University Vice-Presidency

College of Computing and Informatics

STUDY PLAN PROJECT

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

September 2021

COLLEGE AT A GLANCE:

History:

A royal decree was issued by King Abdullah Bin Abdulaziz, the custodian of the Two Holy Mosques, on 10/8/2011 to launch the Saudi Electronic University (SEU) as a government educational institution. The SEU is the only specialized university in distance education and blended learning in the Kingdom of Saudi Arabia that offers both graduate and undergraduate degree programs along with life-long education. The university includes the College of Administration and Finance Sciences, the College of Computer and Informatics, the College of Health Sciences, and the College of Science and Theoretical Studied. Environment based on information and communications technology, e-learning, and distance education. The university awards academic degrees in programs and specializations compatible with the needs of the labour market and the requirements of development and lifelong learning. The university participates in building a knowledge-based economy in the Kingdom of Saudi Arabia and assist in conveying the Kingdom's cultural message worldwide. The academic culture of university is characterized by flexibility, excellence of outputs, and responsiveness to the requirements of the labour market. Modern information-related skills are taught by means of a virtual environment which is more compatible with the needs of comprehensive development and the labour market. Cooperation with international organizations and faculty members, and to present refined educational content from a diversity of international sources and localize it in a form appropriate to Saudi society.

Mission:

To qualify specialized and excellent workforce in the field of computer science and information technology, to contribute to community service through a variety of programs, to carry out research addressing IT real life problems, to prepare excellent Saudi professionals in the field of computing and IT to carry out major IT projects for the benefit of kingdom and its population and to offer consultancy and training services in the specialization of the college in first-class pedagogical environment.

Vision:

Establishment and development of a pioneer college to impart education and academic research conforming with national and international standards in the areas of computer science and information technology through offering locally and internationally accredited programs aiming at state-of-the-art learning.

Values

- Excellence and innovation.
- Institutional commitment to academic standards
- Total Quality Management (TQM).
- Excellence in Education through continuous evolution.
- Industry and Academia Interaction for community welfare.
- Transparency and objectivity in the work

Objectives

The CCI aims at achieving the following:

- Development of a technically proficient workforce comprising of Saudi citizens capable of carrying out software development projects to the best of international standards.
- To keep pace with academic advances in international universities in the field of computation and informatics.
- To increase learners' experience by enabling them to solve academic and practical problems in their areas of specialization.
- To enable graduates to compete in the fields of computation and informatics.
- To support continuous development through partnerships with local and international companies.
- To connect programs through integrated courses designed and taught through advanced technology.
- To integrate academic programs by bridging the gap between theoretical advances and practical applications.

To participate in offering consultation and training programs in the fields of computer science and IT within community service programs.

A. PROGRAM IDENTIFICATION AND GENERAL INFORMATION

1. **Program title:**

   Bachelor of Science in Computer Science (BSc in Computer Science)

2. **Total credit hours needed for completion of the program:**

   130 credit Units. 130 Credit Hours

3. **Award granted on completion of the program:**

   Bachelor of Science in Computer Science

4. **Major tracks/pathways or specializations within the program:**

   Not exist.

5. **Professional occupations**

   1- Software and application Developer (Programmer).
   2- System Developer
   3- Software project manager.
   4- System analyst
   5- Technical support specialist

6. **Name of program coordinator or chair:** Dr. Samah Alhazmi

   Email**:** s.alhazmi@seu.edu.sa

B. PROGRAM CONTEXT:

1. **Rationales of the program:**

The Saudi Arabia's Vision 2030 is committed to provide citizens with knowledge and skills to meet the future needs of the labor market. Information and Communication Technology (ICT) can be a key enabler of the national programs outlined in Saudi Vision 2030, and described in details in the National Transformation Plan 2020. However, the ICT sector suffers from a significant gap between supply and demand for competent skilled human resource. This is reflected in the Ministry of Communications and Information Technology (MCIT) strategic objective, which is "the rehabilitation of specialized Saudi human capital and employment of this capital to reduce the gap between supply and demand in the ICT sector". A recent report by the CIT Commission states that although Saudi universities, colleges, recruitment organizations, and domestic training institutions continue to supply hundreds of new ICT professionals, the gap between the demand and the supply will continue to expand. The ICT talent gap exceeded 37,000 in 2017. The report shows the

growing needs for computer science specialties such as software/application developer/manager which classified among the most difficult skills to find by employers.

