

Department of Computer Science

About the Department

The Department of Computer Science (CS) was established in 1985 to advance research, knowledge, and innovation in computing. It launched again in 1427 A.H. (2006) as a part of the faculty with a more specialized role that spans the range from theoretical algorithmic foundations to scientifically-grounded application areas in computing systems, network computing, programming systems, intelligent systems, computer graphics, high performance computing, and software engineering. The department offers a modern accredited bachelor's degree program, a mature, second-generation research-based master's program, and a Ph.D. program. These programs are supported by experienced faculty members and state-of-the-art specialized labs, including robotics and brain-computer interface labs.

Department Vision

A strong academic environment recognized nationally and internationally in delivering excellent computer science education and conducting distinct research addressing needs of the community we serve.

Mission of the Department

To provide superior educational experiences in areas related to computer science at both undergraduate and graduate levels. To provide an environment conducive to imparting quality education and to conducting distinctive research in theoretical and applied computing.

The Computer Science Program

Demand for computing professionals with scientific background has grown in the past decade as a result of increased demand for sophisticated computing environments, applications, and scientific research inside and outside of academia. The demand for skills targeted by the program has been supported by a university-sponsored study conducted in 2005-2006 (No. 425/629, Shawwal 1426H.).

The Department of Computer Science offers a five-year academic program that provides a balanced mix of strong theory, application and practice. It incorporates the scientific foundations of computing with advanced applications which demand sophisticated knowledge of computing systems, programming and problem-solving tools and techniques.

This program builds on 26 credits of university-required course work in Islamic studies, Arabic language and communication skills, as well as a full academic year of foundation program shared by Science, Medical, and Engineering. It also shares 24 credits of college-required basic computing coursework with other computing programs in the college.

Program Mission

To equip software and computing specialists with in-depth theoretical knowledge and versatile technical and professional skills that enable them to master, improve and efficiently work in a wide range of scientific and technical settings.

Program Educational Objectives

- Have successful career in the practice of computer science and related applications built on their understanding of formal and applied methods for problem solving, design of computer systems, and development of effective software systems and algorithmic applications.
- Advance in responsibility and leadership and contribute as active partners in the economic growth and the sustainable development of the Saudi society.
- Engage in professional development and/or graduate studies to pursue flexible career paths amid future technological changes.

Student Outcomes

In addition to the common student outcomes ABET-A to ABET-I, listed under **خطأ! لم يتم العثور على مصدر المرجع.** on page **خطأ! الإشارة المرجعية غير معروفة.**, the CS program addresses these specific outcomes:

- ABET-A An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- ABET-B An ability to apply design and development principles in the construction of software systems of varying complexity.

Program Tracks

Students may receive a Track Certificate if they take **3 elective courses** from the same group.

Track Name	Electives
Computing Systems	CPCS-462
	CPCS-463
	CPCS-466
Network Computing	CPCS-372
	CPCS-473
	CPCS-474
Programming Systems	CPCS-403
	CPCS-404
	CPCS-405
Intelligent Systems	CPC- 432
	CPCS-433
	CPCS-482
Software Engineering	CPCS-353
	CPCS- 454
	CPCS-457

Program Degree Plan

Forth Semester

Code	Title	Cr	Pre.
ISLS 201	Islamic Culture (II)	2	ISLS 101
ARAB 101	Language Skills	3	---
MATH-202	Calculus (II)	3	MATH-110
CPCS-203	Programming (II)	3	CPCS-202
CPCS-222	Discrete Structures (I)	3	---
Total 14			

Fifth Semester

Code	Title	Cr	Pre.
CPCS-204	Data Structures (I)	3	CPCS-203
CPCS-212	Applied Math for Computing (I)	4	MATH-202
CPCS-211	Digital Logic Design	3	CPIT-201
---	Lab Science (II) *	4	---
Total 14			

Sixth Semester

Code	Title	Cr	Pre.
STAT 352	Applied Probability & Random Processes	3	STAT 210
CPCS-301	Programming Languages	3	CPCS-204 CPCS-222
CPCS-241	Database (I)	3	CPCS-204
CPCS-214	Computer Organization and Architecture (I)	3	CPCS-211
CPCS-223	Analysis & Design of Algorithms	3	CPCS-204
Total 15			

Seventh Semester

Code	Title	Cr	Pre.
CPIS-334	Introduction To Software Project Management	2	---
CPCS-324	Algorithms & Data Structures (II)	3	CPCS-222 CPCS-223
CPCS-331	Artificial Intelligence (I)	3	CPCS-204 CPCS-223
CPCS-351	Software Engineering (I)	3	CPCS-204
CPCS-361	Operating Systems (I)	3	CPCS-214 CPCS-204
CPCS-371	Computer Networks (I)	3	CPCS-214
Total 17			

Eighth Semester

Code	Title	Cr	Pre.
ISLS 301	Islamic Culture (III)	2	ISLS 201
CPCS-302	Compiler Construction	3	CPCS-301
CPCS-381	Human-Computer Interaction (I)	2	CPCS-204
CPCS-391	Computer Graphics (I)	3	CPCS-204 CPCS-212
---	College Free (I)*	3	---
Total 13			

Summer Semester

CPCS-323 Summer (Workplace) Training (I) – Credit: 0 Training: 200 Hours

Ninth Semester

Code	Title	Cr	Pre.
ARAB 201	Writing Skills	3	ARAB 101
CPCS-498	Senior Project (I)	1	Senior Level
---	Department Elective (I)*	3	---
---	College Free (II)*	3	---
---	College Free (III)*	3	---
Total 13			

Tenth Semester

Code	Title	Cr	Pre.
ISLS 401	Islamic Culture (IV)+	2	ISLS 301
CPCS-499	Senior Project (II)	3	CPCS-498
---	Department Elective (II)*	3	---
---	Department Elective (III)*	3	---
CPIS-428	Professional Computing Issues	2	CPCS-323
Total 13			

*Subject to approval by department and academic advisor

+ General ethics

Program Courses

It is worth noting that course codes consist of two parts: the first two letters (CP) represent the faculty code and the second two letters represent the department code (CS). The following table lists topic areas indicated by the middle digits in course numbers:

Middle Digit	Topic Areas
0	Programming Systems
1	Architecture & Organization
2	Theoretical Foundations & Algorithms
3	Intelligent Systems
4	Database & Information Retrieval
5	Software Engineering
6	Computing Systems
7	Network Computing
8	Human Computer Interaction
9	Applications & Advanced Topics

Required Course List

Code	Course Title	Credits	Prerequisite
---	Lab Science (II)*	4	---
CPCS-211	Digital Logic Design	3	CPIT-201
CPCS-212	Applied Math for Computing 1	4	MATH-202
CPCS-214	Computer Organization & Architecture 1	3	CPCS-211
CPCS-223	Analysis & Design of Algorithms	3	CPCS-204
CPCS-241	Database 1	3	CPCS-204
CPCS-301	Programming Languages	3	CPCS-204 CPCS-222
CPCS-302	Compiler Construction	3	CPCS-301
CPCS-323	Summer (workplace) Training I	0	---
CPCS-324	Algorithms & Data Structures (II)	3	CPCS-222 CPCS-223
CPCS-331	Artificial Intelligence 1	3	CPCS-204 CPCS-223
CPCS-351	Software Engineering 1	3	CPCS-204
CPCS-361	Operating Systems 1	3	CPCS-214 CPCS-204
CPCS-371	Computer Networks 1	3	CPCS-214
CPCS-381	Human-Computer Interaction 1	2	CPCS-204
CPCS-391	Computer Graphics 1	3	CPCS-204 CPCS-212
CPCS-498	Senior Project 1	1	Senior Level
CPCS-499	Senior Project (II)	3	CPCS-498
MATH-202	Calculus (II)	3	MATH-110
STAT-352	Applied Probability & Random Processes	3	STAT-210
Total 56 Credits+			

*Must include lab component subject to approval by department and academic advisor. +Students must take a minimum of 1 credit from College of Sciences to complete the 57 credit department requirement.

