MASTER OF SCIENCE IN COMPUTER APPLICATION (MSCA)

(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structure	3				
ICT 202	Computer Organization and Architecture	3				
ICT 205	Computer Interfacing	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 204	Numerical Methods	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
ICT 299	Research Seminar	1				
	Total	10				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 399	Master's Thesis	6				
	Total	6				

Specialization Courses

ICT 132 Biomedical Informatics
ICT 240 Computer simulation and Modeling
ICT 249 Mobile Computing
ICT 285 Robotic Systems
ICT 287 Biomorphic Computation
ICT 290 Digital Signal Processing
ICT 291 Digital Audio Processing
ICT 292 Digital Image Processing
ICT 293 Digital Image Analysis
ICT 294 Advanced Multimedia Systems
ICT 295 Computer Vision I
ICT 296 Computer Vision II
ICT 297 Introduction to Biomedical Imaging

MASTER OF SCIENCE IN COMPUTER SCIENCE

Degree Requirements

Core Courses	12 units
Specialization Courses	18
Research Seminar	1
Thesis	6
Comprehensive Examination	
Total	**37 units**

MASTER OF SCIENCE IN COMPUTER SCIENCE (MSCS)
(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structures	3				
ICT 202	Computer Organization and Architecture	3				
SC	Specialization Course	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 203	Programming Languages for Computer Science and Information Technology	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
ICT 299	Research Seminar	1				
	Total	10				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 399	Master's Thesis	6				
	Total	6				

Specialization Courses

ICT 212	Parallel Algorithms
ICT 221	programming Language Implementation (compiler Design and Construction)
ICT 232	Biomedical Informatics
ICT 233	Probabilistic Methods in computer Science
ICT 240	Computer simulation and Modeling
ICT 242	Theory of Computation
ICT 247	Cryptography
ICT 248	Computational Mathematics
ICT285	Robotic systems
ICT 286	Models of Symbolic Learning
ICT 287	Biomorphic Computation
ICT 312	Advanced Algorithms and Randomized Algorithms
ICT 330	Advanced Scientific Computing
ICT 340	Advanced Topics in Computational Science

MASTER OF SCIENCE IN INFORMATION MANAGEMENT

Degree Requirements

Core Courses	12 units
Specialization Courses	18
Research Seminar	1
Thesis	6
Comprehensive Examination	
Total	**37 units**

MASTER OF SCIENCE IN INFORMATION MANAGEMENT (MSIM)
(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structures	3				
ICT 202	Computer Organization and Architecture	3				
SC	Specialization Course	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 203	Programming Languages for Computer Science and Information Technology	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
ICT 299	Research Seminar	1				
	Total	10				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 399	Master's Thesis	6				
	Total	6				

Specialization Courses

ICT 256	Design of Interactive systems
ICT 261	Developing multimedia Information Systems
ICT 270	Information Organization and Retrieval
ICT 271	Information Users Society
ICT 272	Distributed Computing Applications and Infrastructure
ICT 273	Information Technology Management
ICT 274	IS Policy and Strategy
ICT 278	Analysis of Information Organization and Systems
ICT 279	Group and Organizational Approaches to Information Systems
ICT 303	Information In Society
ICT 276	User Interface Design and Development
ICT 280	Management of Information Systems and Services
ICT 283	Project and Change Management
ICT 288	Information policy
ICT 289	Strategic Computing and Communications Technology
ICT 252	Economic methods for Decision Making
ICT 257	Economics of Information
ICT 258	Legal Issues in Information Management
ICT 259	Intellectual Property
ICT 263	Principles of Information Retrieval
ICT 264	Organization of Information in Collections

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

Degree Requirements

Core Courses	12 units
Specialization Courses	18
Research Seminar	1
Thesis	6
Comprehensive Examination	
Total	**37 units**

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY (MSIT)
(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structures	3				
ICT 202	Computer Organization and Architecture	3				
SC	Specialization Course	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 203	Programming Languages for Computer Science and Information Technology	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
ICT 299	Research Seminar	1				
	Total	10				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 399	Master's Thesis	6				
	Total	6				