Therefore, the BSc in Computer Science program aims to bridge the gap in ICT industry by developing qualified graduates who are able to contribute and participate to the growth of Saudi Arabia and to the improvement of society.

2. Relevance of the program to the mission and goals of the institution:

The program is designed to support the university mission of providing an excellent and qualified modern education for the kingdom and its population. The BSc in CS offers higher education based on the best applications and technologies of e-learning, to transfer and localize knowledge in the subject of CS.

3. Relationship to other programs:

a. Courses required from other programs

- **MATH001** Fundamentals of Mathematics
- **MATH150** Discrete Mathematics
- **MATH151** Linear Algebra
- **SCI101** General Physics 1
- **SCI201** General Physics 2
- **STAT101** Statistics
- **ENG001** English Skills 1
- **ENG103** Technical Writing
- **COMM001** Communication Skills
- **CI001** Academic Skills
- **ISLM 101** Islamic Culture 1
- **ISLM 102** Islamic Culture 2
- **ISLM 103** Islamic Culture 3
- **ISLM 104** Islamic Culture 4

4. Specific enrolment requirements: (IT skills, Language…):

None.

C. MISSION, GOALS & OBJECTIVES AND LEARNING OUTCOMES:

1. Program Mission:

The mission of the BSc in Computer Science program aims at developing cadres to be highly motivated, skilful, innovative, and entrepreneurial CS professionals and scientist, through a modern, flexible education system.

2. Program goals and objectives:

1. Proficiency as computer scientists with an ability to solve a wide range of computing-related problems in industry, government, or other work environments.
2. Professional status with a capacity to adapt quickly to new environments and technologies, assimilate new information, and work in multi-disciplinary areas with a strong focus on innovation and entrepreneurship.
3. Graduate credits toward advanced degrees with a dedication for lifelong learning.
4. Respect as computer scientists in conformance with societal and national expectations for the Kingdom of Saudi Arabia so that it becomes a leading knowledge-based economy in conformance with Islamic and Arabic principles and practice.

3 - Program learning outcomes

NQF Learning Domains		Program Learning Outcomes
1. Knowledge and Understanding		Recognize the concepts of computing and mathematics related to the discipline.
		Ability to use the current techniques, skills, and tools necessary for the computing practice.
		Recognize the local and global impact of computing on individuals, organizations, and the society.
2. Skills	**Cognitive Skills**	Analyze a complex computing problem, apply computing 2.2 principles to identify and define the computing requirements appropriate to its solution.
		Implement mathematical foundations, algorithmic principles, and computer science theories in the modelling and design of computer-based systems.
		Apply theories and principles using cutting edge tools and technologies in the design, implementation and evaluation of computer-based systems to meet a given set of requirements.
	Practical and Physical Skills	Apply computer science theory and software development fundamentals to produce computing-based solutions.

	Communication and ICT Skills	Communicate effectively with a range of audiences, both orally and in a written form, using appropriate media.
3. Values, Autonomy, & Responsibility	**Values and Ethics**	Recognize ethical, legal, security, social issues and professional responsibilities related to computing discipline
	Autonomy and Responsibility	Function effectively on teamwork activities appropriate to the program's discipline to accomplish a common goal.

D. PROGRAM STRUCTURE AND ORGANIZATION

1. Program Structure by kind of requirements:

University requirements:

Course Code	Course Title	Required or Elective	Credit Hours	College or Department
ENG001	English Skills 1	**Required**	16	Science and Theoretical Studies
CS001	Computer Essentials	**Required**	3	Computation and Informatics
COMM001	Communication Skills	**Required**	2	Science and Theoretical Studies
CI001	Academic Skills	**Required**	2	Science and Theoretical Studies
MATH001	Fundamentals of Mathematics	**Required**	3	Science and Theoretical Studies
ISLM 101	Islamic Course 1	**Required**	2	Science and Theoretical Studies
ISLM 102	Islamic Course 2	**Required**	2	Science and Theoretical Studies
ISLM 103	Islamic Course 3	**Required**	2	Science and Theoretical Studies
ISLM 104	Islamic Course 4	**Required**	2	Science and Theoretical Studies
		Total	**34**	