Elective Course List

Code	Course Title	Credits	Prerequisite
CPCS-353	Software Eng. Practices	3	CPCS-351
CPCS-372	Computer Networks (II)	3	CPCS-371
CPCS-403	Internet Application Programming	3	CPCS-371 CPCS-324
CPCS-404	Component-Based Computing	3	CPCS-351
CPCS-405	Software Technology Topics	3	CPCS-351
CPCS-413	Computer Architecture (II)	3	CPCS-241
CPCS-414	High Performance Computing	3	CPCS-361
CPCS-424	Theory Of Computation	3	CPCS-212 CPCS-222
CPCS-425	Information Security	3	CPCS-361 CPCS-371
CPCS-432	Artificial Intelligence (II)	3	CPCS-331
CPCS-433	Artificial Intelligence Topics	3	CPCS-331
CPCS-442	Database (II)	3	CPCS-241
CPCS-454	Object-Oriented Analysis & Design	3	CPCS-351
CPCS-457	Software Engineering Theory	3	CPCS-351
CPCS-462	Operating Systems (II)	3	CPCS-361
CPCS-463	Computing Systems Security	3	CPCS-361 CPCS-371
CPCS-464	Dependable Computing	3	CPCS-463
CPCS-465	Performance & Modeling of Computing Systems	3	CPCS-324 CPCS-361
CPCS-466	Systems Programming	3	CPCS-361
CPCS-473	Computer Networks Practice	3	CPCS-371
CPCS-474	TCP/IP & Web Networking	3	CPCS-371
CPCS-482	Multimedia & User Interface Design	3	CPCS-381
CPCS-494	Special/Selected Topics*	3	

*With department approval.

Department Faculty

Boys Campus - Sulimania

Prof. Fadi F. Fouz, Professor, Ph.D. in Computer Science, Parallel Microprocessor, University of Sheffield, UK, 1981.

Prof. Fathi A. Isa, Professor, Ph.D. in Computer Science, Software Engineering, Al-Azhar University, Egypt, 1989.

Prof. Kamal M. Jambi, Professor, Ph.D. in Computer Science, Artificial Intelligence, Illinois Institute of Technology, USA, 1991.

Prof. Osama A. Abolnaja, Professor, Ph.D. in Computer Science, Systems Programming and Fault-tolerance, University of Wisconsin, USA, 1997.

Dr. Ameen Y. Noaman, Associate Professor, Ph.D. in Computer Science, Data Warehousing, University of Manitoba, CA, 1999.

Dr. Anas M. Fattouh, Associate Professor, Ph.D. in Computer Science, Automatic Control, Automatic Laboratory of Grenoble, France, 2000.

Dr. Maher A. Khemakhem, Associate Professor, Ph.D. in Digital Electronics and Computer Science, Arabic OCR & Distributed Systems, Université Paris Sud, France, 1987.

Dr. Aiiad A. Albeshri, Assistant Professor, Ph.D. in Information Technology, Security in Cloud Computing, Queensland University of Technology, Australia, 2013.

Dr. Abdulla A. Basuhail, Assistant Professor, Ph.D. in Computer Science, Digital Image Processing (Wavelet Transform), Florida Institute of Technology, USA, 1998.

Dr. Ahmad S. Alzahrani, Assistant Professor, Ph.D. in Computer Science, Computer Networks, University of Bradford, UK, 2009.

Dr. Imtiaz H. Khan, Assistant Professor, Ph.D. in Computer Science, Artificial Intelligence, University of Aberdeen, UK, 2009.

Dr. Iyad A. Katib, Assistant Professor, Ph.D. in Computer Science, Telecommunications and Computer Networking, University of Missouri-Kansas City, USA, 2011.

Dr. Jonathan Cazalas, Assistant Professor, Ph.D. in Computer Science, Mobile Computing, University of Central Florida, USA, 2012.

Dr. Khaled O. Thabit, Assistant Professor, Ph.D. in Computer Science, Memory Management, Rice University, USA, 1981.

Dr. Muhammad A. Al-Hashimi, Assistant Professor, Ph.D. in Computer Science, Fault-Tolerant Architectures, Texas A&M University, USA, 2000.

Dr. Muhammad A. Ameen, Assistant Professor, Ph.D. in Computer Science, Artificial intelligence and Image Analysis, George Washington University, USA, 2002.

Dr. Muhammad Y. Dahab, Assistant Professor, Ph.D. in Computer Science, Text Mining, Cairo University, Egypt, 2007.

Dr. Riaz A. Shaikh, Assistant Professor, Ph.D. in Computer Engineering, Computer and Network Security, Kyung Hee University, South Korea, 2009.

Dr. Vijey Thayanathan, Assistant Professor, Ph.D. in Engineering, Communication Systems, University of Lancaster, UK, 1998.

Dr. Wadee Alhalabi, Assistant Professor, Ph.D. in Computer Science, Machine Learning, University of Miami, USA, 2008.

Dr. Wajdi H. Al-Jedaibi, Assistant Professor, Ph.D. in Computer Engineering, Software Engineering and Concurrent Systems, George Mason University, USA, 2001.

Girls Campus - Sulimania

Dr. Arwa Y. Al-Aama, Associate Professor, Ph.D. in Computer Science, Multimedia Systems, George Washington University, USA, 2003.

Dr. Hana A. Alnuaim, Associate Professor, Ph.D. in Computer Science, Multimedia Systems, George Washington University, USA, 2000.

Dr. Laila N. A. Mohamed, Associate Professor, Ph.D. in Computer Engineering, Computer Networks, Anglia Polytechnic University, UK, 1997.

Dr. Lamyaa F. Hassan, Associate Professor, Ph.D. in Engineering, Planning Computer Networks, Cairo University, Egypt, 1999.

Dr. Omaira O. Bamasak, Associate Professor, Ph.D. in Computer Science, Electronic Information Security, University of Manchester, UK, 2006.

Dr. Areej A. A. Malibari, Assistant Professor, Ph.D. in Computer Science, Artificial Intelligence and E-Commerce, University of Essex, UK, 2010.

Dr. Arwa A. Jamjoom, Assistant Professor, Ph.D. in Computer Science, Data Warehousing (Healthcare), University of Surrey, UK, 2011.

Dr. Etimad A. Fadel, Assistant Professor, Ph.D. in Computer Science, Distributed Systems, De Montfort, UK, 2006.

Dr. Ghada A. H. Aldabbagh, Assistant Professor, Ph.D. in Computer Science, Communications and Information Systems, University College London, UK, 2011.

Dr. Lamiaa A. A. Elrefaei, Assistant Professor, Ph.D. in Electrical Engineering, Signal Processing, Benha University, Egypt, 2008.

Dr. Lamyaa Daghestani, Assistant Professor Ph.D. in Computer Science, Computer Graphics, University of Huddersfield, UK, 2012.

Dr. Mai A. Fadel, Assistant Professor, Ph.D. in Computer Science, Software Engineering, Exeter University, UK, 2007.

Dr. Manal A. A. Abdulla, Assistant Professor, Ph.D. in Computer and System Engineering, Computer Networks, Ain Shams University, Egypt, 2002.

Dr. Manar S. Salamah, Assistant Professor, Ph.D. in Computer Science, Software Engineering, University of Leicester, UK, 2012.

Dr. Nadine T. K. Akkari, Assistant Professor, Ph.D. in Computer Science, Computer Networks, National Superior School of Telecommunications (*École Nationale Supérieure Des Télécommunications*), France, 2006.

Dr. Sahar S. Shabana, Assistant Professor, Ph.D. in Computer Science, Graphics and Computer Games, George Mason, USA, 2010.

Dr. Sanaa A. Sharaf, Assistant Professor, Ph.D. in Computer Science, Grid Computing, University of Leeds, UK, 2012.

Dr. Zainab A. E. Mahmoud, Assistant Professor, Ph.D. in Electrical and Computer Engineering, Interactive Computer Graphics, Alexandria University, Egypt, 1991.

Course Catalog

CS Courses

CPCS-201 Introduction to computer science 3

The objective of this course is to provide an introduction to the computer science discipline. Topics include the representation and manipulation of data in computers, description of computer hardware components and how they work, and an overview of operating systems, algorithms, and programming languages.

