

Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
ARED	701	Child Development in Art	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	In this course students will investigate and study the topic of child development in art and education. Students will explore a range of perspectives on developmental theories; the creation, and understanding of children’s art and meaning making; and approaches to teaching art to children in a Birth-12 setting. Resources from the areas of art, psychology, sociology and art education will be investigated. Projects will include the development of a case study, relevant readings, research and studio activities, and collaborative research. Students will be expected to complete weekly reading, writing assignments, conduct research and field experience, and to participate in weekly discussions. This course has a field experience component of 20 hours.
ARED	702	Inclusive Art Education: Teaching Students with Disabilities in the K-12 Art Classroom	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Art Educators are expected to be able to understand the diverse learning needs of all students. Students in this course will discover how to adapt their own curricula and collaborate with special needs teachers to help students succeed in the art classroom. Through course work and field experience students will build a foundation of knowledge for working with children and youth with special needs. Students will develop new instructional strategies for making visual art more accessible for students with exceptionalities and a plan to incorporate accessibility strategies into their daily teachings. In a seminar format, the students realize the course objectives through participatory means. Students are expected to write critical essays, conduct research and field experience, and to participate in weekly small and large format discussion groups. Online technology is utilized in addition to lectures, videos, and other forms of media. This course has a field experience component of 20 hours.
ARED	703	Multicultural Issues in Art and Education	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course will explore a range of perspectives on multicultural issues in the visual arts and education fields. Course content will cover making connections with contemporary multicultural art, the implementation of lesson plans based on multicultural issues for the art education classroom, and an examination of curriculum and policy issues. Students are expected to write critical papers and essays, develop curriculum resources, and to participate in weekly discussions. This course has a field component of 20 hours.
ARED	761	Survey of Methods and Materials for 6th–12th Grade Art Education	Fall	3	Lecture/Studio	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course will examine four topics in media and methods: Drawing, Painting, Printmaking and Ceramic Hand building, in relation to a student’s individual art practices and interest in teaching art education 6th -12th grades. Course content will include examining the elements of art and principles of design. Media and technique exploration will include graphite, charcoal, colored pencils, watercolor paint, tempera and acrylic paint, low fire clay and low fire glazes in relation to pedagogy. Historical and contemporary perspectives will be introduced for each of the four media topics covered. At the completion of this course, students will apply media, methods and perspectives taught in art education programs. Note: Students will need purchase materials to complete this course. The instructor will provide information on the materials required.
CCER	630	Ceramics Elective III	Fall, Spring	3	Studio	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This is a class specifically designed for non-majors covering the fundamental techniques and aesthetics of working with clay. Topics covered include the forming techniques, clay mixing, basic properties of clay, glazing and firing techniques and fundamental understanding of historical and contemporary practices and applications. The course includes prescribed projects. **Fee: There is a lab fee required for this course**

CMTJ	630	Form and Fabrication: Metals and Jewelry Design	Fall, Spring, Summer	3	Studio	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This is an elective course providing graduate-level students an opportunity for introductory study in metals: either hollowware or jewelry. Students will gain an understanding of the history of metals. Development of metals techniques, design fundamentals and encouragement of personal expression are encouraged. The student will learn to evaluate new techniques, materials and concepts. Slide lectures, technical demonstrations, field trips, hands-on experience and critiques used. **Fee: There is a lab fee required for this course**
IDDE	607	Technology Studio	Fall, Spring	3	Studio	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course explores the use of computer-aided design (CAD) and other related technologies as tools for designing, modeling, visualizing, simulating and fabricating design solutions. Emphasis is given to the combination of digital and analog technologies, and the workflows for using them effectively in design process.
IDEA	705	Thinking About Making: The Practice of Art in a Global Society	Fall, Spring	3	Lecture		The course seeks to bridge the gap between studio practice and contemporary art history. Course content will explore current work and ask questions about what is art, who is the audience, what is "our" art making practice, and how does that fit within the larger context of the current state of the global art world. How do we measure success and artistic failure? The course emphasizes observation, critical analysis, and written interpretation.
PHGR	611	Contemporary Issues	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course will study current issues relevant to imaging-based fine art photography and related media; how they relate to broader historical/cultural issues, and how they might suggest future directions. Emphasis is placed on the integration of critical theoretical discourse and studio practice. This course is a touchstone to current and future fine art practices through its engagement with a variety of subjects. This course may be repeated with different topics. Topic is determined by the instructor.
PHGR	701	History and Aesthetics of Photography I	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course, the first in a two-semester sequence, will present an overview of the multiple and intersecting aesthetics, applications, perceptions, and philosophies of photography. Readings and discussions will examine the emergence and establishment of fine art photography, documentary and photojournalism, photography in the sciences, commercial and pop-cultural photographic applications, photography in the political arena, and photography as a mode of social interaction and identity formation. The class will also study the evolving technical history of photographic processes and the proliferation of critical theoretical perspectives on the medium during its first 100 years.
PHGR	724	Professional Development for the Emerging Artist	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course prepares students for entering a career in the arts. Course content covers practical information related to professional practice such as crafting a CV, grant writing, writing an artist's statement, creating a professional application packet and researching exhibition spaces and other opportunities for artists.
PHMS	611	Media Foundations: The Digital File	Fall	3	Lecture		This course will investigate the creation, workflow and output of digital media files, using a variety of capture devices including digital cameras, smartphones, 2D/3D scanners, audio and video recording devices. Course content will focus on device preferences, file attributes, workflow, output, compression with consideration of data management using different media. Hands-on exercises reinforce concepts such as: file types, data compression, color management, media delivery, and distribution. Students will evaluate the influences of operator choices at each stage along the image chain. Special attention will be given to identifying and cultivating industry best practices. At the conclusion of the course, students will be able to create optimized files using a variety of devices that include metadata construction.

SCUL	643	Foundry Practices	Fall, Spring	3	Studio	This course is available to RIT degree-seeking graduate students	This course will introduce and develop students' skills in casting metals with an emphasis on cast iron and the use of cupola. Course content will cover advanced pattern-making, mold-making, spruing, patination, and casting techniques will be introduced. Students will create several cast metal pieces using different mold-making materials and alloys. At the completion of this course students will be able to develop their concepts through cast metal sculpture. **Fee: There is a materials fee required for this course and an additional course fee applied via student account. See course notes for course fee information**
SOFA	635	Acting for Film	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	A course in basic acting technique with an emphasis on the requirements of film production. Students are introduced to various approaches to acting through exercises and by performing in scenes from professional productions. Scenes are rehearsed outside of class, and then staged and critiqued during class time.
SOFA	652	Alternative Frame by Frame	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course will give all students a chance to explore three different approaches to stop-motion animation. The class will study and experiment with pixilation, time-lapse and relief animation with a "down-shooter." These techniques will expand the student's knowledge of traditional and experimental animation and present an alternative means of expression. The class will study existing work with these techniques, analyze and discuss them with the instructor and then produce several examples of their own after instruction for each approach. There will be a final project in the technique of the student's choice.
SOFA	691	Film Sound Theory Music	Fall, Spring, Summer	3	Lecture/Lab	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course is one of three in the study of film sound theory. Through readings, focused group discussion, and the viewing of/listening to select films, the course promotes critical analysis of the varied and profound uses of music in sound design. Addressed is the history of music from the silent era to the modern score. The concepts studied include the modal changes in point-of-audition, and positioning across diegeses. Newer topics including audio-visualization and ventriloquism theory are also addressed.
STAR	635	Curating and Managing Art Spaces	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course explores the roles of contemporary, traditional, and alternative art spaces through curatorial studies, exhibition evaluation and criticism. Student will consider gallery administration roles and supporting operations, and undertake site visitations and gallery research. Students will organize and install a final exhibition project in an approved exhibition venue.
STAR	678	Screenprinting	Fall, Spring	3	Studio		This course will be a comprehensive introduction to non-toxic silkscreen printing concepts and techniques. Organized to create a broad introductory experience, the course will focus on the expansion of problem solving and skill building within the context of screenprinting. The course will address a wide variety of media, tools, techniques both traditional and technological and the theoretical concepts to facilitate skill development and experimentation with process. Accumulative aspects of the curriculum will include the exploration of historical and cultural concepts of materiality and the multiple, intertwined aspects of personal interpretation and experience. **Fee: There is a lab fee required for this course**
STAR	701	Technology in the Studio	Fall, Spring	3	Studio	Department Consent Required	This course will introduce a contemporary technology used by the course instructor in their studio practice. Students will be encouraged to investigate how this technology may be applied in their making process. The subjects offered in the course will vary according to the faculty teaching the class. The course can be taken multiple times with faculty permission.

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CONM	650	Principles of Construction Leadership and Management	Fall	3	Lecture	This course is restricted to CONSMGT-MS students.	Introduction to leadership and management principles applicable to the construction industry including those associated with strategic planning, construction processes, communications, ethical behavior, human resources development, financial management, and risk management. There will be an emphasis on safety and loss prevention management, insurance and risk management, marketing construction services, and bonding requirements for construction companies.
CONM	690	Sustainable Building Construction and Design	Spring	3	Lecture	This course is restricted to CONSMGT-MS students.	This course will prepare students to critically assess and prepare written communications regarding the current and evolving understandings, practices, and potentials of sustainable building construction and design and prepare them with the skills to determine and communicate value-to-cost differences between “green” and conventional designs. Students will also be able to understand the role of construction managers in the design and construction of buildings while incorporating sustainable strategies.
CONM	718	Construction Operations and Productivity	Fall	3	Lecture	This course is restricted to CONSMGT-MS students.	A study of construction operations with emphasis on productivity enhancement focusing on an integrated approach to planning, modeling, analysis, and design of construction operations. This includes productivity concepts; data collection; analysis of productivity data and factors affecting productivity; means for improving production and study of productivity improvement programs.
CONM	720	Construction Cost Analysis and Management	Spring	3	Lecture	This course is restricted to CONSMGT-MS students.	A logistical study of pre-construction cost analysis and construction management procedures, including conceptual estimating, project cost analysis and control, value engineering, life-cycle costing, feasibility studies, project financial and economic modeling, and quantitative risk analysis techniques.
EDLI	723	Group Dynamics and Facilitation Skills	Fall, Spring	3	Lecture	This course is restricted to student in the HRDE-MS program.	Group dynamics explores current theories and models of how individuals work within groups. The outcome of this analysis is to allow students to learn to effectively manage, lead, and generate results from group processes. The facilitation of groups into teams to achieve stated outcomes is within the group process strategies learned. The outcome of this course is to provide students with an understanding of group dynamics and their impact on organizational interventions with emphasis on team building, facilitation tools, and techniques.
EDLI	730	Theories of Learning	Spring	3	Lecture		This course examines the physiological, psychological, and socio/cultural factors related to learning and development of humans throughout the life cycle, as appropriate for the organization's needs. Selected theories of learning and development are critically analyzed and applied to teaching contexts. Students are expected to critically examine their own assumptions and beliefs about learning, and development and develop an appropriate approach to the task of designing learning based on the organization's workforce and needs. Attention is given to stages of cognitive growth, the development of learning goals, learning environments, and to a variety of theories of learning. Learning styles are discussed as a sub component of learning theories.
EDLI	733	Instructional Design	Spring	3	Lecture		The process of instructional design is both an art and science. The framework of this course is to teach the students how to design instruction regardless of content area to allow learners to successfully achieve stated outcomes. The components of the course include problem identification, needs assessment, analysis of learner’s abilities, the design of measurable performance objectives, the development of assessment strategies within the design of instructional materials, and the formative and summative evaluation process.