Specialization Courses

ICT 212	Parallel Algorithms
ICT 208	Computational Complexity / Complexity Theory
ICT 249	Mobile computing
ICT 254	Software Reliability and Reusability
ICT 256	Design of Interactive Systems
ICT 261	Developing Multimedia Information Systems
ICT 273	Information Technology Management
ICT 283	Project and Change Management

MASTER OF COMPUTER APPLICATIONS

Degree Requirements

Core Courses	15 units
Specialization Courses	15
Research Seminar	1
Thesis	6
Comprehensive Examination	
Total	**37 units**

MASTER OF COMPUTER APPLICATION (MCA)

(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structure	3				
ICT 202	Computer Organization and Architecture	3				
ICT 205	Computer Interfacing	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 204	Numerical Methods	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
ICT 299	Research Seminar	1				
	Total	10				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 398	Special Projects	3				
SC	Specialization Course	3				
	Total	6				

Specialization Courses

ICT 132	Biomedical Informatics
ICT 240	Computer simulation and Modeling
ICT 249	Mobile Computing
ICT 285	Robotic Systems
ICT 287	Biomorphic Computation
ICT 290	Digital Signal Processing
ICT 291	Digital Audio Processing
ICT 292	Digital Image Processing
ICT 293	Digital Image Analysis
ICT 294	Advanced Multimedia Systems
ICT 295	Computer Vision I
ICT 296	Computer Vision II
ICT 297	Introduction to Biomedical Imaging

MASTER OF COMPUTER SCIENCE

Degree Requirements

Core Courses	12 units
Specialization Courses	27
Research Seminar	1
Special Projects	3
Comprehensive Examination	
Total	**43 units**

MASTER OF COMPUTER SCIENCE (MCS)
(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structures	3				
ICT 202	Computer Organization and Architecture	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 203	Programming Languages for Computer Science and Information Technology	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	1				
	Total	12				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 398	Special Projects	3				
SC	Specialization Course	3				
	Total	6				

Specialization Courses

ICT 212 Parallel Algorithms
ICT 221 programming Language Implementation (compiler Design and Construction)
ICT 232 Biomedical Informatics
ICT 233 Probabilistic Methods in computer Science
ICT 240 Computer simulation and Modeling
ICT 242 Theory of Computation
ICT 247 Cryptography
ICT 248 Computational Mathematics
ICT285 Robotic systems
ICT 286 Models of Symbolic Learning
ICT 287 Biomorphic Computation
ICT 312 Advanced Algorithms and Randomized Algorithms
ICT 330 Advanced Scientific Computing
ICT 340 Advanced Topics in Computational Science

MASTER OF INFORMATION MANAGEMENT

Degree Requirements

Core Courses	12 units
Specialization Courses	27
Research Seminar	1
Special Projects	3
Comprehensive Examination	
Total	**43 units**

MASTER OF INFORMATION MANAGEMENT (MIM)

(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structures	3				
ICT 202	Computer Organization and Architecture	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 207	Programming Languages for Information Management	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 398	Special Projects	3				
SC	Specialization Course	3				
	Total	6				

Specialization Courses

ICT 256	Design of Interactive systems
ICT 261	Developing multimedia Information Systems
ICT 270	Information Organization and Retrieval
ICT 271	Information Users Society
ICT 272	Distributed Computing Applications and Infrastructure
ICT 273	Information Technology Management
ICT 274	IS Policy and Strategy
ICT 278	Analysis of Information Organization and Systems
ICT 279	Group and Organizational Approaches to Information Systems
ICT 303	Information In Society
ICT 276	User Interface Design and Development
ICT 280	Management of Information Systems and Services
ICT 283	Project and Change Management
ICT 288	Information policy
ICT 289	Strategic Computing and Communications Technology
ICT 252	Economic methods for Decision Making
ICT 257	Economics of Information
ICT 258	Legal Issues in Information Management
ICT 259	Intellectual Property
ICT 263	Principles of Information Retrieval
ICT 264	Organization of Information in Collections

MASTER OF INFORMATION TECHNOLOGY

Degree Requirements

Core Courses	12 units
Specialization Courses	27
Research Seminar	1
Special Projects	3
Comprehensive Examination	
Total	**43 units**

