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CURRICULA AND STUDY PLANS

OF

UNDERGRADUATE PROGRAMS

SCHOOL OF COMPUTATIONAL SCIENCES AND ARTIFICIAL INTELLIGENCE

UNIVERSITY OF SCIENCE AND TECHNOLOGY

ZEWAIL CITY OF SCIENCE, TECHNOLOGY AND INNOVATION

SEPTEMBER 2023

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1. CURRICULUM STRUCTURE

- The curriculum at CSAI is structured in a manner that assists its students in building a solid foundation in Computational Sciences and Artificial Intelligence.
- To graduate from any of the CSAI programs, students must fulfil their degree requirements, including completing at least 132 credit hours.
- Out of the 132 credit hours, all CSAI students are required to successfully complete at least
    - 16 credit hours of University Requirements constituting a set of Humanities and Social Sciences courses which are designed to provide UST students with skills and knowledge to develop an intellectual, well-rounded, and successful personal identity,
    - 50 credit hours of CSAI School Requirements that provide CSAI students with skills and knowledge essential to develop a successful CSAI graduate, and
    - 66 credit hours of Program Requirements, including Major Requirements and Concentration Requirements, if any.
- The concentrations are offered depending on the number of enrolled students and according to program resources and UST administration approvals.

1.1. UNIVERSITY REQUIREMENTS (16 CR)

University requirements provide UST students with skills and knowledge to develop an intellectual, well-rounded, and successful personal identity. University requirements is a set of Humanities and Social Sciences courses which are designed to enrich students with an appreciative understanding of the natural and cultural environments in which they live and their roles in the society and community services.

CSAI students as required to complete the University Requirements, including General Education Electives from the list announced by the General Education Department. A student can refer to the program curriculum for any extra constraints on the General Education Electives list.

University Requirements (16 Cr)					
Compulsory Courses (10 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
ENGL 156	Technical English 1	2	2	0	ENGL 004, if the student was placed in ENGL 003 or ENGL 004 after the English placement exam.
ENGL 157	Technical English 2	2	2	0	ENGL 156, Technical English 1
SCH 163	Sustainability, Social and Ethical Issues in Computing	2	2	0	
SCH 261	Project Management and Economics	2	2	0	
SCH 264	Entrepreneurship and Small Business Management	2	2	0	
Elective Courses (6 Cr)					
Student must select at least 6 Cr from the offered General Education Courses					

1.2. SCHOOL REQUIREMENTS (53 CR)

The aim of school requirements is to provide CSAI students with skills and knowledge essential to develop a successful graduate. School Requirements include:

- mathematics and fundamental computing topics that are essential to all CSAI students.
- a successful completion of an internship to enable CSAI students to practice skills related to their field of specialization in a real life workplace experience.
- a successful completion of a program Senior Project in which students integrate, apply, and demonstrate their acquired knowledge and skills.

School Requirements (53 Cr)					
Math and Basic Science Requirements					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
MATH 103	Calculus for Computational Sciences	3	2	2	
MATH 104	Linear Algebra	3	2	2	
MATH 105	Probability and Statistics	3	2	2	MATH 103, Calculus for Computational Sciences
MATH 308	Discrete Mathematics	3	2	2	
Fundamental Computing Topics Requirements					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 100	Introduction to Computational Sciences and AI	1	1	0	
CSAI 101	Fundamentals of Programming and Computer Science	2	1	3	
CSAI 102	Digital Logic and Computer Architecture	3	2	3	
CSAI 151	Object-Oriented Programming	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
CSAI 201	Data Structures	3	2	3	CSAI 151, Object-Oriented Programming
CSAI 202	Introduction to Database Systems	3	2	3	CSAI 151, Object-Oriented Programming
CSAI 203	Introduction to Software Engineering	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
CSAI 251	Algorithm Design and Analysis	3	2	3	CSAI 201, Data Structures
CSAI 252	Introduction to Computer Networks	3	2	3	
CSAI 253	Machine Learning	3	2	3	CSAI 201, Data Structures MATH 105, Probability and Statistics
CSAI 301	Artificial Intelligence	3	2	3	CSAI 201, Data Structures
CSAI 351	Principles and Practices for Secure Computing	3	2	3	CSAI 201, Data Structures
Internship and Senior Project Requirements					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 399	Internship	4	0	12	
CSAI 498	Senior Project - Part 1	1	0	3	
CSAI 499	Senior Project - Part 2	3	0	9	CSAI 498, Senior Project – Part 1

2. Software Development Program (SWD) (132 Credit Hour)

2.1. Program Description

Software Development (SWD) is a program where a core body of knowledge in application development, gaming and computer graphics, human computer interaction, and related subjects are used to develop software applications that help the enterprise and non-enterprise end users perform their tasks efficiently. The demand for software developers is extremely high and is expected to stay strong for several years. The software developers' jobs have been among the top highest-paying Jobs. The SWD program is expected to provide new opportunities for the graduates and to better serve the needs of the industry and community. In the first two years of study, more emphasis is placed on the common knowledge and skills in the software development area including the different parts of the software development lifecycle. In the last two years, students select one of the offered three concentrations to gain in-depth knowledge and experience in these fields: Application development, Gaming and Computer Graphics, and Human-Computer Interaction.

برنامج تطوير البرمجيات

برنامج تطوير البرمجيات هو برنامج يتم فيه استخدام مجموعة أساسية من المعارف في تطوير التطبيقات وتطوير ألعاب الحاسوب والرسومات الحاسوبية، والتفاعل البشري مع الحاسوب، والموضوعات ذات الصلة لتطوير تطبيقات البرامج التي تساعد المستخدمين النهائيين للمؤسسات وغير المؤسسات على أداء مهامهم بكفاءة. الطلب على مطوري البرمجيات مرتفع للغاية ومن المتوقع أن يظل قوياً لعدة سنوات، ووظائف مطوري البرمجيات من بين الوظائف الأعلى ربحًا. من المتوقع أن يوفر برنامج تطوير البرمجيات فرصًا جديدة للخريجين ولخدمة احتياجات الصناعة والمجتمع بشكل أفضل. في أول عامين من الدراسة يتم التركيز بشكل أكبر على المعارف والمهارات العامة في مجال تطوير البرمجيات بما في ذلك الأجزاء المختلفة من دورة حياة تطوير البرمجيات. في أخر عامين من الدراسة، يختار الطلاب أحد التخصصات الثلاثة المعروضة لاكتساب معرفة وخبرة متعمقة في هذه المجالات: تطوير التطبيقات، والألعاب والرسومات الحاسوبية، والتفاعل بين الإنسان والحاسوب.

