Catalog Copy for Courses listed on the 3-01-07 Consent Calendar

A&S 1506
ESTABLISH AN EMERGENCY CERTIFICATE FOR THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

The concentration in Emergency Management within the Master of Public Administration degree program offers students training in the skills and administrative tools necessary to run public, nonprofit, and private sector programs involved in protecting citizens and infrastructure against catastrophic events as well as aiding and assisting them once such events have occurred. Topics of study include, but are not limited to, homeland security and terrorism, emergency prevention and response, and disaster management. The focus of the concentration is to enable graduates to manage emergency programs in the most effective, efficient, and legally sound manner.

This concentration requires completion of the core MPA courses and MPAD 6187 and MPAD 6188. The emergency management concentration consists of 12 credit hours within the MPA curriculum and 3 credit hours within the Department of Geography and Earth Sciences (as part of the 39 hours required for the degree. MPAD 6290 *Emergency Management*, MPAD 6291 *Homeland Security*, and MPAD 6292 *Disaster Management* are required. For each of these courses, several on-line workshops offered by the Department of Homeland Security=s National Incident Management System (NIMS) must be completed. Thus, after completion of MPAD 6290, MPAD 6291, and MPAD 6292 students will be regarded as "NIMS compliant" by the Department of Homeland Security. GEOG 5190 *Geographic Information Systems for Non-Majors* is required. The focus of the research paper in MPAD 6188 must be an approved topic in the emergency management field. An additional 3 credit hours from the following are also required:

MPAD 6141   Conflict Management in Public Organizations
MPAD 6185   Intergovernmental Relations
MPAD 6293   Fighting Terrorism
GEOG 5130   Advanced Geographic Information Systems
CJUS 5103   International Criminal Justice
CJUS 6120   Criminal Justice Management and Decision Making
CJUS 6132   Legal Issues in Law Enforcement
COMM 5102 Federal Interpretation of the First Amendment
COMM 6120 Communication and the Network Society
PSYC 6155   Community Psychology
ITIS 5250   Computer Forensics
CSLG 7680   Crisis Counseling

Students may petition to take courses from other departments with approval from the MPA director.

[Four new courses are being proposed]

MPAD 6290. Emergency Management. (3) This course focuses on the principles and practices of emergency management at the local, state, and national levels and will explore the concepts of preparedness, mitigation, response and recovery. The course will also be conducted from the perspective of emergency management's impact on local government and infrastructure, and the community's ability to prepare for, respond to, and recover from a wide array of catastrophes. (Fall).

MPAD 6291. Homeland Security. (3) In the wake of the events of September 11, 2001, this nation has struggled to both re-write its understanding of "security" within its borders and to re-organize its resources committed to maintaining that "security." Out of these efforts has emerged not only a new Department of Homeland Security, built from portions of more than a dozen other agencies and bureaus, but also a sense of insecurity in the American people. This course is designed to explore both of these aspects: the revamping of the bureaucracy responsible for "homeland security," and the impact on the population of this sense of uncertainty within borders. Students will examine the impact of these developments on state and local resources committed to "security" in communities, evaluating the strengths – and weaknesses – of the new "homeland security" efforts on the sub-national scale. (Fall).

MPAD 6292. Disaster Management. (3) Emergency managers must be prepared to face a wide variety of natural, technological and public health disasters in their communities. Having a good understanding of a potential disaster's unique characteristics and dynamics can help an emergency manager better prepare for the worst-case scenario. This course focuses on a series of natural and weather-related disasters, technological or man-made disasters and public health disasters. (Spring).

MPAD 6293. Fighting Terrorism. (3) This course investigates the phenomenon of the form of violence known as "terrorism". Students will examine many facets of such violence, and the types of political violence which have existed throughout history, noting the changes which have occurred in recent years. The causes for which individuals, states and groups commit these acts, as well as the kinds of persons who have committed (or are committing) such violence will also be examined. Students will also study the strategies and tactics of both the perpetrators of terrorism and their opponents in modern administrations. Finally, students will critically analyze several regions in which terrorism has been prevalent, and the actions taken by systems to control that violence. (On Demand).