College requirements

Course Code	Course Title	Required or Elective	Credit Hours	College or Department
CS230	Object Oriented Programming	**Required**	3	Computing and Informatics
ENG103	Technical Writing	**Required**	3	Science and Theoretical Studies
MATH150	Discrete Mathematics	**Required**	3	Science and Theoretical Studies
CS240	Data Structure	**Required**	3	Computing and Informatics
MATH151	Linear Algebra	**Required**	3	Science and Theoretical Studies
CS350	Introduction to Database	**Required**	3	Computing and Informatics
CS351	Operating Systems	**Required**	3	Computing and Informatics
CS360	Computer Networks	**Required**	3	Computing and Informatics
STAT101	Statistics	**Required**	3	Science and Theoretical Studies
CS499	Practical Training	**Required**	3	Computing and Informatics
		Total	**30**	

Specialization requirements:

Course Code	Course Title	Required or Elective	Credit Hours	College or Department
SCI 101	General Physics 1	**Required**	3	Science and Theoretical Studies
SCI 201	General Physics 2	**Required**	3	Science and Theoretical Studies
CS231	Digital Logic Design	**Required**	3	Computing and Informatics
CS241	Computer Architecture and Organization	**Required**	3	Computing and Informatics
CS242	Theory of Computing	**Required**	3	Computing and Informatics
CS243	Discrete Mathematics for CS	**Required**	3	Computing and Informatics
CS352	System Analysis and Design	**Required**	3	Computing and Informatics
CS353	Design and Analysis of Algorithms	**Required**	3	Computing and Informatics
CS361	Web Programming	**Required**	3	Computing and Informatics

CS362	Artificial Intelligence	**Required**	3	Computing and Informatics
CS363	Principles of Programming Languages	**Required**	3	Computing and Informatics
CS364	Computing Entrepreneurship and Innovation	**Required**	3	Computing and Informatics
CS470	Human Computer Interaction	**Required**	3	Computing and Informatics
CS471	Computer Security	**Required**	3	Computing and Informatics
CS479	Senior Project 1 in Computer Science	**Required**	3	Computing and Informatics
CS489	Senior Project 2 in Computer Science	**Required**	3	Computing and Informatics
CS480	Project Management in Computing	**Required**	3	Computing and Informatics
CS481	Professional Ethics in Computer Science	**Required**	3	Computing and Informatics
CS4xx	Elective 1	**Elective**	3	Computing and Informatics
CS4xx	Elective 2	**Elective**	3	Computing and Informatics
CS4xx	Elective 3	**Elective**	3	Computing and Informatics
CS4xx	Elective 4	**Elective**	3	Computing and Informatics
		Total	**66**	

Tracks requirements:

None.

2 - Program Structure by years

Year 1

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
First Year	CS001	Computer Essentials	3		
	ENG001	English Language Skills	16		
	CI001	Academic Skills	2		
	MATH001	Fundamentals of Mathematics	3		
	COMM001	Communication Skills	2		
		Total	**26**		

Year 2

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
Semester 1	SCI 101	General Physics 1	3	Pass First Year	
	CS230	Object Oriented Programming	3		
	ENG103	Technical Writing	3		
	MATH150	Discrete Mathematics	3		
	CS231	Digital Logic Design	3		
	ISLM101	Islamic Culture 1	2		
		Total	**17**		

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
Semester 2	SCI 201	General Physics 2	3	SCI 101	
	CS240	Data Structure	3	CS230	
	CS241	Computer Architecture and Organization	3	CS231	
	CS242	Theory of Computing	3	CS230	
	CS243	Discrete Mathematics for CS	3	MATH150	
	ISLM102	Islamic Culture 2	2	–	
		Total	**17**		

Year 3

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
Semester 1	MATH151	Linear Algebra	3	MATH150	
	CS350	Introduction to Database	3	CS240	
	CS351	Operating Systems	3	CS241	
	CS352	System Analysis and Design	3	CS230	
	CS353	Design and Analysis of Algorithms	3	CS240, CS242	
	ISLM103	Islamic Culture 3	2	–	
		Total	**17**		

