such as Just-In-Time, On-Job Training and Total Quality Management to the real world of high technology Research & Development (R&D) are studied. As a team project for the course, the student identifies and develops solutions to practical problems or market needs for a hypothetical scenario.

BTEC 698 Biotechnology Graduate Internship (3 semester hours)
Prerequisite: Completion of 6 credits in the BTMS program
Description: This graduate internship course provides the student an opportunity to serve as a graduate intern to learn the skills of a certain job in real world situation. It is the student's responsibility to identify an industry or an organization from the field of interest and work on a mutually relevant topic under direct supervision of an employee from that company.

BTEC 699 Applied Project in BTEC (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of BTEC. A faculty member will supervise this study.

COMPUTER INFORMATION SCIENCES

CISC 504 Principles of Programming Languages (3 semester hours)
Prerequisites: A Baccalaureate degree in computer science or a related technical field (e.g., electrical and computer engineering, information science, operations research) or permission of CISC grad committee
Description: This course explores a topic of collection of topics of special interest that is timely and in response to critical or emerging topics in the broad field of computer information sciences. The student with prior math or engineering education may have a foundation for the statistical concepts they encounter in a computer science graduate program, but not enough programming experience to keep up with the analysis, modeling and creating their own computational solutions. This course is intended to give the student the programming capability and experience required to succeed in their graduate study of master computer information sciences. The course is an application-driven and solution strategies with Python. Furthermore, integration between Python and other languages is also covered. Topics include programming paradigms, functional programming scripting languages, objects, algorithm design and analysis, trees, graphs, sorting and searching. The focus is on how these concepts relate to computational tasks in science and engineering.

CISC 510 Object-Oriented Software (3 semester hours)
Prerequisites: Baccalaureate degree in Computer and Information Sciences with a concentration in Software Engineering and Systems Analysis or the equivalent.
Description: This course develops fluency in object-oriented design. The student studies semantics of object-oriented languages, strengths and limitations of the object-oriented approach, processes that can lead to good design outcomes, graphical and textual representations for design including UML,

common problems and some of the patterns that can solve them, and refactoring utilizing modern IDEs. The student develops an ability to read and critique designs, and to clearly present and advocate design ideas.

CISC 520 Data Engineering and Mining (3 semester hours)
Prerequisites: Baccalaureate degree in Computer and Information Sciences with a concentration in Software Engineering and Systems Analysis or the equivalent.
Description: This course addresses the emerging issues in designing, building, managing, and evaluating advanced data-intensive systems and applications. Data engineering is concerned with the role of data in the design, development, management, and utilization of complex computing/information systems. Areas of interest include database design; meta knowledge of the data and its processing; languages to describe data, define access, and manipulate databases; and strategies and mechanisms for data access, security, and integrity control. Data mining is a rapidly growing field that is concerned with developing techniques to assist managers to make intelligent use of these data repositories. A number of successful applications have been reported in areas such as credit rating, fraud detection, database marketing, customer relationship management, and stock market investments. The field of data mining has evolved from the disciplines of statistics and artificial intelligence.

CISC 525 Big Data Architectures (3 semester hours)
Prerequisites: Baccalaureate degree in Computer Information Systems, Computer Sciences, or related field.
Description: Government, academia and industry have spent a great deal of time, effort, and money dealing with increases in the volume, variety, and velocity of collected data. Collection methods, storage facilities, search capabilities, and analytical tools have all needed to adapt to the masses of data now available. Google paved the way for a new paradigm in Big Data, with two seminal white papers describing the Google File System, a distributed file system for massive storage, and MapReduce, a distributed programing framework designed to work on data stored in the distributed file system. This course introduces the student to the concepts of Big Data and describes the usage of distributed file systems and MapReduce programming framework to provide skills applicable to developers and the data scientist in any facet of industry.

CISC 530 Computing Systems Architecture (3 semester hours)
Prerequisites: Baccalaureate degree in Computer and Information Sciences with a concentration in Software Engineering and Systems Analysis or the equivalent.
Description: Modern computer information systems are ever-increasing in complexity and sophistication. As a result, software engineers must be able to make effective decisions regarding the strategic selection, specification, design, and deployment of information systems. Therefore, this course addresses the topics of architectural design that can significantly improve the performance of computer information systems. The course introduces key architectural concepts, techniques, and guidance to software engineers to enable them to make more effective architectural decisions.

CISC 540 Agile Software Development (3 semester hours)
Prerequisites: Bachelor of Science in Computer Information Systems, Computer Sciences, or related field.
Description: This course addresses what agile methods are, how they are implemented, and their impact on software engineering. A variety of agile methods are described, including but not limited to: Scrum, Extreme Programming, and Crystal Clear. The concerns associated with planning and controlling agile projects, along with the implications of agile development on the customer-developer dynamic are analyzed.

CISC 550 Software Engineering in Mobile Computing (3 semester hours)
Prerequisites: CISC 510 and CISC 520
Description: Recent years have witnessed the advent of wireless mobile and sensor technologies and the proliferation of application scenarios whereby large numbers of pervasive computing devices are

connected to a wireless networking infrastructure in an ad hoc manner. The student is shown how to design, implement, and deploy location/context-aware applications that interact with Service Oriented Architecture (SOA) solutions. Topics to be covered include: basic user interfaces, application design, concurrency, and location-aware and other context-aware programming.

CISC 560 Secure Computer Systems (3 semester hours)
Prerequisites: Bachelor of Science in Computer and Information Sciences with a concentration in Software Engineering and Systems Analysis or the equivalent.
Description: This course focuses on the design principles for secure computer systems. Topics regarding authentication, access control and authorization, discretionary and mandatory security policies, secure kernel design, secure operating systems, and secure databases are covered from a systems architecture perspective. Emphasis is on the design of security measures for critical information infrastructures. Upon completion of this course, the student is able to design, implement, and manage secure computer systems through the design of a security awareness program.

CISC 570 Advanced Database Security (3 semester hours)
Prerequisites: CISC 560
Description: This course focuses on topics related to the design and implementation of secure data stores. Emphasis is placed on multi-level security in database systems, covert channels, and security measures for relational and object-oriented database systems. This course teaches how to recognize the insecurities present within common database systems and how these flaws can leave a database wide open to attack. The course covers how hackers discover and exploit vulnerabilities to gain access to a data store.

CISC 580 Advanced Network Security (3 semester hours)
Prerequisites: CISC 560
Description: This course covers fundamental concepts, principles, and practical networking and inter-networking topics relevant to the design, analysis, and implementation of enterprise-level trusted networked information systems. Topics include networking and security architectures, techniques, and protocols at the various layers of the internet model. Security problems in distributed application environments are analyzed and solutions discussed and implemented.

CISC 590 Information Security Project (3 semester hours)
Prerequisites: CISC 560
Description: This project course serves as a capstone for the specialization in Information Security. The class focuses on techniques for protecting critical information infrastructures through case studies, application development, and systems assessment, while the project's activities encompass research, development and analysis/synthesis for a particular problem or opportunity.

CISC 592 Software Architecture and Microservice (3 semester hours)
Prerequisites: Bachelor of Science in Computer Science or a related technical field (e.g., Electrical and Computer Engineering, Information Science, Operations Research) or permission of CISC grad committee.
Description: This course explores a collection of topics in Software Architecture and Microservices and introduces concepts and best practices of software architecture. It deals with; high-level building blocks that represent the underlying software system, how a software system is structured, and how that system's elements are meant to interact. Fundamentals of software architecture, its principles, elements, components, configurations and architectural structures and styles will also be discussed. Special focus will be given to the interaction between quality attributes and software architecture. Societal and ethical implications of software architecture and microservices will also be discussed

CISC 593 Software Verification and Validation (3 semester hours)
Prerequisites: CISC 592
Description: This course will introduce various software testing techniques such as; unit testing, integration testing, system testing, acceptance testing, and regression testing, types of software errors, reporting and analyzing software errors, problem tracking systems, test planning, test case design, and verification & validation. The course also explores functional (black box) methods for testing software systems, reporting problems effectively and planning testing projects. The student will apply testing techniques that they have learned, throughout the course, to a sample application.

CISC 594 Software Testing Principles and Techniques (3 semester hours)
Prerequisites: CISC 593
Description: This course explores a collection of topics in Software Testing Principles and Techniques. It introduces testing techniques, software quality fundamentals, and focuses on software quality assurance for the entire software development lifecycle. It covers topics such as; Quality factors, Software Quality Requirements, Reviews, Software Audits, Software Configuration Management, Policies, Processes, and Procedures, Measurement, Risk Management, Software Quality Assurance Plan, Software Quality Models, Test Automation, Testing Tools, Black Box and White Box testing techniques. The Pareto Principle Applied to Software Quality Assurance, and Software Testing Strategies will also be discussed.

CISC 600 Scientific Computing I (3 semester hours)
Prerequisites: A baccalaureate degree in computer science or a related technical field (e.g. electrical and computer engineering, information science or operations research).
Description: This course provides an overview of scientific computing and covers: Solution of Linear Algebraic Equations, Interpolation and Extrapolation, Integration and Evaluation of Functions, Random Numbers, and Sorting. The course uses C++ programming language as the base language to solve the problem sets. The student may choose to use another programming language as well. The course is conceived as an introduction to the thriving field of numerical simulation for computer scientists, mathematicians, engineers, or natural scientists without an already strong background in numerical methods.

CISC 601 Scientific Computing II (3 semester hours)
Prerequisites: CISC 600
Description: Scientific Computing II covers: root finding and nonlinear sets of equations, minimization or maximization of functions, eigensystems, fast Fourier transform, Fourier and spectral applications, statistical description of data, and modeling of data. The course uses C++ programming language as a base language to solve the problem sets, or a student can choose another programming language. The course is intensely practical with fully worked examples and graded exercises.

CISC 603 Theory of Computation (3 semester hours)
Prerequisites: CISC 530 and CISC 610
Description: This course contains abstract models of computation and computability theory including formal languages, finite automata, regular expressions, context-free grammars, pushdown automata, Turing machines, primitive recursive and recursive functions, and decidability and un-decidability of computational problems.

CISC 610 Data Structures and Algorithms (3 semester hours)
Prerequisites: CISC 504
Description: This course emphasizes fundamental algorithms and advanced methods of algorithmic design, analysis and implementation. This class overs techniques used to analyze problems and algorithms (including asymptotic, upper/lower bounds, best/average/worst case analysis, amortized

analysis, complexity), basic techniques used to design algorithms (including divide and conquer/greedy/dynamic programming/heuristics, choosing appropriate data structures) and important classical algorithms (including sorting, string, matrix, and graph algorithms) and data structures.

CISC 611 Network Operating Systems (3 semester hours)
Prerequisites: CISC 530 and CISC 610
Description: This course introduces the principles and implementations of operating systems and networking. The operating system manages hardware resources and provides a simplified interface for programs to use these resources. Networking allows different computers to communicate and potentially act as a larger virtual system. These topics are closely related; networking is often managed by the operating system (and always requires use of the hardware it manages) and the operating system uses the network to provide services like the file system. C++ language is needed to facilitate out study to these topics which provides low-level access to the hardware and is often used in operating systems and networking.

CISC 612 Elements of Computing Systems (3 semester hours)
Prerequisites: CISC 611
Description: This course is an integration process of key notions from algorithms, computer architecture, operating systems, compilers, and software engineering into one unified framework. This is done constructively, by building a general-purpose computer system from the ground up. In the process, many ideas and techniques are used in the design of modern hardware and software systems, and discuss major trade-offs and future trends. This is a hands-on course, evolving around building the full set of HW and SW modules including the chip set of simple computers using a simulator, developing the assembler, building part of the virtual machine translator and a simple compiler all the way to a simple programming language and a simple game.

CISC 614 Computer Simulation (3 semester hours)
Prerequisites: CISC 601
Description: This course is about the use of simulation to make better business decisions in application domains from healthcare to mining, heavy manufacturing to supply chains, and everything in between. It is written to help both technical and non-technical users better understand the concepts and usefulness of simulation. The student can use the programming languages of their choice or use an off-the-shelf software to implement their projects.

CISC 620 Principles of Machine Learning (3 semester hours)
Prerequisites: CISC 530, CISC 600, and CISC 610
Description: This course introduces the basic idea of machine learning and the application to data from real world problems. Topics include: Classification as a Problem-Solving Tool, Similarity Measures and Clustering. The Classification Process, Classification for Sentiment Analysis, Advanced Recommendations, FFT Classifiers, Computer Vision & Pattern Recognition, Dimensionality Reduction, and Big Data & Machine Learning.

