Computer Science and Engineering (CSE)

Adama Science and Technology University

The mission of the Computer Science and Engineering CSE program is to provide students with a broad and flexible education in computer science and engineering, to prepare its graduates for rapidly changing technological fields, and give them a sound basis for professional practice, advanced education, active citizenship, and lifelong learning. The students are prepared to expand this knowledge through research into new technologies, design methods, and analysis techniques that link the knowledge with multidisciplinary fields and advance the state of the art. With a knowledge of contemporary technological issues and their impact globally, economically, and environmentally, computer scientists and engineers are at the forefront of advances that continually transform society.

CSE undergraduate program tries to make balance among two spinoffs; Computer Science, and Computer Engineering. This scheme exactly fits and aligned with the latest ACM curriculum directions, which considers best and tested experience internationally. Course distribution in each semester is well planned and structured to harness knowledge from the two spinoffs into computer science and engineering knowledge domain. Elective courses give opportunity for program student to make more stable basement in one of the spinoffs for further study, without compromising computer science and engineering knowledge domain.

There are eight course clusters, supposedly specialty steams in the PG curriculum.

- *Algorithm and computation*
- *Artificial Intelligence*
- *Data Science*
- *Software Engineering*
- *Systems and Networks*
- *Computer Architecture*
- *Computer Vision, Graphics and Robotics*
- *Network and Information Systems Security*

Duration of study

Normal modality

Regular: a 5-year program

Continuing: 5-year program Dual major/manor: 6 years.

Course category: General/ university required

Course Name: Communicative English Skills (EnLa 1001) Credit Hour: 3

Prerequisite: None

Course description (Synopsis):

Communicative English Skills is a course where students learn what they need to know for a career in science context. The course gives students the language, information, and skills they need to study science context. It also provides students the language appropriate for studying science context and real work situations as it comprises unique sections such as: 'it's my job' wherein real people talk about their work in science context , 'listening' whereby students are exposed to situations related to science context , technical explanations, and interviews, 'reading' whereby students meet a variety science context based texts, and the 'writing section' which is designed to let students compose short reports on different activities.

Course category: General/ university required

Course Name: Basic Writing Skills (EnLa-1002) Credit Hour: 3

Prerequisite: Communicative English Skills (EnLa 1001)

Course description (Synopsis):

Basic Writing Skills course aims at developing students' basic writing skills in science context. The course gives students the language writing skills they need to study science. It contains sentence level writing: sentence structure, sentence types sentence combinations, common sentence errors (fragment, run on, comma splices, misplaced modifier, dangling modifier, faulty parallelism, faulty reference of

pronoun, faulty agreement and shifts); paragraph level writing: the essence of a paragraph, components of a paragraph (topic sentence, supporting sentences, concluding sentence), characteristics of effective paragraph (unity, coherence and completeness) and the steps in writing a paragraph and types of a paragraph; essay level writing: structure of an essay, thesis statement and supporting paragraphs, types of essays and techniques of essay development.

Course category: General/ university required

Course Name: Introduction to Civics and Ethics (LART 1001) Credit Hour: 3

Prerequisite: None

Course description (Synopsis):

It is now become clear that Ethics and Citizenship Studies has become not only a field of specialization in itself but has also been attracting leaders who envision instilling democracy on a nun shakable ground within their own society. Autoscore, Ethics is a system of moral principles which involves systematizing, defending and recommending concepts of rights and wrong behavior. It affects how people make decisions and lead their lives. Citizenship, on its part, is a legal status of individuals within a given state. It embodies the legal and political relationship between citizens and state, underlining the reciprocal relationship between the two. This course is designed with the aim of equipping learners with necessary ethical qualities and civic competences while dealing with issues that affect their society at all levels and human in general. The course starts with unfolding the notions, principles and theories of ethics which can shape human attitude, action and behavior in making moral judgments. Next, the course introduces learners to the nature, mutual interactions and historical evolutions of society, state, government and citizenship. It also elucidates issues pertaining to political governance such as constitution, democracy, and human rights in some details. To enable learners, grasp basic knowledge of political, economic and social dynamics of international system in today's globalized world, the course also introduces international relations and foreign policy and other major contemporary global issues. In light of this, the course does not present mere theoretical knowledge, but also practical knowledge of accentuating art of governing and protecting national interest in today's complex world.