EDLI	750	Strategic Career Development	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Strategic Career Development introduces students to traditional and emerging career development theory and its application to workplace issues. Theories such as trait and factor, type, developmental, psychodynamic, work adjustment, life-span, social learning, and career decision-making are covered using a system theory approach. Additional topics include organizational career development, application of theory to modern problems and issues, and contemporary issues in career development. The course is participative and draws heavily on case studies, role-playing, self-assessment, and group work to understand the theory and workplace application issues.
EDLI	751	Career Counseling Techniques	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course introduces students to selected theories and techniques for use in counseling clients and/or employees about career issues. Students analyze and practice various counseling scenarios and apply theory. They learn to give and accept feedback related to career counseling skills through the use of role plays. Issues related to careers and the HR professional's roles are explored. The future of career counseling in the workplace is examined as it relates to HR planning.
EDLI	752	Assessments and Measurements in Human Resource Development	Fall or Spring or Summer	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course provides an introduction to the fundamentals of assessment and measurement tools used in human resource and organizational development activities. An overview of a variety of instruments will be studied and some will be administered. Reading, lecture and class activities will include theory of test development, criteria for administration, validity, reliability, and assessing best instruments for use.
EDLI	753	The Student Experience in Higher Education	Fall	3	Lecture		This course explores the student experience in higher education. Since students are, arguably, a university's most important customer, how should institutions approach the student experience on and off campus? This course will prompt students to consider the wide range and types of colleges and universities around the world and the models used that form the college experience. These approaches impact students' perceptions of the higher education university reputation, marketability, alumni giving, and retention. Topics for investigation include: (1) campus facilities and third places; (2) student services; (3) student activities and athletics; (4) teaching and learning; (5) campus traditions; (6) assessment strategies.
EDLI	754	Critical Systems in Higher Education	Summer	3	Lecture		Higher education is a vital societal component in American and global societies and must be accessible to citizens. This course examines current and historical perspectives of the critical systems in higher education to fund, manage risk, and adhere to lawful practices and lead. All of these systems affect students in areas of accessibility, value, customer service, and the higher education experience. Included is an exploration of how price, cost, and value shape what is provided by and who attends college as well as reviewing current practices and events that continue to shape higher education.
EDLI	755	Learning Assessment and Evaluation	Fall	3	Lecture		In a learning environment assessing the accomplishment of learning outcomes involves designing evaluation instruments, collecting data regarding performance, and calculating the overall impact of learning. Of equal importance is to calculate the costs for the learning program to demonstrate a return on investment to the organization. This outcome is computed through measuring the increased competencies of the learners and determining the value the learning contributes to the organization. To achieve this outcome learners will measure and grade performance for a variety of intellectual learner domains as well as assess the overall program effectiveness through interpretation of data. This is an online class only.

EDLI	756	Learning Design and Technology	Summer	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	<p>Learning in the 21st century requires creating an engaging and exciting learning experience whether you are interested in online, classroom-based or blended, and delivery for a school, college or training environment. This course guides you through the process of developing and applying a learning product or solution that addresses a performance gap or educational need in any educational or training experience. The course learning outcome is to develop an instructional strategy proposal, create a learning plan that includes technology to support the learning experience and then evaluate the effectiveness of that learning plan. Course topics include: learning in the 21st century, understanding diversity in learning design, and applying assistive technologies, analyzing task and learner needs; applying instructional design principles with a focus on educational technologies, exploring innovative and emerging technologies; and evaluating strategy. Upon completion of this course, students will be able to:</p> <ul style="list-style-type: none"> •Demonstrate knowledge of a job analysis/needs analysis and selection of an appropriate model to accomplish learning. •Demonstrate the ability to develop and implement a learning strategy using technology, given the needs of the learners and the organization. •Describe how to conduct a formative evaluation process evaluating the effectiveness and efficiency of the selected learning strategy in the work environment including learner achievement and the organization's needs. •Evaluate technology used for learning and training purposes. <p>This course is open to any graduate status student or department permission.</p>
EDLI	757	Organization and Leadership in Higher Education	Spring	3	Lecture		<p>This course examines features of core functional areas of modern higher education. The course focuses on the administration of higher education institutions and includes (1) historical contexts for higher education; (2) student experience; (3) academic and administrative issues; (4) infrastructural concerns, including planning, technology, and facilities management. This course uses a survey perspective of these areas to provide a foundation for understanding the dimensions found within higher education. This course is open to RIT students with a graduate status, or those with department permission.</p>
EDLI	758	Design for On-Line Learning	Fall or Summer	3	Lecture		<p>Online learning has grown to be a significant learning/teaching strategy for higher education. This course will include strategies for interactive learning activities to engage adult learner and achieve learning outcomes using a variety of instructional techniques appropriate for the online learning environment. This course will provide an opportunity to complete an actual work-related learning activity as an alternative to a case-based learning activity.</p>
ESHS	601	Fire Protection	Fall	3	Lecture	Students cannot take and receive credit for this course if they have taken ESHS-501.	<p>Introduces fundamental concepts in protection of industrial workers and property from fire and explosion. Fire chemistry, control of ignition sources in industry, and properties of combustible materials are discussed. Fire detection and extinguishment are covered along with building construction for fire prevention, life safety, fire codes, and related topics. This course is co-listed with ESHS-501; students may receive credit for ESHS-501 or ESHS-601, not both.</p>

ESHS	611	Occupational Health	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor. If you have earned credit for ESHS-511 or you are currently enrolled in ESHS-511 you will not be permitted to enroll in ESHS-611.	This course will provide students with an overview of the fundamentals of industrial hygiene. Emphasis will be on the toxicological effects of various industrial substances, on the body, monitoring and personal sampling for these substances and personal protection against such substances. This course maybe co-listed with ESHS-511; students may receive credit for ESHS-511 or ESHS-611, not both.
ESHS	613	Solid and Hazardous Waste Management	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	An examination of strategies and technologies to move an organization toward environmental sustainability, including resource use reduction, material substitution, process and product modification, and waste minimization; and for handling and managing wastes including treatment, storage, transport, and disposal storing solid and hazardous waste. Associated environmental impacts, regulatory concerns, technical feasibility, and costs are considered. (Students who have completed ESHS-310 Solid and Hazardous Waste Management may not receive credit for this course.)
ESHS	614	Industrial Wastewater Management	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course investigates characteristics and sources of industrial wastewaters, related environmental impacts, regulatory implications, and technical considerations of current treatment and disposal methodologies. Students learn to identify appropriate methods, technologies, and sequences for source reduction, treatment and pretreatment, direct discharge, and management of treatment residuals. (Students who have completed ESHS-330 Industrial Wastewater may not receive credit for this course.)
ESHS	615	Air Emissions Management	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor. Students cannot take and receive credit for this course if they have taken ESHS-525.	This course will present an overview of industrial air pollution management: its sources, methods of reduction, control, and management. Students will become familiar with the history of air pollution, the chemistry and effects of pollutants, regulations and standards, and control technologies as well as developing analytical and quantitative skills necessary in air emissions management decision-making. By the end of the course, students will be able develop a comprehensive facility air emissions management plan. This course maybe co-listed with ESHS-525; students may receive credit for ESHS-525 or ESHS-615, not both.
ESHS	620	Occupational Safety	Fall	3	Lecture	This course is restricted to students in the EHSM-MS program.	This course is an overview of the occupational safety management tools and techniques utilized in today's industry. Topics examined include OSHA requirements, record keeping, guarding, electrical safety, material handling, welding, fire prevention, excavation, medical surveillance, worker's compensation, inspection techniques, auditing, committees, incentives, and voluntary programs.

ESHS	630	Mechanical and Electrical Controls and Standards	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor. Students cannot take and receive credit for this course if they have taken ESHS-530.	Discussion of machine safety with emphasis on hazard analysis, risk estimation, safeguarding techniques, and electrical safety. Particular attention will be paid to applicable OSHA, ANSI, NFPA, and EN standards as they relate to wood, metal, films, and automation. Elements of the course will change regularly to reflect emerging issues in industry. This course is co-listed with ESHS-530; students may receive credit for ESHS-530 or ESHS-630, not both.
ESHS	665	Sustainable Product Stewardship	Summer	3	Lecture		This course examines the principles of sustainable product stewardship, including the ethical, legal, and economic issues that product manufacturers face as well as the relationship between products and sustainability. Students will learn and apply some environmental sustainability, health and safety analysis techniques used to identify and manage product environmental sustainability aspects as well as health and safety hazards. Students will use case studies to examine the concept of product stewardship management through product life cycle thinking and extended producer responsibility. (Students who have completed ESHS-565 Product Stewardship may not receive credit for this course.)
MCET	621	Advanced Strength of Materials	Spring	3	Lecture/Recitation		This course will provide a thorough understanding of beam structures under combined shear, bending, and torsional loads. Topics include the study of semi-monocoque structure idealizations, effects of tapered and laminated structures, shear deformations and warping, location of elastic axis in open and closed sections, and torsion of multi-cell sections. Matrix methods are introduced and utilized throughout the course. The course has a project component that combines analytical, theoretical, and experimental methods.
MCET	680	Plastics Manufacturing Technology	Fall	3	Lecture	Students cannot take and receive credit for this course if they have taken MCET-580.	The course studies plastic materials and processing technology to manufacture various plastic products in plastics industry. The course emphasizes new materials, such as bio-degradable, environmentally friendly polymers, and process selections for engineering applications and design. Students may not take and receive credit for this course if they have already taken and received credit for MCET-580.
MCET	692	Spray Theory and Application	Fall	3	Lecture	Students cannot take and receive credit for this course if they have taken MCET-592.	This course covers the theory necessary to understand spray formation and evolution, as well as a host of spray applications. Knowledge of differential equations is required. Topics include drop size distributions, breakup of liquid sheets and ligaments, drop formation and breakup, drop motion and the interaction between a spray and its surroundings, drop evaporation, nozzle internal fluid mechanics, external spray characteristics, nozzle performance, and experimental techniques relevant to these subjects. Applications will include: (1) gas turbine engines, (2) internal combustion engine sprays, (3) sprays for geo-engineering, (4) agricultural sprays, (5) consumer products, (6) paints and coatings, and (7) use of non-traditional liquids in aero-propulsion and other systems. Time spent on each topic depends on student interest. Each student is expected to work on a final project, of their choosing, focused on a topic within the realm of spray theory and application. A research related topic is preferred, but not required. Students must design an experiment and correlate their results with their developed theoretical model. The project is the prime method for assessing student learning. Students will be asked to demonstrate a deep theoretical understanding of spray formation and applications. Students may take and receive credit for MCET-592 or MCET-692, not for both.