CISC 621 Statistical Pattern Recognition (3 semester hours)
Prerequisites: CISC 610, equivalent, or permission of the instructor
Description: Statistical pattern recognition techniques are used to design automated systems that improve their own performance through experience. This course covers the methodologies, technologies, and algorithms of statistical pattern recognition from a variety of perspectives. The objective is to provide a reasonable answer for all possible data and to classify input data in to objects or classes based on certain features. After taking the course, the student should have: a clear understanding of the design and construction and a pattern recognition system; major approaches in statistical and syntactic pattern recognition; some exposure to the theoretical issues involved in pattern

recognition system design such as the curse of dimensionality and clear working knowledge of implementing pattern recognition techniques.

CISC 625 Digital Image Processing (3 semester hours)
Prerequisites: CISC 621, equivalent, or permission of the instructor
Description: This course focuses on explaining and demonstrating the limitations and tradeoffs of various digital image representations, such as computed 3-D images, grayscale versus color, and tools such as wavelet transforms and image compression techniques. Additionally, displaying the ability to manipulate both binary and grayscale digital images using morphological filters and operators to achieve a desired result; showing how higher-level image concepts such as edge detection, segmentation, representation, and object recognition can be implemented and used.

CISC 661 Principles of Cybersecurity & Cyber Warfare (3 semester hours)
Prerequisites: Bachelor of Science degree in Computer and Information Sciences
Description: The course introduces the student to the interdisciplinary field of cybersecurity. Topics include the evolution of information security into cybersecurity and exploring the relationship of cybersecurity to organizations and society. The analyses of the threats and risks to/in these environments are examined. The ultimate goal of this course is for the student to acquire the advanced knowledge required to develop the skills needed to integrate knowledge from this course into a workplace environment.

CISC 662 Ethical Hacking Development Lab (3 semester hours)
Prerequisites: CISC 661
Description: This course integrates cyber risk management into day-to-day operations. Additionally, it enables an enterprise to be prepared to respond to the inevitable cyber incident, restore normal operations and ensure that the enterprise assets and the enterprise's reputation are protected. This course focuses the student on a broad range of topics relative to risk-based planning for enterprise cybersecurity. The intent is to focus on creating risk assessment and modeling approaches to solve cybersecurity issues, so organizations can build security framework and sustain a healthy security posture. This course analyzes external and internal security threats, failed systems development and system processes and explores their respective risk mitigation solutions through policies, best practices, operational procedures, and government regulations.

CISC 663 Cyber Risk Assessment and Management (3 semester hours)
Prerequisites: CISC 661
Description: This course integrates knowledge accumulated from the prerequisites and serves as a capstone for the concentration in Computer Security. Attention is focused on the techniques for protecting critical information infrastructures and the process of identifying the risk to data and information using case studies, application development, and systems assessment.

CISC 664 Advanced Digital Forensics (3 semester hours)
Prerequisites: CISC 662
Description: Digital Forensics is "the application of computer science and investigative procedures for a legal purpose involving the analysis of digital evidence." Digital forensics encompasses much more than just laptop and desktop computers. Mobile devices, networks, and "cloud" systems are very much within the scope of the discipline. It also includes the analysis of images, videos, and audio (in both analog and digital format). The goal is to provide digital evidence that are obtained (both in direct and indirect ways) from digital media. The course focuses on the analysis of authenticity, comparison, and enhancement as the main vehicle to obtain digital evidences (both in direct and indirect ways) from digital media.

CISC 665 Biometric Security Systems (3 semester hours)
Prerequisites: CISC 662
Description: Biometric security systems is a rapidly evolving field with applications ranging from accessing one's computer to gaining entry into a country. Biometric systems rely on the use of physical or behavioral traits, such as fingerprints, face, voice, and hand geometry, to establish the identity of an individual. The deployment of large-scale biometric security systems in both commercial and government applications increases the public's awareness of this technology. This rapid growth also highlights the challenges associated with designing and deploying such systems. The core computational component of biometric systems is biometric identification (or recognition), and it is indeed a grand challenge in its own right. The purpose of this course is to expose the student to current biometric identification techniques and systems, teach them to coin their own biometric security applications through capturing human biometric traits, creating unique identifications for them, build classification systems that can identify individuals, and make decisions to maintain security parameters.

CISC 680 Special Topics in CISC (3 semester hours)
Prerequisites: None
Description: This course explores a topic or collection of topics of special interest that is timely and in response to critical or emerging topics in the broad field of computer information sciences.

CISC 681 Special Topics in Scientific Computing (3 semester hours)
Prerequisites: CISC 614 or permission of instructor
Description: This course explores a topic or collection of topics of special interest that is timely and in response to critical or emerging topics in the broad field of scientific computing in computer information sciences.

CISC 682 Special Topics in Software Engineering and Software Testing (3 semester hours)
Prerequisites: CISC 593 or permission of instructor
Description: This course explores a topic or collection of topics of special interest that is timely and in response to critical or emerging topics in the broad field of software engineering and software testing in computer information sciences.

CISC 683 Special Topics in Cyber Security (3 semester hours)
Prerequisites: CISC 663 or permission of instructor
Description: This course explores a topic or collection of topics of special interest that is timely and in response to critical or emerging topics in the broad field of cyber security in computer information sciences.

CISC 691 Current Topics in Scientific Computing (3 semester hours)
Prerequisites: CISC 614 or permission of instructor
Description: This course explores a topic or collection of current topics that are timely and in response to critical or emerging topics in the broad field of scientific computing computer information sciences.

CISC 692 Current Topics in Software Engineering and Software Testing (3 semester hours)
Prerequisites: CISC 593 or permission of instructor
Description: This course explores a topic or collection of current topics that are timely and in response to critical or emerging topics in the broad field of software engineering and software testing in computer information sciences.

CISC 693 Current Topics in Cyber Security (3 semester hours)
Prerequisites: CISC 663 or permission of instructor
Description: This course explores a topic or collection of current topics that are timely and in response to critical or emerging topics in the broad field of cyber security in computer information sciences.

CISC 699 Applied Project in CISC (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of CISC. A faculty member will supervise this study.

ENTEPRENEURSHIP

ENTP 500 Entrepreneurship and Innovation (3 semester hours)
Prerequisites: Graduate Standing
Description: Entrepreneurship and innovation are drivers of transformative change. This course introduces the concepts of innovation and entrepreneurship and strategies to take an idea into execution. Moreover, entrepreneurial and innovation ecosystems, and innovation within corporations are studied by utilizing case studies of some Silicon Valley companies.

ENTP 510 Entrepreneurship: From Traction to Scale (3 semester hours)
Prerequisites: Graduate Standing
Description: This course introduces the theoretical knowledge and practical skills needed to successfully navigate through the second stage of the business start-up, which is to gain traction and scale. The student is taught the Lean Method to take their start-up from raising investment to scale. Moreover, this course will provide hands-on training in the technologies and strategies used by small and large corporations in all aspects of running a start-up business.

ENTP 520 Economics of Innovation (3 semester hours)
Prerequisites: Graduate Standing
Description: This course introduces the role of innovation and technological change in business practice and economic growth. It analyzes sources of innovation in science, technology, and commercialization. Among others, the following topics are covered: founding of new industries and new markets, commercialization of new technologies, incentives and organization of science, openness and proprietary/controlled innovation. Moreover, selected public policies toward invention and innovation are considered.

ENTP 530 Financial Sustainability (3 semester hours)
Prerequisites: Graduate Standing
Description: Financial sustainability is the goal of every start-up and new business unit. Starting from a discussion of common business models, the course covers business models, financial projections, and pro forma statements., funding models, institutional venture capital investment, social entrepreneurship, crowdfunding, corporate investment, etc. The course also covers administrative, operations, and legal issues.

ENTP 699 Applied Project in TCMS (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of Techpreneurship. A faculty member will supervise this study.

GRADUATE STUDIES

GRAD 690 Graduate Independent Study (3 semester hours)
Prerequisites: None
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. 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 course.

GRAD 695 Research Methodology and Writing (3 semester hours)
Prerequisites: Completion of at least 18 graduate semester hours; must be taken prior to GRAD 699
Description: This course guides the student to develop and finalize a selected research problem and to construct a proposal that effectively establishes the basis for either writing a thesis or launching an experiential capstone project. The course provides an overview of strategies for effective problem investigation and solution proposal. Research methodology is studies and applied as part of suggesting a solution to a problem. Writing and formatting techniques are also explored and applied as a communication tool for cataloging the investigation and recommending the solution.

GRAD 699 Graduate Thesis (3 semester hours)
Prerequisites: GRAD 695 and the permission of instructor
Description: In consultation with the advisor, the student conducts research designed in GRAD 695 to address a problem as identified in the solution proposal.

HEALTHCARE INFORMATICS

HCIN 500 Healthcare Informatics (3 semester hours)
Corequisites: ISEM 541 or by permission of instructor
Description: This is the survey course for the Program in Healthcare Informatics, both for the certificate and the master's degree. The student is exposed to the full range of healthcare informatics as it is employed in today's workplace. This course discusses issues, trends, challenges, and applications related to the role of the Informaticist in Healthcare Systems and Institutions including big data management, electronic medical records systems, eHealth, data governance and data sharing. Case-based and project-based approaches are used for discussion and assignments. The student does not require academic healthcare system knowledge beyond that contained in ISEM541 Healthcare Systems, although clinical experience facilitates more rapid assimilation of content material and a deeper understanding of the overall curriculum. The overall goal of the course is familiarity with the potential contributions of informatics to both health outcomes and business operations so that successful learners return to their workplaces with sufficient knowledge to immediately function more effectively and efficiently as Informaticists. *Cross-listed with ISEM 542.*

HCIN 515 Essential Informatics Skills I (3 semester hours)
Prerequisites: None
Description: This is the first half of the keystone course for the Program in Healthcare Informatics, both for the certificate and the master's degree. The student engages in a 3-credit executive format course which provides them with a robust set of tools for devising customized potential solutions to a range of Healthcare Information Technology (HIT) implementation challenges facing healthcare systems today. Interactive sessions are needed to facilitate mastery of interpersonal skills. The goal of the course is familiarity with basic techniques and current best practices for the planning, evaluation, implementation, adoption and optimization of healthcare IT systems. The successful learner will be

able to plan and execute HIT projects, facilitate change, communicate effectively with all staff, and intervene with problem adopters.

HCIN 520 Essential Informatics Skills II (3 semester hours)
Prerequisites: HCIN 515
Description: This is the second half of the keystone course for the Program in Healthcare Informatics, both for the certificate and the master's degree. The student engages in a 3-credit executive format course that provides them with a robust set of tools for devising customized potential solutions to a range of Healthcare Information Technology (HIT) implementation challenges facing healthcare systems today. Interactive sessions are needed to facilitate mastery of interpersonal skills. The goal of the course is familiarity with basic techniques and current best practices for the planning, evaluation, implementation, adoption and optimization of healthcare IT systems. The successful learner will be able to lead multidisciplinary teams, plan and execute HIT projects, work in an Agile/Lean environment, leverage adult learning theory, optimize the human-computer interface, and advise on HIT compliance issues.

HCIN 545 Healthcare Data (3 semester hours)
Prerequisites: None
Description: This course addresses the central role of healthcare data in both health outcomes and business operations. This is the basic course in healthcare data management for the ISEM graduate program as well as the program in Healthcare Informatics, both the certificate and master's degree. The goal of the course is familiarity with basic techniques and current best practices for the governance, collection, cleaning, storage, sharing and handling of healthcare data. Case-based and project-based approaches are used for discussion and assignments. Prior experience in healthcare systems is not required, but knowledge of material contained in ISEM 541 Healthcare Systems is helpful in establishing context. *Cross-listed with ISEM 545.*

HCIN 550 Introduction to Healthcare Analytics (3 semester hours)
Prerequisites: None
Description: This is the analytics survey course for the Program in Healthcare Informatics, both for the certificate and the master's degree. Graduate students are exposed to the wide range of analytics tools and techniques used in today's workplace. The ultimate goal of the course is familiarity with the strengths and limitations of these tools so that successful learners return to their workplaces with sufficient knowledge to ask appropriate questions of the available data, choose the appropriate tools and techniques used to analyze the available data, and explain the strengths and weaknesses of any inferences made. Master's Degree students in Healthcare Analytics desiring more in-depth analytics application knowledge will pursue elective courses in ANLY. The student does not require mathematical knowledge beyond high school level algebra, although introductory calculus knowledge facilitates understanding in a few areas such as matrices, vectors, and rates of change.

HCIN 699 Applied Project in HCIN (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of HCIN. A faculty member will supervise this study.

INFORMATION SYSTEMS ENGINEERING AND MANAGEMENT

ISEM 500 Strategic Information Systems Planning, Engineering and Management of Enterprises (3 semester hours)
Prerequisites: None
Description: This course introduces the basic principles (systems thinking and quantitative methods) of systems engineering and shows how these principles can be used to strategically plan, integrate, secure and administer the complex information systems that support and drive the current and future digital enterprises. Topics include: digital enterprises, aligning information technology strategy to business strategy, enterprise applications (customer relations management, procurement, supply chain management), ecommerce, decision support, knowledge management, artificial intelligence (AI) applications, cost/benefit analysis and information technology infrastructure. These topics are explained through case studies and examples by using a strategic planning methodology.