MASTER OF INFORMATION TECHNOLOGY (MIT)

(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 201	Data Structures	3				
ICT 202	Computer Organization and Architecture	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 206	Operating Systems	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
	Total	12				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 203	Programming Languages for Computer Science and Information Technology	3				
SC	Specialization Course	3				
SC	Specialization Course	3				
SC	Specialization Course	1				
	Total	12				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
ICT 398	Special Projects	3				
SC	Specialization Course	3				
	Total	6				

Specialization Courses

ICT 212	Parallel Algorithms
ICT 208	Computational Complexity / Complexity Theory
ICT 249	Mobile computing
ICT 254	Software Reliability and Reusability
ICT 256	Design of Interactive Systems
ICT 261	Developing Multimedia Information Systems
ICT 273	Information Technology Management
ICT 283	Project and Change Management

CATALOGUE OF COURSES

ICT 200 INTRODUCTION TO APPLIED LOGIC

Structures: relations between structures, term structures; description: rotation and meaning, substitution operations, first order formulas, database languages, program verification conditions, semantics valuation, normal forms, quantifier reduction, axiomatic theories; proof: resolution, sequential calculi, natural deduction, automated theorem proving, semantic completeness; limits of formalization: compactness, undecidability of truth, undecidability of canonical theories, non-formalizability of database theory.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 201 DATA STRUCTURES

Advanced data structures; algorithm design techniques and mathematical tools in the analysis of algorithms: models, recurrences, summations, growth rates; probabilistic techniques, upper and lower bounds; worst-case and average-case analysis, amortized analysis, dynamization; comparison-based algorithms: search, selection, sorting, hashing; information extraction algorithms (graphs, databases); graphs algorithms: spanning trees, shortest paths, connectivity, depth-first search, breadth-first search.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 202 COMPUTER ORGANIZATION AND ARCHITECTURE

Basic computer logic: truth tables; logic equations, gates, combinatorial logic; basic computer arithmetic; binary numbers; addition and subtraction; floating point representation; system hierarchy; integrated circuit technology; performance; metrics; closing benchmarks; Amhdal's law; instruction sets and operations; MIPS; assembly Language; machine language; examples of other instruction sets.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 203 PROGRAMMING LANGUAGES FOR COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Systematic approach to programming languages, relationships among languages, properties and features of languages: imperative, functional, logic-based and object-oriented.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 204 NUMERICAL METHODS/ANALYSIS

Topics include numerical solution of algebraic and transcendental equations; linear systems and the algebraic eigenvalue problem; interpolation and approximation; numerical integration; difference equations; numerical solution of differential equations; and finite difference methods.

Credit : 3 units (3 hrs lec / 0 hrs lab)
Prerequisite(s) : None

ICT 205 COMPUTER INTERFACING

The course includes the discussion of the parallel port and the serial port of a PC, both the hardware and the software and its communication with the internal circuit.

Credit : 3 units (3 hrs lec, 0 hrs lab)

Prerequisite(s) : None

ICT 206 OPERATING SYSTEMS

Topics include operating system structures, multiprogramming and multiprocessing; process management; memory management; storage management, I/O systems; distributed systems; protection and security.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 207 PROGRAMMING LANGUAGES FOR INFORMATION MANAGEMENT

Topics include survey of different programming languages, evaluation and performance of each programming language, relationships and features. This course is intended for Information Management and may not be credited for Computer Science and Information Technology.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 208 COMPUTATIONAL COMPLEXITY / COMPLEXITY THEORY

Computational complexity classes, their intrinsic properties and relations between them; time and space computational complexity; classification of decision problems; complexity of optimization problems; reducibility and completeness of problems within complexity of classes, circuit complexity classes; space-time, memory-hierarchy tradeoffs; hard and complete problems; relativization of the P=? NP conjecture; parallel computation models and the class NC.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 242 (Theory of Computation)

ICT 209 SPECIFICATION AND VERIFICATION

Topics include tools and techniques for rigorous reasoning about software and digital hardware; safety, reliability, security, and other design-critical applications; decision algorithms; projects involving the use of automated reasoning, such as model checkers, theorem provers, and program transformation.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 210 DATA COMMUNICATIONS AND NETWORKING