Course category: General/ university required

Course Name: Logic and Critical thinking (LART 1002) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

The main goal of the course is to improve critical and logical reasoning skills. Students will see how our ordinary intuitions on good or bad reasoning can be articulated explicitly in formal

systems, and gain a new ability to evaluate arguments and reasoning they encounter every day with rigorous logical concepts and tools. As to the subject matter, it introduces systematic methods of

reasoning, such as argument, deduction, induction, syllogistic, and propositional logic.

Course category: General/ university required

Course Name: Physical Fitness and Conditioning I(SpSc1011) Credit Hour: 0 cr.hr
Prerequisite: None

Course description (Synopsis):

This course will provide the students with basic concepts of the five components of health related physical fitness (cardiovascular, muscular strength and endurance, flexibility, and body composition), hypokinetic disease and general principles of training. It is mainly practical oriented. As a result, the students will be exposed to various exercise modalities, sport activities, minor and major games, and various training techniques as a means to enhance health related physical fitness components. In addition, they will develop the skills to assess each component of fitness and will practice designing cardiovascular, muscular strength and endurance, and flexibility programs based on the fitness assessment. The course serves as an introduction to the role of exercise in health promotion, fitness, performance including the acute and chronic responses of the body to exercise.

Course category: General/ university required

Course Name: Physical Fitness and Conditioning II (SpSc 1022) Credit Hour: 0 cr.hr
Prerequisite: SpSc 1011 Course description (Synopsis):

This course is designed to acquaint freshman engineering and applied natural science students with the nature and scope of different ball games.
It emphasizes the value of establishing lifelong fitness using ball games as a means and focuses on the fundamental of volley ball, hand ball, basketball and football as a life time leisure activity also focuses on the development of personalized approach to healthy active living through participation in a verity of ball games that have the potential to engage students' interest throughout their lives. Again the courses enable the participants enjoying practice and acquire proper technique and strategies associated with the ball games mentioned above and learn rules governing the game.

Course category: Basic

Course Name: Applied Mathematics I (Math1101) Credit Hour: 4
Prerequisite: None

Course description (Synopsis):

This course covers vectors, matrices & determinants, limit and continuity, derivatives & their applications, integrals, integration techniques and their applications.
Course category: Basic

Course Name: Applied Mathematics II (Math 1102) Credit Hour: 4
Prerequisite: Applied Mathematics I (Math 1101)

Course description (Synopsis):

This course covers sequences, series, power series, Fourier series differential and integrals calculus of functions of several variables and their applications. problems. This course covers integer programming, deterministic.

Course category: Basic

Course Name: Applied Mathematics –III (Math2302) Credit Hour: 4
Prerequisite: Applied Mathematics-II Course description (Synopsis):

This course covers the topics in First order ordinary Differential Equation, second order ordinary Differential Equation, Laplace transforms and its application, scalar and vector fields and complex analytic function.

Course category: Basic

Course Name: General Chemistry (Chem1101) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

General chemistry is the science of the properties of atoms and the laws governing their combination, composition, and structure of substances, the transformations they undergo, and the energy that is released or absorbed during chemical or physical process. The topics covered in this course includes: Introduction to the study of modern chemistry, acids and bases, the periodic table, chemical bond and molecular structure, rates of physical and chemical processes, materials, kinetic molecular description of the state of matter and equilibrium in chemical reaction.

Course category: Basic

Course Name: General Physics (Phys1101) Credit Hour: 4
Prerequisite: Knowledge in Higher Secondary Physics Course description (Synopsis):

At the end of this course students are expected to be acquainted with basic concepts in different branches of physics, identify the connection between them and explain the common phenomena. They will also develop skills of solving problems.

Course category: Basic

Course Name: Introduction to Computing (CSEg 1101) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

In this course the basic techniques of computational problem solving will be covered by using computational thinking while writing small and medium sized programs, mapping problems into computational frameworks emphasizing on scientific problems, understanding problems and formulation of problems based on the elective programming language (using python). The course includes the concepts and techniques of data structure, input/output, flow control and incidental program, and by using a systematic division of problem solution and concept of module, to solve problems in numerical value field and non-numerical value field with program experiment.

