INFORMATION TECHNOLOGY (IT)

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Graduate Program Director: Bee Lim.
Graduate Faculty: Califf, Fang, Han, Javadi, Jia, Li, Lim, Mahatanankoon, Qaddour, Sagers, Saripalle, Sikolia, Suh, Tang, Wolf.

Programs Offered

M.S. in Information Systems with sequences in: Geographic Information Systems, Internet Application Development, Network and Security Management, and Systems Development. Graduate certificates are offered in: Information Assurance and Security, Internet Application Development, Network and Telecommunications Management, and Systems Analyst.

Program Requirements

Within each sequence the student may choose to complete a 36 semester hour thesis option, a 39 semester hour project option, or a 39 semester hour course option. This degree assumes an undergraduate knowledge base in information technology, which students with computer-related undergraduate degrees will typically have acquired. Students lacking sufficient background will need to complete fundamental courses before enrolling in the Information Systems core courses.

All master's degree programs require a minimum of 50 percent of the non-thesis credit hours applied to the degree to be 400-level courses or above.

Students lacking sufficient background should expect to complete some or all of the following courses with a grade of B or better: IT 250 Fundamentals of Information Assurance and Security, IT 254 Hardware and Software Concepts, IT 261 Systems Development I, IT 275 Java as a Second Language OR IT 168 Structured Problem Solving Using the Computer AND IT 178 Computer Applications Programming, IT 276 Data Communications, IT 378 Database Processing.

The graduate advisor will determine specific requirements.

The MS in Information Technology has a 21 hour core requirement: IT 351 or 357, 377, 432, 463, 478, 496, and 497

- IT 497, must be taken during the first year in the program

Geographic Information Systems Sequence:

Option I—Thesis: This 36 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 499 Master's Thesis

- 6 hours: GEO 303, 304

- 3 hours: GEO 488 or IT 467

Option II—Project: This 39 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 494 Master's Project

- 6 hours: GEO 303, 304

- 6 hours: 2 of the following: GEO 305, 488; IT 341, 353, 467

Option III—Courses: This 39 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 3 hours: ENG 349

- 6 hours: GEO 303, 304

- 3 hours: IT 495, Capstone

- 6 hours: 2 of the following: GEO 305, 488; IT 341, 353, 467

Internet Application Development Sequence:

Option I—Thesis: This 36 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 499 Master's Thesis

- 9 hours: IT 353, 354, 358

Option II—Project: This 39 hour sequence requires:

- 21 hour core: IT 351 or 357, 432, IT 478, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 494 Master's Project

- 9 hours: IT 353, 354, 358

- 3 hours: 1 of the following: IT 368, 467, 468, 485

Option III—Courses: This 39 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 3 hours: ENG 349

- 9 hours: IT 353, 354, 358

- 3 hours: IT 495, Capstone

- 3 hours: 1 of the following: IT 368, 467, 468, 485

Network and Security Management Sequence:

Option I—Thesis: This 36 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 499 Master's Thesis

- 6 hours: IT 450, 477

- 3 hours: 1 of the following: IT 351, 357, 370, 374, 376, 379, 381

Option II—Project: This 39 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 494 Master's Project

- 6 hours: IT 450, 477

- 6 hours: 2 of the following: IT 351, 357, 370, 374, 376, 379, 381

Option III—Courses: This 39 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 3 hours: ENG 349

- 6 hours: IT 450, 477

- 3 hours: IT 495, Capstone

- 3 hours: 2 of the following: IT 351, 357, 370, 374, 376, 379, 381

Systems Development Sequence:

Option I—Thesis: This 36 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 499 Master's Thesis

- 6 hours: IT 467, 468

- 3 hours: 1 of the following: IT 341, 368, 485

Option II—Project: This 39 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 6 hours: IT 494 Master's Project

- 6 hours: IT 467, 468

- 6 hours: 2 of the following: IT 341, 368, 485

Option III—Courses: This 39 hour sequence requires:

- 21 hour core: IT 432, IT 478, IT 351 or 357, IT 497, IT 377, IT 463, IT 496

- 3 hours: ENG 349

- 6 hours: IT 467, 468

- 3 hours: IT 495, Capstone

- 6 hours: 2 of the following: IT 341, 368, 485

Graduate Certificate Programs

The School of Information Technology offers several graduate certificate programs. The certificates are designed for individuals who would like to gain specialized knowledge in one of the areas of the certificates without the commitment of completing an entire degree program. The certificate programs provide students with focused studies and exposure to the very latest topics and trends in the IT industry and various opportunities for career advancement. Courses completed as part of the certificates may also be counted towards the requirements of the Master of Science in Information Systems with official admission to the graduate program. Students must apply for the certificate before beginning coursework.