Managerial level of technical knowledge and terminology for data, voice, image, and video communications and computer networks to effectively communicate with technical, operational and management people in telecommunications.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 202 (Computer Organization and Architecture)

ICT 212 PARALLEL ALGORITHMS

Models of parallel computation; performance measures, scalability, pipelining techniques for analyzing parallel algorithms; interconnection network topologies; and applications.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 202 (Computer Organization and Architecture)

ICT 213 NETWORK PERFORMANCE AND MONITORING

Network performance evaluation; measurement techniques and tools; simulation, queuing models, case studies and applications.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None ICT 210 (Data Communications and Networking) or Consent of Instructor.

ICT 221 PROGRAMMING LANGUAGE IMPLEMENTATION (COMPILER DESIGN AND CONSTRUCTION)

The implementation of traditional and nontraditional computer programming languages; compilation including lexical analysis, parsing, optimization, code generation, testing and techniques in error correction and recovery; run-time support including run-time libraries, storage management, input-output; comparison of implementation techniques and extensive laboratory exercises and project.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 203 (Programming Languages for Computer Science and Information Technology)

ICT 230 SCIENTIFIC COMPUTING

Overview of computer hardware, software, and numerical methods that are useful on scientific workstations and supercomputers; high-performance computer architectures, software tools and packages; characteristics of numerical methods in common use; graphical presentation of results and performance analysis and improvement.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None Consent of Instructor

ICT 232 BIOMEDICAL INFORMATICS

Computational methods for managing and analyzing information about biomedical systems; standards and tools in biomedical informatics.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None Consent of Instructor

ICT 233 PROBABILISTIC METHODS IN COMPUTER SCIENCE

Random combinatorial structures and their applications to computer science.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None Consent of Instructor

ICT 240 COMPUTER SIMULATION AND MODELING

Basic principles of simulation and simulation languages; overview of probability theory; mathematical modeling; random number generation; discrete simulation models; queuing theory and stochastic processes; applications and comparison of simulation languages.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 242 THEORY OF COMPUTATION

Deterministic and nondeterministic automata; regular expressions; pumping lemmas; context-free languages; parsing; pushdown automata; context-sensitive languages; LBA, LR(k) languages; closure and decidability of language classes; Turing machines; random access machines; grammars; general recursive functions; equivalence of computation models; universal machines; relative computing; unsolvability, semi-recursive sets and Rice's Theorem.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : CSc 133 (Theory of Computation) and Consent of Instructor

ICT 243 COMPUTER GRAPHICS

Introduction to graphics hardware and software; two-dimensional graphics methods; transformations, and interactive methods; three-dimensional graphics; transformations; viewing geometry, object modeling and interactive manipulation methods; basic lighting and shading; video and animation methods.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 245 NETWORK OPTIMIZATION

Algorithms for network optimization problems; shortest paths, maximum flows; minimum cuts; matching, assignment problems and applications.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 247 CRYPTOGRAPHY

Primality testing; finite fields; elliptic curves; protocols: public key cryptography, digital signatures; zero-knowledge proofs, and other cryptographic protocols.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 248 COMPUTATIONAL MATHEMATICS

Overview of computational mathematics; algorithms for computing with algebraic structures and computer algebra systems.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 249 MOBILE COMPUTING

Mobile computing systems; data management; packet transmission; mobile IP; routing protocols; reliability and issues in mobile wireless networks.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 250 SOFTWARE ENGINEERING ECONOMICS

Economic perspectives on software engineering; historical evolution of software knowledge capital; cost effectiveness analysis; technology investments; cost and constraint models; cost estimation technologies; software estimation methods; COCOMO; SLIM; function point cost estimation models; activity based costing; validation of software effort and schedule models; and valuation of software as knowledge capital.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 251 DATABASE SYSTEMS

Physical and logical organization; file structures; indexing; entity relationship model; hierarchical, network and relational models; normalization; query languages and database logic; stored procedures; security and management.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 252 ECONOMIC METHODS FOR DECISION MAKING