CPCS-202 Programming (I) 3

The objective of this course is to cover the fundamental concepts of procedural programming. This course introduces the Java programming language and helps students develop basic problem-solving skills. Topics include algorithms, flowchart, API, IDE, and JDK, numerical data, primitive data type, short hand operators, cast value of one type to another type, selection statements, switch statements, break and continue statements, relational operators, logical operators, logical expressions, Boolean variable, Boolean expressions, repetition statements, nested loops, methods, pass arguments to a method, method overloading, method abstraction, use of methods in the math class, arrays, common array operations, methods with array arguments and return value, search and sort operations on array.

CPCS-203 Programming (II) 3

The objective of this course is to cover the basic and intermediate concepts of object oriented programming. Topics include the use of numerical data, primitive data types, selection statements, repetition statements, class, standard classes, object, instance of a class, object oriented programming, software development, constructor, methods, call by values, call by reference, UML, state memory diagram, class diagram, arrays, method overloading, constructor overloading, overriding, this, new, exception and assertions, Inheritance, encapsulation, data abstraction, private, public, protected, exception, inheritance, abstract class, polymorphism, file handling.

PREREQ: CPCS-202

CPCS-204 Data Structures (I) 3

The objective of this course is to provide students an understanding of abstract data structures, including, but not limited to, arrays, linked lists, queues, stacks, trees, and graphs. The course also aims to give a conceptual understanding of the trade-offs between various different data structures, hence enabling students to choose an optimal data structure for a particular application. The students will also learn concepts of algorithmic design, recursion, and a variety of searching and sorting algorithms.

PREREQ: CPCS-203

CPCS-206 Principles of Programming 3

The objective of this course is to explore the capabilities of Visual Basic in developing Windows applications. Topics include concepts such as terminology, an introduction to the visual basic controls, statements and functions, and scope and lifetime of variables. The student will also learn how to create and code menus, and use the package and deployment wizard.

CPCS-211 Digital Logic Design 3

This objective of this course is to provide an introduction to the fundamental concepts of digital logic design. Topics include number systems, binary codes, Boolean algebra, canonical and fundamental forms of Boolean functions, functions applications to digital circuits design, minimization of Boolean functions by Boolean algebra and Karnaugh maps, two-level and multi-level digital circuits, decoders, encoders, multiplexers, demultiplexers, latches, flip-flops, registers, counters, analysis and synthesis of synchronous sequential circuits. Additionally, this course includes a laboratory component in which students apply the design principles learned in lectures to the design of combinational circuits and synchronous sequential circuits.

PREREQ: CPIT-201

CPCS-212 Applied Math for Computing (I) 4

The objective of this course is to familiarize students with the basic concepts of applied mathematics used in computer science. Topics include: Matlab: matrices and arrays, Matlab:

graphics, Matlab: programming, solution of nonlinear equations, solution of systems of linear equations, numerical integration, numerical differentiation, and ordinary differential equations.

PREREQ: MATH-202

CPCS-214 Computer Organization and Architecture (I) 3

The objective of this course is to explain how computers are designed and how they work. Students are introduced to modern computer principles using a typical processor. They learn how efficient memory systems are designed to work closely with the processor, and how input/output (I/O) systems bring the processor and memory together with a wide range of devices. The course emphasizes system-level issues and understanding program performance. Topics include instructions sets, assembly language, internal data representation, computer arithmetic, processor data path and control, memory hierarchy, I/O devices and interconnects, and an introduction to parallel processing.

PREREQ: CPCS-211

CPCS-222 Discrete Structures (I) 3

The objective of this course is to study the logical and algebraic relationships between discrete objects. This course cultivates clear thinking and creative problem solving by developing students' mathematical maturity in several core areas: logic and proofs, sets, functions, relations, and counting techniques.

CPCS-223 Analysis and Design of Algorithms 3

This course is the first of a two-course sequence on algorithmic solution design and advanced data structures. The objective of this course is to introduce selected fundamental algorithms from different application areas to illustrate the techniques used to construct those algorithms, and to study their performance. Topics include: formal definition and characterization of algorithms, fundamentals of algorithm efficiency including recurrence relations, asymptotic notation, efficiency classes and empirical analysis of performance, brute force techniques, divide-conquer, decrease-conquer and graphs, problem transformation and balanced trees,

and trading time for space including hashing and B-trees.

PREREQ: CPCS-204

CPCS-241 Database (I) 3

This objective of this course is to introduce students to database management systems. Topics include Data, Information, File System, Database and Database Users, Database System Concepts and Architecture, Data Modeling using the Entity Relationship (ER) Model, The Relational Data Model and Relational Database Constraints, Functional Dependencies and Normalization for Relational Databases, The Relational Algebra and Relational Calculus, Relational Database Design by ER and EER to Relational Mapping, Disk Storage, Basic File Structure and Hashing, SQL-99 Schema Definition, Constraints, Queries and Views (DDL and DML).

PREREQ: CPCS-204

CPCS-301 Programming Languages 3

The objective of this course is to provide a comprehensive coverage of the fundamental concepts of programming languages by discussing the design issues of the various languages constructs, examining the design choices for these constructs in some of the most common languages, and critically comparing design alternatives. It discusses the formal methods of describing the syntax and semantics of programming languages.

PREREQ: CPCS-204, CPCS-222

CPCS-302 Compiler Construction 3

The objective of this course is to acquaint students with the fundamentals of compilers and their construction. The course considers the principles that underlie compiler construction and focuses on the translation of programs written in conventional, higher level language into semantically equivalent programs written in assembly language. Students will learn how modern programming languages are implemented, how compilers interact with operating systems and machine architecture, and how to use compiler construction tools.

PREREQ: CPCS-301

CPCS-323 Summer (workplace) Training 0

This is mandatory, 200-hour internship program for all students in FCIT. The objective of this course is to provide students the opportunity to apply their academic education with hands-on, real world experience in a work setting. Students are sent to different companies to get the real flavor of work group, communications, and professional development experiences.

CPCS-324 Algorithms and Data Structures (II) 3

This course is the second of a two-course sequence on algorithmic solution, design, and advanced data structures. The objective of this course is to introduce advanced algorithms from different application areas to illustrate the techniques used to construct those algorithms, and to study algorithm performance. Topics include: space and time tradeoffs, dynamic programming, greedy technique, iterative improvement, and limitation of algorithm power.

PREREQ: CPCS-222, CPCS-223

CPCS-331 Artificial Intelligence (I) 3

The objective of this course is to provide a broad overview of AI and building intelligent systems. Topics include intelligent agents, problem-solving as a search activity, knowledge representation, planning, reasoning and learning. Students will also be introduced to evolutionary computation (EC), natural language processing (NLP), and programming in Prolog.

PREREQ: CPCS-204, CPCS-223

CPCS-351 Software Engineering (I) 3

The objective of this course to introduce students to the basic concepts of software engineering as they relate to the development of medium to large scale software systems. Topics include the software life cycle, requirements development, object orientation, software architecture & design, and software testing. Students are expected to learn how to apply such principles to a real world problem. A term project of a medium-size is required.

PREREQ: CPCS-204

CPCS-353 Software Engineering Practice 3

The objective of this course is to further explore the design and thinking of object-oriented software engineering, from analysis through testing. Topics include practices of software project management, project estimation, distributed system architectures (client/ server), distributed object model, building client/server applications based-on Object-oriented technology, and Object-Oriented software engineering approach. The course will also teach students the principles and practices of software testing, validation, verification, maintenance, writing documentation, and evaluation of systems and tools.

PREREQ: CPCS-351

CPCS-361 Operating Systems (I) 3

The objective of this course is to provide a general overview of operating systems concepts and recent methodologies and techniques used in the field and their trade-offs, with various examples from the contemporary used systems. Topics include the basic structure of an operating system, its interaction with the hardware, software, and users, and the services it provides. The course illustrates different algorithms and techniques used in controlling, managing, and allocating various computer resources, such as CPU, memory, storage and I/O devices. It demonstrates the tuning of the operating system for maximizing the utilization and increasing the performance of the computer system.

PREREQ: CPCS-214, CPCS-204

CPCS-371 Computer Networks (I) 3

The objective of this course is to provide an introduction to computer networks and the ISO-7 layers reference model, which includes necessary protocols. Selected network layers, such as data link layer, transport layer, network layer, etc., will be focused with detail information. In addition to this, network security, web technologies and application layer will also be introduced.