2.2. Program Educational Objectives (PEOs)

SWD will nurture an academic environment that contributes effectively to empower its graduates towards having the choice, talents, and knowledge to transition into a broad range of career options.

Within three to five years of graduation, the SWD Program graduates should be able to:

1. Successfully advance in their career in software development or related fields and contribute to the body of software products and/or services.
2. Contribute to or lead software development based (or related) teams.
3. Pursue advanced degrees in local and international graduate programs in software development or related fields to emerge as thought leaders, researchers, experts, and educators.
4. Remain current in their chosen careers through being lifelong learners in ever-changing global economic and technological environments.

2.3. Student Outcomes (SOs)

Student Outcomes describe what students are expected to be able to do by the time of graduation. The SWD program adapts the Student Outcomes of the ABET Computing Accreditation Commission general criteria. Graduates of the SWD program will have the ability to:

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

2.4. Program Educational Objectives Mapping to Student Outcomes

		Student Outcomes (SOs)				
		SO 1	SO 2	SO 3	SO 4	SO 5
Program Educational Objectives (PEOs)	PEO 1	×	×	×	×	×
	PEO 2			×	×	×
	PEO 3	×	×	×	×	
	PEO 4	×	×		×	

2.5. Degree Requirements for B.Sc. in Software Development (SWD)

A Student who intends to major in SWD must submit a Program Declaration Form by the end of the first semester. Students should consult their academic advisor on a regular basis to ensure the prerequisites for their university requirements, school requirements, and program requirements (major requirements and concentration requirements) are fulfilled.

University Requirements (Cr)	School Requirements (Cr)	Program Requirements (Cr)		Total (Cr)
		Major Requirements (Cr)	Concentration Requirements (Cr)	
16	53	33	30	132

2.5.1. Major Requirements

The program offers a major specialty in Software Development (SWD), which requires successful completion of 33 credits:

Major Requirements (33 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 204	Operating Systems	3	2	3	CSAI 201, Data Structures
MATH 307	Numerical Methods	3	2	2	MATH 104, Linear Algebra
PHYS 103	Physics 1	3	2	3	MATH 103, Calculus for Computational Sciences
PHYS 104	Physics 2	3	2	3	PHYS 103, Physics 1
SW 151	Computer Architecture and Organization	3	2	3	CSAI 102, Digital Logic and Computer Architecture
SW 251	User Experience and Interaction Design	3	2	3	CSAI 203, Introduction to Software Engineering
SW 252	Embedded Systems	3	2	3	SW 151, Computer Architecture and Organization
SW 301	Object-Oriented Analysis and Design	3	2	3	CSAI 151, Object-Oriented Programming
SW 302	User Interface Development	3	2	3	SW 251, User Experience and Interaction Design
SW 401	Parallel and Distributed Computing	3	2	3	CSAI 151, Object-Oriented Programming
SW 402	Software Project Management	3	2	3	CSAI 203, Introduction to Software Engineering

2.5.2. Concentration Requirements

The SWD program offers the following three concentrations, which require successful completion of at least 30 credits in one of the following:

- Application Development (APD)
- Gaming and Computer Graphics (GCG)
- Human Computer Interaction (HCI)

2.5.2.1. APPLICATION DEVELOPMENT (APD) CONCENTRATION REQUIREMENTS

Application Development (APD) Concentration Requirements (30 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 302	Advanced Database Systems	3	2	3	CSAI 202, Introduction to Database Systems
SWAPD 301	Software Systems Requirements Development	3	2	3	CSAI 203, Introduction to Software Engineering
SWAPD 351	Software Architecture and Design	3	2	3	SWAPD 301, Software Systems Requirements Development
SWAPD 352	Web Applications Development	3	2	3	CSAI 202, Introduction to Database Systems
SWAPD 401	Software Testing, Validation, and Quality Assurance	3	2	3	SWAPD 301, Software Systems Requirements Development
SWAPD 402	Mobile Application Development	3	2	3	CSAI 201, Data Structures
SWAPD 452	Enterprise Application Development	3	2	3	CSAI 202, Introduction to Database Systems
SWAPD 453	IoT Applications Development	3	2	3	CSAI 252, Introduction to Computer Networks
SWAPD ###	Application Development Electives	6	-	-	

2.5.2.2. GAMING AND COMPUTER GRAPHICS (GCG) CONCENTRATION REQUIREMENTS

Gaming and Computer Graphics (GCG) Concentration Requirements (30 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
SWGCG 301	Computer Graphics and Multimedia Systems	3	2	3	CSAI 201, Data Structures
SWGCG 351	Game Design and Development	3	2	3	CSAI 251, Algorithm Design and Analysis
SWGCG 352	Computer and Physics-Based Animation	3	2	3	SWGCG 301, Computer Graphics and Multimedia Systems
SWGCG 401	Design and Geometric Modeling for Visualization and Communication	3	2	3	
SWGCG 402	Visual Effects Production	3	2	3	SWGCG 352, Computer and Physics-Based Animation
SWGCG 451	Model Creation and Character Animation	3	2	3	CSAI 201, Data Structures
SWGCG 452	Physics-Based Vision and Rendering	3	2	3	SWGCG 301, Computer Graphics and Multimedia Systems
SWGCG 453	Mobile and Casual Game Development	3	2	3	CSAI 201, Data Structures
SWAPD ###	Application Development Electives	6	-	-	

2.5.2.3. HUMAN COMPUTER INTERACTION (HCI) CONCENTRATION REQUIREMENTS

Out of the General Education credit hours in the University Requirements, HCI Concentration students are required to replace two of the General Education elective credits with the following course:

Course Code	Course Title	Cr	L	P	Prerequisite
SCH 273	Cognitive Psychology	2	2	0	

A student in HCI Concentration is required to fulfil the following Concentration Requirements.