Use of economic methods for management decisions; understanding costs and pricing; microeconomics for information and information organizations; financial management.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 253 ISSUES, TRENDS, AND STRATEGIES FOR COMPUTER SYSTEMS MANAGEMENT

Technological advances in computer systems; problems relating to ethics, security, the proliferation databases, risk analysis, telecommunications, artificial intelligence, and human-machine interaction.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 254 SOFTWARE RELIABILITY AND REUSABILITY

Principles of reliability, reusability, initiatives, and standards in software engineering, such as function point as a measure of complexity and reliability; software reliability models; software fault analysis; types of software errors; types of design errors and inherent characteristics of software that determine reliability; software redundancy; automating tools for software reliability prototypes; and real-time software reliability.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 255 INTRUSION DETECTION, INCIDENT RESONSE, AND COMPUTER FORENSICS

Theory, skills, and tools needed in intrusion detection and computer forensics; techniques for identifying vulnerable target systems and types of malicious code, for mitigating security risks, ad for recognizing attack patterns; the conceptual and operational tools necessary for analysis and resolution of problems with respect to effective filters and firewalls; attack tracing; system recovery; continuity of operation; evidence collection; evidence analysis; and prosecution.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 256 DESIGN OF INTERACTIVE SYSTEMS

Interactive design, iterative design, usability analysis, prototyping and evaluation, mental models, conceptual models, interaction styles, the use of guidelines; normative, descriptive and formative

approaches to work analysis; modeling user's activities, defining and validating requirements, presenting interactive system designs, and the theoretical foundations underlying the design of interactive systems.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 257 ECONOMICS OF INFORMATION

Measurement and analysis of the role information plays in the economy and the resources devoted to production, distribution, and consumption of information; economic analysis of the information industry; macroeconomics of information.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 258 LEGAL ISSUES IN INFORMATION MANAGEMENT

Introduction to legal issues in information management, antitrust, contract management, international law including intellectual property, trans-border data flow, privacy, libel, and constitutional rights.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 259 INTELLECTUAL PROPERTY

Philosophical, legal, historical, and economic analysis needed for and uses of laws protecting intellectual property; types of intellectual property (copyright, patent, trade secrecy), the interaction between law and technology, various approaches (including compulsory licensing), and the relationship between the intellectual property and compatibility standards.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 261 DEVELOPING MULTIMEDIA INFORMATION SYSTEMS

Concepts and practices associated with the creation, utilization and evaluation of multimedia for information delivery; basics of digitizing and manipulating text, sound and video/still images; and multimedia design and implementation.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 262 DISTRIBUTED DATABASE SYSTEMS

File allocation; dead-lock detection and prevention, synchronization; update consistency; query optimization and fault tolerance.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 263 PRINCIPLES OF INFORMATION RETRIEVAL

Theories and methods for searching and retrieval of text and bibliographic information; analysis of relevance, utility; statistical and linguistic methods for
automatic indexing and classification.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 270 (Information and Organization Retrieval) or Consent of Instructor

ICT 264 ORGANIZATION OF INFORMATION IN COLLECTIONS

Standards and practices for description and organization for bibliographic, textual, and nontextual collections; design, selection, maintenance and evaluation of cataloging, classification, indexing and thesaurus systems for particular settings; vocabulary control; codes, formats and standards for data representation and transfer.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 270 (Information and Organization Retrieval) or consent of Instructor

ICT 265 EXPERT SYSTEMS

Artificial intelligence; cognitive psychology; linguistics; and philosophy; dialog structure interface; inference engine techniques; knowledge base representations; explanations certainty factors and human factors; expert system construction: problem selection; knowledge acquisition, representation, and programming; evaluation; and maintenance.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 267 DATA WAREHOUSE TECHNOLOGIES

Designing and implementing a data warehouse; data model approaches; and performance challenges.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 270 INFORMATION ORAGANIZATION AND RETRIEVAL

Organization, representation, and access to information; categorization, indexing, and content analysis; data structures; design and maintenance of databases, indexes, classification schemes, and thesauri; use of codes, formats and standards; analysis and evaluation of search and navigation techniques.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 271 INFORMATION USERS AND SOCIETY