PREREQ: CPCS-214

CPCS-372 Computer Networks (II) 3

The objective of this course is to introduce students to the principles, design,

implementation, and performance of computer networks. This course is based on the layering architecture and covers the routing protocols in detail. Topics include Internet routing protocols, local area networks, congestion control, TCP, wireless communications and networking, mobile IP, performance analysis, network address translation, multimedia over IP, switching and routing, peer-to-peer networking, network security, and other current research topics in the area of computer networks.

PREREQ: CPCS-371

CPCS-381 Human-Computer Interaction 2

The objective of this course is to familiarize students with the skills and concepts of Human-Computer Interaction (HCI), including the understanding of user needs, interface design and prototyping, and interface evaluation. Topics include an introduction to HCI, HCI goals, cognitive and perceptual issues, HCI design, data gathering, data analysis, task description, task analysis, interaction styles, interaction frameworks, prototyping, and evaluation.

PREREQ: CPCS-204

CPCS-391 Computer Graphics (I) 3

The objective of this course is to study the hardware and software principles of interactive raster graphics. Topics include an introduction to the basic concepts of computer graphics, 2-D and 3-D modeling and transformations, viewing transformations, projections, rendering techniques, graphical software packages, and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms.

PREREQ: CPCS-204, CPCS-212

CPCS-403 Internet Application Programming 3

The objective of this course is to provide a broad overview of Internet and Web technologies. Topics include HTML, XHTML, CSS, client-side scripting (JavaScript), server-side scripting (PHP), Web data-base connectivity, and XML Technologies. The students will be encouraged to design, implement, and evaluate small-scaled Web projects in groups/teams.

PREREQ: CPCS-371, CPCS-324

CPCS-404 Component-Based Computing 3

The objective of this course is to familiarize students with Component-Based Computing. Topics include component fundamentals, rationale of using component-based computing, and their standard criteria. The course also focuses on recent researches and techniques related to component-based computing. Moreover, it covers issues related to the component-based technology, the various tools of component-based computing, and the future of component-based computing.

PREREQ: CPCS-351

CPCS-405 Software Technology Topics 3

The objective of this course is to explore recent topics related to Software Technology. Topics include Object-Oriented Programming fundamental concepts, advanced swing graphical user interface, advanced exception Handling Techniques, Streams and Files, multithreading programming, and networking programming. Moreover, the course also focuses on database programming (JDBC), servlets and java server pages (JSP), and Java Security.

PREREQ: CPCS-351

CPCS-413 Computer Architecture (II) 3

The objective of this course is to explore modern computer architecture approaches, such as designing advanced computer instructions, parallelism, and the advanced methods of data processing.

PREREQ: CPCS-241

CPCS-414 High Performance Computing 3

The objective of this course is to provide an in-depth overview of the current state of the art in high-performance computing. Additionally, the course provides more information about the architecture of high-performance computers.

PREREQ: CPCS-361

CPCS-424 Theory of Computation 3

The objective of this course is to introduce students, with a background in Sciences,

Engineering, or Mathematics, to some of the basic principles pertaining to the modeling and analysis of computational problems and their solutions.

PREREQ: CPCS-222, CPCS-212

CPCS-425 Information Security 3

The objective of this course is to provide an introduction to information security in computer networks, with a focus on providing basic knowledge of the technical and operational issues of modern cryptosystems and their related standards. Topics include security threats and vulnerabilities, classical encryption techniques, block ciphers and stream ciphers, DES and triple DES, AES, Block cipher operation modes, asymmetric ciphers: RSA, Diffie-Hellman key exchange, hash functions, MAC functions, digital signature: digital Signature Standard DSS, key management and distribution, X.509 certificates, web security: SSL and TLS, email security (PGP), malicious software, and firewalls.

PREREQ: CPCS-361, CPCS-371

CPCS-432 Artificial Intelligence (II) 3

The objective of this course is to explore advanced topics concerning Artificial Intelligence and to cover programming language related to AI.

PREREQ: CPCS-331

CPCS-433 Artificial Intelligence Topics 3

The objective of this course is to explore recent topics related to Artificial Intelligence and the latest advances in this field.

PREREQ: CPCS-331

CPCS-442 Database (II) 3

The objective of this course is to explore advanced topics in databases, with a focus on distributed and parallel database management systems followed by database design and implementation. Topics include performance optimization, database security, transaction processing, data warehouses, and data mining.

PREREQ: CPCS-241

CPCS-454 Object-Oriented Analysis and Design 3

The objective of this course is to familiarize students with the fundamental foundations of Object-Oriented Approach in relation to systems and the advantages of this method. This course covers understanding various approaches and methodologies used in different phases of software development lifecycle, including requirements, analysis and specification, software design, software construction, software maintenance, and software process.

PREREQ: CPCS-351

CPCS-457 Software Engineering Theory 3

The objective of this course is to study the methods, values, attitudes, and techniques in software systems. It provides an understanding of the need for rigor and enables students to select and apply a relevant methodological approach to the development of well-designed and documented systems.

PREREQ: CPCS-351

CPCS-462 Operating Systems (II) 3

The objective of this course is to familiarize students with the modern alternative operating models such as distributed processing, parallel processing, and real-time processing. Topics include virtual memory, thread scheduling, Security systems and their requirements, shared security systems, performance quality, system reliability, system failure, pre-failure warning, and system recovery.

PREREQ: CPCS-361

CPCS-463 Computing Systems Security 3

The objective of this course is to introduce the fundamentals of Computer Security Systems and the potential risks and vulnerabilities in these therein. Topics include security management practices, access control systems and methodology, networks and Internet security, enterprise security architecture, operations security law, investigation, and ethics.

PREREQ: CPCS-361, CPCS-371

CPCS-464 Dependable Computing 3

The objective of this course is to acquaint students with the high-reliability computer systems used in fault intolerant critical applications. Topics include computing systems security, applications that require high-quality computer systems, mobile client system, various security protocols, multi-distribution system, breach discovery and prevention, wireless networks reliability measurement, and ensuring the quality of service.

PREREQ: CPCS-463

CPCS-465 Performance and Modeling of Computing Systems 3

This objective of this course is to familiarize students with the fundamentals of performance and computer systems modeling, introducing students to computer systems and their components (hardware and software). This course also covers different methods of performance measurement, algorithms of software performance measurement, and computer performance measurement.

PREREQ: CPCS-324, CPCS-361

CPCS-466 Systems Programming 3

The objective of this course is to explore the design, development, and operation of system applications. Topics include the difference between system software and application software in terms of development features and area of application, file systems, permanent and temporary storage systems, assembly compiler, high-level languages, application setup, memory management system, and processes carried out under the operating systems.

PREREQ: CPCS-361

CPCS-473 Computer Networks Practice 3

The objective of this course is to explore topics related to the practical aspects of networks, thereby familiarizing students with the various network components. The course provides an understanding of the network design and analysis as well as network architecture, including requirements validation and traceability. Students will be introduced to analyzing, developing, and validating requirements regarding the network architecture, in addition to network

management principles and performance evaluation.

PREREQ: CPCS-371

CPCS-474 TCP/IP and Web Networking 3

The objective of this course is to study the fundamentals of TCP/IP networks, technologies, and the Web. Topics include HTTP protocols, Web protocols, TCP/IP networks, Web services and standards.

PREREQ: CPCS-371

CPCS-482 Multimedia and User Interface Design 3

The objective of this course is to explore the fundamentals of multimedia and the use of multimedia in user interface design. The course is intended to give students both a theoretical understanding of, and practical experience with, designing multimedia products and the user interface design.

PREREQ: CPCS-381

CPCS-494 Special/Selected Topics 3

The objective of this course is to explore selected topics about the latest advancements in the field of Computer Science (topics determined by the Council of the Computer Science Department).

CPCS-498 Senior Project (I) 1

This course is the first part of a sequence of two courses that constitute the BSc graduation capstone project. In this part, the student is expected to propose, analyze, and design a software system or conduct a thorough investigation of a particular CS-related problem for research-based projects. The student will deliver oral presentations and written reports.

CPCS-499 Senior Project (II) 3

This course is the second part of a sequence of two courses that constitute the BSc graduation capstone project. In this project, the student will continue the System/Research development of the project that started in CPCS-498. The student will deliver oral presentations, progress reports, and a final report.

