



MINISTRY OF HIGHER EDUCATION

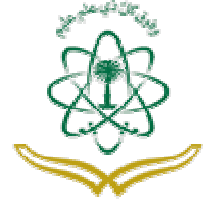
SAUDI ARABIA

KING FAISAL UNIVERSITY

**COLLEGE OF COMPUTER SCIENCES &
INFORMATION TECHNOLOGY**

Prospectus For Postgraduate Studies

2013-2014



وزارة التعليم العالي
Ministry of Higher Education



TABLE OF CONTENTS

1	INTRODUCTION	3
1.1	About KFU	4
1.2	About CCSIT	6
2	MASTERS PROGRAMS	10
2.1	MS CS Program	12
2.2	MS CIS Program	14
2.3	General Academic Policy	16
2.4	Study Plans & Detailed Curricula	18
3	FACILITIES & RESOURCES	48
3.1	Faculty	49
3.2	Facilities	52
3.3	Library	55
3.4	Research	56
4	CONTACT INFORMATION	59



1. INTRODUCTION

1.1. About King Faisal University

King Faisal University (KFU) is one of the public institutions providing higher education and research in the Kingdom of Saudi Arabia (KSA). It is located in the city of Al Ahsa in the Eastern Province of the Kingdom, an area critical to KSA for Agriculture and food production, water and oil resources, culture and tradition. Al Ahsa is famous as the world's largest oasis and as the historical capital of eastern Arabia.

At KFU, we offer degrees, both undergraduate and postgraduate, in a range of disciplines, and have seven research centers in addition to new medical training facilities. In addition to its campus, KFU has teaching and research facilities spread across the Al Ahsa area. In 2010, there were more than 47000 young adult learners (23,255 full time and 24, 057 distance education), and annually graduate more than 3000 students. We have made substantial investment in learning technologies and are able to serve a larger group of distance education students as well. A new University City campus is under construction in Al Ahsa, with two sets of facilities: one for female and one for male students. King Faisal University employs national and international professionals as teaching, research and administrative faculty, as well as large numbers of technical and support staff, thus making it the largest employer in the Al Ahsa area. With our technologies and international outreach. We are involved in the worlds of higher education and training, professional training and development, business and socio-economic development, both across the whole GCC area and beyond.

1.1.1 Vision

To lead in community engagement through excellence in education, research and leadership.

1.1.2 Mission

To serve the community with excellent teaching and learning, relevant and respected research, lifelong learning opportunities, effective and efficient administration, leadership service and development , and community engagement for mutual enrichment

1.1.3 Goals

1. Excellent teaching and learning.
2. Relevant and respected research.
3. Lifelong learning opportunities.
4. Effective and efficient administration.
5. Leadership service and development.
6. Community engagement for mutual enrichment.



A view of the CCSIT Building

1.2 About College of Computer Sciences & Information Technology

The College of Computer Sciences & Information Technology (CCSIT) was established in King Faisal University (KFU) in 2003. The College is comprised of the following four departments:

1. Computer Sciences Department (CS)
2. Information Systems Department (IS)
3. Computer Engineering Department (CE)
4. Communications & Computer Networks Department (CN)

Each of the CS, IS and Networking Department offers a separate curriculum leading to a B.Sc. Degree in Computer Sciences, Information Systems and Network Communication, respectively. The department of CE offers support courses that are included in other programs. Over the years, the College has shifted to its independent new building with more than 40 faculty members.

The College of Computer Sciences and Information Technology is proud to achieve ABET (Accreditation Board for Engineering and Technology, USA) accreditation for its bachelors programs which is a demonstration of our strict policies of quality control for achieving quality education and research. The quality of our teaching is also evident from our highly talented and experienced professional faculty members from around the world. The faculty comes from varied educational and research backgrounds with a vision to polish the abilities of students and devotedly bestow them with the enlightenment towards a better career in their lives and to enable them to better serve the community and the nation.

The college has excellent facilities for students and staff including spacious class rooms, modern computing and engineering labs, and high speed internet and intranet connections. A suitable combination of talented professionals and modern equipment with healthy and research oriented environment of college provides a platform to students for completion of their studies with knowledge and skill and become an asset to the society through leadership and self-reliance. All the above makes the college a special place in the region of Al Ahsa.



College of Computer Sciences & Information Technology

1.2.1 Vision

To be the leader and institution of choice in Computer Sciences and Information Technology related disciplines through quality education and research productivity in service of the community

1.2.2 Mission

To achieve international standards of quality education through industrial collaboration for the service of community.

1.2.3 Goals

- To prepare highly qualified students in information technology areas who are qualified in the theoretical principles as well as application methods for international market in computer sciences and information technology.
- To cooperate with specialized national and international institutions for developing systems and solutions and exchanging knowledge in the specialized fields.
- To raise the standards of teaching and research by organizing national and international academic meetings and conferences.
- To provide state-of-the-art high quality education relevant to the local and international markets by conducting theoretical and practical studies in the information technology areas with the support and participation of industry.
- To apply research to solve problems in the industry and for the service of the community.



2. MASTERS PROGRAMS

The proliferation of information technology has created a strong demand for computing and IT professionals in the industry and academia with specialized knowledge. The college developed its master degree programs to meet such a demand by training fresh graduates as well as practitioners with state of the art knowledge and skills in computer sciences and information system.

The College of Computer Sciences and Information Technology (CCSIT) currently offers two Master's degree programs: Master of Science in Computer Science (MS CS) and Master of Science in Computer Information Systems (MS CIS). Students may choose either Thesis Track or Coursework Track study path to fulfill the necessary credit requirements for the respective degree. The faculty-guided dissertation component of thesis-track study enables students to pursue doctoral level study or academic and R&D careers. The project components of the Coursework Track study is also a guided research component and aims to developing practical creative thinking and problem solving skills of the graduate students.

The college offers excellent learning and research environment and facilities for graduate students. Internationally recruited faculty members with diverse area of expertise make CCSIT an ideal college to pursue a postgraduate degree. The normal duration of study of our Master's degree programs is two academic years (4 semesters). Working students may choose to enroll on a part-time basis to complete their degrees over an extended period of time as permitted by the university regulations. Dissertation and project can be undertaken flexibly over an extended period of time.

The college adopts a credit-based system, and cumulative grade point average (CGPA) is used for assessment. The total credit requirement of each program or track may vary slightly. The medium of instruction of all our Master's degree programs is English.

The program educational objectives and outcomes, admission criteria, and relevant academic regulations including graduation requirements of each program are given below.

2.1. Master of Science in Computer Sciences (MS CS)

2.1.1 MS CS Program Educational Objectives

The Master of Science in Computer Sciences (MS CS) program will prepare students to:

- Demonstrate professional excellence in practical problem-solving by applying novel theory and practice in computer sciences
- Incorporate state-of-the-art design and development techniques for construction, validation and verification of various computing systems
- Initiate basic and applied research projects for the benefit of the community and communicate scientific knowledge with the global partners
- Pursue a high-caliber academic, research or professional career through lifelong learning in the area of computer science

2.1.2 MS CS Program Outcomes

By the time of graduation, the students are expected to acquire the following knowledge, skills and abilities:

- A clear understanding of computer science theory and practice in terms of modeling, algorithms, software and system development to solve real-life problems
- The ability to design and develop systems of varying nature and complexity by engaging themselves in continuous professional development
- The ability to follow the technical trends in computing and deliver innovative solutions through critical analysis and adoption of new technology

- The ability to conduct research and development using appropriate methodologies
- The ability to communicate scientific knowledge with a wide range of audience through effective presentations and writings
- The ability to work independently or as a team to accomplish desired goals and objectives

2.1.3 MS CS Admission Criteria

The candidate applying for admission to the Master of Science in Computer Sciences (MS CS) program must:

- Have a bachelor's degree in computer sciences
- Have a minimum CGPA of 3.75/5.00 or equivalent in the bachelor degree, however, those who have minimum CGPA of 2.75/5.00 may be admitted with tuition fees
- Demonstrate English language proficiency through one of the following:
 - A score of 61 or above in the Test of English as a Foreign Language Internet-Based Test (TOEFL-iBT), or Band 5.0 in the International English Language Testing System (IELTS); or equivalent
 - Earning a bachelor degree with English language as medium of instruction
- Provide two letters of recommendation
- Provide a certificate of good character (behavior)
- Provide a letter of approval from the employer if the candidate is currently employed
- Pass entry test or interview conducted by the department

- Meet any other criteria recommended by the department or the college

2.2. Master of Science in Computer Information Systems (MS CIS)

2.2.1 MS CIS Program Educational Objectives

The Master of Science in Computer Information Systems (MS CIS) program will prepare students to:

- Demonstrate professional excellence in strategic planning, development and management of mission critical information systems
- Incorporate technical knowledge with that of management and operations in delivering cutting edge solutions to businesses and organizations
- Initiate basic and applied research projects to address contemporary issues in the area of information systems and communicate scientific knowledge with the global partners
- Pursue a high-caliber academic, research or professional career through lifelong learning in the area of information systems

2.2.2 MS CIS Program Outcomes

By the time of graduation, the students are expected to acquire the following knowledge, abilities and skills:

- The ability to analyze, design, develop and evaluate computer-based information systems that meet the organizational needs

- The ability to use correct techniques and tools for IS development and management by engaging themselves in continuous professional development
- A clear understanding of professional, ethical, legal, security and social issues and practices related to information systems
- The ability to critically review scholarly work, to adopt appropriate research methodology in conducting effective research
- The ability to communicate scientific knowledge with a wide range of audience through effective presentations and writings
- The ability to work independently or as a team to accomplish desired goals and objectives

2.2.3 MS CIS Admission Criteria

The candidate applying for admission to the MS CIS program must satisfy the following:

- Have a bachelor degree in:
 - Information Systems/Information Technology or a related discipline; or
 - A field not related to IS/IT, in which case a candidate will have to pass some pre-requisite courses (to be determined by the department on case by case basis) before starting their master degree
- Have a minimum CGPA of 3.75/5.00 or equivalent in the bachelor degree, however, those who have minimum CGPA of 2.75/5.00 may be admitted with tuition fees
- Demonstrate English language proficiency through one of the following criteria:

- A score of 61 or above in the Test of English as a Foreign Language Internet-Based Test (TOEFL-iBT), or Band 5.0 in the International English Language Testing System (IELTS); or equivalent
- Earning a bachelor degree with English language as medium of instruction
- Provide two letters of recommendation
- Provide a certificate of good character (behavior)
- Provide letter of approval from the employer if the candidate is currently employed
- Pass entry test or interview conducted by the department
- Meet any other criteria recommended by the department or the college

2.3. General Academic Policy, Graduation Requirements and Career Prospects

2.3.1 General Policy and Academic Calendar

The Master's degree programs utilize classroom based lectures, and course related hands-on projects and case studies (as individual or in a group) as well as supervised projects and dissertation to achieve its teaching and learning objectives. The lectures are traditionally classroom based and conducted on campus. To accommodate female students the college uses various modes of instruction ranging from partitioned classroom to video conferencing as necessary.