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
Semester 2	CS360	Computer Networks	3	CS351	
	STAT101	Statistics	3	MATH150	
	CS361	Web Programming	3	CS350	
	CS362	Artificial Intelligence	3	CS353	
	CS363	Principles of Programming Languages	3	CS240	
	CS364	Computing Entrepreneurship and Innovation	3	CS350	
		Total	**18**		

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
Summer	CS499	Practical Training	3	86 credit hours	
		Total	**3**		

Year 4

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
Semester 1	ISLM104	Islamic Culture 4	2	–	
	CS470	Human Computer Interaction	3	CS352	
	CS471	Computer Security	3	CS360	
	CS479	Senior Project 1 in Computer Science	3	CS350, CS352	
	CS4xx	Elective 1	3	–	
	CS4xx	Elective 2	3	–	
		Total	**17**		

	Course Code	Course Title	Credit Hours	Pre-requisites	Co-requisites
Semester 2	CS489	Senior Project 2 in Computer Science	3	CS479	
	CS480	Project Management in Computing	3	CS352	
	CS481	Professional Ethics in Computer Science	3		
	CS4xx	Elective 3	3		
	CS4xx	Elective 4	3		
		Total	**15**		

Elective Courses				
Concentration	**Course Code**	**Course Title**	**Credit Hours**	**Pre-Requisites**
Advance Application Development	CS475	Mobile Computing	3	CS363
	CS476	Parallel and Distributed Computing	3	CS363
	CS477	Compiler Design	3	CS363
	CS478	Computer Graphics	3	CS363
Gaming Development	CS485	Game Architecture and Design	3	CS363
	CS486	2D Game Programming	3	CS361
	CS487	3D Game Programming	3	CS361
	CS488	Game Artificial Intelligence	3	CS362

3. Field Experience (internship, cooperative program….):

a. Brief description

The field experience activity is represented by the practical training course during the summer semester, which aims to enrich students' practical skills via providing them with the opportunity to apply the learned knowledge and skills throughout the bachelor program in a selected and well-developed organization in the field of ICT.
The computer science department proposes a number of approved organizations according to specific criteria, and directs students to conduct their summer training activities under internal and external supervision from the department and the workplace respectively.
The department identifies general guidelines about what kinds of tasks the student is supposed to practice. The supervisor at the work environment is responsible for guiding and assigning tasks to the student, as well as reporting the student's progress to the internal supervisor assigned by the department. Then, the student will be evaluated by the department supervisor base on his progress.

b. Semester:

During the summer semester after completing 86 credit hours.

c. Time allocation and scheduling arrangement

Spending around 280 working hours in no less than 8 weeks.

d. Number of credit hours

Three credit hours.

e. Intended learning outcomes

- Enrich students' practical skills via providing them with the opportunity to apply the learned knowledge and skills throughout the bachelor program in a selected and well-developed organization in the field of ICT.
- Familiarizing the student with the real job world.

f. Assessment procedures

By an evaluation form filled by the employer, and a written report submitted by the student.

4. Project or Research Requirements (if any)

a. Brief description

- **CS479 Senior Project I**

  This project is a significant computer or software project requiring extensive research and development, conducted under the general guidance of an approved faculty member, and conforming to departmental project guidelines. The project spans for two semesters: CS479 and CS489. To equip them with necessary skills and tools in research and analysis phases of this senior project, in the first four weeks of CS479, the students will be taught on how to review literature, conduct research and elicit requirements. These following details outline the desired objectives of this teaching.

  This course will equip undergraduate Computer Science students with the basic skills to conduct researches in the field of Computer Science. The course aims to introduce the required techniques for conducting a research, implementing systems, writing technical reports and the skills for presenting the work for audiences. This course will particularly focus on topics, which are related to the field of Computer Science. The course will also provide guidance to the students in selecting their projects, understanding the research process as well as the tools needed to support implementing the system and writing its documentation. The course discusses other issues including research methods that are normally used in researches such as experiments, survey, interview and simulations, understanding the importance of literature review, preparing visual presentations and other ethical issues such as plagiarism.