Course category: Basic

Course Name: Fundamentals of Programming (CSEg1104) Credit Hour: 3
Prerequisite: Introduction to Computing Course description (Synopsis):

The course is designed to introduce structured programming in C++ by providing an overview of programming concepts, on creating and working computer programs in C++. It will address fundamental concepts of program analysis, design, coding, testing and development. It includes

introduction to computer programming; programming paradigms; algorithms and problem- solving; introduction to data structures and Programming constructs. The course is designed on how to solve business and scientific problems through the technique of structured programming. It will prepare students for focused studies in any programming language.

Course category: General/ university required Course Name: Introduction to Economics (SOSC2002) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

This course provides a general introduction to economics combining elements of micro and macro fundamentals. The main objective of this course is to introduce and acquaint students with the preliminary principles (theories) and knowledge of economics and the application of economic theories (principles) in the actual world; the daily activities of the households, firm business or any other form of enterprises at micro levels. Students will also able to contextualize the key macroeconomic variables and policy instruments.
Specifically, the course introduces students with theory of consumer behaviours, production, and cost of production. In these theories how decisions are made by different economic agents will be discussed. Furthermore, the course covers different characteristics of perfect and imperfect market structure. Lastly the course tries to introduce basic macroeconomic concepts such as national income accounting,

unemployment, inflation, fiscal and monetary policy instruments.

Course category: Basic mandatory

Course Name: Fundamentals of electrical engineering I (EPCE 2101) Credit Hour: 4
Prerequisite: Maths1102 and General physics Course description (Synopsis):

The course will deal with basic concepts of electrical engineering, basic circuit law and circuit analysis methods, fundamental circuit theorems, transient circuit analysis, steady state circuit and power analysis, introduction to polyphase circuits, electromagnetisms and frequency analysis.

Course category: Basic

Course Name: Data Structures and Algorithms (CSEg 2101) Credit Hour: 3
Prerequisite: CSEg 1104 Course description (Synopsis):

The course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems. Topics include basic data structures such as arrays, stacks, queues, and lists and advanced data structures such as trees and graphs. The algorithms used to manipulate these structures, and their application to solving practical engineering problems.

Course category: Major mandatory

Course Name: Electronics circuits-I (ECEg-2201) Credit Hour: 4

Prerequisite: Fundamentals of Electrical Engineering-EPCE2101 Course description (Synopsis):

Introducing semiconductor devices, basic structure, principles and operations. Analysis of BJT and FET basic operation with i-v characteristics and small signal analysis of BJT and FET. Application of semiconductor devices, BJT, FET with real time examples. Frequency Response of BJT and FET and various coupling methods. Basic construction of Amplifiers with various biasing methods and its application.

Course category: Major mandatory

Course Name: Electronics circuits-II (ECEg2202) Credit Hour: 4
Prerequisite: Electronics circuits-I Course description (Synopsis):

Introducing feedback amplifier and the analysis of negative feedback amplifiers with various topologies and applications, More analysis of feedback amplifier with differential mode response and some other parameters. Introducing integrated circuit with various effective parameters and illustrate with real time applications. Introducing oscillators and different types of oscillator circuit with frequency determination and describe about multivibrator circuits with applications. Power semiconductor devices like SCR,

TRIAC, DIAC devices with operation and characteristics. Explain in detail about single and double tuned amplifiers, ideal band pass amplifiers and power amplifiers.

Course category: General/ university required
Course Name: Introduction to Economics (SOSC2002) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

This course provides a general introduction to economics combining elements of micro and macro fundamentals. The main objective of this course is to introduce and acquaint students with the preliminary principles (theories) and knowledge of economics and the application of economic theories (principles) in the actual world; the daily activities of the households, firm business or any other form of enterprises at micro levels. Students will also able to contextualize the key macroeconomic variables and policy instruments.
Specifically, the course introduces students with theory of consumer behaviours, production, and cost of production. In these theories how decisions are made by different economic agents will be discussed. Furthermore, the course covers different characteristics of perfect and imperfect market structure. Lastly the course tries to introduce basic macroeconomic concepts such as national income accounting, unemployment, inflation, fiscal and monetary policy instruments.