ISEM 501 Information and Communication Technologies (ICT) Principles (3 semester hours)
Prerequisites: None *(This course is designed for the student that does not have a CS or IT background.)*
Description: This course provides the basic background in the rapidly advancing field of information and communication technologies (ICTs). It offers a rigorous overview of the current, as well as emerging, ICT building blocks that enable and drive modern enterprises. The first part of the course introduces the student to the key building blocks (enterprise applications, computing platforms, databases, and networks) of the modern IT infrastructure. The emphasis is on the Internet, broadband wired and wireless networks, classical Web, Semantic Web, XML, Web 2.0, social networking, and mobile computing. The second part of the course introduces the student to the main aspects of software development processes through hands-on projects. Basic software concepts are explored within this context by developing simple web sites using HTML and then using JavaScript, Java applets and XML to introduce more sophisticated features. The student has an opportunity to learn database technologies and run simple database queries using SQL.

ISEM 502 User-Centered Design (3 semester hours)
Prerequisites: None
Description: 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- centered design (UCD) describes an approach to business analysis and technology development that demands user interaction and user feedback in all stages of the development lifecycle. The UCD process involves a collection of activities and techniques that can be used to create the more usable, intuitive, and effective technology possible. This course covers the full range of UCD methods and demonstrates the importance of these techniques in designing and building interactive technology, focusing mostly on software applications.

ISEM 503 Artificial Intelligence Principles and Applications (3 semester hours)
Prerequisites: ISEM 500
Description: Interdisciplinary presentation of artificial intelligence as a coherent body of knowledge to acquaint the student with the key concepts and applications in business, science and engineering. The course covers models of intelligent behavior, including problem solving, knowledge representation, reason, planning, decision making, learning, perception, pattern recognition, action, communication and interaction. Recent developments in knowledge management, expert systems, computer-aided consulting and integrated intelligent systems are covered through a wide range of case studies, examples and hand-on experiments.

ISEM 515 Commercialization of New Technologies (3 semester hours)
Prerequisites: None

Description: This course is designed to prepare a Next Generation Technologist for taking their innovation to the public marketplace. It is an introduction to a wide range of practical aspects, which are important to realizing the commercial potential of the innovation. Topics include corporate formation, team recruitment, intellectual property protection, supply-chain development, production and scaling, marketing and sales, media relations, venture capital markets, investor relations, social and business networks, organizational culture, and business development.

ISEM 520 Service Science, Management and Engineering (3 semester hours)
Prerequisites: None
Description: This course addresses Service Science, Management and Engineering (SSME) as a growing discipline that integrates aspects of established fields like computer science, operations research, engineering, management sciences, business strategy, social and cognitive sciences, and legal sciences.

ISEM 521 Life Science for IT Professionals (3 semester hours)
Prerequisites: None
Description: This course provides an ample spectrum of basic topics such as life science fundamentals, gradually leading to introduction to the interface between automation/IT applications for several fields of such as medicine, diagnostics, medical devices, agriculture, environment, food, pharmaceutics, and Nanobiotechnology. These topics allow the student to be introduced to an area of specialization in IT support, bioinformatics research or programming applications for the life sciences industry. The course starts with an overview of essential concepts of biological systems and proceeds to the structures and functions cellular macromolecules, particularly nucleic acids and proteins directly involved in storage and retrieval of biological information. After building a sound introduction to the basics of the living system, the course introduces the interface between these basic structures and applications of information technology to a variety of fields of applied life science.

ISEM 525 Business Process Modeling and Workflow Systems (3 semester hours)
Prerequisites: ISEM 500 or PMGT 510
Description: This course introduces the concepts of business process modeling and workflow systems in modern enterprises. In-depth modeling techniques used to capture business processes, workflows and conceptual information models are covered. Emphasis is placed on business modeling techniques such as the Business Process Modeling Notation (BPMN), business-use case modeling, Entity Relationship (ER) modeling, and other selected techniques from the Unified Modeling Language. The emphasis is on concepts and how these concepts are being used in practice by the most recent tools. The student develops business models to reflect case studies and real-world scenarios.

ISEM 528 Industry Analysis and Technology Patterns (3 semester hours)
Prerequisites: None
Description: Complex interdependencies exist between various industry sectors and emerging technologies. This course is designed to prepare a Next Generation Technologist for a broad understanding of industries and their dependence on emerging technologies. Topics include analysis of the key industry sectors in the digital age and an examination of their financial and logistical interdependencies. Focus is on industry ecosystem as the network of organizations — including suppliers, distributors, customers, competitors, government agencies, and others — involved in the delivery of a specific product or service through competition, cooperation, and organizational learning. Particular attention is paid to the role of substitute technologies that could disrupt an entire industry ecosystem. Several real-life case studies and examples with particular focus on supply chains will be used to illustrate the key points.

ISEM 530 Analysis and Design of Modern Information Systems (3 semester hours)
Prerequisites: ISEM 500

Description: This course prepares the student to analyze business information systems and to build models and logical designs that can be later implemented. The emphasis is on the business processes and business requirements needed to build conceptual models that help in analysis of business requirements. This course prepares the student to design complex systems and build applied designs and architectures.

ISEM 534 Database Design and Management (3 semester hours)
Prerequisites: None
Description: This course emphasizes the practical aspects of the design and administration of modern Database Management Systems (DBMSs) that host enterprise data. Specific topics include the role of data in modern enterprises and the data life cycle that spans conceptual database design, database query languages such as SQL, database integrity rules, database administration, and data warehouses. This course utilizes commercially available relational DBMSs for hands-on experiments and explore how to create an entity-relationship data model, translate that model into relational schema, build and use a relational database that implements the schema, create SQL queries to retrieve and manipulate needed data, provide access to remote databases from web browsers, and experiment with DBA (Database Administration) capabilities. The student also investigates recent developments in database technologies (e.g. NoSQL). This course prepares the student for database design and administration positions and will also provide the necessary background for more specialized courses in database systems.

ISEM 536 IT Infrastructure and the Internet (3 semester hours)
Prerequisites: ISEM 501 or permission of the instructor. *(This course is designed for the student that does not have a CS or IT background.)*
Description: This course concentrates on the practical aspects of Internet technologies, architectures and administration. Topics include: IT infrastructure, Internet Service Providers (ISPs), communications network principles, Internet Protocols, IPv4, IPv6, TCP sockets, and Internet of Things (IoTs). Administrative topics are network management, website administration, introduction to network security, wireless technologies and mobile computing. Classroom projects expose the student to network architectures for small to large enterprises. This course prepares the student for network planning administration positions and provides the necessary background for more specialized courses in communication networks.

ISEM 539 Enterprise Architecture Frameworks (3 semester hours)
Prerequisites: ISEM 500
Description: This course provides an overview of the common enterprise-wide architectural framework that drives business decisions regarding selection, implementation and management of ICT systems and solutions. In addition, different enterprise architecture frameworks are reviewed and the most commonly used framework – TOGAF (The Open Group Architecture Framework) – is examined in detail. The course topics include supporting and transforming Global Value Chains; e-business designs; creating an enterprise architecture; and the various methodologies, tools and techniques used in the design and implementation of the enterprise architecture. The course encompasses all aspects of information and communications technology, including data networks, applications, operating systems, database systems, telecommunications systems, and hardware components in the context of a total enterprise-wide framework.

ISEM 540 Enterprise Architecture and Integration (3 semester hours)
Prerequisites: ISEM 500
Description: Modern digital enterprises are characterized by increased automation, mobile services, extended B2B operations with global business partners, and on-demand business services. This course presents a 'systems' perspective based on service-oriented architecture (SOA) that combines processes, people and technologies, and highlights the role of information and communication technologies,

enterprise models, and emerging SOA standards to develop flexible and integrated business architectures.

ISEM 541 Healthcare Systems (3 semester hours)
Prerequisites: None
Description: This course covers the basic principles, models and approaches of healthcare systems and introduces healthcare administration topics. The focus of the course is not on technologies but instead on the business and management aspects of healthcare. The course introduces the student to a wide range of healthcare topics such as healthcare business processes and business patterns, healthcare business process re-engineering and integration, healthcare clinical systems and services (patient care, physician support systems, health networks), hospital systems, management concerns, and government regulations. In addition, varied approaches and models of healthcare administration at local, national and international levels are discussed.

ISEM 542 Health Informatics and Information Systems (3 semester hours)
Prerequisites: ISEM 541 and a basic understanding of modern information systems
Description: This course introduces the basic concepts of healthcare information systems and explains the role of information and communication technologies in current and future healthcare systems. The course reviews the role of different players in healthcare: providers, physicians, and insurance companies. Topics covered in healthcare informatics include: health information networks (HINs) at local, regional, national and global levels; information technology systems and applications; standards and interoperability topics; electronic health records (EHR) and EMR; clinical decision support; computer physician order entry (CPOE), and e-prescriptions, privacy and security concerns, financial/administrative systems, and examples of IT infrastructure for healthcare. *Cross-listed with HCIN 500.*

ISEM 543 Digital Health (3 semester hours)
Prerequisites: ISEM 542
Description: This course explains the basic principles of e-Health and m (mobile)-Health through case studies and examples. The student is shown how to effectively develop and administer e-Health systems using web technologies. A wide range of case studies and examples of e-Health systems are used. The course also examines how wireless networks and mobile computing applications are used in healthcare informatics. The student investigates the latest developments in the field and identifies research topics of importance.

ISEM 544 Social, Technical and Organizational Issues in Digital Health (3 semester hours)
Prerequisites: ISEM 542 and permission of instructor
Description: This course covers a wide range of socio-technical issues in healthcare information technologies. The focus is on the healthcare workplace as a dynamic system in which people, processes and technologies interact and influence each other. The course focuses on the people, processes and technologies related to important areas such as security and privacy, public policies and regulations, medical decision support systems and knowledge management in healthcare, electronic health records (HER), telemedicine systems, wireless sensor networks in healthcare, and others. Case studies and examples are used highlight practical aspects of socio-technical interactions.

ISEM 545 Healthcare Data (3 semester hours)
Prerequisites: None
Description: This course addresses the central role of healthcare data in both health outcomes and business operations. This is the basic course in healthcare data management for the ISEM graduate program as well as the program in Healthcare Informatics, both the certificate and master's degree. The goal of the course is familiarity with basic techniques and current best practices for the governance, collection, cleaning, storage, sharing and handling of healthcare data. Case-based and project-based

approaches are used for discussion and assignments. Prior experience in healthcare systems is not required, but knowledge of material contained in ISEM 541 Healthcare Systems is helpful in establishing context. *Cross-listed with HCIN 545.*

ISEM 550 Information Security Management (3 semester hours)
Prerequisites: ISEM 500
Description: This course covers the technical and administrative aspects of security, privacy and control that are vital to IS management. A comprehensive overview of security and IT control principles and practices that are needed to satisfy the IS systems integrity, confidentiality and availability requirements are addressed. Topics include security awareness, IS Security and Control Practices, IT audit principles and standards, risk analysis, and process-flow analysis for auditing.

ISEM 551 Web-based Software Engineering (3 semester hours)
Prerequisites: ISEM 501 or IT/CS background or degree
Description: This course is an introduction to web-based software engineering environments, design patterns, frameworks and key architectural aspects of robust enterprise applications. Topics for software development technologies include development languages and frameworks (e.g., .Net, Java, open-source), various tools used during the development lifecycle, and key components of an application in terms of the data, process and presentation layers. Architectural topics include prevalent design patterns such as model-view-controller (MVC), Web Services, and service-oriented architecture (SOA). The student uses computer-aided software engineering (CASE) environments and develops software architectures of real-life enterprise applications.

ISEM 555 Mobile Computing and Wireless Communications (3 semester hours)
Prerequisites: ISEM 500
Description: This course provides a management overview of wireless networking and mobile computing with a key focus on the building blocks and their inter-relationships.

ISEM 547 IT Management (3 semester hours)
Prerequisites: ISEM 500 or permission of instructor
Description: This course introduces the core principles and practical methods and techniques for effectively managing Information Technology (IT) systems and organizations. The emphasis is on business and information technology for planning, investing, budgeting, assessing value and risks, as well as governing and securing Information Technology organizations and assets. Topics include management and leadership roles and challenges associated with IT manager in the digital enterprise, organizational design for flexible IT organizations, corporate and IT governance frameworks, IT policies and controls for the business, risk assessments and response planning, IT finance and budgeting, and the role of close-based IT services in modern organizations. Extensive practical exercises and case study method will be used throughout the course.