- **CS489 Senior Project II**

  This a continuation of the graduation project started in CS479. The focus will be in this part on low-level design, implementation, testing and quality assurance as well as management of the project.

b. Semester:

Semester 7 and 8.

c. Number of credit hours

3 (CS479) + 3 (CS489), the total is 6 hours.

d. Intended learning outcomes

On completion of this module, students should be able to:

- select an area for study appropriate to the programme of study.
- negotiate with a supervisor to define a problem to be solved.
- identify and review relevant literature.
- identify and implement an appropriate project methodology.
- manage the project using appropriate tools and techniques.
- deliver a solution as negotiated with the supervisor.
- evaluate the solution.
- give a presentation to an audience of peers and staff on aspects of the project.
- write a report presenting the problem and its solution.
- reflect upon the project experience.

e. Assessment procedures

The assessment will include the evaluation of the following items

- A complete written report by the student.
- Student commitment based on the supervisor report.
- Student's oral presentation and demonstration.

5. Admission Requirements for the program:

None

6. Attendance and Completion Requirements:

The course load is divided as follows: 25% face-to-face lectures and 75% e-learning activities based on the University's Distance Learning regulations.

To complete the program, a student has to successfully complete the 128 credit hours as specified in the above detailed study plan.

E. LEARNING FACILITIES AND EQUIPMENT:

1. Facilities required

The college has provided state of the art facilities to the students for imparting quality education. The campuses provide modern class rooms with electronic gadgets required for smooth execution of class hours. The students also avail the opportunities to interact with faculty during visiting hours who are required to be in their allocated office spaces which are also furnished with all facilities needed for blended learning environment including hardware and software which is needed.

2. Classrooms

It is mandatory for all classes to be held in properly designed classrooms during the face to face hour. Each class is equipped with electronic podium which has the facility to record the lecture as well as sound control apart from other features. Each classroom is connected with internet. Multimedia support is available in every class room. Each classroom is equipped besides these with general amenities like air-conditioning, sufficient lighting and proper sitting arrangements. All classrooms are regularly monitored to ensure that none of the assets is in bad or disorderly shape.

3. Equipment (including IT)

The most salient IT equipment includes:

1. State of the art latest computing machines and laptops for faculty members.
2. 24 hours uninterrupted high speed internet provision at all the campuses.
3. Provision of SEU portal accounts to all the students and faculty members.
4. Blackboard system as teaching software with accounts for all the teachers and students to manage their academic activities and conduct virtual sessions.
5. Attendance, grading, E-mail and other relevant software.
6. Access to Saudi Digital Library for all the students and faculty alike

4. Learning Outcomes in Domains of Learning, Assessment Methods and Teaching Strategy

Program Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning and teaching.

The ***National Qualification Framework*** (NQF) provides three learning domains. Learning outcomes are required in the first four domains and some programs may also require the Psychomotor Domain.

On the table below are the Three NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable learning outcomes required in each of the learning domains. **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each program learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process.

NQF Learning Domains		Program Learning Outcomes	Teaching Strategies	Assessment Methods
1. Knowledge and Understanding		Recognize the concepts of computing and mathematics related to the discipline.	1. Class lectures 2. research activities 3. brainstorming 4. Class exercises and discussions. 5. Lab programming exercises	1. Quizzes/ Assignments. 2. Written exams (midterm and final) 3. Lab 4. Project
		Ability to use the current techniques, skills, and tools necessary for the computing practice.	1. Class lectures 2. research activities 3. brainstorming 4. Class exercises and discussions. 5. Lab programming exercises 6. Team Projects	1. Quizzes/ Assignments. 2. Written exams (midterm and final) 3. Lab 4. Project
		Recognize the local and global impact of computing on individuals, organizations, and the society.	1. Class lectures 2. Class exercises and discussions 3. brainstorming 4. case studies 5. Practical Training	1. Company (trainer) evaluation report, student report, 2. presentation and discussion
2. Skills	**Cognitive Skills**	Analyze a complex computing problem, apply computing 2.2 principles to identify and define the computing requirements appropriate to its solution.	1. Class lectures 2. Problem analyzing, 3. problem solving 4. Class Exercises, and assignments	1. Quizzes/ Assignments. 2. Written exams (midterm and final) 3. Lab 4. Project
		Implement mathematical foundations, algorithmic principles, and computer science theories in the modelling and design of computer-based systems.	1. Class lectures 2. research activities 3. brainstorming 4. Class exercises and discussions. 5. Lab programming exercises 6. Team Projects	1. Quizzes/Assignments. 2. Written exams (midterm and final) 3. Lab 4. Project Evaluation
		Apply theories and principles using cutting edge tools and technologies in the design, implementation and evaluation of computer-based systems to meet a given set of requirements.	1. Class lectures 2. Lab programming exercises. 3. Class exercises and discussions 4. Team Projects	1. Quizzes/ Assignments. 2. Written exams (midterm and final) 3. Lab 4. Project
	Practical and Physical Skills	Apply computer science theory and software development fundamentals to produce computing-based solutions.	1. Class lectures 2. Lab programming exercises. 3. Class exercises and discussions 4. Team Projects	1. Quizzes/ Assignments. 2. Written exams (midterm and final) 3. Lab 4. Project