PREREQ: CPCS-498

IS Courses

CPIS-210 **Computer Architecture and Organization** 3

The objective of this course is to study the internal architecture/components of the computer, how they are integrated together, and the way they are controlled. This course should be preceded by an introduction in Logic and Digital Design. Topics include basic scientific concepts of how data networks function, data transferring techniques starting from hardware levels to high levels of data transferring protocols over intra-networks, and the scientific theories on which the modern digital communication technology is based.

PREREQ: CPCS-202

CPIS-220 **Principles of Information Systems** 3

The objective of this course is to provide students with an overall understanding of the main concepts of information systems and to highlight the importance of information systems in modern organizations and societies. Topics include information, data, and system concepts, information requirements in modern organizations and businesses (including decision making, operations, and other types of requirements), introducing different types of information systems, exploring the systems development life cycle (analysis, design, and implementation), methodologies of developing information systems, managing resources of information systems (data, hardware, software, etc.), knowledge management, quality and evaluation of information systems, ethical, social, and security issues of information systems

PREREQ: CPCS-202

CPIS-222 **Principles of Operating Systems** 3

The objective of this course is to present the basic concepts, modules and algorithms that work as intermediary programs between the user and the hardware, known as operating systems. It covers the basic concepts of recent operating systems, how they are designed and the way they work in terms of their efficiency and reliability. Also, it compares the techniques used inside the operating systems in terms of their speed and use of space.

Topics include an overview of operating systems, operating system principles, CPU scheduling and dispatch, concurrency, memory management, and virtual memory.

PREREQ: CPCS-204, CPIS-210

CPIS-240 **Database Management Systems (I)** 3

This course is the first in a series of courses on designing and implementing database information systems. The objective of this course is to prepare students to become able to implement a working database system using one of the popular commercial DBMSs, such as Oracle or MS SQL Server. The course introduces students to the concepts of databases and database modeling and design. It, in particular, provides students with a three-stage methodology for designing relational database applications, namely, conceptual, logical, and physical database modeling and design. In the first stage students will build a conceptual data model that is independent of all physical considerations. They will then transform this model in the second stage into the relational database logical model. In the third stage, students will translate the logical data model into a physical design for the target DBMS. Topics include basic concepts of databases, the 3-stage modeling and design methodology, the concepts of the relational database, conceptual data modeling using ERD, from ERD to RDB and reverse engineering, data normalization, SQL:DDL, SQL:manipulation and query languages, and relational algebra for querying.

PREREQ: CPCS-204

CPIS-241 **Introduction to Database Management** 3

The objective of this course is to introduce the basic concepts of database management systems. It equips the students with the theoretical and practical skills to design and analyze databases. Students also study how to use the various forms to create and develop databases and to create reports using one of the well-known database applications such as MS-Access.

CPIS-250 **Software Engineering** 3

The objective of this course is to introduce the basic concepts and required skills for software engineering. It covers the basic concepts and

skills required for developing large scale applications that take long periods of time. The course presents the latest methods and techniques used in software engineering obtained from the actual practice in the field as well as latest advances accomplished by specialist research centers. Also, it particularly emphasizes on the role of team work on developing software and the skills required to work as part of a team. Topics include foundation for systems development, methodologies of IS development, software process models, process iteration, process activities, project management, project scope, project management life cycle, managing IS project, planning IS project, feasibility study of IS project, models of software development, determining system requirements (functional and non-functional requirements), data modeling and E-R-D model, object-oriented analysis and modeling, systems structure modeling, object, class, attributes, methods, classes relationships, generalization, specialization, association, class diagrams, object-oriented analysis and modeling.

PREREQ: CPCS-204

CPIS-312 Information and Computer Security 3

The objective of this course is to equip students with the scientific and mathematical concepts and skills related to information security. Topics include the security of information and software systems, including attacks and data encryption, mathematical foundations, algorithms of cryptography, ways of distributing keys, techniques of data protection over computer networks, and controlling access using passwords.

PREREQ: CPCS-370

CPIS-320 Decision Support Systems and Theory 3

The objective of this course is to study how Decision Support Systems (DSS) work and the theory behind different DSS techniques, thereby enabling them to understand today's turbulent business environment and how organizations survive and even excel in such environments (particularly solving problems and exploiting opportunities). This course provides the required skills and knowledge of the various decision-making models so that decisions can be based on logical and

mathematical foundations under different circumstances, such as in cases of uncertainty, lack of information, or certainty. This course studies the design of computerized systems to support individual or organizational decisions. Moreover, the course aims at understanding the need for computerized support of managerial decision making and what was an early framework for managerial decision making.

PREREQ: CPIS-220

CPIS-323 Summer (workplace) Training 0

This is mandatory, 200-hour internship program for all students in FCIT. The objective of this course is to provide students the opportunity to apply their academic education with hands-on, real world experience in a work setting. Students are sent to different companies to get the real flavor of work group, communications, and professional development experiences.

CPIS-330 Advanced Project and Quality Management 3

The objective of this course is to provide students with the necessary skills to plan, implement, control and finish large scale Information Systems projects, making sure of the quality of the projects during and after construction. It equips the students with the advanced requirements of sophisticated projects, the ability to identify the target users of such projects, and the ability to manage versatile projects. This course also covers the standard requirements of the Project Management Institute (PMI), as well as the requirements of (CMMI) Software Engineering Institute (SEI) with the help of one of the project management software packages.

PREREQ: CPIS-334, CPIS-357

CPIS-334 Introduction to Software Project Management 2

The objective of this course is to study the processes, methods, techniques, and tools that organizations use to manage their information systems projects. The course covers a systematic methodology for initiating, planning, executing, controlling, and closing projects. This course assumes that project management in the modern organization is a complex team based activity, where various

types of technologies (including project management software as well as software to support group collaboration) are an inherent part of the project management process. This course also acknowledges that project management involves both the use of resources from within the firm, as well as contracted from outside the organization.

CPIS-340 Database Management Systems II 3

The objective of this course is to study advanced concepts in Database Managements Systems. It emphasizes on practical skills in designing, using, and optimizing performance of databases. It covers the fundamentals of object-oriented and distributed databases and their architectures. It aims to equip the students with the required techniques to optimize database performance and troubleshoot the concurrency problems of transactions.

PREREQ: CPIS-240

CPIS-342 Data Warehousing and Mining 3

The objective of this course is to study the basic concepts of data warehousing and the required skills to develop and use them. It emphasizes on employing data warehousing to support the decision-making process. It also covers the architectures of data warehousing and the infrastructural settings to develop them. It explains various ways of extracting, analyzing data to support the decision-making process. This course is intended to develop the student's ability to extract information from data and identify patterns and trends by designing a data warehouse and by applying data mining methods for classification, clustering, and association analysis.

PREREQ: CPIS-240

CPIS-350 Systems Design Patterns 3

The objective of this course is to study the principles of large-scale software architecture. It introduces the patterns, frameworks, and techniques for developing system based on components.

PREREQ: CPIS-250

CPIS-351 IS Analysis and Architecture Design 3

The objective of this course is to introduce methods used in IS analysis in order to identify

and characterize needs and to automate and create computer systems for them. The automated systems incorporate several technologies, and this course studies the way making optimum use of such systems for the users' service. The course emphasizes on the design phase activities and also presents design using structural and object-oriented techniques. Topics include system architectures design, traditional approach to design, object-oriented approach to design for applications, designing files and database, designing the user interface, designing the system interface and prototyping, controls and security, implementation, and support issues.

PREREQ: CPIS-250, BUS-232

CPIS-352 IS Applications Design and Development 3

The objective of this course is to explore the design, selection, implementation, and management of enterprise IT solutions. The focus is on applications and infrastructure and their fit with the business. Topics include frameworks and strategies for infrastructure management, system administration, data/information architecture, content management, distributed computing, middleware, legacy system integration, system consolidation, software selection, total cost of ownership calculation, IT investment analysis, and emerging technologies. These topics are addressed both within and beyond the organization, with attention paid to managing risk and security within audit and compliance standards. Students also hone their ability to communicate technology architecture strategies concisely to a general business audience.