Information Assurance and Security Graduate Certificate

The Information Assurance and Security Graduate Certificate is designed for IT professionals who are interested in continuing education in methodologies and tools necessary for protecting information and information systems. The certificate provides an in-depth study of protecting the confidentiality, availability, and integrity of information using technology, people, and policy. The courses required to receive this certificate have been certified by the National Security Agency; students completing this certificate will also receive certification for the CNSS 4011 national standard.

Two core courses, IT 250 and 450, and one of IT 351 or 357 are required to earn the certificate. Prerequisites: IT 261 or consent of the graduate advisor.

Internet Application Development Graduate Certificate

The Internet Application Development Graduate Certificate is designed to provide a specialized education in emerging technologies for students who seek further

studies in Web development. The certificate is intended to prepare students to meet the growing demand for qualifications in this field. Two core courses, IT 353, 354, and one of IT 467, 468, or 485, are required to earn the certificate. Prerequisites: IT 261 and 276 or consent of the graduate advisor.

Network and Telecommunications Management Graduate Certificate

The Network and Telecommunications Management Graduate Certificate is designed for IT professionals who are interested in pursuing further professional development in the Telecommunications and Networking area. This certificate program prepares students to better understand different network and telecommunications technologies and management methodologies. Two core courses, IT 381 and 477 and one of IT 376 or 377 are required to earn the certificate. Prerequisite: IT 276 or consent of the graduate advisor.

Systems Analyst Graduate Certificate

The Systems Analyst Graduate Certificate is designed for IT professionals who are interested in pursuing further professional development in the Systems Analyst area. This certificate program prepares students to better understand different information systems development methodologies and develop the skills to manage information systems projects. Three courses, IT 432, 463, and 478, are required to earn the certificate. Prerequisites: IT 261 and 378 or consent of the graduate advisor.

Information Technology Courses

Beginning with the 2016-2018 Graduate Catalog, 300-level Information Technology courses are no longer designated with .05 after the number. Only 300-level courses that are in this graduate catalog may be counted toward a graduate program.

326 PRINCIPLES OF SOFTWARE ENGINEERING
3 sem. hrs.
Fundamentals of software engineering. Topics include specification models, metrics, design fundamentals, interface design, quality assurance, and automated tools. Prerequisites: IT 179, 261. Consent of the graduate advisor.

327 CONCEPTS OF PROGRAMMING LANGUAGES
3 sem. hrs.
Survey of pragmatic, syntactic and semantic structure of programming languages. Procedural, logic-oriented, object-oriented and other contemporary languages included. Prerequisite: IT 179. Major or minor only or consent of the graduate advisor.

328 INTRODUCTION TO THE THEORY OF COMPUTATION
3 sem. hrs.
Basic concepts in computing theory. Topics include recursive definitions, regular expressions, transition graphs, automata, nondeterminism, grammars, parsing, decidability, Turing machines. Prerequisite: Major or minor only, a grade of C or better in IT 279 or consent of graduate advisor.

330 INTRODUCTION TO ENTERPRISE COMPUTING SYSTEMS
3 sem. hrs.
Introduction to the mainframe enterprise computing systems, organizations, architectures, operating systems, networking, hardware and software utilities, and applications. Prerequisite: Grade of C or better in IT 225 or 254. Major or minor only or consent of the graduate advisor.

340 INTRODUCTION TO ARTIFICIAL INTELLIGENCE
3 sem. hrs.
Foundations of artificial intelligence including heuristic search and knowledge representation with a survey of several artificial intelligence research areas. Prerequisite: Major or minor only, grade of C or better in IT 279 or consent of graduate advisor.