Gaming and Computer Graphics (GCG) Concentration Requirements (30 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
SWHCI 301	Prototyping Algorithmic Experiences	3	2	3	CSAI 251, Algorithm Design and Analysis
SWHCI 351	Statistical Graphics and Visualization	3	2	3	MATH 105, Probability and Statistics
SWHCI 352	User-Focused Sensing Systems	3	2	3	SW 251, User Experience and Interaction Design
SWHCI 401	Human Information Processing and Artificial Intelligence	3	2	3	CSAI 301, Artificial Intelligence
SWHCI 402	AI Based Products and Services	3	2	3	CSAI 301, Artificial Intelligence
SWHCI 451	Cognitive Modeling for HCI	3	2	3	SCH 273, Cognitive Psychology
SWHCI 452	Designing Extended Reality Experience	3	2	3	SW 251, User Experience and Interaction Design
SWHCI 453	Human Factors	3	3	0	
SWAPD ###	Application Development Electives	6	-	-	

2.6. Sample Study Plan For B.Sc. in Software Development (132 Credit Hours)

Software Development Year 1 (Total Credits: 32 Cr)

Year 1 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 100	Introduction to Computational Sciences and AI	1	1	0	
CSAI 101	Fundamentals of Programming and Computer Science	2	1	3	
CSAI 102	Digital Logic and Computer Architecture	3	2	3	
ENGL 156	Technical English 1	2	2	0	ENGL 004, if the student was placed in ENGL 003 or ENGL 004 after the English placement exam.
MATH 103	Calculus for Computational Sciences	3	2	2	
MATH 104	Linear Algebra	3	2	2	
SCH 163	Sustainability, Social and Ethical Issues in Computing	2	2	0	
Total		**16**			

Year 1 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 151	Object-Oriented Programming	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
ENGL 157	Technical English 2	2	2	0	ENGL 156, Technical English 1
MATH 105	Probability and Statistics	3	2	2	MATH 103, Calculus for Computational Sciences
PHYS 103	Physics 1	3	2	3	MATH 103, Calculus for Computational Sciences
SW 151	Computer Architecture and Organization	3	2	3	CSAI 102, Digital Logic and Computer Architecture
SCH ###	General Education Electives	2	2	0	
Total		**16**			

Software Development Year 2 (Total Credits: 34 Cr)

Year 2 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 201	Data Structures	3	2	3	CSAI 151, Object-Oriented Programming
CSAI 202	Introduction to Database Systems	3	2	3	CSAI 151, Object-Oriented Programming
CSAI 203	Introduction to Software Engineering	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
MATH 308	Discrete Mathematics	3	2	2	
PHYS 104	Physics 2	3	2	3	PHYS 103, Physics 1
SCH 261	Project Management and Economics	2	2	0	
Total		**17**			

Year 2 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 204	Operating Systems	3	2	3	CSAI 201, Data Structures
CSAI 251	Algorithm Design and Analysis	3	2	3	CSAI 201, Data Structures
CSAI 252	Introduction to Computer Networks	3	2	3	
CSAI 253	Machine Learning	3	2	3	CSAI 201, MATH 105
SCH 264	Entrepreneurship and Small Business Management	2	2	0	
SW 251	User Experience and Interaction Design	3	2	3	CSAI 203, Introduction to Software Engineering
Total		**17**			

Software Development Year 3

Application Development (APD) Concentration (Total Credits: 36 Cr)

Year 3 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 301	Artificial Intelligence	3	2	3	CSAI 201, Data Structures
SW 252	Embedded Systems	3	2	3	SW 151, Computer Architecture and Organization
SW 301	Object-Oriented Analysis and Design	3	2	3	CSAI 151, Object-Oriented Programming
SW 302	User Interface Development	3	2	3	SW 251, User Experience and Interaction Design
SWAPD 301	Software Systems Requirements Development	3	2	3	CSAI 203, Introduction to Software Engineering
SCH ###	General Education Electives	2	2	0	
Total		**17**			

Year 3 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 302	Advanced Database Systems	3	2	3	CSAI 202, Introduction to Database Systems
CSAI 351	Principles and Practices for Secure Computing	3	2	3	CSAI 201, Data Structures
MATH 307	Numerical Methods	3	2	2	MATH 104, Linear Algebra
SWAPD 351	Software Architecture and Design	3	2	3	SWAPD 301, Software Systems Requirements Development
SWAPD 352	Web Applications Development	3	2	3	CSAI 202, Introduction to Database Systems
Total		**15**			

Year 3 / Summer					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 399	Internship	4	0	12	
Total		**4**			

Software Development Year 4

Application Development (APD) Concentration (Total Credits: 30 Cr)

Year 4 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 498	Senior Project - Part 1	1	0	3	
SW 401	Parallel and Distributed Computing	3	2	3	CSAI 151, Object-Oriented Programming
SW 402	Software Project Management	3	2	3	CSAI 203, Introduction to Software Engineering
SWAPD 401	Software Testing, Validation, and Quality Assurance	3	2	3	SWAPD 301, Software Systems Requirements Development
SWAPD 402	Mobile Application Development	3	2	3	CSAI 201, Data Structures
SWAPD ###	Application Development Electives	3	2	3	
Total		**16**			

Year 4 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 499	Senior Project - Part 2	3	0	9	CSAI 498, Senior Project - Part 1
SWAPD 452	Enterprise Application Development	3	2	3	CSAI 202, Introduction to Database Systems
SWAPD 453	IoT Applications Development	3	2	3	CSAI 252, Introduction to Computer Networks
SCH ###	General Education Electives	2	2	0	
SWAPD ###	Application Development Electives	3	2	3	
Total		**14**			

Software Development Year 3

Gaming and Computer Graphics (GCG) Concentration (Total Credits: 35 Cr)

Year 3 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 301	Artificial Intelligence	3	2	3	CSAI 201, Data Structures
SW 252	Embedded Systems	3	2	3	SW 151, Computer Architecture and Organization
SW 301	Object-Oriented Analysis and Design	3	2	3	CSAI 151, Object-Oriented Programming
SW 302	User Interface Development	3	2	3	SW 251, User Experience and Interaction Design
SWGCG 301	Computer Graphics and Multimedia Systems	3	2	3	CSAI 201, Data Structures
SCH ###	General Education Electives	2	2	0	
Total		**17**			

Year 3 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 351	Principles and Practices for Secure Computing	3	2	3	CSAI 201, Data Structures
MATH 307	Numerical Methods	3	2	2	MATH 104, Linear Algebra
SWGCG 351	Game Design and Development	3	2	3	CSAI 251, Algorithm Design and Analysis
SWGCG 352	Computer and Physics-Based Animation	3	2	3	SWGCG 301, Computer Graphics and Multimedia Systems
SCH ###	General Education Electives	2	2	0	
Total		**14**			

Year 3 / Summer					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 399	Internship	4	0	12	
Total		**4**			

Software Development Year 4

Gaming and Computer Graphics (GCG) Concentration (Total Credits: 31 Cr)