PREREQ: CPIS-351

CPIS-354 Principles of Human-Computer Interaction 3

The objective of this course is to provide an introduction to the field of human-computer interaction (HCI), an interdisciplinary field that integrates cognitive psychology, design, computer science and others. Examining the human factors associated with information systems provides the students with knowledge to understand what influences usability and acceptance of IS. Topics include the examination of human performance,

components of technology, methods and techniques used in design and evaluation of IS, societal impacts of HCI, user-centered design methods, and the contemporary technologies used in empirical evaluation methods.

PREREQ: CPIS-250

CPIS-356 Software Metrics and Economics 3

The objective of this course is to study successful software development based on three factors: software technology, economic factors and human relations. This course also covers a variety of important concepts that influence the economics of software development, such as the procedures accompanying the software development process and cost accounting with an emphasis on the various measurement criteria of applications and their development process.

PREREQ: CPIS-250

CPIS-357 Software Quality and Testing 3

The objective of this course is to study the significance of quality during the process of developing software. Topics include the basic concepts of software quality assurance during all the stages of software development process and quality standard systems used in the field of software industry and Information Systems.

PREREQ: CPIS-334, CPIS-250

CPIS-358 Internet Applications and Web Programming 3

The objective of this course is to equip students with the necessary knowledge to design and implement Internet applications. Topics include the specific technologies of these applications, how to employ them in building effective and efficient applications, the technical characteristics of the Internet protocols, the various structures of Internet-based application development, and the organization and security of business transactions conducted over intranets.

PREREQ: CPIS-250

CPIS-360 Advanced Information Systems Technologies 3

The objective of this course is to study the basic concepts of using advanced technologies in building and developing recent Information

Systems. Topics include object-oriented databases, distributed databases, data warehouses, and data mining techniques.

PREREQ: CPIS-240

CPIS-363 Intelligent Systems 3

The objective of this course is to equip students with the required skills to be able to access information and be able to use it efficiently through using intelligent systems that lead to success and economic superiority. This course will cover the necessary concepts and techniques that facilitate developing intelligent systems used in business applications.

PREREQ: CPIS-250

CPIS-370 Fundamentals of Data Networks 3

The objective of this course is to provide an introduction to IT infrastructure issues for students majoring in Information Systems. It covers topics related to both computer and systems architecture and communication networks, with an overall focus on the services and capabilities that IT infrastructure solutions enable in an organizational context. It gives the students the knowledge and skills that they need for communicating effectively with professionals whose special focus is on hardware and systems software technology and for designing organizational processes and software solutions that require in-depth understanding of the IT infrastructure capabilities and limitations. It also prepares the students for organizational roles that require interaction with external vendors of IT infrastructure components and solutions. The course focuses strongly on Internet-based solutions, computer and network security, business continuity, and the role of infrastructure in regulatory compliance.

PREREQ: CPCS-204, CPIS-210

CPIS-371 Computer Networks 3

The objective of this course is for business students to study computer networks and network administration. Topics include OSI reference model, TCP/IP protocol architecture, networking components and management, network implementation strategy design, performance management, fault management,

network management configuration, management tools, and network security.

CPIS-380 Introduction to E-Business Systems 3

The objective of this course is to study the marketing implications of the e-business systems. Topics include impact on information systems within a business, impact on business design and strategy, impact on the industries and markets, and business models for e-business.

PREREQ: CPIS-351, CPIS-358

CPIS-382 Development of E-Systems and Interface Design 3

The objective of this course is to introduce techniques that are useful stand-alone and can be integrated for building a semantic web. Topics include semantic web technologies, data modeling languages such as XML, XML SCHEMA, domain modeling languages such as RDF, RDF Schema, ontology modeling languages such as OWL, query languages such as XQuery and SPARQL. Also students will use tools such as Stylus studio and Protégé in their modeling.

PREREQ: CPIS-358

CPIS-410 Information Security 3

This course is designed to extend the basic knowledge of DSS covered in the course CPIS-230 with practical techniques and methods for DSS. Coupled with classical approaches, the course extends to the latest techniques available for extracting suitable and relevant information to support making a wide range of decisions from day to day structured decisions, to complex unstructured decisions. In addition, the course also covers intelligent systems in particular relation to DSSs.

CPIS-420 Techniques of Decision Support Systems 3

The objective of this course is to extend the basic knowledge of DSS covered in the CPIS-230 by studying practical techniques and methods for DSS. Coupled with classical approaches, the course explores the latest techniques available for extracting suitable and relevant information to support making a wide range of decisions from day to day structured decisions, to complex unstructured decisions.

In addition, the course also covers intelligent systems in particular relation to DSSs.

PREREQ: CPIS-320

CPIS-424 Modeling and Simulations 3

The objective of this course is to develop the student's ability to understand the basic concepts in modeling and simulation and develop discrete event simulation models. Topics include basic simulation modeling, simulation input and output analysis, validation and verification of simulation models, and building simulation models using Arena and MS Excel.

PREREQ: CPIS-250

CPIS-428 Professional Computing Issues 2

The objective of this course is to explore the ethical and social issues sparked by the ever-growing information society at the local and global level. Topics include the impact of digitized information on individuals and societies, privacy, intellectual property, computer crimes, evaluating and controlling technology, and professional ethics and responsibilities. The course also explores the social impact of information technology in different areas of human life such as Internet, information flooding, and the computerized world, business, medicine, law, government, transportation, entertainment, education, banking, e-commerce, communications, an overview of the law, ownership of software, software contracts and liability, privacy and the data protection act, computer misuse, and forensic, societies for computing professionals, and professionalism and ethics.

PREREQ: CPIS-323

CPIS-430 IS Change Management 3

The objective of this course is to equip students with practical procedures to develop and change Information Systems, providing them with scientific methods to create an organization under advanced IS management. Upon finishing this course, students are expected to be able to develop and restructure Information Systems in any department and understand the change management process.

PREREQ: CPIS-330

CPIS-434 IS Strategies and Policies 3

The objective of this course is to define the concept of the strategic framework that can be used to evaluate and make use of recent technologies to serve the overall goals of institutions. Topics include the main principles of strategic planning and the interrelation between them, the fundamental management strategies and how to make use of Information Systems, and how to develop short and long-term plans to obtain and manage technology.

PREREQ: CPIS-220

CPIS-444 Knowledge Management 3

The objective of this course is to provide the students with the fundamental concepts of Knowledge Management, equipping them with both scientific and theoretical background as well as the necessary practical skills. This course also covers the characteristics of and practical models used in Knowledge Management. It discusses the methods of collecting, classifying, and deploying knowledge to serve the overall goals of the organization.

PREREQ: CPIS-240

CPIS-461 Business Information Systems 3

The objective of this course is to equip students with the spirit of initiative in using technology to support business management and to employ technologies to support such spirit. It aims to make the students able to make use of technology as a source of support and strength for the organization. It seeks to meet business requirements by providing them with graduates who are proficient in Information Systems through a set of business applications. It discusses the role of Information Systems in the integration process between the different departments of the organization through a homogeneous of administrative operations.

PREREQ: CPIS-360

CPIS-462 Information Systems Applications 3

The objective of this course is to discuss advanced applications of Information Systems, as determined by the Council of the IS Department.

PREREQ: CPIS-461

CPIS-464 Distributed Systems 3

The objective of this course is to explore the concepts and theories of distributed systems. Topics include the characteristics and specifications of distributed systems, how to make use of them to serve operations and the organization in general, and the technical challenges faced to design, develop, and protect distributed systems.

PREREQ: CPIS-370

CPIS-465 Geographical Information Systems 3

The objective of this course is to explore the concepts and principles of Geographic Information Systems (GIS). Topics include identifying and evaluating the Geographic Information Systems, the distinction between the geographic and non-geographic environments, and a survey of the GIS programming tools and devices.

PREREQ: CPIS-220

CPIS-466 Office Automation Systems 3

The objective of this course is to explore the concepts of office automation. It emphasizes on the planning techniques of office automation and the methods of implementing these plans, including selecting the appropriate technology, hardware, communication equipment, and training human resources. It also covers the administrative and technical concepts of the transformation process to office automation and the significance of the human impact during this process.