ISEM 558 IoTs and Embedded Systems (3 semester hours)
Prerequisites: Graduate Standing
Description: This course is an introduction to the area of Internet of Things (IoTs) with a special focus on Embedded Systems and their applications. The course addresses a wide breadth of technologies and standards used to support this rapidly evolving domain. This includes the embedded system hardware, software, and operating systems. It also goes through wireless connectivity systems used for IoT, as well as the cloud support. The student will have an opportunity to explore current and future applications of IoTs and embedded systems in healthcare, energy, manufacturing, agriculture, transportation, and other vial sectors.

ISEM 560 eGovernment and eCommerce (3 semester hours)
Prerequisites: ISEM 500

Description: eGovernment and eCommerce (EG/EC) are changing the landscape of business. This course introduces the basic building blocks of EG/EC with an emphasis on strategies and applications and a brief discussion of the enabling technologies. The course provides a review of EC models and applications such as online purchasing, customer relationship management, electronic marketplaces, application service providers, supply chains, enterprise resource planning, and enterprise portals.

ISEM 561 Public Administration (3 semester hours)
Prerequisites: MGMT 511
Description: This course introduces the concepts of public administration with emphasis on key building blocks such as business processes, leadership, personnel management, budgeting, law enforcement and social welfare. The objective is to examine how public sector organizations work and how administrators can operate in such environments. The course covers the most important functions and processes of government agencies and non-profit organizations. The leadership strategies for increased public-sector effectiveness through the typical management processes of planning, organizing, monitoring, control and governance are discussed. The sources of public and non-profit revenue and expenditures are examined in the context of budget management. The topics of law enforcement management with public and non-profit managers are briefly reviewed with an emphasis on human resource accounting and personnel management. Public administrators are invited as guest speakers for local and global perspectives on these topics and to compare/contrast public agencies with their private sector counterparts.

ISEM 562 Public Policy (3 semester hours)
Prerequisites: Graduate Standing
Description: This course gives an overview of the broad field of public policy and examines the key concepts, theories and practical operational methods of public policy. The course presents with an examination of the core concepts in the formulation, implementation, and impact of public policy and covers the role of administrative law in the formulation, implementation and evaluation of public policy. The ethical arguments inherent in public policy decisions and compliance with legislated ethical standards are examined. The policies, politics and administrative activities of federal, state, and local levels are considered. The interaction of the public sector, the private sector, and citizen groups in the implementation of environmental policy is discussed and the role of planning process as a decision-making tool in the implementation of public policy is examined. The course uses a wide range of national and international policy examples in areas such as housing and community development, social welfare, employment programs, transportation, the internet and telecommunications.

ISEM 564 Big Data Applications (3 semester hours)
Prerequisites: ISEM 501 or ISEM 534, or permission of instructor
Description: This course introduces the main concepts of big data with focus on applications of big data and data sciences in business settings. The student explores several Open Big Data (OBD) sources and investigates applications of OBD in health, education, public safety, public welfare and other vital sectors. Through hands-on experiments, the student develops a significant understanding of data science and practical applications of big data. Some tools used by practitioners of data science and analytics are introduced but sophisticated mathematical or programming background is not required.

ISEM 565 Business Intelligence and Decision Support Systems (3 semester hours)
Prerequisites: ISEM 500
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 business intelligence and knowledge management in modern enterprises and discusses how the decision support and expert systems tools can be used for effective decision making in organizations.

ISEM 568 Aligning Business Strategy with IT Strategy (3 semester hours)

Prerequisites: ISEM 500
Description: This course discusses how the information technology (IT) strategy can be aligned with business strategy to compete and become successful. The focus is on the major elements of the business and IT strategic management models and their inter-relationships. Different alignment models such as the Henderson-Venkataraman model are discussed in detail through case studies.

ISEM 570 IT Quality Assurance
Prerequisites: ISEM 500 or permission of the instructor
Description: The information technology product is central to most business systems. Quality of the product is represented by accuracy, reliability, repeatability and specific customer requirement standards. Various techniques to understand the quality control processes and quality assurance measures are demonstrated and industry standards and protocols are covered.

ISEM 572 Smart Enterprises and Strategic Intelligence (3 semester hours)
Prerequisites: ISEM 565 or ANLY 500
Description: This course addresses advances in research, technologies, systems, and applications as related to "strategic intelligence." Strategic intelligence (SI) refers to the intersection of Business Intelligence, Knowledge Management, and Competitive Intelligence for improving the strategic decision making in Smart Enterprises. Instead of intelligence on one topic area, smart enterprises need strategic intelligence that covers multiple topic areas. This course discusses methodologies, trends, challenges, and applications as related to knowledge management, intelligent systems, automated planning and scheduling systems, analytics, and Big Data.

ISEM 574 Block Chains and Bit Coins (3 semester hours)
Prerequisites: Graduate Standing (ISEM 550 recommended)
Description: Blockchain technologies is believed to be a disruptive innovation that enables secure global business transactions. Blockchain was originally developed for the digital currency, Bitcoin, that is currently valued at more than 9 billion USD. Several new applications of blockchain "as a platform" are currently under investigation in several countries such as Canada, South Korea, Singapore, Japan, and Dubai. Some applications include but are not limited to cybercurrency, insurance, and food safety. In this course, the student will study the concepts of blockchain, the type of applications that this platform will enabled and why this "digital gold" is expected to be similar to the coming of Internet in the late 90s.

ISEM 580 Special Topics in ISEM (3 semester hours)
Prerequisites: None
Description: This course explores a topic or collection of topics of special interest that is timely and in response to critical or emerging topics in the broad field of information systems engineering and management.

ISEM 581 Directed Study (variable credit)
Prerequisites: None
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. 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.

ISEM 699 Applied Project in ISEM (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor

Description: This course allows the student to pursue an area of interest that is within the broad scope of ISEM. A faculty member will supervise this study.

ISEM 775 Advanced Design Project (3 semester hours)
Prerequisites: Completion of 12 credits in the Certificate Program
Description: This course goes beyond the master's level capstone courses and concentrates on the design of complex intelligent systems in modern settings. Instead of behavioral research approaches, the emphasis is on design science approach, where artifacts are designed based on iterative prototyping, modeling, and simulation techniques. In addition to a written document that catalogs the investigation, a demonstration of the proposed design is required through gamifications and/or actual operational prototypes. A student who has developed a system design in ISEM capstone may implement or further enhance and enrich his/her design in this course.

INFORMATION TECHNOLOGY PROJECT MANAGEMENT

ITPM 515 Business and Requirements Analysis Fundamentals (3 semester hours)
Prerequisites: None
Description: This course is designed to help the student prepare for a career in management, building on their technical and professional background and education. The field of business analysis is a fast-growing profession that offers a global certification. Business analysis is a key function on a project team that promotes understanding of what the customers want the project team to build for them; it is essential to project success. Through the use of real life project examples, the student gains expertise in planning, eliciting, writing, and managing customer requirements for IT and other types of projects.

ITPM 580 Special Topics in IT Project Management (3 semester hours)
Prerequisites: None
Description: This course explores a topic of special interest that is timely and in response to a critical topic in the field of technology project management.

INTERACTIVE MEDIA

IMED 500 Design Perspectives (3 semester hours)
Prerequisites: None
Description: This course will introduce the student to the design perspectives encountered most often in human-centered interaction design. Design perspectives are attitudes towards how to do design which reflect their political, social, and technological beliefs about design practice. Through readings and case studies, the student explores a variety of perspectives in the domain of digital interactive design. The student delves into the foundations of design practice through different standpoints, histories, frames of reference and interpretations of different views of the 'best' way to design.

IMED 504 Methods for Design Research (3 semester hours)
Prerequisites: None
Description: This course will introduce the student to the package of study design and research methods employed within human-centered interaction design. In this process-driven course, the lessons will be structured around design research methodology, execution, and reporting. The course will take place as a series of situation studios, in which the student engages their evolving design eye and research skills to research the people, processes, contexts, and temporalities of digital interaction opportunities. Through readings, discussions, and the exploration of examples, guidelines, and

heuristics, the course engages the student in the ethical and entrepreneurial aspects of design research within design practice.

IMED 510 Human Sociotechnical Interactions (3 semester hours)
Prerequisites: None
Description: This course will introduce the student to the theories and perspectives of human social behavior that are employed most often in HCID. Drawing on canonical and new sociotechnical science literature, the course will present the student with overviews of theories of information, action, sociality, conflict, and interaction within traditional and digital environments. Through readings and examples, the course includes attention to sociotechnical theories around communities of practice, online communities, social media, and enterprise knowledge management. This seminar course offers the student a better understanding of the contexts and perspectives within which people interact with others, around and through offline, online, and hybrid environments.

IMED 520 Users and Populations (3 semester hours)
Prerequisites: None
Description: This course will introduce the student to the design-based theories and contexts of users and populations, as found in human-centered interaction design. The course will be structured around three design contexts: cohorts; environments; and capabilities. The course will take place as a series of case-based seminars. Through readings, discussions, and the exploration of examples and heuristics, the course draws the student's attention to the need to develop their design eye for contextual integration of user and population theory within design practice.

IMED 540 Design Tools and Processes (3 semester hours)
Prerequisites: None
Description: This course offers the student the opportunity to work with a variety of tools and processes that support design practice. The course exposes the student to traditional and digital tools, templates, and techniques for design. Using an example project supplied by the professor, the course is run as a series of studios. After using tools and processes in each stage of the design process, the student reflects on the suitability and use case for each tool and reflect of their evolving sense of self as a designer. The course covers the tools, processes, and techniques necessary to professionalize the student's design practice.

IMED 570 Design Patterns and Contexts (3 semester hours)
Prerequisites: None
Description: This course introduces the student to the contextual design of patterned interfaces in human-centered interaction design. The course is structured as a series of seminars around four design area: contexts; visuals; patterns; and actions. Taking the approach of goal-driven design, the student will engage in reading, discussing, experimenting, and presenting design rationales for design choices around traditional and new digital interfaces. The course builds on what the student learned in the other courses and intensifies the student's development of their design eye for contextually sensitive interaction design. The student will be challenged to consider areas of conflict and divergence within design thinking. While employing their own evolving capacity for design, the student will learn to manage conflicts between goal orientations, contextual needs, and environmental challenges.

IMED 680 Special Topics (3 semester hours)
Prerequisites: None
Description: The in-program elective choice will vary each year, depending on needs and abilities of students, faculty, and external clients. Some co-teaching across the university's technology programs is expected to occur. For example, as an HCID in-program elective, courses could be offered in Designing Publics (Entertainment; Education; Engagement; Art and Activism); or in Ubiquitous Computing (wearables; smart homes; Internet of Things; 30 printing); or in Audiovisual Design

Theories and Productions (Live streaming video; studio video production; sound production); or in Collaborative Crisis Response Management (natural disasters; environmental accidents; tragic events).

IMED 695 Design Research Studio (3 semester hours)
Prerequisites: Completion of all HCID Core Courses
Description: This course is a one-on-one student-focused research preparation studio. This course requires the student to conduct original research and document a design space within the domain of human-centered interaction design. The course is the first of two experiential learning classes for the completion of the HCID. The course will prepare the student for the GRAD699 portion of the degree, within which the student ideates, produce, and test a conceptual prototype that addresses the design problem identified through the research and analysis done in this studio course.

LEARNING TECHNOLOGIES

LTMS 500 Macro Instructional Design (3 semester hours)
Prerequisites: None
Description: This course focuses on the use of an instructional design process to improve learning outcomes, with an emphasis on the analysis components of instructional design that create a foundation for successful learning solutions. The course explores tools and techniques for analysis, design, development, delivery and evaluation and addresses strategies that can be enhanced by technology integration. The goal of the course is to establish a systematic process for designing instruction and explores trends and technology integration opportunities throughout the process.

LTMS 501 Active Learning Planning (1 semester hour)
Prerequisites: None
Description: This course focuses on the research and evidence that supports the role of movement in learning, memory, attention and concentration. A course participant creates an active learning intervention plan for the school setting, which is reviewed by experts in the field. Upon completion, the student receives the Active Learning Specialist certificate. This course is delivered in an online, asynchronous format with new cohorts of students starting the online course each semester with a one-month rolling start date. Course completion takes approximately 30 hours over 5 to 10 weeks. Thirty (30) hours of asynchronous contact time equates to 15 hours of standard contact hours or 1 graduate semester hour. *This course is intended for current teachers, pre service teachers, administrators, athletic coaches, nutrition experts, and parents serving on a school board.*

LTMS 503 Raspberry Pi in the STEM Classroom (3 semester hours)
Prerequisite: None
Description: Uses of the Raspberry Pi in the STEM Classroom are explored. Topics include teaching the Linux operating system to students, uses of the various programming languages in the PI, including Scratch, Sonic Pi, and Python. An introduction to physical computing within several curricula in an integral part of the class. The student will be expected to purchase a Raspberry Pi 3B starter kit.