341 OBJECT-ORIENTED SYSTEM DEVELOPMENT
3 sem. hrs.
Main concepts of object-oriented technology and a comprehensive methodology for system development. Object-oriented analysis, design, and implementation including object-oriented databases. Prerequisites: Grade of C or better in IT 261; major or minor only or consent of the graduate advisor.

345 ADVANCED BUSINESS INTELLIGENCE AND DATA WAREHOUSING
3 sem. hrs.
Topics covered include data warehousing, big data, data governance, and the future of the business intelligence field. Prerequisite: Grade of C or better in IT 378.

351 PRACTICAL CRYPTOGRAPHY AND TRUSTED SYSTEMS
3 sem. hrs.
Practical cryptography and its applications, authentication protocols, access controls and trusted systems. Formerly ADVANCED INFORMATION ASSURANCE AND APPLIED CRYPTOGRAPHY. Prerequisites: Grade of C or better in IT 250 or 226 and 276. Major or minor only or consent of the graduate advisor.

353 WEB DEVELOPMENT TECHNOLOGIES
3 sem. hrs.

Web concepts, infrastructure, development technologies, multi-tiered program design and implementation, and current issues and trends. Prerequisite: Grade of C or better in IT 261; major or minor only or consent of the graduate advisor.

354 ADVANCED WEB APPLICATION DEVELOPMENT
3 sem. hrs.

Theory and practice of state-of-the-art technologies for application development for the Web including service-oriented and mobile systems. Prerequisite: Grade of C or better in IT 353; major or minor only or consent of the graduate advisor.

356 INTRODUCTION TO COMPUTER GRAPHICS
3 sem. hrs.

Graphics software and hardware, pipeline model of rendering; 2-D and 3-D modeling, transformations. Algorithms: polygons, lighting, textures, visibility. Prerequisite: IT 279; major or minor only or consent of the graduate advisor.

357 TOOLS AND TECHNIQUES IN INFORMATION ASSURANCE AND SECURITY
3 sem. hrs.

Application of current tools and techniques in information assurance and security including monitoring, malware, penetration testing, and data forensics. Prerequisite: Grade of C or better in IT 250 and 276.

358 MOBILE AND CLOUD COMPUTING
3 sem. hrs.

Develop, deploy, and troubleshoot mobile and cloud computing applications. Prerequisite: Grade of C or better in IT 353, or consent of the graduate advisor.

367 DESIGNING THE USER INTERFACE
3 sem. hrs.

Human factors issues in developing information systems: task analysis, user interface design guidelines, psychological principles, prototyping interfaces, and user evaluation. Prerequisite: Grade of C or better in IT 261; major or minor only or consent of the graduate advisor.

368 TOPICS IN INFORMATION SYSTEMS
3 sem. hrs.

Advanced topics in information systems, including systems analysis, design, and systems development, and Web development. Multiple enrollments allowed if content is different. Prerequisite: Major or minor only or consent of the graduate advisor. Prerequisites vary with topic chosen.

368A16 MANAGING IT SERVICES
3 sem. hrs.

The entire Information Technology Infrastructure Library (ITIL) service lifecycle, consisting of five interrelated phases is introduced and narrated with real-world scenarios and case studies. Prerequisite: Information Systems or Computer Science major or minor or consent of the graduate advisor.

368A17 ENTERPRISE RESOURCE PLANNING
3 sem. hrs.

This course provides students with a comprehensive evaluation of Enterprise Resource Planning (ERP) from managerial and technical aspects. Prerequisites: Major or minor only or consent of the department advisor. A grade of C or better in IT 261 and COM 223 or consent of the graduate advisor.

370 SERVER MANAGEMENT
3 sem. hrs.

Build, manage and troubleshoot server hardware and software. Prerequisite: Grade of C or better in IT 377, or consent of the graduate advisor.

372 EXTERNAL DATA STRUCTURES
3 sem. hrs.

External file design, VSAM, IBM utilities and sort/merge, basic concepts of IBM/MVS operating systems, and extensive study of JCL. Prerequisites: Grade of C or better in IT 254 and 272; major or minor only or consent of the graduate advisor.