Year 4 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 498	Senior Project - Part 1	1	0	3	
SW 401	Parallel and Distributed Computing	3	2	3	CSAI 151, Object-Oriented Programming
SW 402	Software Project Management	3	2	3	CSAI 203, Introduction to Software Engineering
SWGCG 401	Design and Geometric Modeling for Visualization and Communication	3	2	3	
SWGCG 402	Visual Effects Production	3	2	3	SWGCG 352, Computer and Physics-Based Animation
SWGCG ###	Gaming and Computer Graphics Electives	3	2	3	
Total		**16**			

Year 4 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 499	Senior Project - Part 2	3	0	9	CSAI 498, Senior Project - Part 1
SWGCG 451	Model Creation and Character Animation	3	2	3	CSAI 201, Data Structures
SWGCG 452	Physics-Based Vision and Rendering	3	2	3	SWGCG 301, Computer Graphics and Multimedia Systems
SWGCG 453	Mobile and Casual Game Development	3	2	3	CSAI 201, Data Structures
SWGCG ###	Gaming and Computer Graphics Electives	3	2	3	
Total		**15**			

Software Development Year 3

Human Computer Interaction (HCI) Concentration (Total Credits: 35 Cr)

Year 3 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 301	Artificial Intelligence	3	2	3	CSAI 201, Data Structures
SCH 273	Cognitive Psychology	2	2	0	
SW 252	Embedded Systems	3	2	3	SW 151, Computer Architecture and Organization
SW 301	Object-Oriented Analysis and Design	3	2	3	CSAI 151, Object-Oriented Programming
SW 302	User Interface Development	3	2	3	SW 251, User Experience and Interaction Design
SWHCI 301	Prototyping Algorithmic Experiences	3	2	3	CSAI 251, Algorithm Design and Analysis
Total		**17**			

Year 3 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 351	Principles and Practices for Secure Computing	3	2	3	CSAI 201, Data Structures
MATH 307	Numerical Methods	3	2	2	MATH 104, Linear Algebra
SWHCI 351	Statistical Graphics and Visualization	3	2	3	MATH 105, Probability and Statistics
SWHCI 352	User-Focused Sensing Systems	3	2	3	SW 251, User Experience and Interaction Design
SCH ###	General Education Electives	2	2	0	
Total		**14**			

Year 3 / Summer					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 399	Internship	4	0	12	
Total		**4**			

Software Development Year 4

Human Computer Interaction (HCI) Concentration (Total Credits: 31 Cr)

Year 4 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 498	Senior Project - Part 1	1	0	3	
SW 401	Parallel and Distributed Computing	3	2	3	CSAI 151, Object-Oriented Programming
SW 402	Software Project Management	3	2	3	CSAI 203, Introduction to Software Engineering
SWHCI 401	Human Information Processing and Artificial Intelligence	3	2	3	CSAI 301, Artificial Intelligence
SWHCI 402	AI Based Products and Services	3	2	3	CSAI 301, Artificial Intelligence
SWHCI ###	Human Computer Interaction Electives	3	2	3	
Total		**16**			

Year 4 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 499	Senior Project - Part 2	3	0	9	CSAI 498, Senior Project - Part 1
SWHCI 451	Cognitive Modeling for HCI	3	2	3	SCH 273, Cognitive Psychology
SWHCI 452	Designing Extended Reality Experience	3	2	3	SW 251, User Experience and Interaction Design
SWHCI 453	Human Factors	3	3	0	
SWHCI ###	Human Computer Interaction Electives	3	2	3	
Total		**15**			

2.7. SOFTWARE DEVELOPMENT (SWD) ELECTIVE COURSES

Application Development (APD) Elective Courses					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
SWGCG 351	Game Design and Development	3	2	3	CSAI 251 Algorithm Design and Analysis
SWGCG 453	Mobile and Casual Game Development	3	2	3	CSAI 201 Data Structures
SWHCI 351	Statistical Graphics and Visualization	3	2	3	MATH 105 Probability and Statistics
SWHCI 452	Designing Extended Reality Experience	3	2	3	SW 251 User Experience and Interaction Design
SWAPD 451	Software Maintenance	3	2	3	CSAI 203 Introduction to Software Engineering
Gaming and Computer Graphics (GCG) Elective Courses					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
SWAPD 352	Web Applications Development	3	2	3	CSAI 202 Introduction to Database Systems
SWAPD 402	Mobile Application Development	3	2	3	CSAI 201 Data Structures
SWHCI 351	Statistical Graphics and Visualization	3	2	3	MATH 105 Probability and Statistics
SWHCI 452	Designing Extended Reality Experience	3	2	3	SW 251 User Experience and Interaction Design
Human Computer Interaction (HCI) Elective Courses					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
SWAPD 352	Web Applications Development	3	2	3	CSAI 202 Introduction to Database Systems
SWAPD 402	Mobile Application Development	3	2	3	CSAI 201 Data Structures
SWGCG 351	Game Design and Development	3	2	3	CSAI 251 Algorithm Design and Analysis
SWGCG 453	Mobile and Casual Game Development	3	2	3	CSAI 201 Data Structures

3. Data Science and Artificial Intelligence Program (DSAI) (132 Credit Hour)

3.1. Program Description

Data Science and Artificial Intelligence (DSAI) is an interdisciplinary program where statistics, big data analytics, artificial intelligence techniques, and related subjects are used to analyze real-world data. It provides the business with the necessary tools to understand the past and the current situation to make an informed decision and predict future scenarios. Today, data science is an essential part of several industries, e.g., telecommunications, manufacturing, insurance, and marketing. It is expected that data science will be part of all industries and for some will be a department by itself. Data science can turn information into actionable insights and give the industry a competitive advantage. The demand for data scientists is extremely high and is expected to stay strong for several years. The data scientist has been among the top jobs with a high salary. The DSAI program is expected to provide new opportunities for the graduates and to better serve the needs of the industry and community.