LTMS 505 Digital Security for Instructional Technology Specialist (3 semester hours)
Prerequisite: None
Description: If you are a certified Instructional Technology Specialist you need to be aware of a variety of cybersecurity issues that become more important day by day. This class will cover topics in the 5 areas of cybersecurity defined by NIST: Identify, Protect, Detect, Respond and Recover, as well as school specific security concerns.

LTMS 507 Implementing Google Tools in the Classroom (3 semester hours)
Prerequisites: None
Description: This class explores the use of applications within the Google G Suite for education and Google Chromebooks in a school environment. Course topics include the use of the tools to foster individual creativity, collaboration, and presentation skills within a constructivist educational paradigm. This course is taught by Google certified educators and requirements for Google certification are presented.

LTMS 509 Implementing Microsoft Tools for Education (3 semester hours)
Prerequisite: None
Description: This class explores the use of applications within the Microsoft Tools for Educator in a school environment. Course topics include the use of the tools within Office 365 to foster individual creativity, collaboration, and presentation skills within a constructivist educational paradigm, including the use of Skype as a collaboration tool in the classroom. This course is taught by Microsoft certified educators and requirements for Microsoft certification are presented.

LTMS 510 Learning Technologies and Solutions (3 semester hours)
Prerequisites: None
Description: This course presents an overview of multiple technology-based solutions to realize learning outcomes. Beyond a survey of learning software, the course challenges the student to think broadly about emerging technology trends that present opportunities. By establishing a systematic decision analysis process, the student is able to assess suitable technology tools for specific environments and learning needs. A broad survey of open source and proprietary solutions are explored, as well as emerging trends in learning technologies. Course topics are examined within a framework of a learning strategy and a learning architecture.

LTMS 511 Creating the Flipped Classroom (3 semester hours)
Prerequisites: None
Description: This course focuses on designing lessons, creating screencasts and assessing learning in a flipped classroom or blended learning classroom model. The student plans, organizes, develops, and administers screencasted lessons for distribution on a course management system (CMS) or website. Authoring tools are also introduced and utilized to produce eLearning modules with the embedded assessments. This course is for the teacher or business professional who wants to learn the basics of delivering instruction in a flipped classroom model.

LTMS 514 Media Selection, Design and Production (3 semester hours)
Prerequisites: None
Description: This course focuses on creating media for learning solutions. Selecting appropriate media to meet learning objectives are explored as the student creates graphics, illustrations, audio, video, and animations to support learning. Graphic design fundamentals are addressed, in addition to production skills like media compression and conversion. Industry leading media software and open source options are considered.

LTMS 518 eLearning Development (3 semester hours)
Prerequisites: None
Description: This course presents content creation software that can be used for eLearning. The student creates eLearning modules that focus on navigation, usability and compliance to content standards. Planning and asset management are also explored as elements of efficient eLearning development. Industry leading software and open source options are considered.

LTMS 520 Learning Evaluation and Assessment (3 semester hours)
Prerequisites: LTMS 500

Description: This course focuses on measuring multi-modal learning and performance with an emphasis on the use of technology as an evaluation and assessment tool. Course evaluation and learner performance are both explored as formative and summative assessment, authentic assessment, subjective and objective assessment, criterion-referenced and norm-referenced assessment, formal and informal assessment, testing and evaluation standards, analytics and metrics, the importance of validity and reliability, and the use of technology in the evaluation and assessment process.

LTMS 525 Learning Theories and Instructional Strategies (3 semester hours)
Prerequisites: None
Description: This course is an in-depth exploration of learning theories including, but not limited to, behavioral modeling, cognitive processing, metacognition, motivation, social learning, constructivism and connectivism. Culture and learning, brain research and the integration of technology to support learning theories are also explored. Theories and practices are examined within the context of creating instructional strategies as part of learning design with a focus on technology-supported learning solutions.

LTMS 530 Managing Technology Resources (3 semester hours)
Prerequisites: LTMS 510
Description: New technologies are changing instruction and placing new demands on technology professionals that support learning technologies. This course addresses the challenge of providing access to educational technologies while balancing security and resources in learning environments. The course establishes strategies for assessing, planning, implementing, supporting and governing learning technologies with a focus on maximizing the instructional value of technology investments.

LTMS 531 Designing Serious Games and Simulations (3 semester hours)
Prerequisites: LTMS 500
Description: This course focuses on applying game and simulation design strategies to increase context, motivation, engagement and learning outcomes. Character development, narrative, user interface, game play, game balancing, principles of level design and feedback in games and simulations are applied as the student designs a game or simulation to achieve a learning goal. The differences and similarities between game and simulation concepts, genres and worlds are examined, in addition to game and simulation intricacies for specific groups and game production and management.

LTMS 532 Developing Serious Games and Simulations (3 semester hours)
Prerequisites: LTMS 514 and LTMS 531
Description: This course presents tools and techniques for developing serious games and simulations. Programming and scripting languages, simulation systems, programming fundamentals, game architecture, navigation, usability, feedback, data management, artificial intelligence, media programming and developing for multiplayer environments are explored as the student develops the design from the "Designing Serious Games & Simulations" course. Game production and management with a focus on the game development phase are also discussed.

LTMS 533 3-D Modeling and Design (3 semester hours)
Prerequisites: LTMS 514
Description: This course develops skills in computer-generated 3D modeling and design with a focus on basic 3D concepts, animation concepts and physics, scene management, modeling, mesh, materials and mapping. A focus is given to lighting, physics, and particle emitters as part of object development and animation. 3D rendering options and preferences are also examined. A discussion of 3D production and management requirements is also explored.

LTMS 534 Development for Virtual Worlds (3 semester hours)
Prerequisites: LTMS 531 and LTMS 533

Description: The course focuses on building engaging, interactive and collaborative experiences in a distributed virtual world environment. Building objects, advanced building techniques, object editing, texturing and lighting, clothing and accessories, animation, filming, scripting and terraforming are explored as virtual world development skills. User experience topics like performance lag, accessibility and interface design are addressed. Virtual world production and management requirements are also explored.

LTMS 535 Critical Issues in Biology Education (3 semester hours)
Prerequisites: LTMS 500 and LTMS 510
Description: This course addresses topics in biology education that combine current priorities in science and the need of the society. Topics such as biological knowledge, scientific methods, and career awareness are covered. This course also surveys the biology education landscape to identify topics in K-12, postsecondary and professional biology education that are impacting interest and achievement in STEM education and how interactive learning experiences such as games and simulations can address the student motivation and cognition challenges for improved learning outcomes.

LTMS 536 Applied eHealth Communication (3 semester hours)
Prerequisites: LTMS 500 and LTMS 525
Description: This course focuses on developing a foundational knowledge of theory-based methods in health communication and the application of those methods to creating health communication products that influence awareness, knowledge, attitude, and behavior within a target audience. The course examines successful case studies in health communication and the stages of health communication product development (audience assessment, product planning, development, testing, revision, and implementation) as they apply to eHealth Communication.

LTMS 537 Rapid eLearning (3 semester hours)
Prerequisites: LTMS 500, LTMS 514 and LTMS 518
Description: This course focuses on techniques for designing and developing learning solutions in a reduced time frame. The need to rapidly create learning solutions increases as information, expectations and requirements change quickly in a technology-based, global marketplace. Strategies for reducing the instructional design timeframe and reducing the need for development resources are explored.

LTMS 538 Critical Issues in Instructional Design (3 semester hours)
Prerequisites: LTMS 500 and LTMS 510
Description: This course looks at the field of instructional design, including opportunities to advance the field and develop skills in areas of emerging need. The industry-related opportunities and challenges of instructional design commonalities and disparities in various learning environments are also explored.

LTMS 539 Using Virtual Worlds for Learning and Collaboration (3 semester hours)
Prerequisites: None
Description: This course focuses on promoting active learning, impacting learner engagement and improving learning outcomes through distributed learning in a virtual world environment. Concepts are explored throughout the course as the student explores and evaluates virtual world environments. The course promotes active learning solutions based on proven design and development trends and research-based practices for engagement, learning and collaboration using virtual worlds.

LTMS 540 The Instructional Designer as Entrepreneur (3 semester hours)
Prerequisites: completion of 15 graduate-level credits
This course focuses on the evolution of the profession of instructional designer from one customarily employed by a corporation to one where the instructional designer is most frequently an independent contractor. The focus is on the effect this has on the required skillset and mindset of the designer. The course explores tools and techniques for finding work, evaluating requests for proposals, writing proposals, meeting with selection teams, and building strategies that can be enhanced by technology integration. The goal of the course is to establish a systematic process for designing the workflows, processes, and skillsets needed to build an instructional design consultancy.

LTMS 541 Using Mobile Devices for Learning (3 semester hours)
Prerequisites: None
Description: This course focuses on promoting active learning, impacting learner engagement, improving access and improving learning outcomes through the use of mobile devices. As mobile devices become more abundant, their use as a learning tool is increasing. Mobile learning can increase engagement, enhance access, support differentiated instruction and provide alternate assessment opportunities. Mobile learning opportunities, design considerations, development tools and implementation challenges are explored.

LTMS 542 Classroom Technology (3 semester hours)
Prerequisites: None
Description: Interactive whiteboards, student response systems, mobile devices and other systems for supporting and extending classroom-based learning solutions are explored. Classroom technologies can be used to engage learners, enable formative assessment, capture the learning environment and promote higher level learning in today's classroom. The student designs a learning solution delivered through the use of classroom technology. Open-source and industry leading hardware and software options are both considered.

LTMS 543 Interactive Media Management (3 semester hours)
Prerequisites: Background in interactive media
Description: This course explores the management of interactive media in the modern industry environment. It is designed to give the student an understanding of the factors that influence the structures, policies, programming, and management practices of various interactive media projects. The objective is to integrate relevant social, organizational and political topics related to interactive media management and programming decisions. Topics include a management perspective on the practice of digital video production, including nonlinear editing, graphics creation, multi-channel audio mixing, and streaming video. Special attention is paid to the study of laws and regulations as they pertain to media operations and the internal and external codes that guide media behavior. Discussions include: media ownership and operation, including monopoly and competition, labor relations, industry trends and market relations.

LTMS 544 Critical Issues in Teaching Mathematics (3 semester hours)
Prerequisites: LTMS 500 and LTMS 510
Description: This course explores the integration of learning technologies into a math curriculum. Emerging opportunities in learning technologies for active learning, applied math, data visualization, media solutions and assessment are investigated. Promoting math careers and supporting professional development through the use of learning technologies are also explored.

LTMS 580 Special Topics in LTMS (3 semester hours)
Prerequisites: None
Description: This course explores a topic of current interest in the field of learning technology.

LTMS 598 Critical Issues in Teaching Science (3 semester hours)
Prerequisites: LTMS 500 and LTMS 510
Description: This course explores the integration of learning technologies into a science curriculum. Emerging opportunities in learning technologies for active learning, virtual labs, data visualization, media solutions and assessment are investigated. Promoting science careers and supporting professional development through the use of learning technologies are also explored.

LTMS 599 Critical Issues in Teaching Technology (3 semester hours)
Prerequisites: LTMS 500 and LTMS 510
Description: This course explores the integration of learning technologies into a technology curriculum. Emerging opportunities in learning technologies for active learning, virtual computer labs, media solutions and assessment are investigated. Promoting technology careers and supporting professional development through the use of learning technologies are also explored.

LTMS 600 Implementing Web 2.0 in the Classroom (3 semester hours)
Prerequisites: None
Description: This course enables exploration and practice with "Web 2.0" learning technologies and investigates how the integration of these technologies in the classroom can impact teaching and classroom dynamics. A variety of tools for managing information, creating content and collaborating for learning are explored. Within a peer learning model, the student designs, implements and evaluates a classroom activity that incorporates one or more Web 2.0 tools.

LTMS 602 Technology Evaluation and Selection (3 semester hours)
Prerequisites: LTMS 510
Description: Effectively evaluating and selecting the right technology solution (software, hardware, and services) for myriad complex situations is a necessary skill in the development and management of learning technology projects and initiatives. This course explores the request for proposal (RFP) process for evaluation and selection including evaluating the needs and internal processes of the organization along with writing an RFP. Keys to the successful implementation of new technologies and solutions are also explored.

LTMS 603 Engaging with Learning Activities, Games and Simulations (3 semester hours)
Prerequisites: None
Description: This course focuses on promoting active learning, impacting learning engagement and improving learning outcomes with technology-based activities, games and simulations. Concepts are applied throughout the course as the student designs engaging learning experiences using current techniques and technologies. The course promotes active learning solutions based on proven design and development trends and research-based practices in engagement, game and simulation concepts.