The college follows semester-based academic calendar. One academic year is divided into two semesters. Each Semester consists of 16 weeks including the final exam. Each credit-hour is equivalent to one hour of lecture or three hours of lab per week. The grade-point average (GPA) is calculated according to the university grading policy as shown in the following table. A Cumulative GPA of 3.75 out of 5.0 is required for graduation.

Table 2.1: Grading Policy

Grades	Meaning	Points out of 5.0	Marks Distribution
A+	Exceptional	5.00	95-100
A	Excellent	4.75	90 – 94
B+	Superior	4.50	85 – 89
B	Very Good	4.00	80 – 84
C+	Above Average	3.50	75 – 79
C	Good	3.00	70 – 74
D+	High Pass	2.50	65 – 69
D	Pass	2.00	60 – 64
F	Fail	1.00	below 60
IP	In-Progress	-----	-----
IC	In-Complete	-----	-----
DN	Denied	-----	-----
NP	No Grade- Pass	-----	-----
NF	No Grade- Fail	-----	-----
W	Withdrawn	-----	-----

2.3.2. Graduation Requirements

The degree of "Master of Science in Computer Sciences" or "Master of Science in Computer Information Systems" will be awarded on successful completion of **36 credits** including a 9-credit Dissertation (Thesis Track) or **42 credits** including a 9-credit Project (Coursework Track). Dissertations and projects are supervised by the highly qualified faculty members at the college. The minimum CGPA required for graduation for all our Master's degree programs is 3.75 out of 5.00. A Thesis or a Project is mandatory for successful completion of the Master's degree. The detail curriculum including a typical Study Plan for each program/track is presented in Section 3.4 below.

2.3.3. Career Prospects of CCSIT Master's Degree Graduates

Depending on their specializations and interests, the Master's degree graduates of the College of Computer Sciences and Information Technology will be prepared to join the IT workforce in various capacities. Some possible career opportunities are listed below:

- Managerial positions in the IT Industry

- IT policy making and infrastructure development
- ICT project management
- Business and system analyst
- System development and solution delivery
- Independent consulting
- Self-employed Software Entrepreneur
- Training and academic positions
- Research positions in the industry and academia
- Doctoral level education

2.4 Study Plans and Detailed Curricula

The College offers flexible study plans based on an up to date graduate level curricula in computer sciences and computer information systems that suits national and global needs and standard. Various top ranked universities of USA, Canada, UK and Saudi Arabia offering Master of Science in Computer Sciences were selected and their curricula were studied during the development of the curriculum. The guidelines of some other international professional bodies including ACM/IEEE, ABET were also consulted. A comparative study was done to evaluate the programs for study plan and suggesting the core and elective courses. Our curricula reflect a balance between theory and practice.

2.4.1. MS CS Program Study Plans and Curricula

The curriculum of the degree program includes a balance between theory, applications and research. Further core and elective requirements are set to complete the master in computer sciences. The students are allowed to choose one of the following two tracks:

- Thesis Track
- Coursework Track

Both of the above tracks will provide students with a theoretical background and solid foundation in computing. Further, the students will be exposed to the latest tools, techniques and technologies to have innovative ideas in the area of computer science.

2.4.1.1 Thesis Track Study Plan

The objective of the Thesis Track Master’s degree is to provide students with advanced level knowledge in computing while developing their ability to work independently and develop their research skills. The dissertation topic should reflect original and creative solution to practical problems in computer science. Writing a dissertation requires a good grasp of the subject, time commitment and good command of technical and academic writing. This option is suitable for those students who are interested in research careers and further study such as a PhD. The program is composed of 36 units which are distributed according to the course categories. The learning material is comprised of core courses, elective courses and the Dissertation. The dissertation is compulsory for completion of the Master of Science in Computer Sciences by research track. The semester-wise distribution of the courses is given in the following Table.

Table 2.2: Thesis Track Study Plan

Year	First Semester			Second Semester		
	Course #	Course Title	Units	Course #	Course Title	Units
1	0911611	Advanced Algorithms	3	0911614	Advanced Software Engineering	3
	0911612	Distributed Systems	3	0912615	Research Methodology	3
	0911613	Advanced Computer Architecture	3		Elective 1	3
	Total		9	Total		9
	First Semester			Second Semester		
2		Elective 2	3	0911700	Dissertation	9*

	Elective 3	3		
	Elective 4	3		
	Total	9	Total	9
* Dissertation can be registered earlier and may be extended over the maximum duration of the degree				

2.4.1.2 Coursework Track Study Plan

The objective of Coursework Track program is to provide students with an advanced level of knowledge and skills that will enable them to be valuable professionals for practicing in industry. This objective will be achieved through projects in collaboration with governmental and private industrial institutions, where students will have the opportunity to apply the state-of-the-art techniques they have learned. The objective is to meet the current and future demands of the industry by highly trained computer science specialists. Students are required to submit a proposed proposal in consultation with faculty members. Upon approval of the proposal, students will undertake project implementation under the guidance of their supervisors.

In this track, an effort will be made to help the individuals to enhance their technical and managerial skills in the field. This program will provide a strong foundation in theory and practice in the area of computer science and applications providing them with new professional skills and critical analytical thinking that are necessary to work in the competitive market of today. The program is comprised of 42 units for which the semester-wise distribution is given in Table 5.

Table 2.3: Coursework Track Study Plan

Year	First Semester			Second Semester		
	Course #	Course Title	Units	Course #	Course Title	Units
1	0911611	Advanced Algorithms	3	0911614	Advanced Software Engineering	3
	0911612	Distributed Systems	3	0912615	Research Methodology	3
	0911613	Advanced Computer Architecture	3		Elective 1	3
					Elective 2	3
	Total			9	Total	

2	First Semester			Second Semester		
	Course #	Course Title	Units	Course #	Course Title	Units
	0911690	Project Proposal*	3	0911695	Project Implementation	6*
		Elective 3	3		Elective 6	3
		Elective 4	3			
		Elective 5	3			
	Total		12	Total		9
* Project can be registered earlier and may be extended over the maximum duration of the degree						

2.4.1.3 Core and Elective Courses for MS CS Program

To demonstrate a breadth of knowledge of the students in the area of computer science, core requirements are set in the study plan. This is because the core courses reflect a minimum level of knowledge in the field and hence are designed accordingly. The cores are drawn from the following broad areas of computer science:

1. Algorithms and Complexity
2. Software Engineering
3. System and Network Architecture

The five core courses are selected to give students a strong foundation in the areas which are central to computer science. As such these will serve as basis to most of the advanced elective courses. The students will be advised to complete all or most of the core courses in the first year of their master program. These courses will prepare students for taking the specialized elective courses for both tracks. The core courses offered in the degree program are listed in the following Table.

Table 2.4: Core Courses

Course #	Course Title	Units
0911611	Advanced Algorithms	3
0911612	Distributed Systems	3
0913613	Advanced Computer Architecture	3

0911614	Advanced Software Engineering	3
0912615	Research Methodology	3

The department will offer a broad range of elective courses subject to the students demand, considering current and future needs and availability of the faculty and staff. These courses cover a variety of areas in the field of computer science ranging from artificial intelligence to software engineering and game development. The students may take such courses based on their individual interest, background and career objectives. Such a diverse range of elective courses offered by the college will give students an opportunity to specialize in topics suited to their professional interests. The list of knowledge areas selected is given below.

1. Algorithms and Complexity
2. Networks and Systems Architecture
3. Graphics and Visual Computing
4. Intelligent Systems
5. Information Management
6. Software Engineering
7. Computational Science
8. Research Work

The list of elective courses along with course numbers is listed in the following Table.