برنامج علم البيانات والذكاء الاصطناعي

علم البيانات والذكاء الاصطناعي هو برنامج متعدد التخصصات حيث يتم استخدام الإحصائيات وتحليلات البيانات الضخمة وتقنيات الذكاء الاصطناعي والمواضيع ذات الصلة لتحليل بيانات العالم الحقيقي. يزود الشركة بالأدوات اللازمة لفهم الماضي والوضع الحالي لاتخاذ قرار مستنير والتنبؤ بالسيناريوهات المستقبلية. اليوم، يعد علم البيانات جزءًا أساسيًا من العديد من الصناعات؛ على سبيل المثال: الاتصالات والتصنيع والتأمين والتسويق. من المتوقع أن يكون علم البيانات جزءًا من جميع الصناعات وسيكون للبعض قسمًا في حد ذاته. يمكن لعلم البيانات تحويل المعلومات إلى رؤى قابلة للتنفيذ ومنح الصناعة ميزة تنافسية. الطلب على علماء البيانات مرتفع للغاية ومن المتوقع أن يظل قوياً لعدة سنوات. كان عالم البيانات من بين أفضل الوظائف براتب مرتفع. من المتوقع أن يوفر برنامج علوم البيانات فرصًا جديدة للخريجين وأن يخدم بشكل أفضل احتياجات الصناعة والمجتمع.

3.2. Program Educational Objectives (PEOs)

The DSAI program will nurture an academic environment that contributes effectively to empower its graduates towards having the skills, talents, and knowledge to attain the following educational objectives within three to five years of graduation to:

1. Pursue a successful career in data science and artificial intelligence and contribute to the advancement of businesses through data analytics
2. Pursue advanced degrees in local and international graduate programs in data science and artificial intelligence and related fields to emerge as thought leaders, researchers, experts, and educators.
3. Be a lifelong learner in the field of data science and artificial intelligence and remain current in the emerging technologies and methodologies in their career.
4. Assume a leadership role in the field of data science and artificial intelligence.

3.3. Student Outcomes (SOs)

Student Outcomes describe what students are expected to be able to do by the time of graduation. The DSAI program adapts the Student Outcomes of Data Science programs listed by the ABET Computing Accreditation Commission. Graduates of the DSAI program will have the ability to:

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply theory, techniques, and tools throughout the data analysis lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.

3.4. Program Educational Objectives Mapping to Student Outcomes

		Student Outcomes (SOs)					
		SO 1	SO 2	SO 3	SO 4	SO 5	SO 6
Program Educational Objectives (PEOs)	PEO 1	×	×	×	×	×	×
	PEO 2	×	×	×	×		×
	PEO 3	×	×		×		×
	PEO 4			×	×	×	

3.5. Degree Requirements for B.Sc. In Data Science and Artificial Intelligence (DSAI)

A Student who intends to major in DSAI must submit a Program Declaration Form by the end of the first semester. Students should consult their academic advisor on a regular basis to ensure the prerequisites for their university requirements, school requirements, and program requirements are fulfilled.

University Requirements (Cr)	School Requirements (Cr)	Program / Major Requirements (Cr)	Total (Cr)
16	53	63	132

3.5.1. Major Requirements

The program offers a major specialty in Data Science and Artificial Intelligence (DSAI), which requires successful completion of 63 credits:

Major Requirements (63 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 205	Fundamentals of Circuits and Electronics	3	2	3	
CSAI 302	Advanced Database Systems	3	2	3	CSAI 202, Introduction to Database Systems
DSAI 103	Data acquisition in data science (ETL)	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
DSAI 104	Knowledge Representation and Reasoning	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
DSAI 201	Data Mining and Information Retrieval	3	2	3	CSAI 202, Introduction to Database Systems
DSAI 202	Data Governance	2	1	3	DSAI 203, Data Integration and Visualization
DSAI 203	Data Integration and Visualization	2	1	3	DSAI 103, Data acquisition in data science (ETL)
DSAI 305	Interpretability & Explainability in AI	2	1	3	CSAI 301, Artificial Intelligence
DSAI 307	Statistical Inference	3	2	3	MATH 105, Probability and Statistics
DSAI 325	Introduction to Information Theory	3	2	3	MATH 105, Probability and Statistics
DSAI 352	Computer Vision	3	2	3	DSAI 308, Deep Learning
DSAI 353	Natural language processing	3	2	3	DSAI 308, Deep Learning
DSAI 308	Deep Learning	3	2	3	CSAI 253, Machine Learning
DSAI 402	Reinforcement Learning	3	2	3	DSAI 308, Deep Learning
DSAI 403	Nature inspired computation	3	2	3	CSAI 251, Algorithm Design and Analysis
DSAI 406	Machine Learning Engineering for Production (MLOps)	3	2	3	DSAI 308, Deep Learning
DSAI 427	Big Data Analytics	3	2	3	CSAI 253, Machine Learning
DSAI 456	Speech recognition	3	2	3	DSAI 308, Deep Learning
MATH 404	Linear and Nonlinear Programming	3	2	2	MATH 103, Calculus for Computational Sciences
DSAI ###	Data Science and AI Specific Electives	9	-	-	

3.6. Sample Study Plan For B.Sc. in Data Science and Artificial Intelligence (132 Credit Hours)

Data Science and Artificial Intelligence Year 1 (Total Credits: 32 Cr)

Year 1 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 100	Introduction to Computational Sciences and AI	1	1	0	
CSAI 101	Fundamentals of Programming and Computer Science	2	1	3	
CSAI 102	Digital Logic and Computer Architecture	3	2	3	
ENGL 156	Technical English 1	2	2	0	ENGL 004, if the student was placed in ENGL 003 or ENGL 004 after the English placement exam
MATH 103	Calculus for Computational Sciences	3	2	2	
MATH 104	Linear Algebra	3	2	2	
SCH 163	Sustainability, Social and Ethical Issues in Computing	2	2	0	
Total		**16**			

Year 1 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 151	Object-Oriented Programming	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
DSAI 103	Data acquisition in data science (ETL)	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
DSAI 104	Knowledge Representation and Reasoning	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
ENGL 157	Technical English 2	2	2	0	ENGL 156, Technical English 1
MATH 105	Probability and Statistics	3	2	2	MATH 103, Calculus for Computational Sciences
SCH ###	General Education Electives	2	2	0	
Total		**16**			

Data Science and Artificial Intelligence Year 2 (Total Credits: 32 Cr)

Year 2 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 201	Data Structures	3	2	3	CSAI 151, Object-Oriented Programming
CSAI 202	Introduction to Database Systems	3	2	3	CSAI 151, Object-Oriented Programming
DSAI 203	Data Integration and Visualization	2	1	3	DSAI 103, Data acquisition in data science (ETL)
CSAI 205	Fundamentals of Circuits and Electronics	3	2	3	
MATH 308	Discrete Mathematics	3	2	2	
SCH 261	Project Management and Economics	2	2	0	
Total		**16**			