LTMS 607 Writing for Learning Solutions (3 semester hours)
Prerequisites: None
Description: This course addresses writing styles, formats and techniques for asynchronous learning solutions. Best practices for technical writing and writing for the web are explored. Storytelling as an instructional strategy is emphasized throughout the course and is examined as an important element for successful learning design.

LTMS 608 Course Management Systems (3 semester hours)
Prerequisites: None
Description: This course addresses the integral role that the course management system (CMS) plays in today's classroom, online instruction, and blended learning environments. As systems advance and become more affordable, educators and learners are embracing the CMS as the hub of educational coordination and activity. The student creates a learning solution that uses a CMS to implement

advanced pedagogical approaches to help the student achieve a higher level of learning. Open source and industry leading software options are both considered.

LTMS 609 Synchronous Facilitation (3 semester hours)
Prerequisites: LTMS 500
Description: This course is an in-depth discovery of planning, producing and facilitating synchronous face-to-face and online communication and learning events. Classroom facilitation techniques are examined, in comparison and support of developing online facilitation skills. Creating audience engagement with effective content development, media and interactive elements in an online synchronous session are addressed. The producer's role in facilitator and participant preparation, technology validation, logistics, in-session troubleshooting and post-session follow-up is also examined. Industry leading web conferencing and virtual classroom software and open source options are both considered.

LTMS 610 Learning Technologies Project (3 – 6 semester hours)
Prerequisites: None
Description: The student creates and executes a detailed project plan to use as part of a real-world project that applies concepts and skills previously explored throughout the program. The student's project is customized to a particular area of interest in learning technologies. This experiential course also provides an opportunity to reinforce and demonstrate the eight University competencies, i.e., critical thinking, communication, teamwork and collaboration, entrepreneurship, information literacy, ethical decision making, global awareness, and civic engagement.

LTMS 611 Extensible Languages for Development (3 semester hours)
Prerequisites: LTMS 518
Description: This course addresses the need to extend visual authoring and editing tools with scripting and programming to achieve advanced features. Proprietary languages are used along with program, platform and device independent languages to create dynamic data display and advanced interactions. Web-based, Windows OS and mobile device environments are considered.

LTMS 612 Integrating Learning Technologies with Human Resource Functions (3 semester hours) Prerequisites: LTMS 500 and LTMS 510
Description: This course investigates the benefits of and opportunities for integrating learning technologies into talent management activities like hiring, onboarding, knowledge management and competency-based employee evaluation and development. Compliance throughout the organization and training employees to utilize human resource tools are explored, as will integrating learning technologies with human resource information systems (HRIS) and enterprise resource planning (ERP) tools.

LTMS 613 Data Protection in Learning Solutions (3 semester hours)
Prerequisites: LTMS 500 and LTMS 510
Description: This course explores general privacy and security needs to ensure data protection in learning solutions in addition to specific requirements based on federal, state and industry regulations. Records and information management, export compliance and safe harbor/international trade agreements are also considered in the context of a global audience. Security and privacy strategies for media, access and reporting are examined, as well as developing contingency plans for security and privacy breaches.

LTMS 614 Social Learning in the Organization (3 semester hours)
Prerequisites: None
Description: This course explores the use of social learning and communication in organizations, the software tools used to enable online social interaction and the challenges of organizational

implementation. Social learning technologies enable conversations, content creation, connections and collaboration in the organization. When socially-enabled, these activities can increase productivity, deliver knowledge at the time of need and address time and location challenges that exist in today's organizations. The student identifies a learning or communication opportunity to create a solution using social learning technologies. Open source and industry leading hardware and software options are both considered.

LTMS 615 Coordinating the Learning Technology Infrastructure (3 semester hours)
Prerequisites: LTMS 530
Description: This course focuses on identifying, selecting, installing and maintaining a technology infrastructure to support technology-enabled learning solutions. Administrative and educational technology needs along with the need for assistive technology resources to support learners with special needs are specifically addressed within the examination of the overall infrastructure.

LTMS 616 Authoring Medical Mannequin Simulations (3 semester hours)
Prerequisites: None
Description: This course focuses on creating highly realistic patient simulation training experiences by organizing pre-programmed scenarios, programming custom events, using event handlers to create automatic responses and using trending to create dynamic simulations in a medical mannequin authoring system.

LTMS 617 Performance Evaluation for Medical Mannequin Simulations (3 semester hours)
Prerequisites: None
Description: This course is a study of debriefing strategies to evaluate performance and enhance learning in medical mannequin simulations. The use of a video debriefing system with synchronized recordings and comment logs is combined with questioning, facilitation and collaboration techniques to increase the effectiveness of medical mannequin simulations.

LTMS 618 Accessibility Software and Devices (3 semester hours)
Prerequisites: LTMS 500
Description: This course is a study of software and hardware devices that are used to address accessibility requirements. Design fundamentals, built-in accessibility development functions, scripting solutions, accessibility devices and alternative delivery methods are explored in the context of achieving compliance with the 1998 amendment to Section 508 of the Rehabilitation Act of 1973 requiring electronic and information technology accessibility by government and government-subsidized organizations for persons with disabilities.

LTMS 619 Enterprise Applications for eLearning (3 semester hours)
Prerequisites: LTMS 518 and 611
Description: This course explores the options available for eLearning design, development and implementation with existing enterprise applications and systems. Leveraging existing enterprise resource planning, asset management, communication and collaboration systems as resources for creating and managing learning solutions can decrease costs and create cross-functional process and technology synergies. The enterprise application landscape, as it applies to the design, development and management of eLearning, is examined within the context of creating an eLearning solution. Industry leading software and open source options are both considered.

LTMS 625 Learning Management and Learning Content Management Systems
(3 semester hours)
Prerequisites: LTMS 500 and LTMS 518
Description: The course explores the evolving role and nature of learning management (LMS) and learning content management systems (LCMS) to support learning in organizations. The Shared

Content Object Reference Model (SCORM), Content Object Repository Discovery and Registration/Resolution Architecture (CORDRA) and the Aviation Industry CBT (Computer-Based Training) Committee (AICC) standards are examined and applied as part of designing and creating learning objects that can be incorporated into an LCMS and administered by an LMS. Industry leading software and open source software are both examined.

LTMS 635 eLearning Authoring Systems (3 semester hours)
Prerequisites: LTMS 500 and LTMS 518
Description: Systems built for asynchronous eLearning development are explored in a hands-on environment. The storyboarding, content management, asset management and team communication elements of eLearning authoring systems are also examined, within the context of analyzing the systems' abilities to enhance the instructional design process in a team environment.

LTMS 636 Micro Instructional Design (3 semester hours)
Prerequisites: LTMS 510, LTMS 514, LTMS 518, LTMS 520, and LTMS 525
Description: An in-depth exploration of instructional design strategies and techniques are explored in a project-based group environment. Selecting media, identifying learning objectives, writing assessment instruments and creating a detailed instructional plan are examined as part of the complete design and development of a learning solution.

LTMS 645 Visual Representation for Learning and Communication (3 semester hours)
Prerequisites: LTMS 514
Description: This course explores the benefits of visually representing ideas, concepts and processes to improve the results of learning and communication. The history of visualization for learning and communication, along with the current research and trends in using visuals to improve learning and communication, are explored. Techniques and technologies for brainstorming, mind mapping, creating instructional and curricular design, thinking creatively, planning, creating visuals and delivering visual learning and communication are applied in individual and group projects throughout the course.

LTMS 680 Advanced eLearning Development (3 semester hours)
Prerequisites: LTMS 611, LTMS 619, LTMS 625, and LTMS 635
Description: An in-depth exploration of advanced eLearning application development is explored in a project-based group environment. Interactivity, personalization, data flow and management and system integration are examined as part of developing an advanced eLearning application.

LTMS 697 LTMS ePortfolio (0 semester hours)
Prerequisites: None
Corequisites: LTMS 698
Description: A graduate student pursuing the Pennsylvania Department of Education Instructional Technology Specialist (ITS) K-12 instructional certificate is required to create an ePortfolio. The ePortfolio presents the student's knowledge and performance in the competencies required by the ITS guidelines.

LTMS 698 Learning Technologies Internship (1-6 semester hours)
Prerequisites: GRAD 695 and permission of advisor
Description: The student conducts learning technology-related activities at an organization to apply concepts and skills previously explored throughout the program. This experiential course also provides an opportunity to demonstrate and further develop the eight University competencies, i.e., critical thinking, communication, teamwork and collaboration, entrepreneurship, information literacy, ethical decision making, global awareness, and civic engagement.

LTMS 699 Applied Project in LTMS (3 semester hours)
Prerequisites: GRAD 695 and permission of advisor
Description: This course allows the student to pursue an area of interest that is within the broad scope of learning technologies. A faculty member supervises this study.

MANAGEMENT

MGMT 510 Business Strategy and Management Principles (3 semester hours)
Prerequisites: None
Description: This course introduces the basic concepts of business strategy and management principles of planning, organizing, staffing, developing, and monitoring/control. The context is global markets and their impact on business strategies and managerial processes. The course explores the best practices in global strategic management, organizational design, human resource processes, and organizational behavior.

MGMT 511 Digital and Global Enterprises (3 semester hours)
Prerequisites: MGMT 510
Description: Modern enterprises are globally dispersed organizations where nearly all significant business processes and relationships with customers, suppliers, and employees are digitally-enabled and key corporate assets are managed through digital means. Such organizations merge the concepts traditionally discussed in ecommerce, ebusiness and egovernment. This course introduces the organizational and operational aspects of such organizations and highlights the role of managing such organizations. Topics include organizational structure and design, learning and agile organizations, and operational concerns such as management of supply chains and B2B trade at a global level.

MGMT 512 Marketing Principles and Applications (3 semester hours)
Prerequisites: MGMT 510
Description: This course introduces the student to the most recent and relevant thinking in marketing in the competitive global marketplace. 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.

MGMT 513 Accounting Principles and Applications (3 semester hours)
Prerequisites: MGMT 510
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 corporations' performance and position for readers external to management.

MGMT 520 Professional Communication (3 semester hours)
Prerequisites: None
Description: This course provides training in business writing, interpersonal communication and oral communication to prepare the student to be a more effective professional communicator. The student works on projects in the classroom that offer practical applications of concepts covered in the textbook, including case study examples of poorly executed business communication that the student revises and improves. The student also writes a proposal and a report and prepares a plan to manage a project team kickoff meeting.

MGMT 531 Business Entrepreneurship Principles (3 semester hours)
Prerequisites: MGMT 510
Description: This course is designed for the student and working professional with interest in owning, or participating in, a successful business startup. The course focuses on the principles that are essential to forming a successful startup company, and the role of innovation in entrepreneurship.

MGMT 532 Business Entrepreneurship Management (3 semester hours)
Prerequisites: MGMT 531
Description: This course focuses on the management and planning processes needed for sustained growth of a startup company. Specifically, the course goes beyond the initial idea formulation stages and provides hands-on experience in developing a business plan for a startup. Emphasis is placed on innovation and the management of opportunities rather than to concentrate on the efficient management of ongoing operations. The course is organized around the following themes: management systems for innovative companies, short- and long-range planning in owner-managed businesses, measuring economic performance and obtaining information for management decision making, legal and human resource issues, and entrepreneurship and managing growing companies.

MGMT 533 Business and Entrepreneurial Financing (3 semester hours)
Prerequisites: MGMT 531
Description: This course introduces the student to the fundamentals of business financing with emphasis on financing for entrepreneurship. The course covers topics such as financial theory, risk assessment, and financial reporting systems in modern business settings. Special attention is paid to financing the startups with different options from venture capitals, angels and banks.

MGMT 560 Organizational Leadership (3 semester hours)
Prerequisites: None
Description: Successful project managers are adept at leading. Leadership, however, is a complex undertaking that requires knowledge and understanding of a number of competencies. This course builds these competencies. Focusing on organizational leadership, the course explores and develops skills and knowledge needed to lead organizational transformation and change, negotiate conflict resolution, build relationships and human capital, and instill business ethics and professional codes of conduct.

MGMT 580 Special Topics in MGMT (3 semester hours)
Prerequisites: None
Description: This course explores a topic of current interest in the field of management.

MATHEMATICS

MATH 510 Applied Statistical Methods (3 semester hours)
Prerequisites: None
Description: This is an applied statistics course with probability theory being presented but applicable statistics is emphasized. The course covers the statistical methods and models that practitioners require for use in their professions and is an applied course in regression, analysis of variance, and linear models which includes experience with the SAS statistical software package. Topics include descriptive statistics/data summaries, inference in simple and multiple linear regression, residual analysis, estimation and testing of hypothesis, transformations, polynomial regressions, model building with real data, nonlinear regression and linear models. This course is not mathematically advanced but covers a large volume of material.