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A&S 1806
CHANGES TO CURRICULUM & ADMISSIONS REQUIREMENTS, & ADDITION OF THREE NEW COURSES FOR THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

Prerequisite Requirements
In addition to the admission requirements, MPA students must complete the following prior to taking MPAD 6126, MPAD 6131, MPAD 6134, and their elective coursework: POLS 1110, Introduction to American Government (or the equivalent) with a grade of C or higher; STAT 1222, Elementary Statistics for the Social Sciences (or the equivalent) with a grade of C or higher; and demonstrate proficiency in computer applications. Students may complete these after admission into the program.

Core
All students are required to complete 18 hours of core study. The emphasis in the core is twofold: (a) Understanding the various managerial and analytical approaches salient to the environment of public administration; and (b) Achieving an overall perspective on the problems of public administration. Students must achieve a grade of B or higher in each core course prior to enrolling in MPAD 6187 and MPAD 6188. Students earning grades of C in a core course must retake that course at the earliest possible opportunity. The core courses are:

MPAD 6102 Foundations in Public Administration (3)
MPAD 6104 Public Organizations and Management (3)
MPAD 6125 Quantitative Research Methods in Public Administration (3)
MPAD 6126 Data Analysis for Decision Making (3)
MPAD 6131 Public Budgeting and Finance (3)
MPAD 6134 Human Resource Management (3)

New Courses
MPAD 6325. Program Evaluation for the Public and Non-Profit Sectors. (3) This course is designed to give students a comprehensive overview of the theory, concepts, methods, and tools of program evaluation. In addition to providing an overview of various types and uses of program evaluation, the course will emphasize building expertise in evaluation design, developing process and outcome measures, analyzing data, and reporting results. The course will also address the use of evaluation tools to support the development and management of programs. (On Demand).

MPAD 6326. Applied Economics for Public Administrators. (3) The course introduces students to the fundamental concepts of microeconomics in order to enhance their analytical skills to a level that is appropriate for practitioners in the public sector. The course will focus on how the market works, why the market results in beneficial exchanges between sellers and buyers, what effects government intervention can have upon the market, whether government intervention is necessary, and how the tools of economics can be used by public administrators to improve decision making. (On Demand).

MPAD 6328. Urban and Community Development. (3) The course examines the policies and programs designed to reduce social and economic distress in U.S. communities and focuses on local and neighborhood-based efforts to address problems of inadequate housing, unemployment, lack of community services and facilities, crime etc.

This course also considers the various roles that government, private sector, and nonprofit organizations play in community revitalization. (On Demand).

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A&S 1606
ESTABLISH WMST 6601, 6602, 6603, AND 6627

WMST 6601. Theoretical Approaches to Sexuality (3)). An interdisciplinary examination of the history of sexuality and contemporary theories of sexuality and the body. Topics covered include historical aspects of sexuality; representations of sexuality; politics of sexuality; critiques of psycho-analytic approaches to sexuality; feminist engagement with biological constructions of sexuality; and queer theory. (*Alternate years*)

WMST 6602. Theoretical Approaches to Gender (3) An interdisciplinary examination of the core theories about the role of gender in identity formation and social organization. Topics covered include the feminist critique of biological essentialism; gender as a continuum; the social construction of gender; gender performativity; historical changes in gender; masculinity studies; the intersection of race, class and gender; and the economics of gender. (*Alternate years*)

WMST 6603. Language, Gender and Power (3) An examination of the ways language constructs sexual difference and power relations among groups. Topics include the role of language in structuring individual identity and human relations; how that process informs the nature of social institutions; and the control language exercises over human society, from the private to the public domain. (*Alternate Years*)

WMST 6627. Feminist Theory and its Applications (3) An examination of selected works in feminist thought across the disciplines. *(Alternate Years)*

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A&S 1706
CREATE A GRADUATE CERTIFICATE IN GENDER, SEXUALITY, AND WOMEN'S STUDIES

GENDER, SEXUALITY AND WOMEN'S STUDIES

Women's Studies Program
http://womensstudies.UNC Charlotte.edu

Degree
Graduate Certificate

Coordinator:
Coral Wayland, Director of Women's Studies

GRADUATE CERTIFICATE IN GENDER, SEXUALITY AND WOMEN'S STUDIES

The Graduate Certificate in Gender, Sexuality and Women's Studies can be earned in conjunction with master's or doctoral work in a wide variety of subjects. The certificate can also be earned through a freestanding course of study not linked to a graduate degree. The Graduate Certificate in Gender, Sexuality and Women's Studies will expose students from a variety of disciplines to the core theories and approaches used in studies of women, gender (which includes masculinity), feminism and sexuality.