Course category: Major mandatory

Course Name: Digital Logic Design (ECEg3201) Credit Hour: 4
Prerequisite: ECEg2201 Electronics Circuits I Course description (Synopsis):

In this course, students will study various digital logic families such as TTL, 119 ECL, and CMOS, the logic gates under these families, and the electronic circuit techniques used to implement them. Subsequently, they will learn Boolean algebra, logic expressions, number systems and combinational logic design, including logic minimization and hazards. In addition, with the understanding of combinational logic design, students will learn how to design sequential systems, including analysis of the behavior of synchronization elements and system timing design. Finally, in this course, students will have hands-on design experiences by carrying out experiments with component-level devices and designing digital systems.

Course category: Major elective

Course Name: Microcomputer & Interfacing (CSEg3314) Credit Hour: 4

Prerequisite: CSEg3203 - Computer Architecture & Organization Course description (Synopsis):

This course is designed to impart in-depth knowledge in the design, programming and organization of

microcomputers and interfacing circuits. The two most common computer architectures, the Reduced Instruction Set Computing (RISC) and the Complex Instruction Set Computing (CISC) will also be explained. The course involves the study of interfacing peripheral chips (Programming and Signals). It completely covers the popular Intel 8086, which would be a steppingstone for learning the X86 families of microprocessors.

Course category: Major mandatory

Course Name: Database Systems (CSEg2208) Credit Hour: 4
Prerequisite: None

Course description (Synopsis):

A database system is a collection of data with its managements system. So, DB systems discusses an issues related with a data such as, approaches of compiling data/information, manipulating data, keeping data safely, accessing data, concurrent process and etc.
Course category: Major mandatory

Course Name: Introduction To Artificial Intelligence (CSEg3206) Credit Hour: 3
Prerequisite: CSEg 2206 Discrete Mathematics for Computer Science

Course description (Synopsis):

This course is an introductory course on Artificial Intelligence (AI) that presents an overview of AI principles and approaches. It will introduce the basic principles in artificial intelligence research, simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. Areas of application such as knowledge representation, programing in logic, inference and reasoning mechanism, natural language processing, expert systems, vision and robotics will be explored. The PROLOG and others AI programming language will also be introduced.

Course category: Major mandatory

Course Name: Compiler Design (CSEg 4310) Credit Hour: 3
Prerequisite: CSEg 4201 Course description (Synopsis):

This course describes the basic techniques and tool required to construct a compiler. The two parts of compilation: analysis and synthesis will be introduced and discussed. In the analysis part, will learn how to break the source program in to constitute pieces and create an intermediate representation of the source program. In the synthesis part, we will construct a target program from the intermediate representation. Moreover, widely used construction tools (Lex and Yacc) will be explained. Examine the generic issue in the design of code generator.

Course category: Major mandatory

Course Name: Computer Architecture & Organization (CSEg3203) Credit Hour: 3
Prerequisite: ECEg3204 (Digital Logic Design) Course description (Synopsis):

This course aims to provide a strong foundation for students to understand modern computer system architecture and to apply these insights and principles to future computer designs. The course is structured around the three primary building blocks of general-purpose computing systems: processors, memories, and networks. The first half of the course focuses on the fundamentals of each building block. Topics include instruction set architecture; single-cycle, FSM, and pipelined processor microarchitecture; direct mapped vs. set-associative cache memories; memory protection, translation, and virtualization; FSM and pipelined cache microarchitecture; cache optimizations; network topology and routing; buffer, channel, and router microarchitecture; and integrating processors, memories, and networks. The second half of the course delves into more advanced techniques and will enable students to understand how these three building blocks can be integrated to build a modern shared-memory multicore system. Topics include superscalar execution, out-of-order execution, register renaming, memory disambiguation, branch prediction, and speculative execution; multithreaded, VLIW, and SIMD processors; non- blocking cache memories; and memory synchronization, consistency, and coherence. Students will learn how to evaluate design decisions in the context of past, current, and future application requirements and technology constraints.