PREREQ: BUS-232, CPIS-351

CPIS-472 Data Networks Design and Management 3

The objective of this course is to explore the practical concepts and basic processes of designing and managing data networks. It addresses the technical and management aspects related to data networks design and use. It also equips the students with the technical skills required to compare and contrast between the various techniques related to data networking and the ability to develop selection criteria to choose from the available alternatives.

PREREQ: CPIS-370

CPIS-483 E-Systems Applications 3

The objective of this course is to provide broad understanding of various e-system Web applications and to identify the role these E-Systems play in the development process of institutions and the society. Topics/applications include social networks, e-Learning, e-government, mobile computing, pervasive computing, e-CRM, E-Auctions, E-Supply chain, and support technology concepts such Web 2.0 applications, web services, and cloud computing.

PREREQ: CPIS-380

CPIS-486 E-Business Strategies 3

The objective of this course is to explore e-business strategies for Information systems and the infrastructure required for web-based business models. Topics include E-Business and virtual organizations, characteristics of virtual organizations, e-business models, globalization on SME e-business, strategy evaluation to change e-business, virtual infrastructure, culture to contact external bodies and participate in e-business, developing strategies for virtual organizations, IS plans and strategies of e-business, and converting to e-business strategies of e-markets.

PREREQ: BUS-232, CPIS-380

CPIS-490 Selected Topics in IS 3

The objective of this course is to explore selected topics about the latest advancements in the field of Information Systems (topics determined by the Council of the Information Systems Department).

CPIS-498 Senior Project (I) 1

This course is the first part of a sequence of two courses that constitute the graduation capstone project. In this part, the student is expected to propose, analyze, and design a software system or conduct a thorough investigation of a particular IS-related problem for research-based projects. The student will deliver oral presentations and written reports.

CPIS-499 Senior Project (II) 3

This course is the second part of a sequence of two courses that constitute the graduation capstone project. In this project, the student

will continue the System/Research development of the project that started in CPIS-498. The student will deliver oral presentations, progress reports, and a final report.

PREREQ: CPIS-498

IT Courses

knowledge and skills related to understanding existing and emerging information technologies. Students will find this a helpful Bridge course to upper level courses in Information Technology. This course is supported with a laboratory that aims to equip students with practical knowledge and presentation skills. The purpose of this course is threefold: (1) to provide comprehensive and engaging overview of cutting-edge information technologies, (2) to identify and discuss fundamental principles underlying these technologies, and (3) to relate these technologies with practical life. Topics include an introduction to information technology, digital and analog signals, inside the system unit, system software, databases and information systems, system analysis and design, information systems and databases, networking, privacy, crime and security.

PREREQ: CPIT-201

CPIT-221 **Technical Writing** 2

The objective of this course is to study the fundamentals of technical communication. Topics include the concepts of technical communication and its differences with academic writing, processes in technical communication, tools and techniques to perform collaborative projects and writing, formatting the technical documents with modern tools and techniques, techniques to write official letters, memos and E-mail, writing definitions and descriptions, writing informal reports to address immediate and intermediate tasks accomplishment, writing formal report to portray complex nature of issues, writing informal proposals to cover project with limited scope, writing formal proposals to submit a detailed document, normally applied to large projects, developing presentation skills, preparing effective CV's and cover letter, developing skills for Job interview, learning styles in technical writing for effective revision, and practicing professional presentations in a seminar environment.

CPIT-240 **Databases (I)** 3

This course is the first in a series of courses on designing and implementing database information systems. The objective of this course is to prepare students to become able

CPIT-100 **Computer Skills** 3

The course introduces the students to the main concepts and terminologies of information technology, and equipped them with the knowledge to administer one of widely-used operating systems. Topics include Computer Skills Introduction to information Technology, Operating Systems (Microsoft Windows), Word Processing (Microsoft Word), Data Sheets (Microsoft Excel), Databases (Microsoft Access), Presentations (Microsoft Power Point), Internet (Microsoft IE), E-Mails (Microsoft Outlook), E-Learning and Distance Learning.

CPIT-201 **Introduction to Computing** 3

The objective of this course is present computer science subject areas and applications in ways that serve to motivate the study of computer science and to put into context the various subjects that a student encounter later in their studies. Topics include an introduction to the discipline of computing, computer systems, number systems, data representation, basic computer organization, operating system functionality, basics of networking, the Internet, an overview of database systems, models, software engineering methodologies, and programming languages.

CPIT-210 **Computer Architecture** 3

The objective of this course is to provide an introduction to basic computer organization. Topics include binary, hexadecimal, and decimal number conversions, binary number arithmetic, laws of Boolean algebra, basic computer logic, gates, combinational circuits, sequential circuits, adders, counters, registers, decoder, encoder, comparator, multiplexer, computer organization buses and computer architecture, cache memory, computer arithmetic, instruction sets, and addressing modes.

PREREQ: CPCS-202

CPIT-220 **Introduction to IT** 3

The objective of this course is to provide an overview and understanding of the conceptual base of Information Technology, introducing the newly specialized IT students with the

provide to the system or systems we are building from it, and (3) to know how to achieve software qualities using TACTICS. Topics include envisioning architecture (architecture business cycle), architectural patterns, reference models, reference architectures, understanding quality attributes, achieving qualities using tactics, and how to document software architecture.

PREREQ: CPIT-251

CPIT-260 Operating Systems 3

The objective of this course is to provide an introduction to the basic concepts of modern operating systems. The course covers the design of operating systems and the way they work, in terms of efficiency and reliability, in addition to comparing between the techniques used inside the operating systems, in terms of time and space complexity. Topics include the basic components of different operating systems, organizing and managing processes, computing synchronization, different scheduling techniques for processors, storage devices, memory management, file systems, and input/output systems.

PREREQ: CPIT-210, CPCS-204

CPIT-280 Human-Computer Interaction 3

The objective of this course is to study the fundamentals and principles of human computer interaction. Also, it is intended to develop the student's ability to explore and implement a usable design, in addition to measure, analyze, and evaluate the human computer interaction systems

PREREQ: CPIT-250

CPIT-285 Computer Graphics 3

The objective of this course is to study the hardware and software principles of interactive raster graphics. Topics include an introduction to the basic concepts of computer graphics, vector and pixel displaying system, basic computer graphics techniques, graphical software, the use of API(s) for computer graphics, color models, coordinates homogeneous, transformation, rotation, clipping, representation of objects through polygons, two-dimensional and three-dimensional computer graphics techniques, coordinate transformations, drawing curves and surfaces, shading and lighting models, graphics devices, animation techniques, ray

to implement a working database system using one of the popular commercial DBMSs. Topics include data and information, file system, database and database users, database system concepts and architecture, data modeling using the entity relationship (ER) model, the relational data model and relational database constraints, functional dependencies and normalization for relational databases, relational algebra and relational calculus, relational database design by ER and EER to relational mapping, disk storage, basic file structure and hashing, SQL-99 schema definition, constraints, queries, and views.

PREREQ: CPCS-204

CPIT-250 System Analysis and Design 3

The objective of this course is to provide a methodical approach to developing computer systems, including systems planning, analysis, design, and implementation. The course approaches the development of information systems from a problem-solving perspective, placing emphasis is on the strategies and techniques of systems analysis and design for producing logical methodologies for dealing with complexity in the development of information systems.

PREREQ: CPCS-204

CPIT-251 Software Engineering (I) 3

The objective of this course is to study software engineering principles and techniques used in the specification, design, and testing of software systems. Major software development methodologies are reviewed including requirements, analysis and specification, design, testing, and documentation.

PREREQ: CPIT-250

CPIT-252 Software Design Patterns 3

The objective of this course is to study the principles behind the patterns of software and to then apply a number of basic patterns. This course covers fundamental aspects of large scale software architecture, defined frameworks, design patterns, and ways of developing and establishing systems based on components. The purpose of this course is: (1) to know the classical styles of software pattern and the need for a language to describe the architecture, (2) to understand how to express the qualities we want our architecture to

The objective of this course is to study advanced topics in the domain of databases. Topics include distributed databases and client-server architectures, concepts for object databases, enhanced data models for advanced applications, database tuning in relational database systems, concurrency control techniques, and database security.