Impact of information and information systems, technology, practices, and artifacts on how people organize their work, interact, and understand experience; social issues in information systems design and management: assessing user needs, involving users in system design, and understanding human-computer interaction and computer-mediated work and communication; use of law and other policies to mediate the tension between free flow and constriction of information.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 272 DISTRIBUTED COMPUTING APPLICATIONS AND INFRASTRUCTURE

Technical side of distributed computing, complexity management, concurrency, protocols, security, performance, networking, and middleware; application examples including collaboration, electronic commerce; information access and control; economics and policy considerations.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 273 INFORMATION TECHNOLOGY MANAGEMENT

Principles and guidelines in managing hardware and software technology; system architecture for single user, central and networked computing systems; and single and multi-user operating systems.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 274 IS POLICY AND STRATEGY

Development and implementation of policies and plans to achieve organizational goals;

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 281 (Software Engineering)

ICT 275 NEURAL NETWORKS

Basic principles and history of neurocomputing; various models and their common ideas; applications in machine learning and pattern recognition and hybrid system.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 276 USER INTERFACE DESIGN AND DEVELOPMENT

User interface design and human-computer interaction; examination of alternative design; tools and methods for design and development; human computer interaction; methods for measuring and evaluating interface quality.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 271 (Information Users and Society) or Consent of Instructor

ICT 277 ARTIFICIAL INTELLIGENCE

Propositional and predicate logic, notions of logical consequence and provability, soundness and completeness of inference methods, resolution and unification; theorem proving; definition of AI; heuristic, adversary and other search methods for problem solving and games; principles of knowledge representation; AI languages and survey applications.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 278 ANALYSIS OF INFORMATION ORGANIZATIONS AND SYSTEMS

Project planning and scheduling, process design, project management and coordination; analysis of alternatives, design of alternatives; quantitative methods and tools for analysis and decision making; document management; design implementation, and evaluation of a project.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 270 (Information Organization and Retrieval), ICT 271 (Information Users and Society) and ICT 272 (Distributed Computing Applications and Infrastructure)

ICT 279 GROUP AND ORGANIZATIONAL APPROACHES TO INFORMATION SYSTEMS

Transmission and use of information within groups such as work groups and organizations; information flows in organizations; organizations as information processors; collaboration; computer assisted cooperative work; influencing strategies; adoption of innovation; the uses of information for coordination and communications within organizations.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 271 (Information Users and Society) or Consent of Instructor

ICT 280 MANAGEMENT OF INFORMATION SYSTEMS AND SERVICES

Introduction to internal and external management issues and practices in information organizations; internal issues: organizational behavior; organizational
theory; personnel; budgeting; planning; external issues: organizational environments, politics, marketing, strategic planning, funding sources.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 271 (Information Users and Society) or Consent of Instructor

ICT 281 SOFTWARE ENGINEERING

Software engineering principles; and systems analysis and design processes.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 280 (Data Management)

ICT 282 SOFTWARE DESIGN AND DEVELOPMENT METHODOLOGY

Design, analysis, implementation and testing of software used in information management.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 283 PROJECT AND CHANGE MANAGEMENT

Development of detailed project plans, schedules, and budgets; estimate project resources; allocate/coordinate resources; and interface with management.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 281 (Software Engineering)

ICT 284 INTELLIGENT SYSTEMS

Major issues and approaches in artificial intelligence; principles of reactive, goal-based, and utility-based agents; problem-solving, intelligent search optimization methods; knowledge representation and design of representational vocabularies; inference and theorem proving, reasoning under uncertainty, and planning; overview of machine learning, natural language understanding; speech and pattern recognition; other current methods in intelligent systems.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : Computer Programming and Consent of Instructor

ICT 285 ROBOTIC SYSTEMS

Biologically-motivated robotic systems; reactive, deliberative, and hybrid architectures; knowledge representation for robotic systems; sensor fusion and perceptual strategies; and adaptation and social behavior.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 284 (Intelligent Systems) or equivalent