Table 2.5: Elective Courses

Course No	Course Title	Units
0911621	Theory of Computation	3
0911622	Cryptography	3
0911623	Image Processing and Analysis	3
0911624	Machine Learning	3

Course No	Course Title	Units
0911625	Applications of Artificial Intelligence	3
0911626	Formal Software Specification and Design	3
0911627	Theory of Programming Languages	3
0911628	Compiler Design and Construction	3
0911629	Software Validation and Verification	3
0911630	Principles of Distributed Computing	3
0911721	Computer Vision	3
0911722	Software Requirements Engineering	3
0911723	Pattern Recognition	3
0911724	Stochastic Processes	3
0911725	Game Modeling and Development	3
0911726	Computational Geometry	3
0911727	Advanced Modeling and Simulation	3
0912611	Advanced Database Management Systems	3
0912627	Information Retrieval and Extraction	3
0912628	Multimedia Systems Design	3
0914621	New Trends in Computer Networks	3

2.4.1.4 Course Descriptions of MS CS Program

	CS611	Advanced Algorithms	Credit Units	3
D E S C R I P T I O N	Underlying mathematical theory, Induction and recursion techniques, Asymptotic notations, Divide and conquer technique, Randomized algorithms, Parallel and heuristic algorithms, Brute force approach, Dynamic algorithms, Greedy algorithms, Importance of algorithms in graph theory, Optimization algorithms using graphs and trees, Minimal spanning tree algorithms, Variants of shortest path problem, Matrix operations, Algorithms for solving systems of linear equations, Linear programming algorithms, Numerical approximations, Polynomials and fast Fourier transformation, Number theoretic notations and algorithms, RSA cryptosystems, String matching, Pattern matching, Automata theory in algorithms designing, Computational geometry, NP completeness, NP completeness proofs and reducibility, Approximation algorithms.			
	Pre-requisite:		None	

	CS612	Distributed Systems	Credit Units	3
D E S C R I P T I O N	Loosely and Tightly Coupled Hardware and Software, Multiprocessing Systems, Network Operating Systems, Distributed and Parallel Time Sharing, Design Issues of Distributed File System, Transparency, Global States and Coordination, Data Sharing and Transactions, Concurrency Control, Replication, Protocols for Replication, Distributed Shared Memory, Designing Distributed Objects, Principles of Object-Oriented Middleware, Object Synchronization, Dynamic Object Requests, Object Security, Locating Distributed Objects, Object Naming, Object Trading, Object Naming Issues, Naming Scheme, Name Servers, Life Cycle of Distributed Objects, Composite Object Life Cycle, Object Persistence, Distributed Shared Memory, Distributed Security, Fault Tolerance, Remote Procedure Calling, Distributed Databases, Grid Computing, Cloud Computing.			
	Pre-requisite:		None	

	CE613	Advanced Computer Architecture	Credit Units	3
D E S C R I P T I O N	Assessing and evaluating performance of computer, Language of Computer, Operations and operands of hardware, Conversion of higher level to assembly language, Working of compiler, Addressing modes, Processor design, Data paths and control of UP, Single and multi-cycle processor design, Pipelining, Data hazard and forwarding, Branch hazards and solutions, Pentium Systems design, Superscalar processors, Speculation and software pipelining, Hardwired and Micro programmed Control section, Micro-programmed control section, Microprogramming concepts, Memory management, I/O devices, Memory management system, Memory management system of Pentium System, Parallel Processing, Multiple processor organization, Symmetric multiprocessors, Cache coherence and MESI Protocols clusters, Vector computations, VHDL, Design of sequential logic circuit.			
	Pre-requisite:		None	

	CS614	Advanced Software Engineering	Credit Units	3
D E S C R I P T I O N	Requirements Engineering, Functional and Non-Functional Requirements, Procedures for Gathering Requirements, Use Case Model, Functional Specifications, Software Architecture, Deployment Diagrams, Component Based Software Engineering, Reusability and Design Patterns, Anti-Patterns, Abstract Factory, Refactoring Techniques, Software Verification and Validation, Correctness, Formal Methods, Efficiency, Performance and Reliability, Attitude of Industry towards Reliability and Performance, Software Quality, Software Metrics, Function Point Analysis, Cost Constructive Model, Use Case Based Estimation, ISO Quality Assurance and Control, Capability Maturity Model, Project Management, Software Project Planning, Risk Analysis, Project Scheduling and Tracking, Project Evaluation and Review Techniques, Critical Path Method, Inspections and Walkthrough.			
	Pre-requisite:		None	

	IS615	Research Methodology	Credit Units	3
D E S C R I P T I O N	The philosophy of Science, basics of doing research including problem solving and research, defining the research problem, writing a literature review, hypothesis development and validation, conceptual modeling and research design, case study research, survey and observations, primary data collection, experiments, histories and simulations, interventions including benchmarking, action research and pilot studies, sampling and measurement, instrument and questionnaire design, analysis methods including qualitative, quantitative and mixed data analysis, grounded theory, usability evaluations, research ethics, peer review process, reporting and publishing including displaying data and writing up results.			
	Pre-requisite:		None	

	CS621	Theory of Computation	Credit Units	3
D E S C R I P T I O N	History and Preliminaries, Determinism and Non-determinism, Checking vs. Computing, Finite State Systems, Deterministic and Non-deterministic Models, Pumping Lemma, Decision Algorithms for Regular Sets, Pushdown Automata, Context-Free Languages (CFL's), Derivation Trees, Simplification of Context-Free Grammars (CFG's), Normal Forms, Properties of CFL's, Pumping Lemma for CFL's, Closure Properties of CFL's, Decision Algorithms for CFL's, Universal Models of Computations, Turing Machines, Computable Languages and Functions, Church's Hypothesis, Properties of Recursive and Recursively Enumerable Languages, Universal Turing Machines, Translation Between Models, Model Independence, Decidability and Un-decidability Problem, Recursive Function Theory, The Chomsky Hierarchy, Computational Complexity Theory, Complexity Classes, Model-independent Complexity Classes, Reduction, Reducibility among Problems, Tractability and Intractability, NP-completeness, Space Complexity, Provably Intractable Problems, Proving Problems Hard and Complete.			
	Pre-requisite:		None	

	CS622	Cryptography	Credit Units	3
D E S C R I P T I O N	Basic concepts in Number Theory, e.g., Euclidean algorithm, Euler's function, Fermat's theorem and Euler's generalization, Chinese remainder theorem, primitive roots and discrete logarithms, quadratic residues, Legendre and Jacobi Symbols and familiarity with various basic cryptographic concepts, tools and algorithms including DES and differential and linear cryptanalysis, AES, RSA system, Digital signatures, El Gamal signature, digital signature standard, one time undeniable and fail stop signature, hash functions, and coding and information theory, Probability Review, Entropy, Huffman Codes & Perfect Secrecy, The course also covers Error Correcting Codes, Bounds on General Codes, Linear Codes, Hamming Codes, Golay and Cyclic Codes, BCH Codes, Reed-Solomon Codes and Quantum Techniques in Cryptography.			
	Pre-requisite:		None	

	CS623	Image Processing and Analysis	Credit Units	3
D E S C R I P T I O N	Digital image processing is ubiquitous, with applications ranging from television to tomography, from photography to printing, from robotics to remote sensing. This course will provide an introduction to the basic techniques of digital image processing. The student will learn modern approaches to image acquisition and display, image enhancement, image compression and image analysis. The course will covers topics such as: sampling and quantization of images, matrix representation of image forming, Filtering, color representation, image restoration, and feature extraction of images. A significant amount of mathematics background is required since a good portion of the course deals with spatial domain and frequency domain image operators, their underpinnings in algebra and calculus, and the understanding of their application.			
	Pre-requisite:		None	

	CS624	Machine Learning	Credit Units	3
D E S C R I P T I O N	Introduction, Basics of Probability, Examples of Machine Learning Applications, Learning Associations, Concept Learning, Inductive Learning, Find-S Algorithm, Version Spaces, Candidate Elimination, Inductive Bias, Bayes Learning, Decision Trees, ID3 Algorithm, Inductive Bias, Over-fitting, Missing Data, Neural Networks, Perceptrons, Backpropagation, Generalization, Error Functions, Hope Field Networks, Classification, Regression, Unsupervised Learning, Reinforcement Learning, Correct (PAC) Learning, Introduction to Clustering, Mixture Densities, k-Means Clustering, Expectation-Maximization Algorithm, Mixtures of Latent Variable Models, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the Number of Clusters.			
	Pre-requisite:		None	

	CS625 Applications of Artificial Intelligence	Credit Units	3
DESCRIPTION	<p>This course examines goals, problems, concepts and methods of artificial intelligence, heuristic versus algorithmic methods. It looks into techniques to solve complex problems in a particular domain, typically independent of knowledge used to direct the search for an optimal solution. Approaches include simulated annealing, genetic algorithms etc. It covers modern techniques for computers to represent task-relevant information and make intelligent decisions towards the achievement of goals. It covers advanced topics in artificial intelligence such as Machine Learning, Knowledge Discovery, Neural and Evolutionary Computation, Planning Systems, Perception, Natural Language Processing.</p>		
	Pre-requisite:	None	

	CS626 Formal Software Specification and Design	Credit Units	3
DESCRIPTION	<p>Equivalence of propositional and predicate logic, Formal specification, Transformation specification to code, Specification analysis and proof, Program verification, Equality and definite description, Uniqueness and one point rule, Objects and its types, Sets and set types, Bags and types, Sequence and its type, Modeling with sequences and bags, Tuples and Cartesian product types, Generic and axiomatic definitions, Bindings and schema types, Modeling with relations and functions, Domain/range restrictions and subtractions, Notations and properties of relations and functions, Free types, Primitive recursion and induction, Proof by induction, Schemas: properties, type, declaration, predicate, operators. Generic constructions, The Z language, Syntactic conventions, Schema references, Schema texts, Schema expressions, Sequential systems, Modeling with mappings, Consistency and completeness, Visualization, Systematic testing, Relationships between Z and VDM, Validation and verification techniques/tools.</p>		
	Pre-requisite:	None	