PREREQ: CPIT-240

CPIT-345 Database Administration 3

The objective of this course is to explore a variety of topics in Database Administration. Using hands-on training, students will learn about installation, configuration, administration, performance, security, backup and recovery, and enterprise services of databases. Additional topics include an introduction to DBMS, schemas objects, partitioned tables and indexes, built in data types, backup and recovery, enterprise tools, services and connectivity, locking, and concurrency.

PREREQ: CPIT-240

CPIT-370 Computer Networks 3

The objective of this course is to provide a wide background of computer networks, giving students the basic knowledge of data communication, medium accessing protocols, local area networks, and an overview of the higher level protocols. Topics include principles of computer networks, network standard models, analog and digital signals, multiplexing schemes, transmission media, multiple access techniques, wired and wireless lans, network devices, IP addressing, domain name system, and laboratory experiments.

PREREQ: CPIT-210

CPIT-375 Data Network Design and Evaluation 3

The objective of this course is to study the concepts and practical skills to design and evaluate data networks. Topics include technical concepts related to the data networks design, managerial aspects of the design, and technical skills needed to evaluate different network technologies, thereby enabling students to compare and contrast different alternatives for network designs.

PREREQ: CPIT-370

CPIT-380 Multimedia Technologies 3

tracing, and the design and drawing of two-dimensional and three-dimensional graphics objects in OpenGL in C++.

PREREQ: CPCS-204

CPIT-305 Advanced Programming 3

The objective of this course is to study advanced techniques in Java programming. Topics include how to build applications for different purposes, methods for Java programs to interact with other existing technologies, exception and error handling, streams and files operations, concurrent programming, network and socket programming, and Java Database Connectivity (JDBC).

PREREQ: CPCS-204

CPIT-323 Summer (workplace) Training 0

This is mandatory, 200-hour internship program for all students in FCIT. The objective of this course is to provide students the opportunity to apply their academic education with hands-on, real world experience in a work setting. Students are sent to different companies to get the real flavor of work group, communications, and professional development experiences.

CPIT-330 IT Issues and Management 3

The objective of this course is to study the concepts and application of Agile and Scrum techniques to manage software development projects. Topics include an introduction to agile project management, fundamentals of scrum for dealing with uncertainty and risk, identifying the roles and their responsibilities, managing releases, tools for tracking and monitoring a project, planning an agile project, establishing the business reasons for the project, clarifying the business vision, identifying features for development in an iteration, fostering self-management within the development team, creating the optimal working environment, transitioning to self-management, running iterations, managing change, reviewing the iteration through a sprint review, closing the project using a sprint retrospective, applying agile throughout your organization, dealing with the legacy organization, and scaling for large projects.

PREREQ: CPIT-220, CPIT-250

CPIT-340 Database (II) 3

PREREQ: CPIT-330

CPIT-435 Needs Assessment and Technology Evaluation 3

The objective of this course is to explore the methods of identifying organizational needs. Topics include the types of the questions expected in personal interviews, the needed skills in how to identify and assess appropriate technology to meet the needs of the business, and how to follow up, make changes, and find updated technical solutions with the development and renewal requirements in the future.

PREREQ: CPIT-340

CPIT-436 E-Business Technology 3

The objective of this course is to explore e-business technology and the use of computer techniques in updating business processes, which are designed to improve performance and reduce costs.

PREREQ: CPIT-435

CPIT-440 Data Mining and Warehousing 3

The objective of this course is to explore the different knowledge extraction methods and its representation techniques as well as knowledge engineering. It also introduces the different basic artificial intelligence theories that qualify the students to understand the contents of the course. Topics include an introduction to data mining and warehousing, data warehousing and OLAP technology, classification and prediction, mining frequent patterns, associations and correlations, review of probability and statistics, and data preprocessing.

PREREQ: CPIT-340

CPIT-445 Knowledge Engineering 3

The objective of this course is to explore the different knowledge extraction methods and its representation techniques as well as knowledge engineering. It also introduces the different basic artificial intelligence theories that qualify the students to understand the contents of the course.

PREREQ: CPIT-440

CPIT-455 Software Engineering (II) 3

The objective of this course is to study multimedia technologies and programming methods to manipulate multimedia. Topics include creating and modifying images, modifying sounds, splicing words into sentences, reversing sounds, writing programs to generate dynamic Web pages from databases, and creating animations and movies with special effects.

PREREQ: CPIT-285

CPIT-405 Internet Applications 3

The objective of this course is to study Internet programming and Web application development. Students will learn basic principles and techniques for building Internet applications. It provides students with the basic Web page development technologies and an introduction to dynamic Web page development using client-side scripting. Topics include introduction to HTTP protocol and client side programming, XHTML, Cascading Style Sheets, JavaScript DOM, XML (Name space, DTD, Schema, XSLT, XPATH), RSS, and AJAX.

PREREQ: CPIT-370, CPIT-252

CPIT-425 Information Security 3

The objective of this course is to provide basic knowledge about the technical and operational issues of modern cryptosystems and the related standards. Topics include threats to network security and schemes for breaking security, classical encryption techniques, block ciphers and stream ciphers, DES and triple DES, AES, block cipher operation modes, asymmetric ciphers: RSA, Diffie-Hellman key exchange, ElGamal cryptosystem, hash functions, MAC functions, digital signature, key management and distribution, X.509 certificates, transport level security: SSL and TLS, Intrusion, and types and configurations of firewalls.

PREREQ: CPIT-370

CPIT-430 Decision Support Systems 3

The objective of this course is to explore the concept of decision support systems and components. It gives knowledge of decision-making models under different circumstances, as well as to identify the intelligent systems and their role in the process of decision support. It also teaches how to deal with crises and disasters using decision support systems.

infrastructure designing, and planning and administration.

PREREQ: CPIT-370

CPIT-480 Fundamentals of Instructional Techniques 3

The objective of this course is to study the planning, organization and development of educational materials. Also, it uses the instructions system design model (ISD) to analyze, design, deliver, and evaluate instructions.

PREREQ: CPIT-380

CPIT-485 User-Centered System Design 3

The objective of this course is to explore the concepts of instruction between humans and computers and how to apply the rules of design and quality assurance in interactive systems.

PREREQ: CPIT-280

CPIT-490 Selected Topics in IT 3

The objective of this course is to explore selected topics about the latest advancements in the field of Information Technology (topics determined by the Council of the Information Technology Department).

CPIT-498 Senior Project (I) 1

This course is the first part of a sequence of two courses that constitute the graduation capstone project. In this course the students integrate the knowledge areas of IT into a development based project in which they will deliver proposals, reports, and oral presentations. The course topics cover planning, analysis, and design phases of the projects.

CPIT-499 Senior Project (II) 3

This course is the second part of a sequence of two courses that constitute the graduation capstone project. This course aims to execute what was presented in CPIT-498 – the student's present two reports and two presentations of graduation project. The courses topics cover detail design, coding, testing, and implementation of the project.

PREREQ: CPIT-498

The objective of this course is to explore software advanced engineering principles and techniques used in the specification, design, and testing of software systems Topics include software engineering confirmation and authentication, methods and ways of software testing building and managing software development teams, scientific and practical methods for calculating the costs of software development, quality management in software development, processes development in software production, and reconstruction management in software production.

PREREQ: CPIT-251

CPIT-456 Software Economics 3

The objective of this course is to explore concepts in software economics. Topics include important economic concepts in the process of software development, building software development team and empowering them, continuous improvement of procedures in building software process, production tasks in the process of applications development, economies of scale operations related to software development, optimizing restricted operations and cost estimation to build software, models of integrated operations, spiral model to build software, and risk management in building software.

PREREQ: CPIT-251

CPIT-470 Networks Administration 3

The objective of this course is to explore the principles of network administration. Topics include network OSI layers and CISCO IOS configuring devices, IP addressing and subnetting, introduction to routing, static routing, default routing, dynamic routing, RIP1 and RIP2, troubleshooting, routing table lookup process, OSPF, switching & switch configuration, switch security, VLANs, spanning tree protocol, VTP, inter VLAN routing, and network troubleshooting.

PREREQ: CPIT-370

CPIT-475 Wireless Data Networks 3

The objective of this course is to explore principles of IT Infrastructure, Networking and System Administration. Topics include cellular architecture, GSM, GPRS, UMTS, 802.11 WLAN