Course category: Major mandatory

Course Name: Computer Systems Security (CSEg4307) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

This course covers fundamental issues and first principles of security and information assurance. The course will look at the security policies, models and mechanisms related to confidentiality, integrity, authentication, identification, and availability issues related to information and information systems. Other topics covered include basics of cryptography (e.g., digital signatures) and network security (e.g., intrusion detection and prevention), risk management, security assurance and secure design principles, as well as e-commerce security. Issues such as organizational security policy, legal and ethical issues in security, standards and methodologies for security evaluation and certification will also be covered.

Course category: Major mandatory

Course Name: Data Communication and Computer Networks (CSEg3222) Credit Hour: 4
Prerequisite: None

Course description (Synopsis):

This course deals with basic concepts, principles and applications of data communication system. ISO OSI reference model for open system interconnection is used as the basis to discuss the functions and

protocols of layered network structures. The course also introduces the evolution trends of networking technologies, various types of networks from LAN to WAN and

internetworking architectures. Transmission Control Protocol / Internet Protocol (TCP/IP) will be discussed in detail.

Course category: Major mandatory

Course Name: Design and Analysis of Algorithms (CSEg3211) Credit Hour: 3
Prerequisite: Data Structures and Algorithms Course description (Synopsis):

This course provides an introduction to mathematical modelling of computational problems. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems.

Course category: Major mandatory

Course Name: Probability & Random Processes (ECEg3103) Credit Hour: 3
Prerequisite: Maths1102-Applied Mathematics II Course description (Synopsis):

Introducing some application area of probability and random processes and revising Set theory, Function, Factorial, Permutation and Combination. Basic concept of Probability Theory: Probability models and axioms, Conditional probability, total probability, Independence and Bayes' the0rem. Random Variables, Probability Distributions and Densities function, Discrete and Continuous random variables, Gaussian Random Variable and Q-Function, Conditional Distribution and Density Function. Expectations, variances, moments, Expectation of a Function of Random Variable, Characteristic Function, Central Limit Theorem and Transformation of Random Variables. Two and more random variables and their joint distributions and densities. Random processes, Auto and cross correlation Functions, covariance, Stationary Random

Processes, Ergodic Random Processes and Power Spectral Density Function. Introduction to parameter estimation and prediction.

Course category: Major mandatory (dual major) Course Name: Distributed Systems (CSEg5307) Credit Hour: 3
Prerequisite: CSE3222 Data Communication and Computer Networks CSEg4201 Course description (Synopsis):

This course introduces students to the principles, design, and implementation of distributed systems. The Lectures focus primarily on the principles and design of distributed systems, and cover communication, Processes, naming, synchronization, Consistency and Replication, and fault tolerance. A course project

exposes students to the implementation aspects of distributed systems and serves to solidify students' understanding of the course material.

Course category: Major mandatory

Course Name: Formal Language & Automata Theory (CSEg4201) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

The course introduces some fundamental concepts in automata theory and formal languages including grammar, finite automaton, regular expression, formal language, pushdown automaton, and Turing machine. Not only do they form basic models of computation, they are also the foundation of many branches of computer science, e.g. compilers, software engineering, concurrent systems, etc. The properties of these models will be studied and various rigorous techniques for analysing and comparing them will be discussed, by using both formalism and examples.
Course category: Major Mandatory

Course Name: Object Oriented Programming (CSEg2202) Credit Hour: 3
Prerequisite: CSEg1102 (Fundamental of Programming)

Course description (Synopsis):

In this course, the students will learn the concepts of object oriented programming and solving problems in object oriented programming language. The course begins with comparison of structural programming paradigm with object oriented paradigm, a brief review of control structures and data types with emphasis on structured data types and array processing. It then moves on to introduce the object-oriented programming paradigm, focusing on the definition and use of classes and objects, Inheritance, Package and Interface, Exception Handling, File I/O, GUI and Multithreading.