MCET	730	Polymer Engineering Research	Spring	3	Lecture/Lab	This course requires permission of the Instructor to enroll.	This course introduces new graduate students to the fundamental concepts and skills relevant to plastics and polymer engineering research. Students will learn concepts in the chemistry and physics of polymeric materials and the essential techniques used to characterize them. Laboratory skills in the preparation of polymers, polymer blends, their fabrication into useful test specimens and their characterization will be emphasized. Following the successful completion of this course students will be prepared to carry out graduate level polymer engineering research.
MFET	655	Surface Mount Electronics Manufacturing	Fall	3	Lecture/Recitation	This course is restricted to graduate or BS/MS students in the MMSI-MS or at least 3rd year standing in EMET-BS/MS, MCET-BS/MS, MFET-BS/MS programs. Students cannot take and receive credit for this course if they have taken MFET-545.	This course provides a thorough understanding of the technology, components, equipment, materials and manufacturing process for through hole technology and surface mount technology electronics manufacturing. Students will develop a strong foundation needed for advanced work in surface mount technology (SMT). The activities will provide the students an orientation and familiarization of the manufacturing equipment and process parameters for printed circuit board assembly. Graduate students will explore surface defects and remediation and will prepare a detailed annotated bibliography related to specific aspects of electronics manufacturing. Topics in Design for Manufacturing are also considered for high volume vs. low volume manufacturing. Students may only receive credit for this course or MFET-545, not both.
MFET	656	Advanced Concepts in Semiconductor Packaging	Spring	3	Lecture	Prerequisites: MFET-655 or equivalent course. Students cannot take and receive credit for this course if they have taken MFET-556.	The advanced course in semiconductor packaging will provide a thorough coverage of the materials, processes, failure, and reliability of chip level packaging. Specific topics include single-chip, multi-chip, wafer level and 3D stacked packaging, photonic integrated chip (PIC), smaller passives and embedded passive component technology, advanced substrates and microvia technology, solder technologies, metallurgy and joint formation, thermal management, thermal and mechanical behavior of packaging, failure analysis, and reliability testing. Course includes projects and literature review in topics of semiconductor packaging. This course is cross listed with MFET-556 students may receive credit for MFET-556 or MFET-656, not both.
PACK	730	Packaging and the Environment	Spring	3	Lecture		Consideration of packaging in a social context. Factors that enhance secondary use, recycling, recovery of resources, and proper disposal are discussed. Package design in relation to solid waste disposal and materials and energy shortages are considered. Other topics of interest are discussed. Primarily a discussion class for graduate students. Open to graduate non-majors.
PACK	750	Packaging Materials, Processes and Applications	Fall	3	Lecture		This graduate level course is designed to present the theory, foundation principles and practices which form the basis of packaging science.
PACK	751	Advanced Packaging Design	Spring	3	Lecture/Lab		The course develops knowledge of packaging design graphics and skills of package structure design. Topics covered are basics of engineering design graphics, technical sketch, project plan, design matrix, computer aided design (CAD), and rapid prototyping. Emphasis is given to use SolidWorks – CAD software to design typical packaging structures. The design project focuses on developing a packaging structure from an idea to an actual prototype.
PACK	752	Advanced Computer Applications	Spring	3	Lecture/Lab		The course develops knowledge and skills in applying two computer software packages for packaging design: Artios CAD and Adobe Illustrator. Topics covered are builder and rebuild, solid modeling and drawing, animation, coloring, and painting. Emphasis is given to create a typical paperboard based carton with a proper structure and color usage.

PPRT	602	Tone and Color Analysis	Fall	3	Lecture/Lab	Students cannot take and receive credit for this course if they have taken MAAT-544.	This course covers fundamentals of color measurement, color management system, and color reproduction technology for color matching and color image reproduction. Emphases are placed on CIE colorimetry, device calibration and characterization, and color management systems.
PPRT	641	Digital Printing and Publishing	Fall	3	Lecture/Lab	Not if MAAT-541	This course provides students with the opportunity to learn the concepts and applications of digital printing. The course examines the technology of several major digital print engines and compares digital printing to conventional print processes. The economics and application of specific digital printing processes are examined from a workflow perspective. This course is cross-listed with MAAT-541; students may receive credit for MAAT-541 or PPRT-641, not both.
PPRT	651	Lab Topics in Media Sciences	Fall, Spring	3	Lecture/Lab	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Lab Topics in Media Sciences provides a lab-based platform for students to explore the most contemporary issues in the rapidly evolving fields of media arts, media sciences, and media technologies. A subtopic course description will be published each term and may have limited repeatability. This course can be repeated.
PPRT	654	Conventional Graphic Processes	Spring	3	Lecture/Lab		This survey course covers a comprehensive review of conventional print production technologies, with emphasis on offset lithography, flexography, screen, and gravure printing methods. Hands-on laboratory experiences underscore the technical strengths and limitations of commercial applications of the various processes, including the materials such as substrates, inks and appropriate metrologies. Quality assurance and process control procedures specific to each process are featured, and appropriate industry standards and specifications are reviewed.
PPRT	688	Package Printing	Spring	3	Lecture/Lab	Students may not take and receive credit for PPRT-688 and MAAT-558. If you have earned credit for PPRT-688 or you are currently enrolled in MAAT-558 you will not be permitted to enroll in PPRT-688.	This course introduces students to the package printing industry. Printing processes, materials, production workflows and quality control systems used in package printing are introduced. Students will oversee the workflows relevant to package production, from concept to design to finished product. This course is cross-listed with MAAT-558; students may receive credit for MAAT-558 or PPRT-688, not both.
PPRT	703	Cross Media Workflow	Spring	3	Lecture/Lab		This course is designed to expose students to all the elements needed to execute media projects across platforms. Students will learn concepts in project management as it applies to leading cross media projects and teams. Concepts and tools necessary for the implementation of a cross media workflow will be discussed and reinforced with hands-on exercises. Additionally, content management and industry standards and practices such as color management, asset management, and image optimization for output will be studied and applied through the context of cross media workflows.
PPRT	706	Commercial Graphic Trends and Processes	Fall	3	Lecture		This course introduces students to the materials, technological processes and trends in conventional, digital, and functional print production. Theoretical models of innovation and change are covered and applied providing students with a robust comprehension of graphic communication constituencies and their role in various industry sectors.

TCET	601	Programming & Problem Solving in Telecommunications	Fall	3	Lecture		This course provides students with the programming, scripting and problem-solving techniques required for other classes in the TCET MS curriculum and to provide the software skills that are required in today's telecommunication industry. The class will be taught using a programming language that is commonly used in industry today such as Python. The course will cover the following material: Basic programming constructs, Programming best practices, Algorithmic complexity, Data abstraction, Sorting and searching algorithms, Problem solving techniques. Homework assignments will be based upon real-world examples from the telecommunications industry.
TCET	620	Applied Machine Learning	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor. If you have earned credit for EEET-520 or you are currently enrolled in EEET-520 you will not be permitted to enroll in TCET-620.	Machine learning has applications in a wide variety of fields ranging from medicine and finance to telecommunications and autonomous self-driving vehicles. This course introduces machine learning and gives you the knowledge to understand and apply machine learning to solve problems in a variety of application areas. The course covers neural net structures, deep learning, support vector machines, training and testing methods, clustering, classification, and prediction with applications across a variety of fields. The focus will be on developing a foundation from which a variety of machine learning methods can be applied. Students may not take and receive credit for this course if they have already taken EEET-520.
TCET	715	Converged Network Concepts	Fall	3	Lecture		The course provides the student with a solid understanding of access, distribution and backbone network, architecture, equipment and technology related to a variety of service provided networks and services critical to the operation of converged and IP networks. Passive Optical Networking, Hybrid Fiber Coax technology, multiplexing, modulation schemes, coding, signaling and networking protocols used in convergence technologies for the delivery of information in a variety of packet and next generation networks are covered in detail.
TCET	723	Telecommunications Network Engineering	Fall	3	Lecture	Prerequisites: TCET-715 or TCET-710 and TCET-720 or equivalent courses.	This course covers accepted network design principles and methodologies as they apply to circuit, packet, frame, cell and synchronization networks. Course topics are transmission engineering, traffic engineering models, timing and synchronization, design of voice and data networks, and electrical grounding concepts.
TCET	740	Fiber Optic Communications	Fall	2	Lecture		Fiber-optic, point-to-point telecommunication systems are used as a framework to understand the wide array of fiber-optic telecom technologies, including light sources, optical fiber, and photoreceivers. An emphasis on the nature & behavior of optical signals provides insight into these technologies and into the important fiber-channel impairments of attenuation and dispersion. Fundamental concepts and state-of-the-art advances of these technologies are covered, as well as component-level and system-level analysis.
TCET	741	Fiber Optic Communications Lab	Fall	1	Laboratory	Co-requisite: TCET-740 or equivalent course.	This course provides extensive hands-on experience with key technologies used within fiber-optic telecommunication systems, including optical fiber, laser diodes, light-emitting diodes, photodiodes, and pluggable transceivers, as well as key diagnostics such as power meters, oscilloscopes, optical time-domain reflectometers, and optical spectrum analyzers. Students will be trained in laser safety, ESD safety, and fiber-connector inspection, and will develop a broad understanding of fiber-optic test and measurement including transmitter & receiver characterization as well as measuring the fiber-channel impairments of attenuation and dispersion.