Year 2 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 251	Algorithm Design and Analysis	3	2	3	CSAI 201, Data Structures
CSAI 252	Introduction to Computer Networks	3	2	3	
CSAI 253	Machine Learning	3	2	3	CSAI 201, Data Structures MATH 105, Probability and Statistics
DSAI 201	Data Mining and Information Retrieval	3	2	3	CSAI 202, Introduction to Database Systems
DSAI 202	Data Governance	2	1	3	DSAI 203, Data Integration and Visualization
SCH 264	Entrepreneurship and Small Business Management	2	2	0	
Total		**16**			

Data Science and Artificial Intelligence Year 3 (Total Credits: 37 Cr)

Year 3 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 203	Introduction to Software Engineering	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
CSAI 301	Artificial Intelligence	3	2	3	CSAI 201, Data Structures
DSAI 307	Statistical Inference	3	2	3	MATH 105, Probability and Statistics
DSAI 308	Deep Learning	3	2	3	CSAI 253, Machine Learning
MATH 404	Linear and Nonlinear Programming	3	2	2	MATH 103, Calculus for Computational Sciences
SCH ###	General Education Electives	2	2	0	
Total		**17**			

Year 3 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 351	Principles and Practices for Secure Computing	3	2	3	CSAI 201, Data Structures
DSAI 305	Interpretability & Explainability in AI	2	1	3	CSAI 301, Artificial Intelligence
DSAI 325	Introduction to Information Theory	3	2	3	MATH 105, Probability and Statistics
DSAI 352	Computer Vision	3	2	3	DSAI 308, Deep Learning
DSAI 353	Natural language processing	3	2	3	DSAI 308, Deep Learning
SCH ###	General Education Electives	2	2	0	
Total		**16**			

Year 3 / Summer					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 399	Internship	4	0	12	
Total		**4**			

Data Science and Artificial Intelligence Year 4 (Total Credits: 31 Cr)

Year 4 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 498	Senior Project - Part 1	1	0	3	
DSAI ###	Data Science and AI Specific Electives	3	2	3	
CSAI 302	Advanced Database Systems	3	2	3	CSAI 202, Introduction to Database Systems
DSAI 402	Reinforcement Learning	3	2	3	DSAI 308, Deep Learning
DSAI 403	Nature inspired computation	3	2	3	CSAI 251, Algorithm Design and Analysis
DSAI 456	Speech recognition	3	2	3	DSAI 308, Deep Learning
Total		**16**			

Year 4 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 499	Senior Project - Part 2	3	0	9	CSAI 498, Senior Project - Part 1
DSAI ###	Data Science and AI Specific Electives	3	2	3	
DSAI ###	Data Science and AI Specific Electives	3	2	3	
DSAI 406	Machine Learning Engineering for Production (MLOps)	3	2	3	DSAI 308, Deep Learning
DSAI 427	Big Data Analytics	3	2	3	CSAI 253, Machine Learning
Total		**15**			

3.7. Data Science and Artificial Intelligence (DSAI) Elective Courses

Elective Courses					
Course Code	Course Title	Cr	L	P	Prerequisite
DSAI 413	Multimedia Analytics	3	2	3	DSAI 308 Deep Learning
DSAI 414	Social Analytics	3	2	3	DSAI 308 Deep Learning
DSAI 415	Cloud software development	3	2	3	DSAI 308 Deep Learning
DSAI 416	GIS and spatial Analytics	3	2	3	DSAI 308 Deep Learning
DSAI 417	Chatbots	3	2	3	DSAI 456 Speech recognition
DSAI 418	Conversational Agents	3	2	3	DSAI 456 Speech recognition
DSAI 433	Game Theory	3	2	3	CSAI 301 Artificial Intelligence
DSAI 431	Fuzzy logic and fuzzy system	3	2	3	MATH 308 Discrete Mathematics
DSAI 490	Selected Topics in Data science and AI	3	2	3	

4. INFORMATION TECHNOLOGY PROGRAM (IT) (132 CREDIT HOUR)

4.1. PROGRAM DESCRIPTION

Information Technology (IT) program instills its students with the concepts, skills, and applications necessary to design and operate information and communication infrastructure platforms that optimize human performance and produce positive societal change. The IT program prepares students for all potential career positions in the IT field. These include: Systems Analysis and Design, Data Center and Enterprise Information Systems architecture, Computer Networking and Cloud Computing.

برنامج تكنولوجيا المعلومات

يغرس برنامج تكنولوجيا المعلومات (IT) في طلابه المفاهيم والمهارات والتطبيقات اللازمة لتصميم وتشغيل منصات البنية التحتية للمعلومات التي تعمل على تحسين الأداء البشري وتنتج تغييرًا مجتمعيًا إيجابيًا. يقوم برنامج تكنولوجيا المعلومات بإعداد الطلاب لجميع المناصب الوظيفية المحتملة في مجال نظم المعلومات. وتشمل هذه: تحليل وتصميم الأنظمة، مركز البيانات وهندسة أنظمة معلومات المؤسسة، شبكات الحاسوب والحوسبة السحابية.

4.2. PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

Within three to five years of graduation, the IT Program graduates should be able to:

1. Apply best practices in the development and use of information technology to solve real-world problems, enable organizations to meet the opportunities and challenges of a digital economy, and improve the lives of people, communities, and societies
2. Provide leadership in managing information technology in complex and changing organizational environments.
3. Take professional responsibility for safeguarding systems and users.
4. Harness data in an ethical manner to promote the greater good and help organizations achieve their objectives.
5. Actively contribute to the profession through service, life-long learning, and support of diversity and inclusion in their organizations.

4.3. Student Outcomes (SOs)

Student Outcomes describe what students are expected to be able to do by the time of graduation. The IT program adapts the Student Outcomes of Information Technology programs listed by the ABET Computing Accreditation Commission. Graduates of the IT program will have the ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Use systemic approaches to select, develop, apply, integrate, and administer secure computing technologies to accomplish user goals.

4.4. Program Educational Objectives Mapping to Student Outcomes

		Student Outcomes (SOs)					
		SO 1	SO 2	SO 3	SO 4	SO 5	SO 6
Program Educational Objectives (PEOs)	PEO 1	×	×	×	×	×	×
	PEO 2		×	×	×	×	
	PEO 3		×		×		×
	PEO 4	×	×		×		×
	PEO 5			×	×	×	

4.5. DEGREE REQUIREMENTS FOR B.SC. IN INFORMATION TECHNOLOGY (IT)

A Student who intends to major in IT must submit a Program Declaration Form by the end of the first semester. Students should consult their academic advisor on a regular basis to ensure the prerequisites for their university requirements, school requirements, and program requirements (major requirements and concentration requirements) are fulfilled.