	CS627 Theory of Programming Languages	Credit Units	3
DESCRIPTION	<p>Introduction to the main constructs of contemporary programming languages and criteria used for evaluating programming languages and language constructs: influence on language design, and design tradeoffs; Syntax and Semantics description: problems and formal methods; Lexical and Syntax Analysis; Characteristics of variables: Name bindings, type checking and scopes; Data types: Primitive data, character strings, user defined, arrays, record, union, pointer and reference types; Expression and assignment statements; Statement- level control structures: selection and iterative statements, unconditional branching, guarded commands; Subprograms and their implementation: fundamentals, design issues and implementation of simple subprograms; data abstraction facilities: Abstract data types and encapsulation constructs; Concurrent program units; exception handling and event handling; Alternative programming paradigms: functional programming and logic programming.</p>		
	Pre-requisite:	None	

	CS628	Compiler Design and Construction	Credit Units	3
DESCRIPTION	<p>An introduction to Front End of the compiler, Lexical, Syntax and Semantic Analyzers, Intermediate code generator, Code generator, The detail and in-depth discussion will be on the advanced topics of back end including: Issues in the Design of a Code Generator, The Target Language and Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Simple Code Generator. Various optimization techniques and algorithms both machine dependent and machine independent will also be discussed that can be applied to obtain an optimal code generator.</p>			
	Pre-requisite:		None	

	CS629	Software Validation and Verification	Credit Units	3
DESCRIPTION	<p>The validation and verification of software systems is a major issue in the IT industry. The main focus of this course will be proving and ensuring correctness of software systems. The topics include quality assurance, safety, fault tolerance, reliability, Techniques for validation and verification, Research-oriented in-depth study of Verification and Validation, Quality assurance at requirements and design phases, Software testing at unit, module, subsystem and system levels, Automatic and manual techniques for generating and validating test cases, Testing process including static vs. dynamic analysis, functional testing, inspections, and reliability assessment. Some other advanced topics will include Lambda Calculus, Natural Deduction, Term Rewriting, Functional Programming, Sets and Rule Induction, Data types and Recursion, Calculational and Monadic Reasoning, Imperative Program Verification and Hoare Logic, Separation Logic, Proofs.</p>			
	Pre-requisite:		None	

	CS630	Principles of Distributed Computing	Credit Units	3
DESCRIPTION	<p>This course covers algorithms and lower-bounds for fundamental problems in distributed computation, e.g., Self-organization, Distributed approximation, Leader election, Information dissemination, Consensus problems, Consistent snapshot computation and atomic actions concepts, distributed graph traversal termination detection, and monitoring distributed systems and garbage collection in distributed systems. This course explores essential and the most significant algorithmic ideas and lower bound techniques, basically the “pearls” of distributed computing.</p>			
	Pre-requisite:		None	

	CS721	Computer Vision	Credit Units	3
DESCRIPTION	<p>Vision is one of our senses that allow us to build a powerful internal representation of the world. The goal of computer vision is to “discover from images what is present in the world, where things are located, what actions are taking place”. To achieve this goal, we need to know how light is reflected off surfaces, how objects move, and how this information is projected onto an image. This course is an introduction to basic concepts in computer vision and research topics. First, an introduction to low-level image analysis methods, including image formation & image sensing, edge detection, feature detection, and image segmentation. Image transformations (e.g., warping, morphing, and mosaics) for image synthesis. Methods for reconstructing three-dimensional scene information using techniques such as depth from stereo, structure from motion, and shape from shading. Motion and video analysis. Three-dimensional object recognition.</p>			
	Pre-requisite:		None	

	CS722	Software Requirements Engineering	Credit Units	3
DESCRIPTION	<p>The requirements engineering process, including identification of stakeholders, requirements elicitation techniques such as interviews and prototyping, analysis fundamentals, requirements specification, and validation. Use of Models: State-oriented, Function-oriented, and Object-oriented. Documentation for Software Requirements. Informal, semi-formal, and formal representations. Structural, informational, and behavioral requirements. Use of requirements repositories to manage and track requirements through the life cycle. Case studies, software projects, written reports and oral presentations will be required.</p>			
	Pre-requisite:		None	

	CS723	Pattern Recognition	Credit Units	3
DESCRIPTION	<p>A survey of modern methods for computer recognition of patterns in varied applications such as digital images, human speech and sound, and grammar-based sequences. Various approaches are developed, including statistical techniques, heuristic search, Fourier analysis, Markov models, template matching, grammatical inference and neural networks. Computational aspects and efficiency of different methods and algorithms are emphasized. Students must complete a project using methods developed in the course and some software tools like Matlab©.</p>			
	Pre-requisite:		None	

	CS724 Stochastic Processes	Credit Units	3
D E S C R I P T I O N	Sample Space and Events, The Notion and Axioms of Probability, Equally Likely Events, Conditional Probability, Independent and Dependent Events, Total Probability, Bayes Rule, Random Variables, Distribution Functions, Discrete Random Variables and Probability Mass Functions, Continuous Random Variables and Probability Density Functions, Mean and Variance, Some Special Distributions, Conditional Distributions, Bivariate Random Variables, Joint Distribution Functions, Covariance and Correlation Coefficient, Functions of Random Variables, Expectation, Moment Generating Functions, The Law of Large Numbers, Central Limit Theorem, Stochastic Processes, Characterization of Stochastic Processes, Markov Processes, Classification of States, Classification of Chains, Discrete-Parameter Markov Chains, Continuous-Time Markov Chains, Birth Processes and Poisson Process, Brownian Motion Processes, Power Spectral Densities, White Noise, Fourier Transform of Stochastic Processes, Queuing Systems, Birth-Death Process, The M/M/1, M/M/s, and M/M/s/K Queuing Systems.		
	Pre-requisite:	None	

	CS725 Game Modeling and Development	Credit Units	3
D E S C R I P T I O N	There is a growing demand of the programmers from this industry who can design computer games. This course helps students to understand and learn the technology and programming skills that are required to build a computer game. This class introduces students to an object-oriented game engine scripting language. It covers a range of topics that include: Game Memory Management; Multithreading in Games; Sprites & bitmap animation; Collision detection; Differing game types, modes, & perspectives; Game & level design; Path finding algorithms; Sound & Music; Game input devices; Artificial Intelligence in games; Physics based modeling; Advanced Lighting Techniques; Networked Gaming Algorithms; Special Effects etc.		
	Pre-requisite:	None	

	IS611 Advanced Database Management Systems	Credit Units	3
D E S C R I P T I O N	This course covers advanced topics in the design and management of database systems including record storage and primary file organizations, index structures and access methods for files, directory management, query processing, query optimization, transaction processing, nested transactions, concurrency control techniques, deadlock management, fragmentation and its control, integrity constraints, database recovery, distributed databases, object and object-relational databases, deductive databases and data integration in multi-databases.		
	Pre-requisite:	None	

	CS726	Computational Geometry	Credit Units	3
D E S C R I P T I O N	<p>This course will provide an introduction to the fundamental and key concepts of computational geometry. The Problems, techniques and structures within the computational geometry including concepts of points, lines, planes, spheres, duality and subdivisions will be discussed. The line intersections, convex hull, Voronoi diagram, triangulations, Delaunay triangulation, overlay of subdivisions, range searching will be covered. The techniques of sweep-line, randomized incremental construction, fractional cascading will also be discussed. The other topics include double-linked edge-lists, interval trees, segment trees, and priority search trees, Kd-trees, range trees, models of computation, lower bound techniques, geometric primitives, geometric, transforms, Planar convex hulls, higher dimensional convex hulls, randomized, output-sensitive, and dynamic algorithms, applications of convex hull, Intersection detection, segment intersection, line sweep, map overlay, polyhedral intersection and geometric searching.</p>			
	Pre-requisite:		None	

	CS727	Advanced Modeling and Simulation	Credit Units	3
D E S C R I P T I O N	<p>As simulation is increasingly applied to more complex applications, exploiting efficiencies in model design and hence model execution has become a challenging task. The aim of this course is to provide students with the ability to model simulate and analyze complex systems in a reasonable time. This course is divided into three parts and covers advanced techniques in simulation model design, model execution and model analysis. A selection of model design techniques such as conceptual models, declarative models, functional models, constraint models, and multi-models will be discussed. Model execution techniques include discussion of serial and parallel discrete-event simulation algorithms. For model analysis, topics include input-output analysis, variance reduction techniques and experimental design.</p>			
	Pre-requisite:		None	

	IS627	Information Retrieval and Extraction	Credit Units	3
D E S C R I P T I O N	<p>This course will cover traditional material, as well as recent advances in Information Retrieval (IR), the study of indexing, processing, and querying textual data. Basic retrieval models, algorithms, and IR system implementations will be covered. The course will also address more advanced topics in "intelligent" IR, including Natural Language Processing techniques, and "smart" Web agents. Topics: Introduction to IR models and methods, Perl tutorial, Text analysis / Web Crawling, Text properties, Vector space model, Boolean model, Probabilistic model; other IR models, IR evaluation and IR test collections, Relevance feedback, query expansion, Web search: link based and content based, Query-based and content sensitive link analysis, Search engine technologies, Search engine user interfaces, Text classification and clustering.</p>			
	Pre-requisite:		None	

	IS628	Multimedia Systems Design	Credit Units	3
D E S C R I P T I O N	<p>Interactive multimedia systems are becoming increasingly widespread in many domains including games, arts and business. This subject introduces fundamental principles of interactive multimedia and associated tools. Topics include digital multimedia applications, social and ethical considerations. Enabling technologies such as digital representations, hardware and software requirements, Introduction to computer graphics: vector graphics and bitmapped images, image manipulation and compression, Digitized video standards, video compression, streamed video, video editing and post-production, Captured animation and image sequences, key frame and 3-D animation, Digitized sound, sound compression, sound format, combining sound and picture, hypermedia, synchronization-based presentation, Multimedia and Networks: computer network and transport protocols, multicasting, quality of service, server-side computation, protocols applications.</p>			
	Pre-requisite:		None	