Course category: Major mandatory

Course Name: Operating Systems (CSEg4201) Credit Hour: 3
Prerequisite: Computer Organization and Architecture Course description (Synopsis):

This course examines the important problems in operating system design and implementation. The operating system provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The operating system is responsible for sharing resources (e.g., disks, networks, and processors), providing common services needed by many different programs (e.g., file service, the ability to start or stop processes, 237 and access to the printer), and protecting individual programs from interfering with one another. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made

between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on operating system support for distributed systems.

Course category: Major elective

Course Name: Programming languages (CSEg4306) Credit Hour: 3
Prerequisite: CSEg2222 Course description (Synopsis):

This course provides students with the necessary underlying principles in the design and implementation of programming languages. Lectures use a variety of existing general-purpose programming languages from different programming paradigms: imperative, functional, logical, and object-oriented programming.

Course category: Major elective

Course Name: Web Programming (CSEg4204) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

This course will cover World Wide Web as a platform for interactive applications, content publishing and social services. The development of web-based applications requires knowledge about the underlying technology and the formats and standards. In this course you will learn about the HTTP communication protocol, the markup languages HTML, CSS and Server-side programming (PHP).

Course category: Major Mandatory

Course Name: Discrete Mathematics (CSEg2206) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

Discrete mathematics serves as the mathematical foundation for computer science and engineering, providing the necessary tools and concepts to analyze problems, design algorithms, and develop efficient solutions for a wide range of applications.

Course category: Major Mandatory

Course Name: Fundamentals of Software Engineering (CSE3205) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

Fundamentals of Software Engineering for Computer Science and Engineering (CSE) encompass the essential principles, methodologies, and practices involved in developing high-quality software systems. It provides a structured approach to software development, focusing on both technical and managerial aspects.

Course category: Major Mandatory

Course Name: Industry Internship (CSE3200) Credit Hour: 0
Prerequisite: None

Course description (Synopsis):

An internship is a structured, hands-on learning experience that allows to gain practical work experience in a professional setting related to their field of study or career interests. It lasts for 45 days.

Course category: Major Mandatory

Course Name: Engineering Research and Methodology (CSE4221) Credit Hour: 2
Prerequisite: None

Course description (Synopsis):

A course designed to equip engineering students with the fundamental principles and techniques necessary to conduct effective research in their field. The course covers various research methodologies, tools, and practices commonly used in engineering research.

Course category: Major Elective
Course Name: Software Design and Architecture (CSE4309) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

It is a comprehensive course that delves into the principles, methodologies, and best practices involved in designing and architecting software systems. The course covers both theoretical concepts and practical techniques essential for developing scalable, maintainable, and high-quality software solutions.

Course category: Major Elective
Course Name: Software Design and Architecture (CSE4309) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

It is a comprehensive course that delves into the principles, methodologies, and best practices involved in designing and architecting software systems. The course covers both theoretical concepts and practical techniques essential for developing scalable, maintainable, and high-quality software solutions.

Course category: Major Elective
Course Name: Introduction to Data Mining (CSE5317) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

Through a combination of lectures, practical exercises, and real-world examples, students will develop a solid understanding of clustering, classification, and other essential techniques in data mining, enabling them to apply these methods effectively to extract valuable insights from data in various domains.

Course category: Major Elective
Course Name: Introduction to NLP (Natural Language and Processing) (CSE5317) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

It is a foundational course that provides an overview of the principles, techniques, and applications of NLP in various domains. The course covers essential concepts and methodologies for processing and analyzing human language using computational methods.

Course category: Major Mandatory
Course Name: Project Management (CSE4302) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

It is a comprehensive course designed to provide students with the knowledge, skills, and techniques necessary to effectively plan, execute, monitor, and control projects across software development

industries. The course covers key concepts, methodologies, tools, and best practices in project management.

Course category: Major Elective
Course Name: Special Topics in CSE (CSE 5306) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

Machine Learning, Neural Networks, and Deep Learning" is an advanced course designed to provide students with an in-depth understanding of modern machine learning techniques, neural networks, and deep learning algorithms. The course focuses on exploring cutting-edge research, advanced methodologies, and practical applications in these rapidly evolving fields.