University Requirements (Cr)	School Requirements (Cr)	Program Requirements (Cr)		Total (Cr)
		Major Requirements (Cr)	Concentration Requirements (Cr)	
16	53	34	29	132

4.5.1. MAJOR REQUIREMENTS

The program offers a major specialty in Information Technology (IT), which requires successful completion of 34 credits:

Major Requirements (34 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 204	Operating Systems	3	2	3	CSAI 201, Data Structures
CSAI 205	Fundamentals of Circuits and Electronics	3	2	3	
IT 101	Shell and Script Programming with UNIX	2	1	3	CSAI 101, Fundamentals of Programming and Computer Science
IT 102	Ethical Hacking and Defense	2	1	3	CSAI 101, Fundamentals of Programming and Computer Science
IT 103	Fundamentals of Information and Communication Systems	2	1	3	
IT 205	Enterprise System Architecture	2	1	3	
IT 206	Fundamentals of IT Governance and Risk Management	2	1	3	
IT 220	Networks installation and Maintenance	2	1	3	CSAI 252, Introduction to Computer Networks
IT 222	Fundamentals of Multimedia Creation, Storage and Transfer	2	1	3	CSAI 252, Introduction to Computer Networks
IT 308	Cloud Computing Architecture	2	2	1	CSAI 201, Data Structures
IT 309	IT User-Experience Design	3	2	3	
IT 310	Foundations of Cybersecurity and Security Management	3	2	3	CSAI 252, Introduction to Computer Networks
IT 402	Fundamentals of Cybersecurity and Encryption	3	2	3	MATH 308, Discrete Mathematics
IT 411	Enterprise Resources Planning	3	2	3	

4.5.2. Concentration Requirements

The IT program offers the following two concentrations, which require successful completion of at least 29 credits in one of the following:

- Networks, Security and Governance (ITNS)
- Infrastructure and Cloud Computing (ITCC)

4.5.2.1. Networks, Security and Governance (ITNS) Concentration Requirements

Networks, Security and Governance (ITNS) Concentration Requirements (29 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
ITNS 301	Network Administration	2	1	3	CSAI 252, Introduction to Computer Networks
ITNS 302	IoT Systems and Application Development	3	2	3	CSAI 252, Introduction to Computer Networks
ITNS 403	Storage Area Networks	3	2	3	CSAI 252, Introduction to Computer Networks
ITNS 404	Network Performance Monitoring and Troubleshooting	3	2	3	CSAI 252, Introduction to Computer Networks
ITNS 406	Network Resilience and Hardening	3	2	3	CSAI 252, Introduction to Computer Networks
ITNS 407	IT Audit and Risk Management	3	2	3	
ITNS 408	Network Security	3	2	3	IT 310, Foundations of Cybersecurity and Security Management
ITNS ###	Networks, Security and Governance Electives	9	-	-	

4.5.2.2. INFRASTRUCTURE AND CLOUD COMPUTING (ITCC) CONCENTRATION REQUIREMENTS

Infrastructure and Cloud Computing (ITCC) Concentration Requirements (29 Cr)					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
ITCC 301	Linux System Administration	2	1	3	
ITCC 302	Cloud Infrastructure Administration	3	2	3	IT 308, Cloud Computing Architecture
ITCC 403	Security Testing for Cloud Applications	3	2	3	IT 310, Foundations of Cybersecurity and Security Management
ITCC 404	Windows Enterprise Administration	3	2	3	
ITCC 405	Virtualization and Cloud Security	3	2	3	IT 308, Cloud Computing Architecture
ITCC 407	Cloud Services Management	3	2	3	IT 308, Cloud Computing Architecture
ITCC 408	Application Development and Scripting in the Cloud	3	2	3	IT 308, Cloud Computing Architecture
ITCC ###	Infrastructure and Cloud Computing Electives	9	-	-	

4.6. Sample Study Plan For B.Sc. in Information Technology (132 Credit Hours)

Information Technology Year 1 (Total Credits: 32 Cr)

Year 1 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 100	Introduction to Computational Sciences and AI	1	1	0	
CSAI 101	Fundamentals of Programming and Computer Science	2	1	3	
CSAI 102	Digital Logic and Computer Architecture	3	2	3	
ENGL 156	Technical English 1	2	2	0	ENGL 004, if the student was placed in ENGL 003 or ENGL 004 after the English placement exam
MATH 103	Calculus for Computational Sciences	3	2	2	
MATH 104	Linear Algebra	3	2	2	
SCH 163	Sustainability, Social and Ethical Issues in Computing	2	2	0	
Total		**16**			

Year 1 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 151	Object-Oriented Programming	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
ENGL 157	Technical English 2	2	2	0	ENGL 156, Technical English 1
IT 101	Shell and Script Programming with UNIX	2	1	3	CSAI 101, Fundamentals of Programming and Computer Science
IT 102	Ethical Hacking and Defense	2	1	3	CSAI 101, Fundamentals of Programming and Computer Science
IT 103	Fundamentals of Information and Communication Systems	2	1	3	
MATH 105	Probability and Statistics	3	2	2	MATH 103, Calculus for Computational Sciences
SCH ###	General Education Electives	2	2	0	
Total		**16**			

Information Technology Year 2 (Total Credits: 33 Cr)

Year 2 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 201	Data Structures	3	2	3	CSAI 151, Object-Oriented Programming
CSAI 202	Introduction to Database Systems	3	2	3	CSAI 151, Object-Oriented Programming
CSAI 205	Fundamentals of Circuits and Electronics	3	2	3	
CSAI 252	Introduction to Computer Networks	3	2	3	
IT 205	Enterprise System Architecture	2	1	3	
SCH 261	Project Management and Economics	2	2	0	
Total		**17**			

Year 2 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 204	Operating Systems	3	2	3	CSAI 201, Data Structures
CSAI 251	Algorithm Design and Analysis	3	2	3	CSAI 201, Data Structures
CSAI 253	Machine Learning	3	2	3	CSAI 201 Data Structures MATH 105 Probability and Statistics
IT 206	Fundamentals of IT Governance and Risk Management	2	1	3	
IT 220	Networks installation and Maintenance	2	1	3	CSAI 252, Introduction to Computer Networks
IT 222	Fundamentals of Multimedia Creation, Storage and Transfer	2	1	3	CSAI 252, Introduction to Computer Networks
SCH 264	Entrepreneurship and Small Business Management	2	2	0	
Total		**16**			