ICT 286 MODELS OF SYMBOLIC LEARNING

Symbolic artificial intelligence methods for learning; inductive and explanation-based generalization; failure-driven learning; case-based learning; operationality of explanations and utility of learning; goal-driven learning; criteria for when, what and how to learn; learning in integrated architectures: pattern recognition, parametric and non-parametric learning, decision trees, Bayesian and neural networks and reinforced learning.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 284 (Intelligent Systems) or Consent of Instructor

ICT 287 BIOMORPHIC COMPUTATION

Biologically-inspired approaches to the design of intelligent systems; distributed and perceptually-grounded representations; temporal processing; neural network approaches to vision and natural language processing; evolutionary computation; comparison of symbolic and biomorphic approaches to intelligence; introduction to computing and dynamical systems.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 284 (Intelligent Systems) or Consent of Instructor

ICT 288 INFORMATION POLICY

Examination of the nature of corporate, non-profit, and governmental information policy; the appropriate role of the government in production and dissemination of information, the tension between privacy and freedom of access to information; issues of potential conflicts in values and priorities in information policy.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite : None

ICT 289 STRATEGIC COMPUTING AND COMMUNICATIONS TECHNOLOGY

Factors strongly impacting the success of new computing and communications products and services (based on underlying technologies such as electronics and software) in commercial applications; technology trends and limits, economics, standardization, intellectual property, government policy and industrial organizations; strategies to manage the design and marketing of successful products and services.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 291 DIGITAL AUDIO PROCESSING

Audio processing; speech processing and recognition; voice recognition and synthesis; compression of audio signals; and layers of compression.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite : ICT 290 (Digital Signal Processing)

ICT 292 DIGITAL IMAGE PROCESSING

Digitized image and its properties; data structures for image analysis; image pre-processing; an introduction to segmentation; linear discrete image transforms; image data compression and elementary case studies.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 290 (Digital Signal Processing)

ICT 293 DIGITAL IMAGE ANALYSIS

Include shape representation and description; object recognition; mathematical morphology; texture and more advanced case studies in image analysis.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 292 (Digital Image Processing)

ICT 294 ADVANCED MULTIMEDIA SYSTEMS

Include video and audio processing; integration and compression; pre-processing of audio and video signals; post processing of signals; compression of synthesized signals.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 293 (Digital Image Analysis)

ICT 295 COMPUTER VISION I

Include shape representation and description; object recognition and case studies in high level processing.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 293 (Digital Image Analysis)

ICT 296 COMPUTER VISION II

Pattern recognition and artificial intelligence techniques; advanced topics in segmentation; 3D vision, geometry and radiometry; use of 3D vision; motion analysis and advanced studies in computer vision.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None ICT 295 (Computer Vision I) and ICT 277 (Artificial Intelligence)

ICT 297 INTRODUCTION TO BIOMEDICAL IMAGING

Understanding of images with physiological feature; data acquisition and pre-processing of images from x-ray, computed tomography, ultrasound and magnetic resonance imaging.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 293 (Digital Image Analysis)

ICT 298 SPECIAL TOPICS

New and highly specialized topics in Computer Science and Information Technology.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : Consent of Instructor

ICT 299 RESEARCH SEMINAR

Independent seminar under the direction of a faculty member. Student is required to render a seminar every week on the progress of his research.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : Completion of Academic Requirements

ICT 303 INFORMATION IN SOCIETY

Societal needs and demands; sociology of knowledge and science; diffusion of knowledge and technology; information seeking and use; information and culture; and technology and culture.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 271 (Information Users and Society) or Consent of Instructor

ICT 312 ADVANCED ALGORITHMS ANALYSIS AND RANDOMIZED ALGORITHMS

Fast algorithms for classical problems; lower bounds results; statistical behavior and construction and analysis of randomized algorithms; expected performance of randomized algorithms; fundamental limitations on probabilistic computations; complexity issues and applications.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : ICT 201 (Data Structures)

ICT 330 ADVANCE SCIENTIFIC COMPUTING

Representation, program dependence, control structures; multiprocessor organization: vectorization, memory organization, processor topologies and architectures; models of parallelism; programming language and systems for scientific and high performance computing; environments for interactive scientific experiments and databases; distributed programming tools; parallelism in scientific problems: parallel computer architectures; parallel algorithmic techniques; parallel algorithms and models, parallel performance analysis and debugging.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : Consent of Instructor