	CN621	New Trends in Computer Networks	Credit Units	3
D E S C R I P T I O N	<p>Review of LANs, Internet and TCP/IP protocol, Resource sharing through multiplexing, Circuit and packet switching technologies, Design issues, Traffic and service classes, Broadband access networks, Internet service provider, T-1 Lease Lines, DSL, Cable access networks, High speed WANs, Frame relay, Asynchronous transfer mode, High speed switched LAN, Traffic modeling, IP multicasting, Optical networks and architectures, Synchronous optical networking, Overview of wireless networks, Mobile IP, Mobile ad-hoc networks, The OSI model, packet and circuit switching, Integrated services digital networks, The TCP/IP protocol stack, Internet control message protocol, Routing, RSVP, Next generation IP, Wireless communication systems, Voice over IP, VPNs, Network security, Quality of service, Distributed systems, Management Protocols.</p>			
	Pre-requisite:		None	

	CS690	Project Proposal	Credit Units	3
D E S C R I P T I O N	<p>Coursework track students will prepare a Project Proposal in consultation with their prospective supervisor(s). Such a proposal will include problem statement, critical review of relevant research, motivation and background, scope, methodology and work-plan as well as objectives and contributions. The project proposal should be defended or approved by the department</p>			
	Pre-requisite:		Completion of core courses	

	CS695	Project Implementation	Credit Units	3
D E S C R I P T I O N	After the project proposal is approved, the students will work on their project implementation based on the approved proposal under the close supervision of the faculty member(s).			
	Pre-requisite:		Project Proposal	

	CS700	Dissertation	Credit Units	3
D E S C R I P T I O N	Thesis Track students will choose their research topics under the supervision of the faculty members. After initial agreement of the dissertation topic, the student needs to define objectives of the research and prepare the research proposal under the guidance of their supervisor(s). In the proposal, he/she will be required to (i) conduct an exhaustive survey (ii) identify and define the problem clearly (iii) decide scope of the problem and provide its assumptions and limitations (iv) ensure the originality of the research proposal (v) suggest the approach and methodology used in the research and (vi) present the expected results. After the successful presentation and approval of the proposal by the department, the students will continue their research under the close guidance of their supervisor(s). Upon completion, the students will submit their dissertation for evaluation. Thesis track students are required to defend their dissertations in front of a committee.			
	Pre-requisite:		Department Approval	

2.4.2. MS CIS Program Study Plans and Curricula

The curriculum of the degree program includes a balance between theory, applications and research. Further core and elective requirements are set to complete the master in computer information systems. The students are allowed to choose one of the following two tracks:

- Thesis Track
- Coursework Track

Both of the above tracks will provide students with a theoretical background and solid foundation in information systems. Further, the students will be exposed to the latest tools, techniques and technologies to have innovative ideas in the area of computer science.

2.4.2.1. Thesis Track Study Plan

The thesis track study path requires students to undertake faculty guided research leading to successful completion of a dissertation. This option is suitable for students interested in further study or choosing a R&D career. It will provide students with experience in conducting research in academic or industrial significance. A detail research proposal is to be submitted and approved by the department prior to successful completion of the dissertation. The Thesis Track program comprises 36 units whose distribution is given in the following Table 3.6.

Table 2.6: Research Track Study Plan

Year	First Semester			Second Semester			
	Course #	Course Title	Units	Course #	Course Title	Units	
1	0912610	Advanced Information Systems	3	0912613	Advanced Object Oriented Design and Development	3	
	912611	Advanced Database	3	0912615	Research Methodology	3	
	0912612	IT Infrastructure	3		Elective 1	3	
	Total			9	Total		9
	First Semester			Second Semester			
2	Course #	Course Title	Units	Course #	Course Title	Units	
		Elective 2	3	0912700	Dissertation	9*	
		Elective 3	3				
		Elective 4	3				
	Total			9	Total		9
* Dissertation can be registered earlier and may be extended over the maximum duration of the degree							

2.4.2.2. Coursework Track Study Plan

The coursework track students will undertake a faculty guided research project in a mutually agreed topic/area. This project component equips students with a strong foundation in theory and practice of Information Systems, and provides them new skills and analytical tools necessary to survive in this competitive market. Therefore, the project topic should be carefully selected to reflect the curriculum objectives. A project proposal is to be submitted and approved by the department followed by the project implementation. The Coursework Track program comprises 42 units whose distribution is given in the following Table 3.7.

Table 2.7: Coursework Track Study Plan

Year	First Semester			Second Semester			
	Course #	Course Title	Units	Course #	Course Title	Units	
1	0912610	Advanced Information Systems	3	0912613	Advanced Object Oriented Design and Development	3	
	0912611	Advanced Database Management Systems	3	0912615	Research Methodology	3	
	0912612	IT Infrastructure	3		Elective 1	3	
					Elective 2	3	
	Total			9	Total		12
	2	First Semester			Second Semester		
Course #		Course Title	Units	Course #	Course Title	Units	
0912690		Project Proposal*	3	0912695	Project Implementation	6*	
		Elective 3	3		Elective 6	3	
		Elective 4	3				
		Elective 5	3				
Total*			12	Total		9	

* Project can be registered earlier and may be extended over the maximum duration of the degree

2.4.2.3. Pre-requisites, Core and Elective Courses for MS CIS Program

The pre-requisite courses are for those having no background in Information Systems. These courses are designed to provide a foundation to enable them to start main courses of the degree program. The courses to be taken by each student will be decided by the department on case basis considering her/his background. The following Table provides the list of pre-requisite courses for the MS CIS program.

Table 2.8: Pre-requisite Courses

Course #	Course Title	Units
0912430	Information Systems Concepts	3
0912431	Database Concepts and Design	3
0912432	System Analysis and Design	3
0914430	Communication and Network Fundamentals	3
0911430	Fundamentals of Programming	3

Core courses reflect a minimum level of knowledge in the field of IS and are designed to provide a common foundation in the field of Information Systems. They prepare students for specialized elective courses for both the tracks. The core courses offered in the degree program are given in the Table below.

Table 2.9: Core Courses

Course #	Course Title	Units
0912610	Advanced Information Systems	3
0912611	Advanced Database Management Systems	3
0912612	IT Infrastructure	3
0912613	Advanced Object Oriented Design and Development	3
0912615	Research Methodology	3

Elective courses are based upon knowledge areas proposed by the Association of Computing Machinery. These courses cover a variety of areas in the field of Information Systems and range from technology-oriented to management-oriented courses. The students can select courses based on their individual

learning goals and career objectives. The elective courses offered in the program are given in the following Table.

Table 2.10: Elective Courses

Course #	Course Title	Units
0912620	Information Systems Security	3
0912621	Consulting in Information Systems	3
0912622	Designing and Implementing Data Warehouses	3
0912623	Advanced Web Based Systems	3
0912624	Enterprise Resource Planning	3
0912625	Information Systems Audit and Control	3
0912626	Managing Information Systems Functions	3
0912627	Information Retrieval and Extraction	3
0912628	Multimedia Systems Design	3
0912629	Knowledge Management	3
0912630	Usability Analysis and Testing	3
0912631	Pervasive and Ubiquitous Information Systems	3
0912632	Decision Support Systems	3
0912633	Service Oriented Computing	3
0912634	Special Topics in Information Systems	3

2.4.2.4. Course Descriptions of MS CIS Program

IS430	Information Systems Concepts	Credit Units	3
DESCRIPTION	<p>This course is divided into two parts. The first part aims to introduce the basic concepts and topics related to Information Systems (IS). It covers topics such as: systems concepts; system components and relationships; specification, design, and re-engineering of IS; procedural versus non-procedural programming languages; object oriented design; database features, functions, and architecture; networks and telecommunication systems and applications; information security, crime, and ethics. This course also includes presentation and discussion of various types of Information Systems and their applications at different management levels. The second part of the course focuses on IS management. Topics to be covered in this part include knowledge of the strategic application of information systems (technology) in organizations, and the ways in which data is used to provide information structures; organizational theory and structure, business process management, information systems management; and use of computer technology in business.</p>		
	Pre-requisite:	None	

	IS431	Database Concepts and Design	Credit Units	3
D E S C R I P T I O N	This course aims to discuss the basic concepts and design of database. It covers topics such as: data model, levels of abstraction, data independence, and concurrency control. It focuses on how to design databases for given problems, and how to use database effectively, including ER modeling, key and participation constraints, weak entities, class hierarchies, aggregation and conceptual DB design using the ER model. Relational model: creating and modifying relation using query language, enforcing integrity constraints. Schema refinement and normal forms: Functional dependencies, reasoning about functional dependencies, decompositions and normalization. Relational queries: Relation algebra and calculus and commercial query languages. Object database systems: User defined abstract data type, structured types, objects; object identity; and reference type, inheritance, and database design for an ORDBMS. Students will be trained on some software tools such as: Oracle, Sybase, DB2, and Informix.			
	Pre-requisite:	None		
	IS432	System Analysis and Design	Credit Units	3
D E S C R I P T I O N	This course emphasizes on the analysis of the structured system and designing techniques for software project development. Topics include setting IS project goals, developing work plans and methods to achieve those goals, and measuring progress against a project plan; major alternative methodologies used in developing information systems; production of the requisite systems documentation at each point in the analysis and designing an information system; analyzing business need for information and developing an appropriate strategy to solve the problem and providing the required information service; information gathering techniques for eliciting user information requirements and system expectations; models for data bases: relational and object oriented physical data flow diagram and functional decomposition. I/O Design and prototyping (screen and report design), user interfaces design process; user interaction models and techniques; and information presentation (screen and layout design, menu systems, control panels, labels, fonts, and colors, etc.)			
	Pre-requisite:	None		
	IS610	Advanced Information Systems	Credit Units	3
D E S C R I P T I O N	At a conceptual level, this course is designed to make the students knowledgeable of the design, implementation, control, evaluation and strategic use of modern information systems. Topics discussed include strategic uses of information systems, information systems in business functions, understanding enterprise systems, data management, basics of data warehousing and knowledge management, managers and their information needs, understanding corporate governance, E-commerce, the internet, intranets & extranets, supply chain management, trustworthy computing, IT security & cryptography, modern IT architectures including utility/service oriented model, web services, B2B and outsourcing, planning & acquisition of IT.			
	Pre-requisite:	None		