TCET	745	Advanced Fiber-Optic Communications	Spring	3	Lecture	Prerequisites: TCET-740 and TCET-741 or equivalent courses.	This course focuses on characterizing and designing the capacity and reach of fiber-optic transmission systems in terms of key performance metrics (BER, Q-factor, eye diagrams, and system margin, transmission penalty, optical-power budgets, and OSNR budgets), the impact of key physical impairments (loss, dispersion, nonlinearity), and techniques used to overcome these impairments (optical amplification, dispersion compensation, power mitigation). Widespread fiber-optic transmission modalities (such as wavelength-division multiplexing and amplitude modulation) as well as emerging modalities (such as polarization-division multiplexing and phase modulation) will be covered.
TCET	747	Next Generation Networks	Fall	3	Lecture	This course is restricted to students in the TCET-MS program.	This hybrid course is a cross between an independent study and a seminar course. It provides MSTET students the opportunity to research and report on near term Next Generation Networks (NGN). The course consists of professor provided discussion on NGN followed by each student researching NGN types. Basically, a case study approach is utilized. Immediately after completing the research and written paper regarding one's selected topic/case, each student will read each others and then present theirs to all other students in the class. As a result, every student will not only benefit from their own research of topics/cases but also be informed of other NGN by other students. Students should already have some understanding of how to perform research and must possess at least adequate writing skills.
TCET	748	Fiber Optic Test & Measurement	Spring	3	Lecture	Prerequisites: TCET-740 and TCET-741 or equivalent courses.	This course covers the test & measurement of fiber-optic components & diagnostics, including: time-based, frequency-based, polarization-based measurement of optical & electro-optic components; test-station design, specification, activation, calibration, and usage; reliability testing & industry test standards; optical-waveguide coupling; design & analysis of diagnostics; polarization generation, manipulation, and detection; data acquisition & analysis.
TCET	751	Wireless Communications	Fall	3	Lecture		Wireless, digital point-to-point communication systems require a wide array of technologies, some analog (such as antennas, amplifiers, mixers) and some digital (filters, equalizers, decoders, etc.). The course focuses on presenting both system-level and component-level analyses of a complete transceiver operating on a fading channel. Fundamental concepts and classical techniques are presented, as well as some state-of-the-art advances. These concepts are illustrated with hands-on activities using software-defined radio.
TCET	752	Advanced Wireless Communication	Spring	3	Lecture		This course focuses on modern wideband wireless communications over the frequency-selective channel. It covers channel models, equalization and synchronization techniques, and contemporary modulations such as SC-FDE and OFDM. State-of-the-art and emerging technologies, such as MIMO, massive MIMO, and spatial modulation are included. These are studied in the context of current mobile and networking standards, such as 3G, LTE, and 5G, and IEEE 802.x.
TCET	753	Wireless Networks	Fall	3	Lecture	Prerequisites: TCET-751 or equivalent course.	This course focuses on multiplexing, multiple access, medium access control, and frequency reuse, and how these influences a wireless network's choice of protocols, topology, security, efficiency, etc. Following this approach, cellular, sensor, WLANs, WPANs, IoT, and other important current wireless network technologies are explored.

TCET	760	Network Planning & Design	Lecture	3	Lecture	<p>This course is restricted to students in the TCET-MS program.</p>	<p>This course teaches the art and science of metropolitan and wide area network design for both modern delay (data) networks and traditional blocking (voice) networks; the greatest emphasis is on modern delay networks. Both qualitative and quantitative approaches are used as the student progresses through the network analysis, architecture and network design processes. An advanced WAN Fiber Optic design tool, such as OPNET Transport Planner is utilized in a required graduate project. The following are typical types of projects: Write an RFP, design an extensive metropolitan and wide area network using the latest technologies, design an extensive fiber optic network using a design tool like OPNET Transport Planner. Note: Since some students may not yet have taken a fiber course, the OPNET project stresses the use of the tool rather than the specifics of fiber optics.</p>
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Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
HLTH	608	Integrated Health Systems & Population Health	Fall	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course discusses the delivery system of health care in the US. Specifically, the course will review the current status of American health care including research into population demographics and health and the concept of wellness and prevention. Following this a review of international health care models will occur to consider best practice as alternative care models for consideration for the US. In addition, the students will develop, for their area of interest and expertise, a strategy for incremental or radical innovation in how we provide health care to our constituents.
HLTH	610	Global Health Systems	Fall	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course will evaluate the modern challenges of global health from a multidisciplinary perspective. The key concepts of global health will be discussed, including various health determinants, human rights, health care systems, culture's impact on health, environmental concerns, nutrition, communicable and noncommunicable diseases, women's health issues, child and adolescent health, injuries, natural disasters and complex humanitarian emergencies, poverty's impact on health and more. Students will be expected to be active learners, lead class activities on certain days as part of group research project presentations, and actively participate in discussions.
HLTH	611	Emergency Management in Health Care	Spring	3	Lecture	Prerequisites: HLTH-608 and HLTH-610 or equivalent courses. Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	The purpose of this course is to describe the fundamental attributes of emergency management to provide students with a foundation of understanding of the field, while also providing students with a basic understanding of how public health, medical, and health care services function as a part of disaster and emergency management. This course provides an introduction to emergency management and the role the health care organizations (public health, medicine, etc.) play in in the four phases of emergency management (mitigation, preparedness, response, and recovery) and its core functions. Students will learn how to apply the core functions of emergency management in health-related disasters and other emergencies to identify solutions and methods to improve emergency management practice.
HLTH	612	Cultural Competency in Global Health	Spring	3	Lecture	Prerequisites: HLTH-610 or equivalent course Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	The Centers for Disease Control and Prevention and the World Health Organization are two of many health organizations that have emphasized the importance of cultural competence in health care. As our society becomes more global, sensitivity to and respect for various cultural norms is an integral component of health care delivery. This course defines cultural competency both in theory and in practice. Select topics to be addressed include: Introduction to cultural competency; diversity, equity and inclusion; how cultural competency impacts health practice; health disparity; language and communication; culture and health literacy; cultural competency; strategies for cultural competency assessment; practicing cultural competency, etc.

HLTH	700	Research Methods	Fall, Spring	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This is an introductory graduate-level survey course on research design/ methods and analysis. The course provides a broad overview of the process and practices of social research in service-related contexts. Content includes principles and techniques of research design, sampling, data collection, and analysis including the nature of evidence, types of research, defining research questions, sampling techniques, data collection, data analysis, issues concerning human subjects and research ethics, and challenges associated with conducting research in real-world contexts. The analysis component of the course provides an understanding of statistical methodology used to collect and interpret data found in research as well as how to read and interpret data collection instruments.
HLTH	706	Leading Health Systems I	Summer	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This is the first of three courses in the HSA, MS program that require students to be on campus. These “immersion” courses will be scheduled over a long weekend and will entail full days on campus as well as pre- and post-course work completed online. The concept is to immerse students in a series of experiences to support their development as high function managers and leaders within the health care industry. This course provides a detailed examination of the core principles of management as well as characteristics and disciplines that are required by persons holding management and leadership roles in health care delivery organizations.
HLTH	710	Health Care Economics and Policy	Spring	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course provides an examination of the roles and responsibilities of policy makers on the health care system and the resulting economic impact of their policies. Students will compare and contrast the regulatory functions of varying levels of government, the political process and economic impacts as they relate to health care systems as well as examine control issues, economic functions and regulatory trends in the United States. In addition, an assessment will be made of national health systems and national health policies of other countries as they compare to the United States.
HLTH	718	Evidence-Based Mangement in Health Care	Spring	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	The purpose of this course is to introduce students to evidence-based management practice in health care. The primary focus is to ensure that managers ask the right questions, use the best evidence available and make better decisions in carrying out their mission. Students will participate in the process of retrieval, appraisal, and synthesis of evidence in collaboration with other members of the health care team to improve processes and patient outcomes in diverse populations. Students complete an individual, final assignment demonstrating the ability to collect, document, and translate research (evidence) on the practice of health care management.
HLTH	723	Human Resources in Health Care	Spring	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course focuses on the changing competitive health care environment that has made human capital an organization’s key asset, with HR largely responsible for cultivating it. Specifically, students will learn the impact that human capital has on the HR division and function of health care organizations. The focus will be on how the “New HR” has become more strategic and fundamental to a health care organization’s success and the need to meet the demands of highly skilled, educated and credentialed health care professionals.

HLTH	725	Health Care Strategic Marketing & Communications	Summer	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course is designed to build innovative, customer-centered, thinking within the future leaders of the health care industry. This is accomplished with an introduction to the role of strategic decision making through the core principles of marketing (the 4'Ps). Students will also experience basic data base management, conducting an internal and external environmental analysis, primary and secondary data gathering and interpretation and the creation of a marketing plan to meet an unsatisfied market need or build volume for a health care product or service. Finally, the role of corporate communication will be interwoven throughout the course as it supports marketing success.
HLTH	730	Health Care Financial Management I: Principles & Practice	Fall	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course provides a basic understanding of health services financial management. We begin with elementary accounting concepts and then focus on financial statement preparation and analysis. Special topics areas include discounted cash flow, risk, capital investments evaluation, debt/equity financing, and financial decision making models such as break-even analysis, cash flow forecasting and the like.
HLTH	731	Health Care Financial Management II: Concepts/Applications	Fall	3	Lecture	Prerequisites: HLTH-730 or equivalent course. Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course builds on the foundational learning from Health Care Financial Management I: Principles & Practice. Course emphasis will be on for-profit entities within the health care sector. The course goes into greater depth on discounted cash flow analysis, risk, financial performance evaluation, capital investments, capital budgeting, debt, and equity financing. A key objective of this class is to develop the student's ability to engage in long-term financial modeling. Students will complete a comprehensive financial forecast as their final graded assessment for this field of study.
HLTH	732	Health Insurance and Reimbursement	Fall	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course provides an in-depth review of the characteristics of successful health insurance plans with emphasis on cost containment and premium control techniques. Emphasis will be placed on learning various cost containment and quality improvement tools of an effective delivery system and how to apply those tolls to different delivery structures. The relationship between shared risk and behavior change is explored as well as basic concepts of health insurance underwriting and the essentials of a successful provider payer partnership.
HLTH	733	Health Systems Quality & Organizational Learning		3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course will incorporate an examination of contemporary organizational systems thinking focusing on concepts relevant to health service organizations and their communities; emphasizing organizational quality, leadership, environment, strategy, structure, and processes. The course provides students with the evaluation of key factors affecting an organization's system as well as their community, through quality and analytical thinking; allowing the student to apply theories that suggest an effective organizational response to such influences and change.

HLTH	735	Management of Risk in Health Care	Spring	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course identifies the risk inherent within health care institutions, organizations, agencies and for individual providers. The management of risk is explored as part of a strategic response of an organization or individual within health care. Specifically the risk inherent within health care organizations; in communications and sharing of data; in the embracing of new technologies and drug treatment therapies; and the expectations of corporate compliance will be discussed. The role of quality assurance will be reviewed as a strategy to control risk. This is a required course in the Health Systems Administration program and assignments/ applications are focused on healthcare issues.
HLTH	736	Health Care Operations: Building High Reliability Systems	Spring	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	The challenges and complexities of the current health care environment require a skilled operations leader that will engage high performing teams, develop highly reliable processes, effectively manage expenses, and succeed in achieving desired outcomes in an increasingly competitive market. The increased focus on population health, payment reform pressure, the emergence of risk and value based payment models will challenge traditional healthcare organizations and require leadership focused on change management and performance improvement. The purpose of this course is to provide students the opportunity to analyze the health care organization using both qualitative and quantitative principles of operations management. It provides an integrated system and a set of contemporary operations improvement tools that can be used to make significant gains in any organization. This course is designed to provide the student with an overview of the field, and the ability to use some of the most commonly deployed operations tools and processes.
HLTH	740	Health Care Leadership	Fall	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	Highly trained clinical and administrative professionals drive the nature of work in health care. The purpose of this course is to provide students the opportunity to study leadership theory as it is applied in health care organizations. Leadership theories and applications geared toward professionals working in health service organizations will be emphasized. Students will learn to apply leadership theories via case studies and issue analysis of their active work environments.
HLTH	746	Leading Health Systems II	Summer	3	Lecture	Prerequisites: HLTH-706 or equivalent course. Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This is the second of three courses in the MHSa program that require students to be on campus. These "immersion" courses will be scheduled over a long weekend and will entail full days on campuses well as pre- and post-course work completed online. The concept is to immerse students in a series of experiences to support their development as high function managers and leaders within the health care industry. This course builds on the first Leading Health Care Systems course and provides a in-depth examination of advanced management and leadership knowledge, skills and values required of contemporary leaders within health care systems.