The certificate program is open to all students who hold a bachelor's degree from an accredited university and either:
1.) are enrolled and in good standing in a graduate degree program at UNC Charlotte, or
2.) have a minimum undergraduate GPA of 2.75.

All students are admitted to the Graduate School in a special category for certificate programs. In addition to the general requirements for graduate certificate programs explained elsewhere in the catalog, students should submit a letter explaining the applicant's educational and work background, interests, and plans, with an emphasis on how this certificate will enhance, complement, or advance the applicant's work and/or education.

Certificate Requirements
The Graduate Certificate in Gender, Sexuality and Women's Studies requires the completion of a minimum of 12 credit hours of graduate course work. This includes 2 core courses and 2 elective courses.

Core Courses: Students are required to complete 2 of the following courses. Students should select the courses that most closely reflect their interests.
- WMST 6601. Theoretical Approaches to Sexuality
- WMST 6602. Theoretical Approaches to Gender
- WMST 6603. Language, Gender and Power
- WMST 6627. Feminist Theory and its Applications

Electives: Students are also required to complete 2 elective courses at the graduate level. Any graduate level course offered by the Women's Studies Program will count as an elective. Elective courses can also come from other disciplines. These courses may be seminars, directed readings or directed research courses as long as they focus on women, gender, feminism or sexuality. Students wishing to use a course offered in another department or program as an elective should have the Director of Women's Studies approve the course prior to enrolling in it.

Transfer Credit
Transfer credit is not accepted in the certificate program.

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TCHR 2-6-07
ESTABLISH A GRADUATE CERTIFICATE IN TEACHING

1. **Program Description** – The Graduate Certificate in Teacher Education has specific features and requirements for each licensure field. Professional education coursework ranges from 18 to 27 hours, depending on the licensure field. All fields have coursework pertaining to students' development and diversity, the K-12 North Carolina standard curriculum in the various content areas, instructional planning and assessment, classroom management, instructional technology, and instructional methods for the content area(s) to be taught as well as methods and expectations for reading and writing instruction in the intended grade levels and/or content areas. Each course requires 20 – 40 hours of clinical observations and activities in schools, and the program culminates with a full-time school-based internship lasting from 10 to 15 weeks.

   Programs leading to a content area teaching license, that is, middle grades (English/Language Arts, math, science, or social studies), secondary education (English, math, history, comprehensive social studies, biology, chemistry, earth science, physics, or comprehensive science), art, dance, music, theatre, and second language education have background content requirements for licensure in those areas; therefore, some students may have additional requirements of undergraduate coursework in their content area in order to meet state and federal licensure requirements.

2. **Admission Requirements** –
   i. Applicants must have an appropriate background major or equivalent (minimum of 24 hours) in the content field of the licensure program to which they are applying. (Not applicable to B-K, Elementary Education, Special Education, and Teaching English as a Second Language). *Applicants who have a significant amount of work completed, but lack the full major or 24 hours, will be considered on a case-by-case basis. Their admission may be deferred until additional content background is developed.*
   ii. Transcripts showing that applicants have an overall undergraduate GPA of at least 2.75
   NOTE: If applicable, the GPA from a graduate degree will substitute for the GPA from an undergraduate degree.
   iii. For teachers: Verification of employment (e.g., teaching contract, letter from principal, RALC plan)
   For non-teachers: Three recommendations from persons familiar with the applicant's potential to be academically successful at UNC Charlotte and in the classroom
   iv. Signed Statement of Commitment regarding dispositions
   v. Signed FERPA form

      vi.   Applicants to the Graduate Certificate in Teaching with a concentration in Music Education must also pass an audition and a screening exam before full admission.

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CSCI 11-14-06
REVISION OF THE COMPUTER SCIENCE MS PROGRAM CURRICULUM

MS Degree Requirements

The Master of Science program in Computer Science requires 30 graduate credit hours, which may optionally include 6 hours of thesis. At least 21 hours of the courses applied to the degree must be from the Department of Computer Science. At least 15 hours must be 6000 level or above courses. No more than 6 hours may be in Individual Study. A maximum of 6 hours of graduate credit may be transferred from other institutions.