NEXT GENERATION DISRUPTIVE TECHNOLOGIES

NGDT 520 Foundations of Blockchain (3 semester hours)
Prerequisites: None
Description: Blockchain technology is recognized worldwide as a serious disruptive force in both the history of money and in ledger technology. In a short period of time, hundreds of thousands of blockchains have emerged to cater to multiple problems whether they are monetary, business, economic, social, or even political problems. It brings forth serious issues of governance as well as the need to reorganize multiple enterprises like state entities, corporations, banks, court systems, etc. This course introduces the student to the significance of this paradigm shift with broad coverage of important changes and the agents of the change. It explores origins of Bitcoin, technical details of underlying blockchain technology, elements of cryptography, supportive technologies, predominant concepts of distributed computing, and emerging layering of internet protocols and their role in new wealth systems.

NGDT 525 Evolution of Crypto Assets and Tokens (3 semester hours)
Prerequisites: None
Description: After the emergence of Bitcoin, hundreds of crypto-currencies have surfaced with a vast supportive infrastructure for exchange of this value. This has resulted in diverse responses from governments and other regulating bodies. This course contains a comprehensive history of crypto-assets and infrastructure built since 2012, including exchanges, wallets, prominent tokens, central bank-issued digital currencies, and the state of regulations. This course gives the student an introduction of top-rated blockchain assets, their security mechanisms, investment strategies, and crypto-trading modes, as well as explain how government jurisdictions are responding to this unique disruption.

NGDT 534 Implementing Smart Contract and DApps (3 semester hours)
Prerequisites: NGDT 520, NGDT 525, and a background in computer programming
Description: Open blockchains, particularly Ethereum, have spawned a unique category of crowdfunding options that standardize the entire process of how capital is raised and allocated. Specific technical expertise and a detailed knowledge of how decentralized applications are fast emerging as the new players in the ecosystem are required to navigate Open blockchains. This course offers a specific understanding of how the Ethereum blockchain has become a standard mechanism for launching new ICO (Initial Coin Offering) projects and DApps. This course takes the student through multiple phases of building an ERC20 (Ethereum Request for Comment) standard token and its deployment in real-life conditions. This course offers not only a core developer experience that stands behind an ICO, but also offers a comprehensive survey of how the Ethereum and non-Ethereum smart contract platforms have contributed to a completely new offering of DApps as blockchain-as-a-microservice.

NGDT 540 Major Blockchain Trade-offs and Choices (3 semester hours)
Prerequisites: NGDT 520 and NGDT 525
Description: Blockchain Technology has ushered in a range of public and private chains. Both have serious trade-offs in terms of scalability, interoperability, and decentralization. While open blockchains have disrupted the capital market with ICO as a new way of borderless crowdfunding, private chains are building tokenization frameworks for existing assets like stocks, bonds, debt instruments, financial derivatives, land titles, etc. This course begins with a basic introduction to growth challenges faced by blockchains and how that has evolved into multi-blockchain ecosystem. It offers a detailed description of the state of deep-impact blockchains dominating in the current climate and what the scale of their applicability is at present. This course also teaches the student how governments/regulatory forces are accepting/reacting to these new forces and the major templates of this response.

NGDT 545 Industry Blockchain and Blockchain-as-a-Service (3 semester hours)
Prerequisites: NGDT 520 and NGDT 525
Description: If enterprises are to adopt blockchain technologies, they need easy-to-implement blockchain platforms. Multiple players have emerged to offer such kind of solutions. Before any specific choice is made in this regard, it is critical to understand the sector and use-case specificity where blockchain needs to be applied. Since there are some standard responses to blockchain applications, this course offers a new way of approaching sectoral applications via building innovation templates. Once standard responses are stabilized, further nuances can be built over it. The major use cases to be covered are digital identity, supply chain, entertainment distribution, and provenance. This course not only offers a capacity building model for multiple industries, but also enables right platform choices in appropriate context.

NGDT 560 Internet of Money and Future of Blockchains (3 semester hours)
Prerequisites: NGDT 520 and NGDT 525
Description: Blockchain is a fundamental disruption in the history of ledger technology, and it will deeply impact the future of all ledger-centric institutions such as central banks, commercial banks, companies and exchanges, as well as the currencies and assets that are transacted and traded inside them. Since peer-to-peer settlement would always be efficient, cost-effective and risk-free as compared to third-party settlement, the future of money and value will be different from what it is now. This course explores how the new consensus mechanisms will emerge for exchanging value across borders, assets, and economic sectors, as well as the new avenues offered by AI and how blockchain can magnify its impact. This course is a bridge between what is present and what could be the future trends. It offers not only a meta-narrative of this potential change, but also elaborates on the new change agents and their strategies. Topics include design of the business models for decentralization and scale, convergence of AI and blockchain, and design of projections-centric studies for blockchain systems.

NGDT 585 Principles of Software Architectural Patterns (3 semester hours)
Prerequisites: A bachelor's degree in a related field with professional work experience in the field.
Description: This course serves as a catalog of commonly used design patterns, prominent and dominant software patterns, and their applications. The course is divided into three modules. First, Software Architecture Patterns covers the various architectural patterns of object-oriented, component-based, client server, and cloud architecture. The need for software patterns is described. The various architectural patterns are listed and explained in detail in order to convey the what, where, why and how of architectural patterns. Second, Enterprise Integration Patterns cover enterprise application integration patterns and how they are designed. Patterns of service-oriented architecture (SOA), event driven architecture (EDA), resource-oriented architecture (ROA), big data analysis architecture, and microservice architecture (MSA) will be carefully studied. Finally, Patterns for Containerized and Highly Reliable Applications covers advanced topics such as Docker containers, high-performance, and reliable application architectures. Key takeaways include understanding what architectures are, why they are used, and how and where architecture design and integration patterns are being leveraged to build bigger and better systems. *Cross-listed with CISC 585.*

NGDT 699 Applied Project in Disruptive Technologies (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of Next Generation Disruptive Technologies. A faculty member supervises this study.

NURSING (NURS)

NURS 510 Foundational Concepts for Master Prepared Nurses (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program
Description: This course is the first course in the core curriculum for Master of Science in nursing. It provides an overview of the theory in advanced nursing to prepare the graduate with a broad knowledge and practice expertise that builds and expands upon their entry-level nursing practice. The student is expected to have a deeper understanding of the discipline of nursing to engage an advanced level of nursing practice and leadership in a variety of settings with the commitment to the lifelong learning philosophy.

NURS 515 Quality and Safety (3 semester hours)
Prerequisites: B or higher in NURS 510
Description: This course will introduce the student to the quality and process improvement methodologies within different healthcare settings. The student is expected to have a deeper understanding of nursing's role in quality and processes improvement. The student delves into the foundations of quality and process improvement practice through different standpoints, histories, frames of reference and interpretations of different views of the best practices.

NURS 520 Healthcare Policy (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program
Description: This course builds upon the student's current knowledge in healthcare policy and advocacy. This course will discuss theories and perspectives of the nursing Framework to support Population, communities, individuals to improve health outcomes. The student draws on the policy and advocacy science literature; the course will present students with overviews of theories of information, action, sociality, conflict, and interaction within traditional and digital environments. Through readings and examples, the course includes attention to sociotechnical theories around communities of practice, online communities, social media, and enterprise knowledge management. This seminar course offers the student a better understanding of the advanced practice nurse responsibility in healthcare policy and advocacy.

NURS 540 Advanced Research Methods and Evidenced-Based Practices (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program
Description: This course builds upon the nurse's knowledge of research theories and methods and evidence-based practices. This course has some strong focus and data analytics and evaluation. Throughout readings, case studies and the application of data the student will have practical experience evaluating evidence-based solutions to improve the health outcomes of an individual or population.

NURS 550 Advanced Pathophysiology/Pharmacology and Health Assessment (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program
Description: This course builds upon the nurse's knowledge of anatomy and physiology, pathology in the disease process, pharmacology, and health assessment associated with the human body systems. This course is an integrated approach to health assessment.

NURS 605 Foundations for the Clinical Nurse Leader I (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program with the Clinical Nurse Leader Concentration
Description: This course provides a foundation for the implementation of the clinical nurse leader role. The student focuses on the role and its contribution to improve patient outcomes, ensure quality care and reduce health care cost. Concepts, theories, and issues related to nursing leadership and care

environment management are investigated in depth. End of program competencies for the Clinical Nurse Leader role will be discussed.

NURS 610 Foundations for Clinical Nurse Leader II (3 semester hours)
Prerequisites: NURS 605
Description: The student applies elements of the CL curriculum with a select cohort of clients. This course facilitates the development of skills for advocacy and leadership in a microsystem to promote positive change in a healthcare delivery system while putting best practices into action. This course will include assignments that will fulfill 25 hours of non-preceptee hours that is a part of the total clinical hours needed to fulfill program requirements.

NURS 620 Theoretical Foundation in Nursing Education (3 semester hours)
Prerequisites: Completion of all MSN Core Courses and B or higher in NURS 510
Description: This course prepares the prospective nurse educator with the foundational principles necessary for teaching in various settings: classroom, clinical, and college laboratories, and health care agencies.

NURS 625 Curriculum Development (3 semester hours)
Prerequisites: Completion of all MSN Core Courses
Description: The purpose of this course is to offer the student applications in nursing curriculum design, including the development of a teaching/ learning philosophy, mission statement, programmatic goals, learning objectives, teaching plans, and individual courses.

NURS 630 Epidemiology in Action: Tracking Health & Disease (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program with the Clinical Nurse Leader Concentration
Description: The student will apply principles of epidemiology using public health and population health theories using data and other variables to determine the best possible clinical or population outcomes. This course includes assignments that will fulfill 25 hours of non-preceptee hours that is a part of the total hours needed to fulfill program requirements.

NURS 635 Clinical Nurse Leader Evaluation of Health Outcomes (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program with the Clinical Nurse Leader Concentration
Description: The student will use quality improvement and process evaluation techniques to track and evaluate health outcomes to ensure the best possible clinical or population outcomes. This course will include assignments that will fulfill 25 hours of non-preceptee hours that is a part of the total clinical hours needed to fulfill program requirements.

NURS 640 Nursing Research and Evidence-Based Teaching Models (3 semester hours)
Prerequisites: Admission to the Master of Science in Nursing Program
Description: This course provides an overview of teaching methods utilized in nursing education to support the student learning in clinical, didactic and online learning environments. The student examines various teaching/learning technologies, including simulation, and integrate these technologies with select teaching methods in the design of coursework to support learning.

NURS 645 Assessment and Evaluation in Education (3 semester hours)
Prerequisites: Completion of all MSN Core Courses
Description: This course explores the theories, principles, and practices that underpin the measurement and evaluation of educational settings and programs. This course includes content on approaches to giving feedback, test construction, and psychometric evaluation, development, and grading of written assignments, evaluation of clinical performance and self-evaluation for personal teaching effectiveness.

NURS 695 Nursing Practicum I (3 semester hours)
Prerequisites: Completion of all MSN Core Courses
Description: This experiential course synthesizes the key concepts of the program extending and applying these concepts to real-life practical problems or research investigation.

NURS 699 Nursing Practicum II (3 semester hours)
Prerequisites: NURS 695
Description: This course is a continuation of the experiential component. The course synthesizes the key concepts of the program extending and applying these concepts to real-life practical problems or research investigation.

PHARMACEUTICAL SCIENCES

PHAR 520 Pharmacokinetics and Pharmacodynamics (3 semester hours)
Prerequisites: A Bachelor of Science degree in Health Science
Description: This course introduces students to the principal factors that can impact absorption, distribution, and elimination of drugs in the body. Specifically, mathematical approaches to characterizing pharmacokinetics (PK), the study of factors influencing drug concentrations in the body, and pharmacodynamics (PD), the study of the physiologic action of drugs in the body, are discussed with an emphasis on small molecule and protein therapeutics. The clinical and non-clinical applications of PK and PD will be discussed. Students will participate in simulations of real-world pharmacokinetic monitoring of various drugs used clinically to treat infections, control seizures, and suppress arrythmias.

PHAR 525 Drug Transport (3 semester hours)
Prerequisites: A Bachelor of Science degree in Life Science
Description: This course covers multiple aspects of drug transport, from simple diffusion to protein-mediated active transport of drugs and other xenobiotics. Specific transporters will be discussed in the context of clinical and pre-clinical effects on drug disposition. Distribution, substrates, and mechanisms of relevant drug transporters will be discussed, as well as how they can mediate potentially toxic effects of drugs.

PHAR 540 Drug Metabolism (3 semester hours)
Prerequisites: PHAR 520
Description: This course focuses on multiple aspects of drug metabolism. Specific content includes instruction on phase 1 and phase 2 drug metabolism. While the majority of the course will involve examining hepatic drug metabolism and extrahepatic metabolic pathways, drug metabolism in preclinical drug development will also be covered. This course will also expose students to the role drug metabolism plays in potentially toxic drug effects and interactions.