HLTH	760	Health IT and Decision Support	Fall	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This course is intended to explore current challenges in the health care system, and how the ability to understand and apply health data and associated health care information technology (IT) tools can improve the quality and cost of health care services. Students will learn about regulations, standards, and rules which impact health IT. The course will include a review of current and future health care technology tools and associated data collection, storage and exchange practices; and utilize applied case studies allowing students to demonstrate their ability to use health care information technology systems and data analytics to improve patient and provider outcomes. The role of technology will also be explored as it relates to strategy, adoption levels, care settings, and patient engagement.
HLTH	796	Health Care Strategy: Analysis & Formulation	Spring	3	Lecture	Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	Having an effective organizational strategy is an essential component of all successful entities. Yet, practicing managers often engage in strategy formulation with very different conceptions of strategy and the strategic process. This course reviews the historical development of modern strategic theory and practice, with a focus on the works of Porter, Mintzberg, and Barney. More importantly, the course will address and utilize various analytical frameworks which infuse the strategic process with intellectual rigor while retaining the essence of strategy that is innovative and creative.
HLTH	798	Health Systems Analysis & Innovation	Summer	3	Lecture	Department Consent Required. Current or prior health care experience is beneficial but not required. In some cases, prerequisites can be waived with director approval.	This is the final of three courses in the MS HSA program that require students to participate in a first-hand analysis of a health system within the United States or outside our borders. The objective of the analysis is to critically examine and assess the structure, function and achievements of care delivery in a domestic or international health system. Students enrolled in this course must select either the domestic, international, independent study option as described by the program.
ILLM	601	Human Gross Anatomy	Fall	6	Lecture/Lab	Department consent required. Permission for non major students requires extensive undergraduate biology coursework.	This course provides an in-depth study of the structure of the human body. Emphasis is on understanding the relationships between anatomical structures as well as their form, texture, and color. Dissection of a human cadaver is supplemented with lectures on the structure and function of the major organ systems.
ILLM	603	Modeling in Biomedical Forms	Fall	3	Studio	Department consent required. Permission for non major students requires proof of art or computer graphics experience.	This course introduces strategies to create polygonal models of biomedical subjects. Students will use contemporary research to accurately define structure and suggest function. Instruction will also focus on lighting and "shader" systems that emphasize form and are consistent with tissue characteristics.

NUTR	625	Medical Nutrition Therapy I	Fall	3	Lecture		This course is the first of a two-course series concerned with the review and application of biological metabolism and the interrelationships of nutrients, hormones, enzymes, and other biochemical substances in humans. Modification of nutritional intake to meet nutritional needs altered by diseases and stress as well as the use of alternate methods of feeding (enteral/parenteral) to meet nutritional needs is discussed in depth. This course emphasizes the practical applications of medical nutritional therapy for use with patients/clients.
NUTR	650	Community Nutrition	Spring	3	Lecture	Prerequisite: NUTR-625 or equivalent course.	Study of current nutrition issues and delivery of food and nutrition services in the community. The course is designed to allow senior level and graduate students to acquire skills necessary to deliver services in the public health and private sector markets. Individual practicum in community facility is required and arranged by the instructor.
NUTR	655	Nutrition Throughout the Lifecycle	Spring	3	Lecture		This course emphasizes the interrelationships of social, psychological, physiological, and biochemical factors and their impact on nutrient requirements and recommendations for food intake during specific stages of the life cycle. Emphasis is given to nutrition during pregnancy, infancy, early childhood, adolescence, young and middle adulthood, and the elderly.
WSHN	600	Principles and Practices of Health Education	Fall, Summer	3	Lecture	This course can be taken by students outside the program with instructor approval. If outside the program, related background experience such as a nutrition course is beneficial.	Students will discover fundamental theories, principles and practices of health education to assess, plan, implement and evaluate components of health that challenge our well-being. Students will develop and apply health education skills to promote community and public health. This course helps prepare students to apply for the Community Health Education Specialist (CHES) credentialing examination.
WSHN	700	Research Methods in Health and Well-being	Fall	3	Lecture	This course can be taken by students outside the program with instructor approval. If outside the program, related background experience such as a nutrition course is beneficial.	Research Methods in Health and Well-being addresses requisite foundational skills to conduct rigorous, robust, and ethical research into problems related to health, nutrition and well-being. Evidence-based and translational research issues are presented in tandem with design of research studies, measurement approaches, funding opportunities, and research management considerations.
WSHN	701	Health and Nutrition Education and Evaluation	Fall	3	Lecture	Co-requisites: WSHN-700 or equivalent course. This course can be taken by students outside the program with instructor approval. If outside the program, related background experience such as a nutrition course is beneficial.	In Health and Nutrition Education and Evaluation, content and research expertise are applied to design effective, theory-based health and nutrition education and establish it as evidence-based. Needs assessment, behavior change models, theories of motivation, and learning styles are presented in the context of planning health and nutrition education and sampling, recruitment, participant retention, instrument development, and data analysis to foster development of evaluation expertise.

WSHN	702	Dissemination and Implementation Science for Health and Well-being	Spring	3	Lecture	<p>Prerequisites: WSHN-700 or equivalent course.</p> <p>This course can be taken by students outside the program with instructor approval. If outside the program, related background experience such as a nutrition course is beneficial.</p>	<p>Dissemination and Implementation Science for Health and Well-being applies constructs practices, and values of dissemination and implementation sciences to health and well-being education activities. Strategies to foster translation of evidence-based practices to standard practice in public and private programs are applied in an experiential learning format.</p>
WSHN	710	Health Risk Identification and Management	Spring	3	Lecture	<p>Prerequisites: WSHN-700 or equivalent course.</p> <p>This course can be taken by students outside the program with instructor approval. If outside the program, related background experience such as a nutrition course is beneficial.</p>	<p>This course will explore health risk assessment and management, including determinants of population health; using epidemiological, clinical, and toxicological methods for identifying health hazards. Population health surveillance combined with methods of population health risk assessment will be considered regarding regulatory, economic, and technological approaches to population health risk management. Application of principles will be practiced through the examination of case studies.</p>
WSHN	720	Topics in Health and Nutrition	Fall, Spring, Summer	3	Lecture	<p>This course can be taken by students outside the program with instructor approval. If outside the program, related background experience such as a nutrition course is beneficial.</p>	<p>Topics in Health and Nutrition engages learners to explore topics of current concern and interest in health and nutrition. Topic-specific literature selection, review, and dissection are the focus of group-based journal club discussions that also foster group facilitation and decision-making skills. Issues of individual interest drive investigative and summative activities that develop abilities in peer review and dissemination, including writing, graphic display, and technology-based modes.</p>

Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
COMM	605	Social Media Analytics and Research	Spring	3	Lecture/Lab		This course focuses on social media research and ethics of applying various methodological approaches to study public data, users and messages. Students will be introduced to a variety of techniques and concepts used to obtain, monitor and evaluate social media content with a focus on how the analytics could inform communication strategies. During the course, students will also learn how to design and evaluate social media-based research studies.
COMM	606	Digital Storytelling	Fall	3	Lecture/Lab		This course provides students with a comprehensive understanding of digital storytelling through an analysis of current trends as well as by utilizing hands-on workshop experiences. Students will develop skills such as content strategy, digital storytelling best practices, content production, and audience analysis. Students in the course will develop critical skills to conceptualize, develop and execute an effective digital storytelling project.
COMM	708	Communication Education	Fall	3	Seminar		An analysis of and practicum in teaching communication in higher education. Students explore teaching and learning styles, the role of technology in higher education, and teaching assessment methods. Students create teaching resources and gain teaching experience in a college classroom.
COMM	709	Digital Advertising	Spring	3	Seminar		This course aims to help students understand the strategic use of digital media from both scholarly and professional perspectives, considering both brand and audience viewpoints. This course will cover the types and practices of digital advertising, including search engine optimization, paid search advertising, display advertising, email marketing, social media marketing, and reputation management.
COMM	710	Visual Communication	Fall	3	Seminar	This course is restricted to COMMTCH-MS Major students.	This course explores visual communication, the process through which individuals -- in relationships, organizations, and societies -- create and interpret visual messages. A variety of theories from the disciplines of art history, psychology, communication theory, and graphic design will be discussed to develop methods for analyzing mediated messages. Students analyze visual messages from the following media: print photography, video, film, and the internet.
COMM	714	Strategic Communication	Fall	3	Seminar		This course will introduce students to the theory and practice of strategic communication in advertising, public relations, health communication, crisis/risk communication, and/or political communication. This course will cover problem identification, audience research, message creation, and execution of strategic communication activities. It will also cover ethics and strategic communication through digital media. By the end of the course, students should be able to analyze and execute various components to help solve problems or achieve an organization's goals and objectives.
COMM	715	Communication Design Principles	Spring	3	Lecture/Lab		An introduction to design theory, history, and design for communication. In a practical, project-oriented setting, students will learn design theory and practice image analysis. Students will apply research, theory, and methodology to create visual communication artifacts using graphic design software.