I.   Core Requirement

All students must take two courses from the Core Category:

ITCS 5102 Survey of Programming Languages
ITCS 5141 Computer Organization and Architecture or ITCS 6182 Advanced
                                    Computer
                                    Architecture
ITCS 6112 Software System Design and Implementation
ITCS 6114 Algorithms & Data Structures

II.   Breadth Requirements

All students must take three courses, each from a different Course Category, to satisfy the breadth requirements.

Course Categories are:

- Data Management

ITCS 6155 Knowledge Based Systems
ITCS 6157 Visual Databases
ITCS 6160 Database Systems
ITCS 6161 Advanced Topics in Database Systems
ITCS 6162 Knowledge Discovery in Databases
ITCS 6163 Data Warehousing

- Networked Systems

ITCS 5145 Parallel Computing
ITCS 5146 Grid Computing
ITCS 6132 Modeling & Analysis of Communication Networks
ITCS 6166 Computer Networks
ITCS 6167 Advanced Networking Protocols
ITCS 6168 Wireless Communications

- Visualization and Computer Graphics

ITCS 5120 Introduction to Computer Graphics
ITCS 5121 Information Visualization
ITCS 5122 Visual Analytics
ITCS 5123 Visualization and Visual Communication
ITCS 6124 Illustrative Visualization
ITCS 6126 Large Scale Information Visualization
ITCS 6127 Real-time Rendering Engines
ITCS 6128 3D Display and Advanced Interfaces
ITCS 6140 Data Visualization

- Intelligent & Interactive Systems

ITCS 5152 Computer Vision
ITCS 6050 Topics in Intelligent Systems
ITCS 6111 Evolutionary Computation
ITCS 6125 Virtual Environments
ITCS 6134 Digital Image Processing
ITCS 6150 Intelligent Systems
ITCS 6151 Intelligent Robotics
ITCS 6156 Machine Learning
ITCS 6158 Natural Language Processing
ITCS 6267 Intelligent Information Retrieval

- Applications (includes all application area specific courses such as Medical Informatics, and Game Design)

ITCS 5133 Numerical Computation Methods and Analysis
ITCS 5230 Introduction to Game Design and development
ITCS 5231 Advanced Game Design and Development
ITCS 5232 Game Design and Development Studio
ITCS 5235 Game Engine Construction
ITCS 5236 Artificial Intelligence for Computer Games
ITCS 5237 Audio Processing for Entertainment Computing
ITCS 6153 Neural Networks
ITCS 6159 Intelligent Tutoring Systems
ITCS 6165 Coding and Information Theory

ITCS 6222 Biomedical Signal Processing
ITCS 6224 Biomedical Image Processing
ITCS 6226 Bioinformatics
ITCS 6228 Medical Informatics

III.   Area of Concentration

Each student must take at least three related courses (9 hours) to form an area of concentration. The area of concentration may differ from the Course Categories; students are encouraged to have their areas of concentration aligned with faculty research areas. The three courses forming the student's area of concentration must have the written approval of the student's academic advisor. Only one breadth course can be included in the area of concentration courses. Core courses can not be used in area of concentration. At least two of the three courses forming an area of concentration should be from the Department of Computer Science.

Minimum Background Requirements for Admission

Applicants to MS program in Computer Science must have had a computing background equivalent to two years of undergraduate training in Computer Science, including at least an introductory course on programming, a course on data structures, and a course either in operating systems or computer architecture. In addition, background in Mathematics to include courses in Linear Algebra or Statistics, Discrete Mathematics, and at least one year of Calculus is also required. Students without sufficient background in Computer Science or Mathematics may be admitted to the Program but must complete background courses determined by the MS Program Director in the first year.

New Courses:

ITCS 4121. Information Visualization. (3) Prerequisites: ITCS 1215 or approval of the instructor. Information visualization concepts, theories, design principles, popular techniques, evaluation methods, and information visualization applications. (Spring) (Evenings)

ITCS 5121. Information Visualization. (3) Prerequisites: graduate standing. Information visualization concepts, theories, design principles, popular techniques, evaluation methods, and information visualization applications. (Spring) (Evenings)

ITCS 4122. Visual Analytics. (3) Prerequisites: any of STAT 1220, 1221, 1222, 2122, or 2223, or approval of the instructor. This course introduces the new field of visual analytics, which integrates interactive analytical methods and visualization.. Topics include: critical thinking, visual reasoning, perception/cognition, statistical and other analysis techniques, principles of interaction, and applications. (Fall) (Evenings)