	Communication and ICT Skills	Communicate effectively with a range of audiences, both orally and in a written form, using appropriate media.	1. Class lectures, 2. seminars, 3. dialogues of interactive discussions with students, 4. proposal preparing and writing, 5.Students' presentations.	1.Student presentation discussion and evaluation
3. Values, Autonomy, & Responsibility	**Values and Ethics**	Recognize ethical, legal, security, social issues and professional responsibilities related to computing discipline	1. Class lectures 2. research activities 3. brainstorming 4. Practical Training	1. Quizzes/ Assignments. 2. Written exams 3. Company (trainer) evaluation reports
	Autonomy and Responsibility	Function effectively on teamwork activities appropriate to the program's discipline to accomplish a common goal.	1. Class lectures 2. research activities 3. brainstorming 4. Team Projects	1. Group Lab Assignments 2. Team Project Evaluation

F. PROGRAM COURSES DESCRIPTIONS

Object Oriented Programming:

This course is to introduce the students to the principles of computer analysis of problems, design of algorithms, programming, and testing using the Java programming language. Topics include problem analysis basics of programming, data types, control structures, functions, arrays, and the mechanics of running, testing and debugging. Students also are introduced to object-oriented programming principles and basic concepts in software development through Java Programming Language, including inheritance, polymorphism, interfaces, I/O, Exception Handling, GUI and Swing, Generic Collections, and Multithreading.

Data Structure:

This course is designed keeping in mind the need to make students understand concepts related to data representation and organization in development of software products and services. This includes an understanding of data structures such as Linked Lists, Stacks, Queues, Binary Trees, Binary Search Trees, Hash Tables and Graphs. Students are taught to apply Object Oriented programming concepts such as Abstraction and encapsulation to implement the data structures using Java language. The students are taught advanced algorithmic concepts such as time and space complexity, searching algorithms and sorting algorithms etc.

Introduction to Database:

The course familiarizes students with significance of maintaining a computer-based database using DBMS and its potential advantages to the organization. The students at the completion of this course will be able to understand the principal database concepts and develop a simple database for a small organization using standard DBMS. In this course, students should study the following topics: Basic concepts in database systems and architectures; Entity-Relationship model, Data models (including basics of Relational model & SQL), Database Design (Database dependencies and Normalization), Database implementation and, lastly, DBMS architecture and administration.

Operating Systems:

This is an introductory and core course in BSCS program which familiarizes students with the principles and underlying concepts of operating systems in standalone as well as distributed environments. The focus of this course is to understand the underlying technologies that make contemporary operating systems work efficiently. Processes, threads, synchronization, I/O, file systems, memory and storage management techniques will be explored in depth.

Computer Networks:

This course explores fundamental concepts in the design and implementation of computer communication networks and their protocols. This includes layered network architectures, applications, transport, congestion, routing, data link protocols, local area networks. An emphasis will be placed on the protocols used in the Internet. Furthermore, the concepts and structure of

IPv4 addressing and subnetting, its application, operation and implementation to networks are discussed. Lastly, Cloud computing will be introduced in this course.

System Analysis and Design:

This course is about solving business issues through analysing the requirements of information systems and designing such systems by applying analysis and design techniques. the course deals with the concepts, skills, methodologies, techniques, tools, and perspectives essential for systems analysts.