COMM	716	Communication and Identity	Spring	3	Lecture	This course engages students in an analytical and applied exploration of the connection between self, identity, communication, media, and society. Drawing from classical and contemporary readings, as well as current events, the course will address topics such as identity and discourse, performance, intersectionality, and representation. Communication has been central to the development of ideas about collective and individual identities. Therefore, the course encourages students to critically examine the political implications of identity construction in our social world. Finally, the course examines how popular notions of identity function in media texts, corporate settings, and digital environments.
COMM	717	Artificial Intelligence and Communication	Spring	3	Lecture	Communication has been impacted by automation and advances in information technology, and now artificial intelligence is changing how we interact with socio-technical systems. In this course, we will explore historical, ethical, computational, and cultural perspectives to understand the implications of algorithmic processes on communication and society. During the course, students will learn how to analyze various digital products and identify the potential consequences of algorithmic systems on various demographics.
COMM	789	Special Topics Communication	Fall or Spring	3	Seminar	An in-depth examination of a selected aspect of the communication discipline (e.g. strategic communication, technical communication, visual communication, technology-mediated communication, advertising, public relations, journalism). Special Topics in Communication can be taken multiple times provided the topic being studied has changed. (Prerequisite: varies by topic)
PSYC	714	Graduate Engineering Psychology	Biannually	3	Seminar	In this course the students will learn to recognize the integrated (systems) nature of Engineering Psychology, the centrality of human beings in systems design, and to use the topics covered and the available knowledge base to adapt the environment to people. This course will cover several fundamental models of human information processing in the context of human-system interactions. The models may include but are not limited to Signal Detection Theory, Information Theory, theories of attention, both normative and naturalistic decision-making models, Control Theory, and the Lens Model of Brunswick, as well as models of the human as a physical engine, that is, anthropometry, biomechanics, and work physiology. Most topics include readings in addition to the course text as well as a lab exercise with a detailed lab report.
PUBL	610	Technological Innovation and Public Policy	Spring	3	Lecture	Technological innovation, the incremental and revolutionary improvements in technology, has been a major driver in economic, social, military, and political change. This course will introduce generic models of innovation that span multiple sectors including: energy, environment, health, and bio- and information-technologies. The course will then analyze how governments choose policies, such as patents, to spur and shape innovation and its impacts on the economy and society. Students will be introduced to a global perspective on innovation policy including economic competitiveness, technology transfer and appropriate technology.
PUBL	630	Energy Policy	Spring	3	Lecture	This course provides an overview of energy resources, technologies, and policies designed to ensure clean, stable supplies of energy for the future. The course evaluates the impacts of fossil fuel, renewable energy, and hydrogen technologies on society and how public policies can be used to influence their development. The development of U.S. energy policy is of particular concern, although a global perspective will be integrated throughout the course.
PUBL	689	Public Policy Graduate Topics	Fall, Spring	1–4	Lecture	Allows examination of a special problem or topical area in the field of public policy at the graduate level. Topics and specific content and methods vary from year to year or semester to semester.

PUBL	701	Graduate Policy Analysis	Fall	3	Lecture	This course provides graduate students with necessary tools to help them become effective policy analysts. The course places particular emphasis on understanding the policy process, the different approaches to policy analysis, and the application of quantitative and qualitative methods for evaluating public policies. Students will apply these tools to contemporary public policy decision making at the local, state, federal, and international levels.
PUBL	702	Graduate Decision Analysis	Spring	3	Lecture	This course provides students with an introduction to decision science and analysis. The course focuses on several important tools for making good decisions, including decision trees, including forecasting, risk analysis, and multi-attribute decision making. Students will apply these tools to contemporary public policy decision making at the local, state, federal, and international levels.
PUBL	703	Evaluation and Research Design	Spring	3	Seminar	The focus of this course is on evaluation of program outcomes and research design. Students will explore the questions and methodologies associated with meeting programmatic outcomes, secondary or unanticipated effects, and an analysis of alternative means for achieving program outcomes. Critique of evaluation research methodologies will also be considered.
PUBL	709	Public Administration and Management	Fall	3	Lecture	This course provides an in-depth look at the evolution of public administration theory and practice. Starting with the basic structure of the U.S. Constitution, the course examines how the key tensions facing local, state, and federal public administrators changed over time with both changes in social science and changes in public administration practice. Topics include public organization theory, public budgeting, citizen engagement, e-government, public-private partnerships, and recent innovations in management practice.
PUBL	730	Telecommunications Policy and Issues	Fall	3	Lecture	The objective of this course is to enlighten students relative to telecommunications policy and standards sufficiently, in order for them to be able to deal with the real-world issues that confront telecommunications professionals on a daily basis. Students will not be prepared to act as regulatory experts or to replace specialized experts with legal training, but should be sufficiently cognizant of pertinent issues to know when it is prudent to call in such forces. The domestic as well as the international regulatory, policy and standard arenas will be explored. This course helps students to understand that the telecommunications environment is greatly effected by technology, policy, security, and market forces with a primary focus on telecommunications policy and all that it entails.
PUBL	810	Technology, Policy and Sustainability	Fall, Spring	3	Lecture	This course introduces students to public policy and its role in building a sustainable society. The course places particular emphasis on the policy process; the relationship among technology, policy, and the environment; and policy mechanisms for addressing market and government failures that threaten sustainability.

Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
BIOL	650	High Throughput Sequencing Analysis	Fall	3	Lecture/Lab	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Students will utilize commonly used bioinformatics tools to analyze a real High Throughput Sequencing data set starting with raw data, proceeding with quality control, either aligning to a reference genome or performing de novo assembly, assessing differential gene expression determination, and finally annotating their results. Weekly lab reports will be required, and a group manuscript is expected at the end of the semester.
CGNS	601	Cognitive Neuroscience	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Cognitive neuroscience is concerned with the study of the biological processes that underlie cognition with a specific focus on neural systems in the brain that are involved in mental processes. This course provides the foundation of cognitive neuroscience including neuroanatomy, neural signaling, motor and sensory pathways, experimental methods employed in cognitive neuroscience, and discusses the neural bases of complex cognitive functions such as attention, perception, learning, memory, emotional regulation, executive control, decision making and language. Critical analysis of primary research and research projects employed in the course foster an in-depth understanding of main areas of cognitive neuroscience and its recent advances.
CHMI	664	Modern Inorganic Chemistry	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course will apply molecular structure and bonding theory to explain inorganic coordinate complex structure and function, and coordination reaction chemistry. The topics discussed in this course are molecular structure, symmetry, bonding theory, d-block electronic structure and properties, and the reaction mechanisms controlling coordinate complexes. Students will be expected to translate the concepts learned in class to solving analytical and structural analysis problems inorganic systems.
CLRS	600	Fundamentals of Color Science	Summer	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This asynchronous online course provides a technical introduction to color science and the CIE system of colorimetry. Topics covered include color perception, color measurement, color spaces, and applications. The course is intended for students with a technical background who are interested in adding an elective course in color science to their graduate program and for practitioners in the color field interested in a more thorough understanding of the science behind colorimetry. Cannot be taken for program credit by Color Science MS and PhD students.
ENVS	615	Aquatic Ecology Seminar	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This graduate seminar course in aquatic ecology will focus on reading and critical evaluation of the peer-reviewed literature, formal and informal communication skills, and discussion of ongoing research in aquatic ecology. This discussion-based course is student lead, and may be retaken for credit.
ENVS	631	Climate Change: Science Technology & Policy	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This multidisciplinary course will provide students with diverse perspectives on global climate change issues, providing a survey of important aspects of the problem augmented by readings in the primary literature. Topics include atmospheric chemistry, climate modeling, ecological impacts and feedbacks, economics of climate change, international climate policies, and social and environmental justice. The course will include a variety of instructors and guest lecturers, providing an overview of the complex and inter-related nature of global climate change. The course will culminate in a project based on finding solutions to the real-world problem of climate change. Students will be required to take a leadership role in bridging the multiple disciplines presented

IMGS	632	Advanced Environmental Applications of Remote	Spring	3	Lecture/Lab	This course requires permission of the Instructor to enroll.	This course will focus on a broader selection of analytical techniques with an application-centric presentation. These techniques include narrow-band indices, filtering in the spatial and frequency domains, principal component analysis, textural analysis, hybrid and object-oriented classifiers, change detection methods, and structural analysis. All of these techniques are applied to assessment of natural resources. Sensing modalities include imaging spectroscopy (hyperspectral), multispectral, and light detection and ranging (lidar) sensors. Applications such as vegetation stress assessment, foliar biochemistry, advanced image classification for land use purposes, detecting change between image scenes, and assessing topography and structure in forestry and grassland ecosystems (volume, biomass, biodiversity) and built environments will be examined. Real-world remote sensing and field data from international, US, and local sources are used throughout this course. Students will be expected to perform a more comprehensive final project and homework assignments, including literature review and discussion and interpretation of results.
MTSE	601	Materials Science	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course provides an understanding of the relationship between structure and properties necessary for the development of new materials. Topics include atomic and crystal structure, crystalline defects, diffusion, theories, strengthening mechanisms, ferrous alloys, cast irons, structure of ceramics and polymeric materials and corrosion principles. Term paper on materials topic.
MTSE	602	Polymer Science	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Polymers are ubiquitous. They are used in everyday applications as well as for specialty and cutting-edge technologies. This course is an introduction to the chemistry and physics of synthetic polymers, which include plastics, elastomers and fibers. The synthesis of polymers, their fundamental properties, and the relations between their syntheses, structure, and properties will be studied. Among the topics discussed are the morphology, thermal behavior, solubility, viscoelasticity and characterization of polymers. Copolymerization, tacticity and sustainability of polymers will also be covered.
MTSE	617	Material Degradation	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course introduces the basic electrochemical nature of corrosion and considers the various factors that influence the rate of corrosion in a variety of environments. Various means of controlling corrosion are considered with demonstrations.
PHYS	670	Teaching and Learning Physics	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course covers the fundamentals of how students learn and understand key ideas in physics and how theory can inform effective pedagogical practice. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Topics include: misconceptions, resources and phenomenological primitives, theoretical foundations for active-learning, constructivism, epistemological, affective, and social-cultural issues that affect learning, guided and unguided reflection strategies, design-oriented curricula, and effective uses of educational labs and technology. Useful for all students, especially for those in interested in physics, teaching and education research.
STAT	614	Applied Statistics	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Statistical tools for modern data analysis can be used across a range of industries to help you guide organizational, societal and scientific advances. This course is designed to provide an introduction to the tools and techniques to accomplish this. Topics covered will include continuous and discrete distributions, descriptive statistics, hypothesis testing, power, estimation, confidence intervals, regression, one-way ANOVA and Chi-square tests.

STAT	670	Design of Experiments	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	How to design and analyze experiments, with an emphasis on applications in engineering and the physical sciences. Topics include the role of statistics in scientific experimentation; general principles of design, including randomization, replication, and blocking; replicated and unreplicated two-level factorial designs; two-level fractional-factorial designs; response surface designs.
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Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
CSCI	719	Topics in Computer Graphics		3	Lecture	Reserve caps may shift based on topic	This course examines current topics in Computer Graphics. This is intended to allow faculty to pilot potential new graduate offerings. Specific course details (such as prerequisites, course topics, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific topics course in this area. Specific course instances presented will be identified as belonging to the Computer Graphics and Visualization cluster.
CSCI	739	Topics in Intelligent Systems	Fall	3	Lecture/Lab	Reserve caps may shift based on topic	This course examines current topics in Intelligent Systems. This is intended to allow faculty to pilot potential new graduate offerings. Specific course details (such as prerequisites, course topics, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific topics course in this area. Specific course instances will be identified as belonging to the Intelligent Systems cluster, the Computational Vision and Acoustics cluster, the Security cluster, or some combination of these three clusters. Course offered every other year.
CSCI	769	Topics in Theory		3	Seminar	Reserve caps may shift based on topic	This course examines current topics in Theory. This is intended to allow faculty to pilot potential new graduate offerings. Specific course details (such as prerequisites, course topics, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific topics course in this area. Specific course instances will be identified as belonging to the Theory cluster, the Security cluster, or both clusters.
CSEC	620	Cyber Analytics and Machine Learning	Fall	3	Lecture	Students taking this course should have knowledge in Discrete Math, Probability and Statistics, and Linear Algebra. Students should also be able to program in Python.	The course provides students an opportunity to explore methods and applications in cyber analytics with advanced machine learning algorithms including deep learning. Students will learn how to use machine learning methods to solve cybersecurity problems such as network security, anomaly detection, malware analysis, etc. Students will also learn basic concepts and algorithms in machine learning such as clustering, neural networks, adversarial machine learning, etc. A key component of the course will be an independent exploratory project to solve a security program with machine learning algorithms. Students taking this course should have knowledge in Discrete Math, Probability and Statistics, and Linear Algebra. Students should also be able to program in Python.
CSEC	659	Seminar in Computing Security	Fall, Spring	3	Lecture	Reserve caps may shift based on topic	This course offers an opportunity to learn about a specific seminar topic in more depth. The course description will be replaced by the specific instance of the seminar, as it is proposed by faculty.
CSEC	759	Graduate Seminar in Computing Security	Fall, Spring	3	Lecture/Lab	Reserve caps may shift based on topic	This course explores current topics in Computing Security. It is intended as a place holder course for faculty to experiment new course offerings in Computing Security undergraduate program. Course specific details change with respect to each specific focal area proposed by faculty.