	CN430	Communication and Network Fundamentals	Credit Units	3
D E S C R I P T I O N	<p>Fundamentals of data communications: essential elements of data communications : simplex, half-duplex and full duplex transmission, analogue and digital signals, periodic and non-periodic signals , signal parameters, time and frequency domains concepts, types of channels, transmission impairment. Transmission media: guided media, unguided media, and types of propagation. Basic concepts of networking: network concepts, network criteria, and network applications and benefits. Configurations, topologies and categories of networks: line configuration, network topologies (mesh, star, tree, bus, ring, hybrid), scopes of networks, internetwork or internet, types of network connection (peer-to-peer network, server based network, combined network), intranet and extranet. Introduction to OSI and TCP/IP models: The OSI model, the OSI layers, TCP/IP Protocol Suite. Error detection and correction techniques: VRC, LRC, CRC, checksum, and hamming code techniques. Circuit and packet switching. Data link layer control: framing, error control, and flow control. Networking and internetworking devices. Student will be trained on the existing components and product related to Cisco such as wireless networking, Switches, routers, etc. in addition with the products, components and software of Heathkit educational systems for wireless networking.</p>			
	Pre-requisite:		None	

	CS430	Fundamental of Programming	Credit Units	3
D E S C R I P T I O N	<p>This knowledge area consists of those skills and concepts that are essential to programming practice independent of the underlying paradigm and programming language. Specific topics covered include: an overview of algorithms and problem-solving (problem solving strategies, role of algorithms in the problem-solving process, etc), fundamental programming constructs (variables, types, expressions, simple I/O, conditional and iterative control structures, functions, recursion, and pointers etc.). The study of programming language features and programming paradigms. Control, run-time environments, and semantics are examples of procedural, functional, logical, and object oriented programming. In practice the programming language used is ANSI-C, the syntax aspect of language and some pragmatic aspects such as comparison of interpreters and compilers and language translation phases must be studied.</p>			
	Pre-requisite:		None	

	IS611	Advanced Database Management Systems	Credit Units	3
D E S C R I P T I O N	<p>This course covers advanced topics in the design and management of database systems including record storage and primary file organizations, index structures and access methods for files, directory management, query processing, query optimization, transaction processing, nested transactions, concurrency control techniques, deadlock management, fragmentation and its control, integrity constraints, database recovery, distributed databases, object and object-relational databases, deductive databases and data integration in multi-databases.</p>			
	Pre-requisite:		None	

	IS612	IT Infrastructure	Credit Units	3
D E S C R I P T I O N	<p>This course focuses on the concepts, models, architectures, protocols, standards, and security for the design, implementation, and management of digital networks, server architectures, server farms, cluster computing, and grid computing, storage area networks and network attached storage, data center design and implementation, development of an integrated technical architecture (hardware, software, networks, and data) to serve organizational needs in a rapidly changing competitive and technological environment, network, data and application architectures, and enterprise application integration.</p>			
	Pre-requisite:		None	

	IS613	Advanced Object Oriented Design and Development	Credit Units	3
D E S C R I P T I O N	<p>“Design Patterns” is a modern classic in the literature of object-oriented development, offering elegant solutions to common problems in software design. This course discusses patterns for managing object creation, composing objects into larger structures, and coordinating control flow between objects. After introducing the students with philosophy and application of design patterns, creational design patterns are discussed. A detailed discussion on structural design patterns is followed by behavioral and concurrency patterns. Case studies are core of the course used to demonstrate how design patterns can be used to solve business problems.</p>			
	Pre-requisite:		None	

	IS615	Research Methodology	Credit Units	3
D E S C R I P T I O N	<p>The philosophy of science, basics of doing research including problem solving and research, defining the research problem, writing a literature review, theory and theory building, conceptual modeling and research design, case study research, survey and observations, primary data collection, experiments, histories and simulations, interventions including benchmarking, action research and pilot studies, sampling and measurement, instrument and questionnaire design, analysis methods including qualitative, quantitative and mixed data analysis, grounded theory, usability evaluations, research ethics, peer review process, reporting and publishing including displaying data and writing up results.</p>			
	Pre-requisite:		None	

	IS620	Information Systems Security	Credit Units	3
D E S C R I P T I O N	<p>The security design principles are discussed and applied to eliminate typical vulnerabilities in implementing an information system. An in depth study of several emerging threats is given including next-generation phishing, drive-by-pharming, online extortion, multi-application botnets, crimeware, mobile worms, and VoIP security. Emerging defense techniques are also discussed with all threats. The latest web vulnerabilities covered in this course include client-state manipulation, cookie-based attacks, SQL injection, cross domain attacks (XSS/XSRF/XSSI), and HTTP header injection. Security issues that arise specifically in Web 2.0 applications taking advantage of AJAX, XmlHttpRequest, and mash-ups are discussed. The course also covers Same-Origin-Policy (SOP) violations that can occur due to DNS rebinding, timing, and user tracking attacks.</p>			
	Pre-requisite:		Advanced Information Systems	

	IS621	Consulting in Information Systems	Credit Units	3
D E S C R I P T I O N	<p>This course investigates the tools used by and skills necessary for information systems consultants. The course will provide with knowledge of various phases of consulting life cycle. Students will learn business needs and developing information systems and technology solutions. Students will also learn various consulting tools and techniques to develop consulting. This course requires students to have a desire to expand their backgrounds to meet the growing demands of today's global business environment. The primary intention of this course is to provide solid foundation to become both external and internal consultants in the marketplace. The course will use class lectures followed by team oriented project approach and presentations to share their experience in information systems and consulting.</p>			
	Pre-requisite:		Advanced Information Systems	

	IS622	Designing and Implementing Data Warehouses	Credit Units	3
D E S C R I P T I O N	<p>This course provides students with the technical skills required to plan, implement, and maintain a data warehouse using a DBMS such as Oracle Warehouse Builder. Key topics include design a data warehousing system; implement a database designed with a star schema, gather data from primary data sources, transform data, and load data in to a DBMS. Students will create a cube using OLAP and analyze cube data using client applications.</p>			
	Pre-requisite:		Advanced Database Management Systems	
	IS623	Advanced Web Based Systems	Credit Units	3
D E S C R I P T I O N	<p>The course provides a process-oriented view of the organization and its relationships with suppliers, customers, and competitors: using processes for achieving strategic objectives and transforming the organization; process analysis, design, implementation, control and monitoring; processes as a means of achieving compliance; impact on work; the role of Enterprise Resource Planning (ERP), Supply Chain Management (SCM), and Customer Relationship Management (CRM) systems, structured and unstructured processes, impact on work practices and the role of systems in transforming organizations and markets in a global perspective.</p>			
	Pre-requisite:		Advanced Object Oriented Design and Development	

	IS624	Enterprise Resource Planning	Credit Units	3
D E S C R I P T I O N	<p>This course covers concepts in Enterprise Resource Planning (ERP). The focus of this course is to show how ERP systems integrate all major business functions (finance, human resources, manufacturing, and inventory etc.) into an enterprise wide shared information systems network. It is also emphasized that by making information available across traditional business unit boundaries, efficiency improves and gives rise to new strategic opportunities. Ultimately, such intranet information systems can be interlinked with other enterprise business partners (e.g. vendors, suppliers, and financial institutions) to form powerful resource planning networks. This course will explore the technology and strategic use of enterprise information systems.</p>			
	Pre-requisite:		IT Infrastructure	

	IS625	Information Systems Audit and Control	Credit Units	3
D E S C R I P T I O N	<p>Businesses of all sizes have desire to obtain a competitive advantage in the development of IT capabilities. The increasing use of technology in businesses has led information security threats and their subsequent audit and control at management level within an organization. This course aims at providing students with an understanding of the threats to information, information systems and imparting an awareness of controls that may be applied to reducing risk from the threats. The students should be able to have an awareness of the importance of good security policy at management level.</p>			
	Pre-requisite:		Advanced Information Systems	
	IS626	Managing Information Systems Functions	Credit Units	3
D E S C R I P T I O N	<p>This course focuses on managing the IS functions to further the policy and strategies of the enterprise. Topics to be covered include strategic uses of Information Technology, strategic information systems planning, designing corporate IT architecture, managing corporate information resources, managing partnership-based IT operations, technology for developing effective systems, management issues in system development.</p>			
	Pre-requisite:		Advanced Information Systems	

	IS627	Information Retrieval and Extraction	Credit Units	3
D E S C R I P T I O N	<p>This course will cover traditional material, as well as recent advances in Information Retrieval (IR), the study of indexing, processing, and querying textual data. Basic retrieval models, algorithms, and IR system implementations will be covered. The course will also address more advanced topics in "intelligent" IR, including Natural Language Processing techniques, and "smart" Web agents. Topics: Introduction to IR models and methods, Perl tutorial, Text analysis / Web crawling, Text properties, Vector space model, Boolean model, Probabilistic model; other IR models, IR evaluation and IR test collections, Relevance feedback, query expansion, Web search: link based and content based, Query-based and content sensitive link analysis, Search engine technologies, Search engine user interfaces, Text classification and clustering.</p>			
	Pre-requisite:		None	