Information Technology Year 3

Networks, Security and Governance (ITNS) Concentration (Total Credits: 36 Cr)

Year 3 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 203	Introduction to Software Engineering	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
CSAI 301	Artificial Intelligence	3	2	3	CSAI 201, Data Structures
IT 308	Cloud Computing Architecture	2	2	1	CSAI 201, Data Structures
ITNS 301	Network Administration	2	1	3	CSAI 252, Introduction to Computer Networks
MATH 308	Discrete Mathematics	3	2	2	
SCH ###	General Education Electives	2	2	0	
Total		**15**			

Year 3 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
ITNS 302	IoT Systems and Application Development	3	2	3	CSAI 252, Introduction to Computer Networks
IT 310	Foundations of Cybersecurity and Security Management	3	2	3	CSAI 252, Introduction to Computer Networks
IT 309	IT User-Experience Design	3	2	3	
CSAI 351	Principles and Practices for Secure Computing	3	2	3	CSAI 201, Data Structures
ITNS ###	Networks, Security and Governance Electives	3	2	3	
SCH ###	General Education Electives	2	2	0	
Total		**17**			

Year 3 / Summer					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 399	Internship	4	0	12	
Total		**4**			

Information Technology Year 4

Networks, Security and Governance (ITNS) Concentration (Total Credits: 31 Cr)

Year 4 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 498	Senior Project - Part 1	1	0	3	
IT 411	Enterprise Resources Planning	3	2	3	
ITNS 403	Storage Area Networks	3	2	3	CSAI 252, Introduction to Computer Networks
ITNS 404	Network Performance Monitoring and Troubleshooting	3	2	3	CSAI 252, Introduction to Computer Networks
IT 402	Fundamentals of Cybersecurity and Encryption	3	2	3	MATH 308, Discrete Mathematics
ITNS 406	Network Resilience and Hardening	3	2	3	CSAI 252, Introduction to Computer Networks
Total		**16**			

Year 4 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 499	Senior Project - Part 2	3	0	9	CSAI 498, Senior Project - Part 1
ITNS 407	IT Audit and Risk Management	3	2	3	
ITNS 408	Network Security	3	2	3	IT 310, Foundations of Cybersecurity and Security Management
ITNS ###	Networks, Security and Governance Electives	6	-	-	
Total		**15**			

Information Technology Year 3

Infrastructure and Cloud Computing (ITCC) Concentration (Total Credits: 36 Cr)

Year 3 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 203	Introduction to Software Engineering	3	2	3	CSAI 101, Fundamentals of Programming and Computer Science
CSAI 301	Artificial Intelligence	3	2	3	CSAI 201, Data Structures
IT 308	Cloud Computing Architecture	2	2	1	CSAI 201, Data Structures
ITCC 301	Linux System Administration	2	1	3	
MATH 308	Discrete Mathematics	3	2	2	
SCH ###	General Education Electives	2	2	0	
Total		**15**			

Year 3 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 351	Principles and Practices for Secure Computing	3	2	3	CSAI 201, Data Structures
IT 309	IT User-Experience Design	3	2	3	
IT 310	Foundations of Cybersecurity and Security Management	3	2	3	CSAI 252, Introduction to Computer Networks
ITCC 302	Cloud Infrastructure Administration	3	2	3	IT 308, Cloud Computing Architecture
ITCC ###	Infrastructure and Cloud Computing Electives	3	2	3	
SCH ###	General Education Electives	2	2	0	
Total		**17**			

Year 3 / Summer					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 399	Internship	4	0	12	
Total		**4**			

Information Technology Year 4

Infrastructure and Cloud Computing (ITCC) Concentration (Total Credits: 31 Cr)

Year 4 / Semester 1					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 498	Senior Project - Part 1	1	0	3	
IT 411	Enterprise Resources Planning	3	2	3	
ITCC 403	Security Testing for Cloud Applications	3	2	3	IT 310, Foundations of Cybersecurity and Security Management
ITCC 404	Windows Enterprise Administration	3	2	3	
ITCC 405	Virtualization and Cloud Security	3	2	3	IT 308, Cloud Computing Architecture
IT 402	Fundamentals of Cybersecurity and Encryption	3	2	3	MATH 308, Discrete Mathematics
Total		**16**			

Year 4 / Semester 2					
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**
CSAI 499	Senior Project - Part 2	3	0	9	CSAI 498, Senior Project - Part 1
ITCC 407	Cloud Services Management	3	2	3	IT 308, Cloud Computing Architecture
ITCC 408	Application Development and Scripting in the Cloud	3	2	3	IT 308, Cloud Computing Architecture
ITCC ###	Infrastructure and Cloud Computing Electives	6	-	-	
Total		**15**			

4.7. Information Technology Program (IT) Elective Courses

Networks, Security and Governance (ITNS) Elective Courses						
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**	
ITNS 410	Penetration Testing	3	2	3		
ITNS 411	Network Programming	3	2	3		
ITNS 412	IT Compliance and Quality Management	3	2	3		
ITNS 413	Emerging Networking Technologies	3	2	3		
ITNS 414	Cyber Forensics	3	2	3	IT 310	Foundations of Cybersecurity and Securit Management
ITNS 415	Wireless Security	3	2	3	IT 310	Foundations of Cybersecurity and Security Management
IT 401	Data Centers	3	1	3	CSAI 252	Introduction to Computer Networks
Infrastructure and Cloud Computing (ITCC) Elective Courses						
Course Code	**Course Title**	**Cr**	**L**	**P**	**Prerequisite**	
DSAI 473	Data warehousing	3	2	3		
ITCC 410	Software Development Operations in Cloud Environments	3	2	3	CSAI 203 IT 308	Introduction to Software Engineering Cloud Computing Architecture
ITCC 411	SaaS, IaaS and PaaS	3	2	3		
ITCC 412	Advanced Cloud Security	3	2	3	IT 308 IT 310	Cloud Computing Architecture Foundations of Cybersecurity and Security Management
ITCC 413	IT Security and Policy Planning	3	2	3	IT 310	Foundations of Cybersecurity and Security Management
ITCC 414	IS Strategy Management and Acquisition	3	2	3		
IT 401	Data Centers	3	1	3	CSAI 252	Introduction to Computer Networks
ITCC 406	Migrating Data and Applications to the Cloud	3	2	3	IT 308	Cloud Computing Architecture