374 TOPICS IN TELECOMMUNICATIONS
3 sem. hrs.

In-depth study of a topic in Telecommunications such as emerging technologies, network administration, network management architectures and wireless communications. Multiple enrollments allowed if content is different. Prerequisites: Major or minor only or consent of the graduate advisor. Prerequisites vary with topic chosen.

376 WIRELESS AND MOBILE NETWORK SECURITY
3 sem. hrs.

Overview of fundamental principles and security algorithms of security in wireless networks. Emphasis is on application, design, and analysis. Prerequisite: Grade of C or better in IT 276. Major or minor only or consent of the school advisor.

377 PRACTICAL TELECOMMUNICATIONS NETWORKING
3 sem. hrs.

Design, configure, operate and use Local Area Networks, network applications, and wide area network concepts. Emphasizing hands-on use of a network operating system. Prerequisite: Grade of C or better in IT 276. Major or minor only or consent of the school advisor.

379 ADVANCED COMPUTER NETWORKS
3 sem. hrs.
Explore the latest advances in networking with emphasis on practical hands-on learning. Formerly TELECOMMUNICATIONS NETWORK OPERATIONS AND MANAGEMENT. Prerequisites: Grade of C or better in IT 377, or consent of the school advisor.

378 DATABASE PROCESSING
3 sem. hrs.
Database concepts, emphasis on relational databases, SQL, data modeling, database design, DBMS functions, database application programming, current trends, design project. Prerequisite: Grade of C or better in IT 261. Major or minor only or consent of the graduate advisor. Not for credit in the IT graduate program.

380 WIRELESS COMMUNICATION SYSTEMS
3 sem. hrs.
Theory and practice of wireless telecommunications systems. Emphasis is on application, design, and analysis of wireless systems. Prerequisite: Grade of C or better in IT 276. Major or minor only or consent of the school advisor.

381 NETWORK DESIGN AND ANALYSIS
3 sem. hrs.
Analyze user internetworking requirements; design and implement a network infrastructure that can meet the user requirements. Prerequisites: Grade of C or better in IT 373 and 377, or consent of the graduate advisor.

382 DISTRIBUTED SYSTEMS
3 sem. hrs.
Overview of distributed systems including system architectures, models, distributed operating systems, distributed algorithms, distributed databases, distributed objects, issues and trends. Prerequisites: Grade of C or better in IT 179 and 225 and 261; major or minor only or consent of the graduate advisor.

383 PRINCIPLES OF OPERATING SYSTEMS
3 sem. hrs.
Functional criteria for operating system design. Job management, task management, data management, resource allocation and dump and trace facilities. Prerequisites: Grade of C or better in IT 225 and 226; consent of the graduate advisor.

385 TOPICS IN COMPUTER SCIENCE
3 sem. hrs.
In-depth study of a topic such as compiler design, artificial intelligence, programming language, and digital logic design. Multiple enrollments allowed if content is different. Offered alternate years. Prerequisites: Major or minor only or consent of the graduate advisor. Prerequisites vary with topic chosen.

385A16 ENTERPRISE RESOURCE PLANNING
3 sem. hrs.
This course provides students with a comprehensive evaluation of Enterprise Resource Planning (ERP) from managerial and technical aspects. Prerequisites: Major or minor only or consent of the graduate advisor. A grade of C or better in IT 261 and COM 223, or consent of the graduate advisor.

388 INTRODUCTION TO PARALLEL PROCESSING
3 sem. hrs.
Study of parallel processors and their software environments. Students will write programs for several parallel computers. Prerequisites: Grade of C or better in IT 225; concurrent registration in IT 279; major or minor only or consent of the graduate advisor.

392 ENTERPRISE SYSTEMS INTEGRATION AND APPLICATION DEVELOPMENT
3 sem. hrs.
Capstone course including business applications, systems integration, enterprise business decisions, systems administration, and the systems deployment life cycle. Prerequisites: Grade of C or better in IT 332 and 378; major or minor only or consent of graduate advisor.