IGME	770	Geographic Information Science and Technology	Fall	3	Lecture/Lab		This course provides a survey of the theory, concepts, and technologies related to representation and understanding of the earth - a scientific domain known as Geographic Information Science and Technology (GIS & T). Students will gain hands-on experience with technologies such as Global Positioning Systems (GPSs), Geographic Information Systems (GISs), remote sensing, spatial data science and analysis, and web mapping. Furthermore, students will learn relevant GIS & T theory, concepts, and research trends such as spatial reasoning, spatiotemporal data representation, and spatial analysis.
IGME	771	Introduction To Geographic Information Systems	Fall	3	Lecture/Lab		This online course introduces students to the world of Geographic Information Systems (GIS). Course lectures, reading assignments, and practical lab experiences will cover a mix of conceptual, practical and technical GIS topics. Topics include GIS data models, basic cartography, geodatabases, spatial analysis, GIS software, and theory and concepts from the Geographic Information Science and Technology domain.

Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
ISUS	718	Sustainable Energy Systems	Spring	3	Lecture		<p>Energy will play an increasingly vital role in economic, environmental and political developments around the world. This course first investigates the current trends in energy production, distribution, and consumption associated with the primary incumbent energy system technologies: fossil fuel combustion and nuclear power. An understanding of the economic, environmental and social limitations of these technologies will lead to analysis of the potential benefits of 3 key renewable technologies: solar (including wind), biomass and hydrogen/fuel cells. Potential paths to market penetration for these technologies will be introduced, including geographical variations expected to occur globally and within the United States.</p>

Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
ISEE	684	Engineering and the Developing World	Spring	3	Lecture		<p>This course helps students develop a system of holistic thinking about engineering pursuits which includes the natural environment, humans as individuals, economics, culture, institutions, policies, and civil society. Topics include research, design, dissemination, and evaluation techniques of the Human Centered Design Methodology (also called Design Thinking), Systems Practice tools for understanding complex problems, comparison of competing economic viewpoints, and evaluation of project case studies for triple bottom line sustainability. The course will include an extensive community engaged experiential learning component with a community partner in the city of Rochester which requires periodic travel to the partner's site for interviews and activities. The course project is intended to lead to ideas that can be continued into social impact design capstone projects for implementation.</p>

Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
ACCT	603	Accounting for Decision Makers	Fall, Spring, Summer	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	A graduate-level introduction to the use of accounting information by decision makers. The focus of the course is on two subject areas: (1) financial reporting concepts/issues and the use of general-purpose financial statements by internal and external decision makers and (2) the development and use of special-purpose financial information intended to assist managers in planning and controlling an organization's activities. Generally accepted accounting principles and issues related to International Financial Reporting Standards are considered while studying the first subject area and ethical issues impacting accounting are considered throughout.
ACCT	794	Cost Management in Technical Organizations	Spring	3	Lecture	Enrollment in this course requires permission from the department offering the course.	A first course in accounting for students in technical disciplines. Topics include the distinction between external and internal accounting, cost behavior, product costing, profitability analysis, performance evaluation, capital budgeting, and transfer pricing. Emphasis is on issues encountered in technology intensive manufacturing organizations. *Note: This course is not intended for Saunders College of Business students.
BANA	680	Data Management for Business Analytics	Fall	3	Lecture	There are no pre or co-requisites; however, instructor permission is required for students not belonging to the MS-Business Analytics or other quantitative programs such as the MS-Computational Finance which have program-level pre-requisites in the areas of calculus, linear algebra, and programming.	This course introduces students to data management and analytics in a business setting. Students learn how to formulate hypotheses, collect and manage relevant data, and use standard tools such as Python and R in their analyses. The course exposes students to structured data as well as semi-structured and unstructured data.
DECS	744	Project Management	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	A study in the principles of project management and the application of various tools and techniques for project planning and control. This course focuses on the leadership role of the project manager, and the roles and responsibilities of the team members. Considerable emphasis is placed on statements of work and work breakdown structures. The course uses a combination of lecture/discussion, group exercises, and case studies.
DECS	758	Seminar in Decision Sciences		3	Lecture		Special topics seminars offer an in-depth examination of current events, issues and problems unique to decision science. Specific topics will vary depending upon student and faculty interests and on recent events in the business world. Seminar topics for a specific semester will be announced prior to the course offering. These seminars may be repeated for credit since topics will normally vary from semester to semester. (instructor-determined)

DECS	782	Statistical Analysis for Decision Making	Fall, Spring, Summer	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This is a course in applied statistics emphasizing an understanding of variation and inference (estimation and testing). Topics to be covered include: review of descriptive statistics, normal distribution, sampling distributions, estimation, test of hypothesis for single and two populations, analysis of variance (ANOVA), linear regression, multiple regression and model building. Students will apply these concepts using mini-cases and problem sets that involve both structured and unstructured data sets. The application of appropriate tools will be required.
ESCB	705	Economics and Decision Modeling	Fall, Spring, Summer	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	The course focuses on the fundamental economic theories most useful for the management of a firm in a global environment. Microeconomic theories and current events are used to explain the performance of the market system and help managers formulate effective pricing and business decisions. Macroeconomic theories and current events are used to explain the direction of the domestic and global economy to help managers understand the implications, including foreign direct investment, for their companies. Students will learn to explain and predict changes in economic growth, inflation, interest rates, international trade and foreign exchange rates.
FINC	605	Financing New Ventures	Fall	3	Lecture		A focus on financial issues affecting an entrepreneur. The course emphasizes, identifies, and follows the wealth creation cycle. The wealth creation cycle begins with an idea for a good, product or service, progresses to an initial company startup, passes through successive stages of growth, considers alternative approaches to resource financing, and ends with harvesting the wealth created through an initial public offering, merger or sale. Identification and valuation of business opportunities, how and from whom entrepreneurs raise funds, how financial contracts are structured to both manage risk and align incentives, and alternative approaches by which entrepreneurs identify exit strategies are reviewed.
FINC	780	Financial Analytics	Fall	3	Lecture	There are no pre or co-requisites; however, instructor permission is required – student aptitude for quantitative work will be assessed; waived for students enrolled in quantitative programs such as the MS-Computational Finance which have pre-requisites in the areas of calculus, linear algebra, and programming.	This course provides a survey of financial analytics applications in contexts such as investment analysis, portfolio construction, risk management, and security valuation. Students are introduced to financial models used in these applications and their implementation using popular languages such as R, Matlab, and Python, and packages such as Quantlib. A variety of data sources are used: financial websites such as www.finance.yahoo.com , government sites such as www.sec.gov , finance research databases such as WRDS, and especially Bloomberg terminals. Students will complete projects using real-world data and make effective use of visualization methods in reporting results.
HRDE	720	Theories of Organizational Development	Spring	3	Lecture		As organizations undergo continual change, HR leaders play a pivotal role enabling their organizations to anticipate, plan, and profit from change. This course introduces the student to theories and practices of organization development and change leadership. Such leadership requires competencies of identifying and framing challenges, consulting with clients, researching solutions, creating, implementing, and evaluating action plans. Through study, practice, and application, students will gain knowledge and skills to foster change, innovation, and the adaptability of an organization.

HRDE	722	Talent Development	Fall, Summer	3	Lecture	This course provides skills to develop, retain, and engage the best available talent required for current and future success. Students examine benchmark practices from all industry types to derive effective strategies for their own organizations, develop a human capital strategy development, and complete an integrated set of projects to implement selected components of the strategy.
HRDE	726	Technology and the Future of Work	Fall	3	Seminar	The rapid pace of progress in technology and the change in demographics of the workforce are anticipated to affect what work will look like in the future, in addition to the structure and nature of work itself. Some of these changes might be incremental and others more radical and disruptive affecting the conduct of business. The pace, nature, and magnitude of these changes demand that businesses, organizations, educators, policy makers, leaders, managers, and individual employees reimagine models of employment including the organization and functioning of the workforce. This course is intended to provide students with a global perspective of the future of work and employment, and insights into the implications on their designated professions and careers. Among others, this course will address the following questions: What are the skills and competencies required of the workforce for this new future of work? What skills, competencies, and job roles may become redundant? How should corporations preempt and prepare to deal with these changes? What will be the role of leaders and managers in reimagining and developing the workforce of the future?
HRDE	742	Leading Change	Summer	3	Lecture	Major change initiatives within organizations fail because of lack of understanding of the process of change and the lack of deliberate and focused attention to the change process. This course teaches students the change process and the alterations required in structures, processes, and activities to effectively implement change initiatives within organizations. The components of this course include applied approaches and tools to help analyze barriers for change, leverage power and influence, and provide frameworks to plan and implement change.
HRDE	743	Training for Global Organizations	Fall, Spring, Summer	3	Lecture	This course is designed to develop a student's understanding of cross-cultural communication and adaptation and how to design and deliver formal training. The course provides an introduction to different theoretical perspectives on cross-cultural communication and adaptation and the application of these perspectives to the design of training. Issues examined include culture theory, cross-cultural competence, and techniques and design of cross-cultural training.
HRDE	765	Diversity in Global Workplace	Spring	3	Lecture	As strategic partners in global workforce development, human resource development professionals guide organizations to build and maintain a diverse workforce. Diversity and inclusion exploit the natural synergies of a multicultural workforce. This course will examine dimensions of diversity beyond race, ethnicity, and gender and create opportunities to develop an understanding about how these dimensions intersect and play out in the workplace. The purpose of this course is to provide HRD professionals the knowledge required to manage these dynamics in an organizational setting and lead initiatives that will create and maintain an inclusive workplace. Project work will allow for the in-depth ability to assess the current state of diversity within a defined organization, conduct research and benchmarking to build a diverse workforce, and develop a diversity strategic plan with an on-going evaluation component to assess the success of diversity initiatives.