ITCS 5122. Visual Analytics. (3) Prerequisites: any of STAT 1220, 1221, 1222, 2122, or 2223, or approval of the instructor. This course introduces the new field of visual analytics, which integrates interactive analytical methods and visualization.. Topics include: critical thinking, visual reasoning, perception/cognition, statistical and other analysis techniques, principles of interaction, and applications. (Fall) (Evenings)

ITCS 4123. Visualization and Visual Communication. (3) Prerequisites: none. Understanding the relatively technical field of visualization from the point of view of visual communication, this course draws connections with photography, design, illustration, aesthetics, and art. Both technical and theoretical aspects of the various fields are covered, and the connections between them are investigated. (Spring) (Evenings)

ITCS 5123. Visualization and Visual Communication. (3) Prerequisites: none. Understanding the relatively technical field of visualization from the point of view of visual communication, this course draws connections with photography, design, illustration, aesthetics, and art. Both technical and theoretical aspects of the various fields are covered, and the connections between them are investigated. (Spring) (Evenings)

ITCS 4133. Numerical Computation Methods and Analysis.(3) Prerequisites: ITCS 2214 and either MATH 1120 or MATH 1241. Introduction to principles and techniques behind numerical methods and algorithms that underlie modern scientific and engineering applications. Roots of equations; linear systems (direct methods, LU/QR factorization, iterative methods); Eigen values and vectors; Interpolation, Approximation; Numerical Differentiation/Integration, ODEs and PDEs. (On Demand).

ITCS 5133. Numerical Computation Methods and Analysis.(3) Prerequisite: ITCS 2214 and either MATH 1120 or MATH 1241. Introduction to principles and techniques behind numerical methods and algorithms that underlie modern scientific and engineering applications. Roots of equations; linear systems (direct methods, LU/QR factorization, iterative methods); Eigen values and vectors; Interpolation, Approximation; Numerical Differentiation/Integration, ODEs and PDEs. (On Demand).

ITCS 4146 Grid Computing. (3) Prerequisite: ITCS 1215.
Grid computing software components, standards, web services, security mechanisms, schedulers and resource brokers, workflow editors, grid portals, grid computing applications. (Spring)

ITCS 5146 Grid Computing. (3) Prerequisite: ITCS 1215 or Graduate Standing.

Grid computing software components, standards, web services, security mechanisms, schedulers and resource brokers, workflow editors, grid portals, grid computing applications. (Spring)

ITCS 4232. Game Design and Development Studio. (3) Prerequisite: ITCS 4120, ITCS 4231, and consent of instructor. Application of advanced concepts and techniques for electronic game design and development. Teams will use engineering techniques to incorporate game programming and scripting, networking, graphics, physics, audio, game data structures and algorithms, and artificial intelligence into an electronic game. Individuals will develop a complete portfolio of prior work and the class project. (Spring) (Evenings)

ITCS 5232. Game Design and Development Studio. (3) Prerequisite: ITCS 5120, ITCS 5231, and consent of instructor. Application of advanced concepts and techniques for electronic game design and development. Teams will use engineering techniques to incorporate game programming and scripting, networking, graphics, physics, audio, game data structures and algorithms, and artificial intelligence into an electronic game. Individuals will develop a complete portfolio of prior work and the class project. (Spring) (Evenings)

ITCS 4235. Game Engine Construction. (3) Prerequisite: ITCS 4120 or Permission of Department. Introduction to principles and techniques behind modern computer and console game engines. Graphics Rendering Pipeline (transformations, lighting, shading); 2D/3D Texture Mapping; Image Based Rendering; Spatial Structures and Acceleration Algorithms; Level of Detail; Collision Detection, Culling and Intersection Methods; Vertex/Pixel Shaders; Pipeline Optimization; Rendering Hardware.(Spring, Alternate Years) (Evenings)

ITCS 5235. Game Engine Construction. (3) Prerequisite: ITCS 5120 or Permission of Department. Introduction to principles and techniques behind modern computer and console game engines. Graphics Rendering Pipeline (transformations, lighting ,shading); 2D/3D Texture Mapping; Image Based Rendering; Spatial Data Structures and Acceleration Algorithms; Level of Detail; Collision Detection, Culling and Intersection Methods; Vertex/Pixel Shaders; Pipeline Optimization; Rendering Hardware. (Spring, Alternate Years) (Evenings)