ICT 340 ADVANCED TOPICS IN COMPUTATIONAL SCIENCE

Special topics in computational science and scientific computing. May be repeated for credit with permission. Topic should be indicated for record purposes.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : Consent of Adviser

ICT 354 NATURAL LANGUAGE PROCESSING

Fundamentals of Linguistic, Computational Linguistic, and Language Formalisms: Unification Grammar, Lexical Functional Grammar, Head Driven Phrase Structure Grammar, NLP areas: Machine Translation, Database Query, Summarization, Question and Answering

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : None

ICT 397 DIRECTED STUDY

Topics that best contribute to the academic goals of the student but are not appropriately covered in courses offered. These can be studied by the student himself but under the direction of a faculty member. Students intending to enroll in the course must request for approval from the faculty member and the department concerned before registration. The course may be taken for a credit of 1-15 units with a grade of S or N (Satisfactory or Not Satisfactory). At most 6 units may be no lectures but laboratory work may be done as needed.

Credit : 1-15 (0 hr lec, as needed lab hours)
Prerequisite(s) : None Consent f Instructor, department concerned and completion of 18 units of required coursework to include 6 units of specialization courses.

ICT 398 SPECIAL PROJECTS

Independent study under the direction of a faculty member, culminating in a written report.

Credit : 6 units (0 hrs lec, 0 hrs lab)
Prerequisite(s) : Coursework (Completion of 12 units including 6 units of specialization courses.)

ICT 399 THESIS

Research under the direction of a member of the graduate faculty leading to an MS thesis.

Credit : 3 units (3 hrs lec, 0 hrs lab)
Prerequisite(s) : Must have completed all coursework

FACULTY PROFILE

1 Ambe, Aloha May H.	MIT (Multimedia & Interactive Systems), ADMU, 2006 BS Info Tech, MSU-IIT, 2002
2 Cabido, Manuel C.	MS Computer Science (Software Engineering), ADMU, 1999 BS Mathematics, MSU-IIT, 1988
3 Dimalen, Davis M.	MS Computer Science (Natural Language Processing), DLSU, 2004 BS Computer Science, MSU-Marawi, 1988
4 Dimalen, Editha D.	MS Computer Studies (Natural Language Processing), DLSU, 2003 BS Computer Science, MSU-Marawi, 1998
5 Dinawanao, Dante D.	MS Computer Science (Operating System, Computer Networks, Distributed Computing), DLSU, 2003 BS Computer Science, MSU-IIT, 1994
6 Empig, Ernesto E.	MS Information Technology, Ateneo de Davao University, 2005 BSIEd Electronics, MSU-IIT, 1993
7 Malabanan, Cenie V.	MIT (Multimedia), Queensland Univ. of Tech., Australia, 2004 Diploma in Commerce, University of Wollongong, Australia, 1993 Bachelor of Engineering Technology, MSU-IIT, 1988 Diploma in Engineering Technology, MSU-IIT, 1980
8 Mostrales, Eli S.	MS Electrical Engineering, 1976, University of the Philippines-Diliman, Quezon City BS Electrical Engineering, 1972, MSU-Main, Marawi City
9 Porquis, Lope Ben C.	MS in Computer Application, MSU-IIT, 2007 BSECE, MSU-IIT, 2001
10 Pinzon, Jeremy V.	MS Computer Science (Computer Hardware System) ADMU, 1986 BS Electrical Engineering, MSU-Marawi, 1972
11 Que Esteves, Chona B.	Master in Business Management (General Management), MSU-IIT, 1993 Associate in Secretarial Science, University of San Carlos, 1974 Bachelor of Arts, Dansalan College, 1972
12 Soliva, Delilah L.	Master in Business Management, MSU-IIT, 1985 BS Business Administration (Accountancy), MSU-IIT, 1975
13 Taculin, Alquine Roy F.	MS Computer Science, UP-Los Baños,2006 BS Computer Science, MSU-IIT, 2001