Design and Analysis of Algorithms

This course introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include asymptotic complexity bounds, techniques of analysis, and algorithmic strategies.

Web Programming:

This course is an overview of the modern Web technologies used for the Web development. The topics include: HTML5, CSS3, JavaScript, DOM, XML, Rich Internet Applications (RIAs) with AJAX, server-side programming using PHP or similar languages, and designing and manipulating web databases.

Artificial Intelligence:

The course is designed to educate students with broad range of artificial intelligence (AI) topics. It provides sufficient understanding about central concepts pf Artificial intelligence such AI applications, predicate calculus, and state space search. Topics also include but are not limited to heuristic strategies, problem solving, knowledge representation, expert systems, and machine learning. The learning of various Artificial Intelligence techniques is supplemented with algorithms development and real-world problem-solving examples.

Digital Logic Design

The objective of this course is to provide an introduction to the fundamental concepts of digital logic design. Topics include number systems, binary codes, Boolean algebra, canonical and fundamental forms of Boolean functions, functions applications to digital circuits design, minimization of Boolean functions by Boolean algebra and Karnaugh maps, two -level and multi-level digital circuits, decoders, encoders, multiplexers, demultiplexers, latches, flip-flops, registers, counters, analysis and synthesis of synchronous sequential circuits.

Discrete Mathematics for Computer Science

This course covers elementary discrete mathematics for computer science. It introduces students to fundamental algebraic, logical and combinatorial concepts in mathematics. Topics include Boolean Logic, Predicate Logic, sets, mapping, relations, elementary counting principles, algorithm & proof techniques, graphs, and recursions.

Computer Architecture and Organization

Computer architecture is the science and art of selecting and interconnecting hardware components to create a computer that meets functional, performance and cost goals. In this course, the students will learn how to completely design a correct single processor computer, including processor data path, processor control, pipelining optimization and instruction level parallelism, cache and memory systems, and I/O systems. The students will also learn how to quantitatively measure and evaluate the performance of the designs. The students will also learn how to construct an assembly language programs.

Theory of Computing

This course provides knowledge of finite automata and their role and use in computation. It also provides the skills and abilities to analyse the complexity of computation problems. The course defines formal mathematical model of computation and study their relationship with formal languages including models of computation such as Finite automata, Pushdown automata, Turing machines; theory of language translators including grammars, syntax, semantics, parsing, regular languages, Pumping Lemmas for regular languages and CFG, and complexity theory.

Principles of Programming Languages

This course is aimed at presenting the fundamental properties of programming languages and discuss how the properties are implemented in particular languages. The course also discuss the pros and cons of using various programming languages to solve particular problems. Major components of the course include history of programming languages; virtual machines; sequence control; data control; scoping; parameter passing; sharing and type checking; run-time storage management; programming language semantics; programming paradigms.

Computer Security

This course focuses on the fundamentals and aspects of computer security including user authentication, access control, malicious software, Denial-of-Service attacks, intrusion detection, cryptography, and other network/computer security topics. Students will learn how to manage computer systems and networks security.

Human Computer Interaction

This course provides an introduction to the basics of Human Computer Interaction (HCI). It investigates the process of interaction design by highlighting the cognitive, social, and emotional aspects of human computer interaction. The course also explores data gathering, analysis, and interpretation techniques along with discovering requirements for user interfaces. It also cover user interaction design, construction, and evaluation techniques and models. The contents of course encourage the students for application of the acquired knowledge in assignments and projects thus enabling them for successful delivery of usable user interfaces.

Project Management in Computing

This course is developed to provide the students with the needed knowledge, and skills for perform as project managers in the field of computing. This course covers detailed topics of the basic concepts of project management in computing, including initiating, planning, controlling, executing, and closing projects. The course also shows how that type of projects should be managed, from inception to post implementation review. This course will help improve management skills and abilities to define the project scope, create a workable project plan, and manage within the budget and schedule.

Professional Ethics in Computer Science

Professional Ethics in Computer Science is the basic course to understand the moral values in practical life activities. This course will be helpful to understand the ethics of computing, licensing, and certification. This course covers the impact of intellectual property on computing technology. Government and network communication privacy is also covered by this course.