ITCS 4236. Artificial Intelligence for Computer Games. (3) Prerequisite: ITCS 3153. Application of advanced concepts and techniques in artificial intelligence for electronic game design and development. An investigation of the artificial intelligence techniques necessary for an agent to act, or appear to act, intelligently in interactive virtual worlds. Topics include uncertainty reasoning, machine learning, perception, knowledge representation, search, and planning. Emphasis will be on implementation and experimentation with the goal of building robust intelligent

agents in interactive entertainment domains. Elements of multi-agent collaboration and the use of cognitive architectures in interactive computer games will also be discussed. (On demand)

ITCS 5236. Artificial Intelligence for Computer Games. **(3)** Prerequisite: ITCS 6150 or permission of instructor. Application of advanced concepts and techniques in artificial intelligence for electronic game design and development. An investigation of the artificial intelligence techniques necessary for an agent to act, or appear to act, intelligently in interactive virtual worlds. Topics include uncertainty reasoning, machine learning, perception, knowledge representation, search, and planning. Emphasis will be on implementation and experimentation with the goal of building robust intelligent agents in interactive entertainment domains. Elements of multi-agent collaboration and the use of cognitive architectures in interactive computer games will also be discussed. (On demand)

ITCS 4237. Audio Processing for Entertainment Computing. **(3) Prerequisite: MATH 1242, MATH 2164, and ITCS 2215 or equivalents.** Introduction to the principles and applications of audio (digital signal) processing focusing on entertainment domains. Topics include: analysis of signals, transforms, digital filter design techniques, audio engine development, file encoding/decoding, spatial sound rendering, optimization, and advanced audio techniques. (On demand)

ITCS 5237. Audio Processing for Entertainment Computing. **(3) Prerequisite: MATH 1242, MATH 2164, and ITCS 6114 or equivalents.** Introduction to the principles and applications of audio (digital signal) processing focusing on entertainment domains. Topics include: analysis of signals, transforms, digital filter design techniques, audio engine development, file encoding/decoding, spatial sound rendering, optimization, and advanced audio techniques. (On demand)

ITCS 6124. Illustrative Visualization. (3) Prerequisites: ITCS 4120 or ITCS 5120. This course focuses on advanced concepts and techniques related to the design, implementation, integration, and management of illustrative visualization and computer graphics. Topics include various advanced visualization topics: feature extraction, non-photorealistic rendering, point-based rendering, hardware-accelerated rendering, segmentation, image generation, animation, evaluation, design, and interaction. (Spring) (Evenings)

ITCS 8124. Illustrative Visualization. (3) Prerequisites: ITCS 4120 or ITCS 5120. This course focuses on advanced concepts and techniques related to the design, implementation, integration, and management of illustrative visualization and computer graphics. Topics include various advanced visualization topics: feature extraction, non-photorealistic rendering, point-based rendering, hardware-accelerated rendering, segmentation, image generation, animation, evaluation, design, and interaction. (Spring) (Evenings)

ITCS 6126. Large Scale Information Visualization. (3) Prerequisites: ITCS 4121 or ITCS 5121 Information Visualization. Concept, theory, design principles, data processing techniques, and visual metaphors and interaction techniques for massive, multi-dimensional, multi-source, time-varying information exploration. (Fall) (Evenings)

ITCS 8126. Large Scale Information Visualization.(3) Prerequisites: ITCS 4121 or ITCS 5121 Information Visualization. Concept, theory, design principles, data processing techniques, and visual metaphors and interaction techniques for massive, multi-dimensional, multi-source, time-varying information exploration. (Fall) (Evenings)

ITCS 6127. Real-Time Rendering Engines. (3G). Prerequisites: ITCS 5120 or ITCS 6120. This course focuses on advanced concepts and techniques employed in building real-time rendering systems that support a high level of realism as well as handle large geometric models. Topics include: modern graphics hardware, programmable shaders, shadow and environment mapping, image-based modeling and rendering, large data models (simplification, level of detail), high quality interactive rendering. (On Demand).

ITCS 8127. Real-Time Rendering Engines. (3G). Prerequisites: ITCS 5120 or ITCS 6120. This course focuses on advanced concepts and techniques employed in building real-time rendering systems that support a high level of realism as well as handle large geometric models. Topics include: modern graphics hardware, programmable shaders, shadow and environment mapping, image-based modeling and rendering, large data models (simplification, level of detail), high quality interactive rendering. (On Demand).