	IS628 Multimedia Systems Design	Credit Units	3
DESCRIPTION	<p>Interactive multimedia systems are becoming increasingly widespread in many domains including games, arts and business. This subject introduces fundamental principles of interactive multimedia and associated tools. Topics include digital multimedia applications, social and ethical considerations. Enabling technologies such as digital representations, hardware and software requirements, Introduction to computer graphics: vector graphics and bitmapped images, image manipulation and compression, Digitized video standards, video compression, streamed video, video editing and post-production, Captured animation and image sequences, key frame and 3-D animation, Digitized sound, sound compression, sound format, combining sound and picture, hypermedia, synchronization-based presentation, Multimedia and Networks: computer network and transport protocols, multicasting, quality of service, server-side computation, protocols applications.</p>		
	<p>Pre-requisite:</p>		
	IS629 Knowledge Management	Credit Units	3
DESCRIPTION	<p>This course introduction to knowledge and knowledge management concepts, and processes in organizations. It also addresses knowledge modeling concepts such as ontologies, structures, relationships, organization modeling, communication, knowledge transfer and total knowledge Management. It addresses knowledge management and knowledge modeling from an information system perspective by focusing on analyzing information and knowledge process in organizations, explicit and implicit tacit knowledge in software systems and in human social systems, languages and models for codifying knowledge, knowledge modeling, ontology and semantic issues, the knowledge management infrastructure, layers, teams, blueprints and leadership.</p>		
	<p>Pre-requisite: Advanced Information Systems</p>		

	IS630 Usability Analysis and Testing	Credit Units	3
DESCRIPTION	<p>As professionals it is important that students are able to critically evaluate user interfaces and work environment issues in relation to humans' interaction with computers. This analysis and evaluation of usability issues is the main focus of the course. Topics to be covered include usability engineering issues, human factors issues, usability testing, human computer interaction, user centered design techniques, and web interface development.</p>		
	<p>Pre-requisite: Advanced Object Oriented Design and Development</p>		

	IS631	Pervasive and Ubiquitous Information Systems	Credit Units	3
D E S C R I P T I O N	<p>The key element of this course is the omnipresence of information devices. These devices can be embedded into cars, airplanes, ships, bikes, posters, signboards, walls and even clothes. This course focuses on independent information devices including wearable computers, mobile phones, smart phones, smart-cards, wireless sensor-compute nodes and the services made available by them. It includes human-computer interaction using several types of elements including sensing, text, speech, handwriting and vision.</p>			
	Pre-requisite:		Advanced Information Systems	

	IS632	Decision Support Systems	Credit Units	3
D E S C R I P T I O N	<p>The purpose of this course is to provide students with an understanding of the key technical and managerial issues in the effective development and use of decision support systems in organizations. This course provides an overview of the theoretical and practical aspects of decision support systems (DSS). The course consists of three modules. The first module concentrates on the managerial aspects of decision-making, the role of automation in decision making, and decision models. The second module discusses the design and development of decision support systems, with an emphasis on data management. The last module addresses the integration and implementation challenges in Enterprise DSS, intelligent DSS, web-based DSS, as well as their future trends. Tools such as DPL and Expert Choice (an analytic hierarchy process-based DSS engine), and TemTec Executive Viewer (an OLAP), Enterprise Resources Planning can be used.</p>			
	Pre-requisite:		Advanced Information Systems	

	IS633	Service Oriented Computing	Credit Units	3
D E S C R I P T I O N	<p>This course examines the concepts, theories, and techniques for Web services architectures for Web applications based on the classical publish, find, and bind triangle and formulates them at a higher level. It considers sophisticated approaches for the description, discovery, and engagement of Web services by emphasizing Web service composition. Key topics include Web Services Architectures and Standards, Enterprise architectures, service foundations (middleware, service interface, publishing, discovery and binding), service description, modeling, composition, adaptation and representation. Issues related to engagement, collaboration, selection, engineering, semantics, transactions, processes, agents, quality of service, compliance and trust are also addressed.</p>			
	Pre-requisite:		IT Infrastructure	

	IS634	Special Topics in Information Systems	Credit Units	3
D E S C R I P T I O N	<p>This course focuses on providing students with the latest knowledge in new emerging topics in the IS related areas.</p>			
	Pre-requisite:	None		
	IS690	Project Proposal	Credit Units	3
D E S C R I P T I O N	<p>Coursework track students will prepare a Project Proposal in consultation with their prospective supervisor(s). Such a proposal will include problem statement, critical review, motivation and background, scope, methodology and work-plan as well as objectives and contributions. The project proposal should be defended or approved by the department.</p>			
	Pre-requisite:	None		

	IS695	Project Implementation	Credit Units	3
D E S C R I P T I O N	<p>After the project proposal is approved, the students will work on their project implementation based on the approved proposal and under the close supervision of the faculty member(s).</p>			
	Pre-requisite:	None		

	IS700	Dissertation	Credit Units	3
D E S C R I P T I O N	<p>Thesis Track students will choose their research topics under the supervision of the faculty members. After initial agreement of the dissertation topic, the student needs to define objectives of the research and prepare the research proposal under the guidance of their supervisor(s). In the proposal, he/she will be required to (i) conduct an exhaustive survey (ii) identify and define the problem clearly (iii) decide scope of the problem and provide its assumptions and limitations (iv) ensure the originality of the research proposal (v) suggest the approach and methodology used in the research and (vi) present the expected results. After the successful presentation and approval of the proposal by the department, the students will continue their research under the close guidance of their supervisor(s). Upon completion, the students will submit their dissertation for evaluation. Thesis track students are required to defend their dissertations in front of a committee.</p>			
	Pre-requisite:	None		



3. FACILITIES & RESOURCES

4.

3.1 FACULTY

The College of Computer Sciences & Information Technology has highly qualified faculty graduated from the top universities from around the world providing a multi-national and multi-cultural platform for research and knowledge sharing. The list of faculty members is given below along with their qualifications and research interests.

S.#	Name	Rank	Qualification & Research Interests
1	Dr. Majed Alshamari	Dean Assistant Professor	PhD (..) Human Computer Interaction, Information systems
2	Dr. Fahad M. Al-Humaidan	Vice Dean Head of Computer Sciences Dept. Assistant Professor	PhD (Computer Sciences) Software Engineering, Information Systems, Workflow Systems
3	Dr. Khalid A. Buragga	Head of Computer Engineering Dept. Associate Professor	PhD (Information Technology) Software Engineering, Quality, E- Commerce, Integrating Systems
4	Dr. Saleh Turki	Head of Information Systems Dept. Assistant Professor	PhD (Computer Information Systems) E-Business, Information Systems, Quality Assurance
5	Dr. Mohammed S. Zahrani	Head of Communications & Computer Networks Dept. Assistant Professor	PhD (Computer Networking & Communication) Networking Applications, Mobile Computing
6	Dr. Badar Aljohar	Professor/ Vice President (Academics)	PhD (..) Artificial Intelligence, Neural Languages Processing
7	Dr. Muhammad Mehboob Yasin	Professor	PhD (Computer Networks) Computer Systems, Computer Networks, Parallel Processing
8	Dr. Sherif Kassem Fathy	Professor	PhD (Information Systems) Database, Parallel Processing, Neural Network, Software Engineering
9	Dr. Moawia Elfaki Yahia	Associate Professor	PhD (Computer Sciences) Data Mining, Human Computer Interaction
10	Dr. Nazir A. Zafar	Associate Professor	PhD (Computer Sciences) Formal Methods, Software Engineering, Graph Theory, Automata

11	Dr. Syed Afaq Husain	Associate Professor	PhD (Informatics) Medical Image Processing, Computer Vision, Biometrics, Pattern Recognition, AI, DSS.
12	Dr. Tagelsir M. Gasmelseid	Associate Professor	PhD (Management Information Systems) Multi-agent Systems, Medical Informatics, Knowledge Management
13	Dr. Abdenour Bounsiar	Assistant Professor	PhD (Machine Learning and Pattern recognition) Machine Learning, Pattern recognition, Data mining
14	Dr. Abdul Raouf Khan	Assistant Professor	PhD (Computer Sciences) Cellular Automata, VLSI Architecture, Image Processing
15	Dr. Asrar Ul Haque	Assistant Professor	PhD (Computer Sciences) Networks, Geographic Information System, GPS Applications, Algorithms
16	Dr. Fawaz Alsaade	Assistant Professor	PhD(Computer Sciences) Artificial Intelligence, Bioinformatics, Pattern Recognition, Security
17	Dr. Gulzar A. Khawaja	Assistant Professor	PhD (Digital Systems) Artificial Intelligence, Image processing, Digital systems
18	Dr. Ishtiaq A. Choudhry	Assistant Professor	PhD (Computer Networks and Protocols) Networks and Protocols, Traffic Management and Embedded Systems
19	Dr. Khalid Rajab	Assistant professor	PhD(Autonomous Decentralized Systems) Peer to Peer Computing, Autonomic Computing, GIS
20	Dr. Mohammad Suleman	Assistant Professor	PhD (Information Systems) Supply Chain Management and Optimization
21	Dr. Muhammad Maruf	Assistant Professor	D.Eng. (Information Science) Digital Library, E-learning, Ontology& Semantic Web Technology
22	Dr. Qazi Mudassar Ilyas	Assistant Professor	PhD (Information and Communication Engineering) Semantic Web, Knowledge Management, and Ontology Engineering
23	Dr. Samir AlAhsan	Assistant professor	
24	Dr. Shehril Suandi	Assistant professor	PhD (CIS) Information Systems, Security and Audit Controls, E-Business
25	Dr. Tayseer A. Al- Khdour	Assistant Professor	PhD (Computer Sciences & Engineering) Wireless Sensor Networks, Routing Protocol, Optimization for WSN
26	Dr. Yasser M. Fouda	Assistant Professor	PhD (Computer Sciences) Computer Vision