HSPT	730	Strategic Hospitality & Tourism Branding	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This class will concentrate on how the differences between product and service branding and marketing apply to travel destinations and tourist services such as lodging and recreational activities. Specific emphasis will be placed on the branding and marketing of tourism suppliers. Special attention will also be paid to promoting destinations as they move through their life cycle. The role of experiences in the marketing system will be covered from both the destination and supplier perspective.
HSPT	740	Economic Performance Analysis for Hospitality & Tourism	Fall, Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	Applications of economic analysis to hospitality and tourism including estimation and prediction of demand and supply, valuation, determination of regional economic impacts, and use of economic analysis in management, marketing, and policy decisions.
HSPT	750	Strategic Processes and Assessment of Hospitality and Tourism Industries	Spring	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This class will apply customer relationship management methods to hospitality and tourism industries in order to develop new service experiences and maintain the economic viability of others. A review of the quality models and strategies available for maintaining hospitality and tourism competitiveness will be covered. The use of the six sigma quality improvement process will be applied to hospitality industries.
HSPT	761	Planning & Development for Hospitality and Tourism Industries	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course analyzes tourism as a system of interrelationships between markets (demand) and destinations (supply), and between governments and private businesses. This analysis provides a framework for the in-depth study of policy initiatives at the local, regional, and international levels. Additionally this course will address tourism and hospitality planning as it defines the frames of reference used in making choices concerning the development of tourism facilities and use of space. Scenario planning will be used to create new service systems for hospitality and tourism industries.
HSPT	763	Resort Amentity and Attraction Development	Fall	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course gives the student an understanding of how resort amenities and visitor attractions are developed and managed in destinations. Focus is on the planning, development, operation, design, and special needs of recreational amenities such as golf, tennis, skiing, spas, and marinas. Additional emphasis is placed on managing both historical, cultural, and natural resource based tourist attractions.
MGIS	650	Introduction to Data Analytics and Business Intelligence	Fall	3	Lecture		This course serves as an introduction to data analysis including both descriptive and inferential statistical techniques. Contemporary data analytics and business intelligence tools will be explored through realistic problem assignments.
MGIS	720	Information Systems Design	Fall	3	Lecture		This course provides students with fundamental knowledge and skills required for successful analysis of problems and opportunities related to the flow of information within organizations and the design and implementation of information systems to address identified factors. Students are provided with knowledge and experience that will be useful in determining systems requirements and developing a logical design.
MGIS	725	Data Management and Analytics	Spring	3	Lecture		This course discusses issues associated with data capture, organization, storage, extraction, and modeling for planned and ad hoc reporting. Enables student to model data by developing conceptual and semantic data models. Techniques taught for managing the design and development of large database systems including logical data models, concurrent processing, data distributions, database administration, data warehousing, data cleansing, and data mining.

MGIS	735	Design and Information Systems	Spring	3	Lecture	Students who complete this course will understand the principles and practices employed to analyze information needs and design appropriate IT-based solutions to address business challenges and opportunities. They will learn how to conduct requirements analysis, approach the design or redesign of business processes, communicate designs decisions to various levels of management, and work in a project-based environment.
MGIS	760	Integrated Business Systems	Spring	3	Lecture	This course focuses on the concepts and technologies associated with Integrated Business Information Systems and the managerial decisions related to the implementation and ongoing application of these systems. Topics include business integration and common patterns of systems integration technology including enterprise resource planning (ERP), enterprise application integration (EAI) and data integration. The key managerial and organizational issues in selecting the appropriate technology and successful implementation are discussed. Hands-on experience with the SAP R/3 system is utilized to enable students to demonstrate concepts related to integrated business systems. (familiarity with MS Office suite and Internet browsers)
MGMT	610	Global Entrepreneurship	Spring	3	Lecture	Global entrepreneurs need to utilize both domestic and overseas resources, explore transnational opportunities, and leverage worldwide networks at early stages of the development. This course is designed to address the unique challenges of this global challenge, as well as the richer opportunities faced by the "born globals." Students will learn how to discover, evaluate, and enact opportunities across national borders in order to create goods and services that serve various company goals. Students will also be informed of the competitive strategies normally adopted by international entrepreneurs in other major economies such as EU, China, and India.
MGMT	720	Entrepreneurship and Technology Entrepreneurship	Fall, Spring, Summer	3	Lecture	This course studies the process of creating new ventures with an emphasis on understanding the role of the entrepreneur in identifying opportunities, seeking capital and other resources, and managing the formation and growth of a new venture.
MGMT	740	Leading Teams in Organizations	Fall, Spring, Summer	3	Lecture	This course examines why people behave as they do in organizations and what managers can do to improve organizational performance by influencing people's behavior. Students will learn a number of frameworks for diagnosing and dealing with managerial challenges dynamics at the individual, group and organizational level. Topics include leadership, motivation, team building, conflict, organizational change, cultures, decision making, and ethical leadership.
MGMT	755	Negotiations	Fall, Spring	3	Lecture	This course is designed to teach the art and science of negotiation so that one can negotiate successfully in a variety of settings, within one's day-to-day experiences and, especially, within the broad spectrum of negotiation problems faced by managers and other professionals. Individual class sessions will explore the many ways that people think about and practice negotiation skills and strategies in a variety of contexts.
MGMT	775	Ethical Decision Making and Corporate Social Performance	Fall, Spring	3	Lecture	This course is designed to equip business practitioners with scientifically supported frameworks and methods for recognizing, analyzing, deciding on, and implementing ethical courses of action in business. Selected topics include stakeholders needs analysis, the science of decision-making, corporate social performance, issues involved with emerging technologies, and doing business in a global context.

MKTG	761	Marketing Concepts and Commercialization	Fall, Spring, Summer	3	Lecture	An introduction to contemporary principles and practices of marketing. The course is structured around the process of marketing planning leading to the development of successful marketing strategies, including the commercialization of products and services in domestic and international environments. Focus is on environmental scanning techniques, setting and evaluating measurable objectives, innovating and controlling the interrelated components of product/service offering, planning and executing the marketing mix (channels of distribution, price, and promotion), and enhancing customer relationships through the delivery of customer value.
SERQ	712	Breakthrough Thinking, Creativity, and Innovation	Fall, Summer	3	Lecture	<p>This is an introductory-level survey course on the dynamics of innovation. The course focuses on individual, team and organization-human and systems dynamics that impact organizational innovation. Students gain awareness in, understanding of and important skills in fostering multi-level organizational human ecologies conducive to the creation of innovation. Issues and challenges important to leaders at all levels in an organization, entrepreneurs and talent management practitioners will be examined and explored. There is a required fee for the class to pay for the administration of the ISPI and Meyers Briggs evaluation instruments.</p> <p>Students will develop in their understanding of innovation, their own personal innovation capabilities, preferences, and the human dynamics unique to innovation applied in an organizational context. This background is becoming increasingly critical to developing innovation capabilities in and across organizations in our increasingly competitive and complex world. This course will build awareness and improve competency in the application of overall course content and design principles particular to developing innovation-competent individuals, teams, and organizations.</p>
SERQ	720	Service Scenario and Strategy Development	Spring, Summer	3	Lecture	The service world has many examples of once-successful companies that failed to accomplish the primary goal of every organization: consistently design, deliver value to customers and other key stakeholder groups in a highly competitive and ever-changing service environment. Today's organizational leaders must be able to develop and implement strategies that ensure the continued competitiveness of their organizations, and identify and leverage opportunities for growth and innovation brought about by change. Firmly grounded in the fundamentals of strategy development this course prepares students to create and sustain competitive advantage; and to apply key foresight techniques including scenario planning to anticipate future opportunities.
SERQ	722	Customer Centricity	Spring	3	Lecture	The Customer Centricity course develops the learners ability to help their organization manage its interactions with its valued customers across multiple channels, maximize revenue opportunities, build foundations to increase customer satisfaction, and drive customer retention and loyalty.
SERQ	723	Service Analytics	Fall, Summer	3	Lecture	Analytics in service organizations is based on four phases: analysis and determination of what data to collect, gathering the data, analyzing it, and communicating the findings to others. In this course, students will learn the fundamentals of analytics to develop a measurement strategy for a given area of research and analysis. While this measurement process is used to ensure that operations function well and customer needs are met; the real power of measurement lies in using analytics predicatively to drive growth and service, to transform the organization and the value delivered to customers. Topics include big data, the role of measurement in growth and innovation, methodologies to measure quality, and other intangibles.

SERQ	732	Assessment of Service Quality	Fall	3	Lecture		The service sector encompasses a large and varied arena making the assessment of service quality challenging. This course will provide quality evaluation strategies which span a variety of service sectors. To build a comprehensive picture of public and private sector quality service indicators will be reviewed as well as strategies to assess service quality. Each of these approaches will be analyzed, discussed and evaluated for the output generated. To assist with this overview, the Serve/Qual model, including the identification of service standards to meet and exceed customer expectations, will be used to evaluate service quality.
SERQ	745	Social Psychology of Service	Summer	3	Lecture	Department consent required	Service interactions are an increasing segment of human interactions in today's society. This course will examine service relationships, encounters and experiences from the perspective of human motivation and relating existing theories of social psychology to the delivery of services. An analysis of the interactions of customers and employees will help the student restrain their use of intuition and overlay critical thinking skills with human dynamics. The areas to be included in this course include; emotional intelligence, reciprocity, persuasion, conflict and communication, motivation, diversity, retention, and other related theories.

Subject	Number	Title	Typically Offered	Units	Components	Requirements	Description
PROF	710	Project Management	Fall, Spring, Summer	3	Lecture	This class is restricted to degree-seeking graduate students or those with permission from instructor.	This course addresses project management from a multidisciplinary perspective, covering the fundamental nature of and techniques for managing a broad range of projects. Topics cover the Project Management Life Cycle from Planning to Termination. It also addresses the behavioral and quantitative facets of project management, as well as the use of methods, tools and techniques for the initiation, planning, and execution of projects. Introduces the standard framework, processes and knowledge areas of the Project Management Institute. *Note: Bachelors degree or minimum of 5 years of work experience in a project related business environment. Recommended education or work experience in organizational behavior, mathematics and basic accounting. *Note: BUSI-510 may not be substituted for BUSI-710 in a graduate concentration or the advanced certificate in project management. Additionally, a student may not register for and receive credit for both BUSI-510 and BUSI-710, whether taken as an undergraduate or graduate student.
PROF	714	Agile Project Management	Fall, Spring	3	Lecture	This course is available to RIT degree-seeking graduate students.	Business agility allows organizations to quickly adapt to new markets. In a fast paced ever changing world of highly competitive products and services, organizations need to be able to deliver solutions to market quickly in an uncertain environment. Agile Project Management provides an iterative and incremental framework to explore and deliver high risk solutions efficiently in a rapid response timeframe. We will explore Agile Project Management practices across multiple industries including Agile project roles following the Project Management Institute® Agile Practice Guide.