PHAR 690 Ethics and Trends in Pharmaceutical Science (3 semester hours)
Prerequisites: To be taken in second year of Pharmaceutical Sciences program
Description: Ethics and Trends in Pharmaceutical Science presents current challenges, trends, and controversies concerning pharmaceutical science. Lectures are generally composed of presenting current (within the calendar year) articles from around the world that introduce a topic of interest. Such topics may include industry news, education trends, and regulatory controversies.

PHAR 699 Applied Project in PHAR (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of Pharmaceutical Science. A faculty member will supervise this study.

PROJECT MANAGEMENT

PMGT 510 Principles of Project Management (3 semester hours)
Prerequisites: None
Description: This course introduces the student to project management knowledge areas and processes used by project managers to successfully deliver their project on time, within budget and to the expectations of project stakeholders. The student works on real-world examples, problems and case studies as individuals in groups. An emphasis is placed on hard and soft skills, and the tools and techniques used by project managers to initiate, plan, execute, monitor/control, and successfully close projects in typical project environments associated with waterfall and agile methodologies.

PMGT 515 Business and Requirements Analysis Fundamentals (3 semester hours)
Prerequisites: None
Description: This course is designed to familiarize the student with common tasks performed by business analysis during the project lifecycle to increase the chances of project success and customer satisfaction. Through the use of real life project examples, the student gains expertise in planning the requirements activity and eliciting, writing, prioritizing, validating and managing customer requirements for IT and other types of projects.

PMGT 530 Procurement, Contracts, and Risk Management (3 semester hours)
Prerequisites: PMGT 510
Description: The student achieves expertise in managing project risks and conducting project procurement that will help them succeed in the workplace. Through the use of real life project examples and scenarios, the student is shown how to reduce negative risk exposure in projects by using effective risk management practices. The student is also shown how to plan a procurement, understand different procurement methods and types of contacts, find a vendor and write a Request for Proposal to apply these concepts to actual projects.

PMGT 540 Planning and Executing Projects (3 semester hours)
Prerequisites: PMGT 510
Description: This course uses Microsoft Project software to schedule and control projects. The student is introduced to, and practices with, the most widely-used project management software system available. Functions, monitoring alternative usages and maintaining data are developed as the student builds a project from the ground up. This is a comprehensive, semester-long project budgeting, scheduling and control course where practiced theory is the platform for learning.

PMGT 550 Quality Management and Continuous Improvement (3 semester hours)
Prerequisites: None
Description: The student will be introduced to how quality improvement techniques and quality management can be used to support organizational initiatives such as projects and operations. This includes quality planning, quality assurance and quality control. Statistical topics will also be discussed and linked to the Lean Six Sigma methodology to improve quality, productivity, and the competitive position. This course will also cover the relationship and overlap of project management and quality management using standards from the Project Management Institute and the International Standards Organization.

PMGT 570 Agile Project Management with Scrum Methodology (3 semester hours)
Prerequisites: None
Description: This course provides to the student the features, benefits, and practices of using Agile Project Management with Scrum Methodology and that this approach differs from traditional project management at the project level and enterprise level.

PMGT 572 Agile Scrum Applied Projects (3 semester hours)
Prerequisites: PMGT 570
Description: This course provides the student with hands on experiential learning using Agile Scrum as a member of a team. The team develops a vision statement and user stories for a real application. The team then implements the product that is specified using Agile Scrum Framework and all the standard Agile Scrum ceremonies such as Product Backlog, Sprints, Sprint Planning, Release Planning, Daily Standups, Sprint Review, and Sprint Retrospectives. Team members play the actual roles of Product Owner, ScrumMaster, Developers, Testers, etc. The course produces an actual working viable product that can be demonstrated to stakeholders. The team consists of a mix of graduate students from Project Management, ISEM, Computer Science, Analytics, and Learning Technologies.

PMGT 573 Scaling Agile for the Enterprise (3 semester hours)
Prerequisites: PMGT 570
Description: This course provides the student with a solid foundation of agile frameworks that have been scaled to the enterprise synchronizing alignment, collaboration, and delivery for large numbers of teams. One of the more popular enterprise agile frameworks called the Scaled Agile Framework (SAFe) will be studied and analyzed. This framework has been a proven framework for enterprises applying integrated principles and practices for Lean, Agile, Systems Thinking, and DevOps. In addition to SAFe, the course provides the student with an overview of other popular frameworks for scaling the enterprise, such as: The Disciplined Agile (DA), the Large-Scaled Scrum (LeSS), Nexus, Scrum@Scale, and Scrum of Scrum (SoS).

PMGT 574 Agile Lean Product Development (3 semester hours)
Prerequisites: None
Description: This level course provides the student with key strategies in agile lean product development that will help the student streamline new product development processes that will decrease time-to-market, reduce waste, enhance product quality, and fully integrate new product designs into a lean production environment. This course uses principles rooted in the iconic Toyota Production system.

PMGT 576 Agile Lean Transformational Leadership (3 semester hours)
Prerequisites: PMGT 570 and PMGT 574
Description: This course provides the student with innovative practices that need to be followed in order to transform a company or organization form a traditional waterfall mindset to more of an Agile Lean mindset and culture. Agile Lean Change management (not the typical change management talked about in project management relative to scope, budget, etc.) and Lean IT are two methods that are being used successfully in the industry to move organizations from a more traditional mindset to Agile. Both methods rely significantly on the leaders in the organizations to facilitate the change. In conjunction with this course, the student learns the responsibilities and techniques of the Agile Coach role, which has become a key role in the industry to facilitate change. The student studies change resistance, change adoption, change planning tools, transformation frameworks, and methods for leading change from any level in an organization.

PMGT 580 Project Management Offices (3 semester hours)
Prerequisites: PMGT 540, PMGT 530
Description: This course provides the student an overview of the types of Project Management Office (PMO) structures, the key elements of each, and the key aspects of how to initiate and sustain a business-centered and value-driven PMO.

PMGT 697 PMP/CAPM Exam Preparation (0 semester hours)
Prerequisites: PMGT 510 and PMI membership
Description: This course exposes the student and the practicing project manager to the Project Management Body of Knowledge processes and standards, which prepares the student to take the PMP or CAPM certification exam. The student must take the PMP or CAPM exam and submit proof of a successful exam score. Upon completion of the six project management courses, the student has one year to take the PMP exam or take PMGT 697 and take the PMP exam.

PMGT 699 Applied Project in Project Management (3 semester hours)
Prerequisites: GRAD 695 and permission of instructor
Description: This course allows the student to pursue an area of interest that is within the broad scope of project management. A faculty member supervises this study.

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 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. A listing of the faculty, administration, and staff are available at https://harrisburgu.edu/faculty-and-staff-listing/

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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)

The University collects a considerable amount of information about each student during the period of enrollment. Almost all this information is contained in educational records protected by the Family Educational Rights and Privacy Act (FERPA). FERPA applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

Under FERPA, students have the right to review their educational records and to challenge content that is inaccurate or misleading. FERPA regulations also stipulate that the University cannot release a student's educational records to anyone but the student without the student's written consent, except to the extent that FERPA authorizes disclosure without consent.

FERPA permits University officials to disclose educational records and certain 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

University Privacy Notice - The University is committed to safeguarding the privacy of individuals who share personal data with it and has adopted a Privacy Notice that outlines HU's collection, use, and disclosure of Information provided by prospective students, applicants, or third parties. A copy of the University's Privacy Notice is available on its webpage at: http://harrisburgu.edu/lib/pdf/HU-Privacy-Notice-9-10-18.pdf

Directory Information - 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. The University defines directory information to include:

- student's name
- both permanent and temporary addresses
- email 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
- eSports Statistics

For additional information on FERPA: https://www2.ed.gov/policy/gen/reg/ferpa/index.html

Campus Crime and Security Disclosure

The Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (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 as identified by the Clery Act 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 harassment and assault, domestic violence, timely warnings, and other safety and security matters including public, private, and University resources that are available to the University community.

The University's current Clery Report is available on its website at:
http://harrisburgu.edu/lib/pdf/annual-security-report-clery-report.pdf

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 HarrisbugU.edu domain. The account is designated as the "[FiLastname@HarrisburgU.edu" or "[Student FiMiLastname]@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 dictated by University policy and as required by federal statutes (Title IX of the Educational Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, Titles VI and VII of the Civil Rights Act of 1964, the Americans with Disabilities Act of 1990 (ADA)) and any other applicable anti-discrimination statutes, including those of the Commonwealth of Pennsylvania (Pennsylvania Human Relations Act of 1955 (PHRA) and the Pennsylvania Fair Educational Opportunities Act of 1961 (PFEOA)).

Student inquiries concerning compliance and information regarding Title IX, Title VI, Title VII, PFEOA, Section 504, campus accessibility, or ADA accommodations should contact the Office of Student Services.

Faculty and staff inquiries concerning compliance and information regarding Title IX, Title VII, PHRA, Section 504, campus accessibility, or ADA accommodations should contact the Office of Human Resources.

Title IX Non-Discrimination Policy and Grievance Procedures

Title IX of the Education Amendments of 1972 is a federal statute that 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 non-discrimination laws, the University has internal policies that prohibit discrimination and sexual misconduct based on sex including sexual harassment and violence, domestic and dating violence, and stalking.

The University's Title IX procedures are contained within its current Clery Report that is available on its website at: http://harrisburgu.edu/lib/pdf/annual-security-report-clery-report.pdf. All Title IX procedures are included as part of the University's overall Sexual Misconduct Policy.

Sexual Misconduct Policy

The University's Sexual Misconduct Policy in located in the Student Handbook and contained within the University's current Clery Report that is available on its website at: http://harrisburgu.edu/lib/pdf/annual-security-report-clery-report.pdf. The policy applies to faculty, students, staff, and visitors.

Non-Discrimination Statute – Commonwealth of Pennsylvania

The Pennsylvania Fair Educational Opportunities Act of 1961 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 statutory obligation 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 can be filed by contacting the Pennsylvania Human Relations Commission (PHRC), 1101-1125 Front Street, 5th Floor, Harrisburg, PA 17104-2515 or by calling (717) 787-9784. Complaints must be filed within 180 days of the incident. Complaint forms can also be obtained at the PHRC's website: https://www.phrc.pa.gov/File-A-Complaint/ComplaintForms/Pages/default.aspx

Emergency Notification System

When HU becomes aware of criminal incidents that, in the judgment of HU's senior leadership, constitute an ongoing threat to the campus community, a Crime Alert will be issued to notify the HU community. Depending on the circumstances, a timely warning will be issued without delay and the information may be further disseminated by using one or a combination of the following: e-mail distribution, HU website, campus publications, and postings and/or activation of the externally hosted emergency notification Omnilert alert system to advise the community of the situation. HU withholds as confidential the names of victims. The same notification system will be used for other campus-wide emergencies/disasters such as fire, weather, or restricted access to buildings.

Members of HU's community may subscribe to receive emergency notifications text alerts regarding HU closures or emergency/disaster situations that may impact the HU community. You can subscribe to the system, "Omnilert," (formally e2Campus) through the MyHU portal of HU's webpage. For additional information on any matters, you will be directed to, or you should go to HU's website or social media accounts. Subscribers are subject to text message costs assessed by their cell phone provider.

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.

Copyright Infringement and Penalties

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 § 106 of the Copyright Act of 1976. These rights include, but are not limited to, 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, impound the infringing work, and grant temporary and permanent injunctions.

Willful copyright infringement can also result in criminal penalties, including imprisonment and fines.

For more information, please see the Web site of the U.S. Copyright Office at: www.copyright.gov, especially the Frequently Asked Questions at www.copyright.gov/help/faq.

Infringement of Digitally Copyrighted Material

The Digital Millennium Copyright Act of 1998 (DMCA) is federal law that criminalizes production and dissemination of technology, devices, or services intended to circumvent measures that control access to copyrighted works (commonly known as digital rights management or DRM). In addition, the DMCA heightens the penalties for copyright infringement on the Internet.

The designated agent to receive notification of a claimed infringement, in accordance with the provisions of the Digital Millennium Copyright Act, is:

Jacqueline Conforti Barnett
General Counsel
326 Market Street
Harrisburg, PA 17101
(717) 901-5100 ext. 1671
jbarnett@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 by 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 University's resolution.

If an individual involved in the complaint fails to take the requested corrective action within 72 hours, access to the University's network will be deactivated. Reactivation to the network can only occur at such time that it is confirmed that corrective action was taken.

Copyright violations may also fall under other University policies and subject to discipline.

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[1].

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.

[1]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.

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[2].
- **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.
- **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.

[2] 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.

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

On July 15, 2004, the Commonwealth of Pennsylvania legislature enacted Act 82 of 2004 requiring universities to adopt a policy that regulates credit card marketing

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."