27	Dr. Manal M. Elobaid	Assistant Professor	PhD (Computer Sciences) AI, Speech to Text Applications, Neural Networks
28	Dr. Sadia Aziz	Assistant professor	PhD (Computer Engineering) Wireless Communication & Networking, Mobile Adhoc Networks
29	Mr. Abdulaziz Saad Al Barrak	Lecturer	MS(Information systems) Business intelligence, E-business, Decision Support Systems.
30	Mr. Abdulaziz A. Al-Humam	Lecturer	MS (Computer Sciences) Software Engineering
31	Mr. Abdulmohsen Albsher	Lecturer	MS(Information Systems) Social Computing, Mobile Services, HCI
32	Mr. Asad Tariq	Lecturer	M.Sc. Telecommunications (Networks Pathway) Wireless Networks & Security, Satellite & Broadcasting Networks, Network Automation.
33	Mrs Fathimathul Rajeena	Lecturer	MCA (Computer Applications) Computer Applications, E-Government
34	Ms. Huma Mehboob	Lecturer	MS(Computer Networks) Mobile Adhoc Networks
35	Mrs Kauser Hameed	Lecturer	MCA (Computer Applications) Computer Applications, E-Government
36	Mr. Marwan El-Haj	Lecturer	MS (Computer Sciences) Image Processing, Artificial Intelligence, Computer Architecture
37	Mr. Muneer Ahmad	Lecturer	MS (Computer Sciences) Bioinformatics
38	Eng. Naveed Rasul	Lecturer	MS(Computer Engineering) Web Applications, Computer Architecture
39	Mr. Noor Zaman	Lecturer	MS (Computer Sciences) Networking, Mobile Computing, Artificial Intelligence, Software Engineering, WSN
40	Eng. Rahoof P. P.	Lecturer	M. Tech (Computer Sciences & Engineering) Computer Networks, Network Protocols and Security, Cloud Computing, P2P
41	Ms. Ramiza Abdul Gafoor	Lecturer	MCA (Computer Applications) Databases

42	Mrs Razia Saher	Lecturer	MS (Communication Engineering) Telecommunication
43	Mr. Rizaldi	Lecturer	MS (Information Technology) Mobile Computing, Web design & Development, Business Information System
44	Ms. Saira	Lecturer	
45	Mr. Shakeel Ahmed	Lecturer	MCA (Computer Applications) Mobile Adhoc Networks Information Systems Software Engineering
46	Ms. Sharmila Bano	Lecturer	MPhil (Computer Sciences) Networks, Software Engineering, Image Processing

3.2 FACILITIES

The college has adequate facilities available for conducting graduate research in most modern areas of interest.

3.2.1 Classrooms

All classrooms are equipped with network and wireless internet connection, and multimedia projectors which are used to deliver class lectures and perform in-class demos and presentations.



3.2.2 Laboratories

All labs are equipped with modern computing facilities and multimedia projectors in addition to hardware and software of specific areas of research.

Some of the main labs are as follows;

3.2.2.1 Microprocessor Lab

The Microprocessor Lab is used by the students to perform microprocessor interfacing, building microcomputer systems and embedded systems.



3.2.2.2 Network & Communication Lab

The Network & Communication lab is used for conducting experiments related to all layers of the TCP/IP protocol stack, network management, network architecture, network security, and wireless networking. The lab is equipped with all necessary equipment for conducting research and simulations in related areas.



3.2.2.3 Digital Systems Lab

The Digital Lab is used to integrate the students' knowledge in computer hardware and electronics gained through the lectures and laboratory courses to design, implement, debug and document major microcontroller based system. The lab houses equipment necessary to make a PCB starting from scratch. The students can use these labs for implementation of their research projects.



3.2.2.4 Programming Lab

The Programming Lab is used for conducting the classes for programming courses and working on software projects. The programming lab is equipped with latest versions of programming software and tools.



3.2.2.5 Operating Systems Lab

The Operating system (Unix/Linux) Lab is also an important addition to the CCSIT. The CCSIT faculty and students have access to this lab to work at the operating system level design and simulation. The lab provides them with

flexibility to select, alter and experiment at the operating system level for their projects and research.

4.2.2.6 Mac Lab

CCSIT provides Mac lab which is equipped with specialty software required by various programming, image processing and networks courses. Mac lab supports a broad spectrum primarily based on video and animation jobs in the industry for our students. This lab also provides basic Adobe editing and Microsoft Office software as a service to those students who do not have their own computers and to supplement the course-specific “specialty” labs. Most major software packages that are used in classes are available in the lab so that students shouldn't need to purchase the software that is used in each major unless they would like to.

3.2.2.7 General Purpose Labs

Several general-purpose labs are available for students to work on their own for their assignments, projects and research. These labs provide network access as well as a good number of major computer applications needed by the students in support of their courses and projects.

3.2.2.8 Master Research Lab

The Master research lab provides office space for each MS student so that he can pursue his study and research at his own pace and time. The lab provides computing and printing/scanning/copying facilities for MS students.

3.3. LIBRARY

The Library plays an important role in satisfying the thirst of knowledge seeking students. The KFU has a generous university library as well as a dedicated college library located in the same building.

3.3.1 University Library

King Faisal Library provides different knowledge materials to the university members : students, Teaching Staff. Besides, the library serves it's society and participate in local, national and international manifestations, especially those related to information and books exhibitions. It is considered a pioneer nationally and regionally in facilitating information through its Electronic Library. The library is striving to provide the community with the best up-to-date collection of knowledge resources and references in all the required fields of knowledge. This effort is central in achieving the university strategic goal of excelling in both academic teaching and research advancement. The library follows the ‘Library of

Congress' classification scheme which divides the human knowledge into 21 divisions. The library also provides access to more than (242,000) full e-books in various scientific specializations, through Saudi Digital Library (SDL) subscription

3.3.2 College Library

The College Library provides access to thousands of books on different research and academic knowledge areas along with latest copies of related journal publications.

3.3.3. Electronic Resources

The College has access to most of the International Journals and E-Knowledge Resources for students and faculty. The College has purchased online access to these resources for better education and research purpose. Students and faculty can take great benefits by accessing the latest papers in the top most research areas of their interest. This includes online access to IEEE Explore that is the most respected database of research publications in science and engineering.



3.4 RESEARCH

Research is a driving force for contributing in the economy and development of a country. The College of Computer Sciences and Information Technology is

well-aware about its role to serve the community and contribute to the scientific knowledge. The college is heavily investing in developing facilities, introducing new technologies and encouraging the faculty and students to promote the research culture with a clear vision and mission. The start of master programs is one step forward to achieve the above objectives. Most of the faculty members are fully engaged in promoting research activities at the college. Periodical seminars at the college are a part of this activity.

3.4.1 Research Areas

To promote the research activities at the college, various research groups have been established which are working in theoretical as well as for practical research. Focused research areas are listed under the each group.

Computer Networks: Wireless sensor networks, Ad hoc networks, Network security, Wireless communication, Communication and networking systems, Communication protocols, Internet protocols, Multimedia computing and communications, Green computing, Communications and networking, Internet services and applications, Network algorithms and performance evaluation, Communications and information security, Communication QoS and system modeling.

Distributed Systems: Parallel and distributed algorithms, Cloud computing, Web-based computing, Service-oriented architecture, Cluster and grid computing, Peer-to-peer computing, Mobile computing, Operating systems, Protocols for secure multicasting and QoS signaling, Distributed architectures, Parallel programming, Interconnection networks, Distributed database, Advanced algorithms and applications.

Image Processing: Medical image enhancement, Multi-media compression, Pattern recognition, Optical character recognition, Computer vision, Visual target tracking, Human identification, Biometric systems, Biometric fusion, Derivation of cryptographic keys from biometrics, Gesture and gait analysis, Multi modal image fusion, Remotely sensed image processing, Automatic inspection.

Intelligent Systems: Machine learning, Natural language processing, Data mining, Hybrid intelligent systems, Soft computing, Neural networks, Fuzzy systems, Rough set theory, Intelligent tutoring systems, Multi-agent systems, Intelligent interfaces, Bioinformatics, Decision support systems, Evolutionary computation, Intelligent information security systems, Intelligent measurement, Ontology-based intelligent systems, Petri nets, Swarm intelligence, Intelligent transportation systems.

Software Engineering: Requirement engineering, Usability engineering, Software design and architecture, Formal software specification, Reusability, Programming languages, Validation and verification, Quality assurance and testing, Software maintenance, Program analysis and type theory, Formal methods, Safety-critical-systems, Fault-tolerant and secure systems, Model checking and theorem proving, Re-engineering, Reverse engineering and reuse, Light-weight formal methods, Integration of approaches, Component-based software engineering, Dependability and reliability, Model-driven software engineering.

Systems Modeling and Design: Business process modeling, Enterprise modeling and integration, Information system architecture, Methods of system analysis and design, Project management, Object-oriented methods, Ontologies and semantic web services, Quality of design, Semantic integrity of business process and data, Service-oriented modeling, System requirements engineering.

3.4.2 Research Projects & Publications

The college encourages its faculty and students to pursue research projects and participate in international conferences.. The faculty has accomplish a number of research projects funded by the deanship of scientific research of the university as well as collaborative projects funded by national universities and international research institutions. The results of this research is periodically published in journals of international repute having high impact.

5 Contact Information

For further Information

Please visit our website: www.kfu.edu.sa

Or Contact

Post Graduate Office

College of Computer Sciences and Information Technology

King Faisal University

P. O. Box : 400 Al-Ahsa 31982

Saudi Arabia

Email: ccsit.pgs@kfu.edu.sa

Tel No. :