ITCS 6128. 3D Display and Advanced Interfaces. (3G). Prerequisites: ITCS 4120 or ITCS 6120. The course covers the fundamentals of 3D display hardware and software technology. Topics include: human visual spatial perception of natural and synthetic 3D images, 3D display hardware, human computer interface algorithms for effective stereoscopic display, 3D display rendering techniques. (On Demand).

ITCS 8128. 3D Display and Advanced Interfaces. (3G). Prerequisites: ITCS 4120 or ITCS 6120. The course covers the fundamentals of 3D display hardware and software technology. Topics include: human visual spatial perception of natural and synthetic 3D images, 3D display hardware, human computer interface algorithms for effective stereoscopic display, 3D display rendering techniques. (On Demand).

ITCS 6159. Intelligent Tutoring Systems. (3) Prerequisite: Graduate standing or permission of the instructor. This course introduces the issues relevant to creating adaptive learning systems using artificial intelligence and includes a project to build a small Intelligent Tutoring System (ITS). Topics include: representation of knowledge and cognition, ITS design, adaptive user interfaces, design and evaluation of feedback, experimental methods, educational data mining, history of intelligent

tutoring, tutor authoring, and issues for implementation. (Fall, alternate years) (Evenings)

ITCS 8159. Intelligent Tutoring Systems. (3) Prerequisite: Graduate standing or permission of the instructor. This course introduces the issues relevant to creating adaptive learning systems using artificial intelligence and includes a project to build a small Intelligent Tutoring System (ITS). Topics include: representation of knowledge and cognition, ITS design, adaptive user interfaces, design and evaluation of feedback, experimental methods, educational data mining, history of intelligent tutoring, tutor authoring, and issues for implementation. (Fall, alternate years) (Evenings)

ITCS 6167. Advanced Networking Protocols. (3) Prerequisites: ITCS 6166 or ITCS 6168. This course focuses on advanced networking concepts and protocols related to the design, implementation, integration, and management of networking and communication systems. Topics include: topology control protocols, ad hoc routing protocols, power management protocols, distributed data processing protocols for various networking systems (Internet, wireless mesh networks, ad hoc networks, sensor networks, peer-to-peer networks). (Spring) (Evenings)

ITCS 8167. Advanced Networking Protocols. (3) Prerequisites: ITCS 6166 or ITCS 8166 or ITCS 6168 or ITCS 8168. This course focuses on advanced networking concepts and protocols related to the design, implementation, integration, and management of networking and communication systems. Topics include: topology control protocols, ad hoc routing protocols, power management protocols, distributed data processing protocols for various networking systems (Internet, wireless mesh networks, ad hoc networks, sensor networks, peer-to-peer networks).   (Spring) (Evenings)

ITCS 6228. Medical Informatics (3) Prerequisites: Graduate Standing. This course focuses on methods and techniques used in storage, communication, processing, analysis, integration, management, and distribution of medical information. The course emphasizes the applications of telemedicine and intelligent computer-aided decision making systems in different medical and surgical systems. The course also discusses the computational methods to accept or reject a new drug or a new treatment for a given disease. (Fall, Alternate years) (Evenings)

ITCS 8228. Medical Informatics (3) Prerequisites: Graduate Standing. This course focuses on methods and techniques used in storage, communication, processing, analysis, integration, management, and distribution of medical information. The course emphasizes the applications of telemedicine and intelligent computer-aided decision making systems in different medical and surgical systems. The course also discusses the computational methods to accept or reject a new drug or a new treatment for a given disease. (Fall, Alternate years) (Evenings)

ITIS 6228. Medical Informatics (3) Prerequisites: Graduate Standing. This course

focuses on methods and techniques used in storage, communication, processing, analysis, integration, management, and distribution of medical information. The course emphasizes the applications of telemedicine and intelligent computer-aided decision making systems in different medical and surgical systems. The course also discusses the computational methods to accept or reject a new drug or a new treatment for a given disease. (Fall, Alternate years) (Evenings)

ITIS 8228. Medical Informatics (3) Prerequisites: Graduate Standing. This course focuses on methods and techniques used in storage, communication, processing, analysis, integration, management, and distribution of medical information. The course emphasizes the applications of telemedicine and intelligent computer-aided decision making systems in different medical and surgical systems. The course also discusses the computational methods to accept or reject a new drug or a new treatment for a given disease. (Fall, Alternate years) (Evenings)