400 INDEPENDENT STUDY
1-3 sem. hrs.
Refer to the Index for General Courses. Prerequisite: Consent of the department.

432 SYSTEMS ANALYSIS AND DESIGN
3 sem. hrs.
Study of systems development life-cycle emphasizing current techniques for documenting users' requirements and producing maintainable, cost effective systems. Not for credit if IT 363 has already been taken. Prerequisites: IT 261 and a two-semester sequence of courses in a high-level programming language or consent of the graduate advisor.

450 POLICY AND ADMINISTRATION IN INFORMATION ASSURANCE AND SECURITY
3 sem. hrs.
Detailed look into the issues involved in managing information security in organizations. Prerequisite: IT 250 or consent of the graduate advisor.

463 INFORMATION TECHNOLOGY PROJECT MANAGEMENT
3 sem. hrs.
Techniques for planning and supervising software development and infrastructure related projects, including defining project scope, allocating resources, projecting costs, and tracking project progress. Prerequisite: IT 432, or consent of the graduate advisor.

467 HUMAN FACTORS IN INFORMATION SYSTEMS
3 sem. hrs.
Human factors issues in developing information systems: design guidelines, psychological principles, incorporation into a systems development life cycle. Prerequisite: IT 432 or consent of the graduate advisor.

468 SOFTWARE QUALITY ASSURANCE AND TESTING
3 sem. hrs.
Major techniques for improving software quality; quality assurance, software controls, and software testing. Prerequisite: IT 432 or consent of the graduate advisor.

477 CONVERGED NETWORK ARCHITECTURES
3 sem. hrs.
Modern technologies for the management, automation, and orchestration of converged networking systems. Prerequisite: IT 377 or consent of the graduate advisor.

478 ADVANCED DATABASE MANAGEMENT
3 sem. hrs.
Theory, design, and implementation of application systems using database technology. Data modeling, database administration, database implementation, performance issues, current trends. Prerequisite: IT 378 or consent of the graduate advisor.

485 ADVANCED TOPICS IN INFORMATION SYSTEMS
3 sem. hrs.
In-depth study of an advanced, state-of-the-art topic in information systems. Multiple enrollments allowed if topic is different. Formerly ADVANCED TOPICS IN SYSTEMS DEVELOPMENT. Prerequisite: Consent of the graduate advisor.

485A02 ADVANCED TOPICS IN SYSTEMS DEVELOPMENT: WEB SITE DEVELOPMENT, .NET TECHNOLOGY
3 sem. hrs.
State-of-the-art web application development using .NET technologies; Current practices and trends. Prerequisite: Consent of the graduate advisor.

494 GRADUATE DIRECTED PROJECT
1-4 sem. hrs.
Software development practicum for graduate students. Designed to integrate computer related skills in an intensive project environment. Multiple enrollments allowed. A maximum of 6 hours may be counted toward a master's degree. Prerequisite: Consent of Graduate Program Committee.

495 INFORMATION TECHNOLOGY CAPSTONE
3 sem. hrs.
A culminating course emphasizing actual design and implementation of information systems by applying systems development, programming, and project management concepts. Prerequisites: 15 hours of 400-level IT courses, including IT 432 and 463.

496 INFORMATION TECHNOLOGY STRATEGY AND POLICY
3 sem. hrs.
Analytical study of the use of information systems technology to develop and maintain a strategic competitive advantage. Prerequisites: IT 432 and 463, or consent of graduate advisor.

497 INTRODUCTION TO RESEARCH METHODOLOGY
3 sem. hrs.
Introduction to the design, evaluation, and understanding of qualitative and quantitative research methodologies. Prerequisites: IT 276 and 378, or consent of the graduate advisor.

498 PROFESSIONAL PRACTICE IN INFORMATION TECHNOLOGY
1-6 sem. hrs.
Refer to Index for General Courses. Supervised work experience in the field of information technology. Prerequisites: Completion of 18 credit hours or more in the IT master's program and consent of graduate advisor. Not for credit toward 400-level course requirements or elective requirements.

499 MASTER'S THESIS
1-6 sem. hrs.
Refer to Index for General Courses.