Course category: Major Elective
Course Name: VLSI Design (CSE 5307) Credit Hour: 3
Prerequisite: Electronics Circuit 1

Course description (Synopsis):

It is an advanced course that focuses on the principles, methodologies, and techniques involved in the design, fabrication, and testing of Very Large-Scale Integration (VLSI) circuits and systems. The course covers both theoretical concepts and practical aspects of VLSI design, providing students with a comprehensive understanding of integrated circuit (IC) design processes.

Course category: Major Elective
Course Name: Cognitive Psychology (LAR 3041) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It is a comprehensive course that explores the theoretical foundations, empirical research, and practical applications of cognitive processes underlying human behavior and mental functioning. The course covers key topics in cognitive psychology, including perception, attention, memory, language, problem-solving, decision-making, and cognitive development.

Course category: Major Mandatory
Course Name: Internship 2 (CSE 4200) Credit Hour: 0
Prerequisite: none

Course description (Synopsis):

An internship is a structured, hands-on learning experience that allows to gain practical work experience

in a professional setting related to their field of study or career interests. It lasts for 45 days.

Course category: Free Elective
Course Name: Theories of Knowledge (LAR 3041) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It is a philosophical course that examines the nature, scope, and foundations of knowledge, as well as the methods by which knowledge is acquired, justified, and evaluated. The course delves into various theories and perspectives on knowledge from both historical and contemporary philosophical traditions.

Course category: Major Mandatory
Course Name: Semester Project (CSE5201) Credit Hour: 2
Prerequisite: none

Course description (Synopsis):

It is an integrative course designed to provide students with the opportunity to apply knowledge and skills acquired throughout their academic program to tackle real-world challenges or explore advanced topics within their field of study.

Course category: Major Mandatory
Course Name: Seminar (CSE5205) Credit Hour: 1
Prerequisite: none

Course description (Synopsis):

It is an interactive and discussion-based course designed to explore advanced topics, current research, and interdisciplinary perspectives within a specific field of study.

Course category: Major Elective
Course Name: Human Computer Interaction (CSE5313) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It is a multidisciplinary course that explores the design, evaluation, and implementation of interactive computing systems that facilitate effective and enjoyable interaction between humans and computers. The course integrates principles from computer science, psychology, design, and usability engineering to address the needs and preferences of users in diverse contexts.

Course category: Major Elective
Course Name: Introduction to Audio and Video Production (CSE5315) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It is a comprehensive course designed to provide students with foundational knowledge and practical skills in the creation, editing, and production of audio and video content.

Course category: Major Elective
Course Name: Introduction to Computer Vison (CSE4312) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It is an introductory course that explores the fundamental principles, techniques, and applications of computer vision, a subfield of artificial intelligence and computer science focused on enabling computers to interpret and understand visual information from the world.

Course category: Major Mandatory
Course Name: BSC Project (CSE5202) Credit Hour: 4
Prerequisite: none

Course description (Synopsis):

The BSc Thesis serves as a culminating experience in the Bachelor of Science program, providing students with the opportunity to conduct original research or engage in a substantial independent project within their chosen field of study. The thesis allows students to demonstrate their mastery of disciplinary knowledge, research methods, critical thinking, and communication skills.

Course category: Major Elective
Course Name: Leadership and Change Management (SOS372) Credit Hour: 2
Prerequisite: none

Course description (Synopsis):

This course is designed to provide students with a comprehensive understanding of leadership principles and strategies for managing organizational change effectively.

Course category: Major Elective

Course Name: Software Quality and Testing (CSE 5310) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It is designed to provide students with a comprehensive understanding of software quality assurance principles, methodologies, and practices, as well as techniques for testing software systems to ensure reliability, functionality, and performance. Through a combination of theoretical concepts, practical exercises, and real-world case studies, students will develop the knowledge and skills necessary to assess, improve, and verify the quality of software products.

Course category: Major Elective
Course Name: Computer Ethic and Social Issues (CSE 5312) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It explores the ethical, legal, and social implications of computer technology in contemporary society. Through theoretical inquiry, case studies, and discussions, students examine ethical dilemmas, privacy concerns, and societal impacts arising from the use of computer technology.

Course category: Major Elective
Course Name: Computer Games and Animation (CSE 5304) Credit Hour: 3
Prerequisite: none

Course description (Synopsis):

It provides students with a comprehensive understanding of the principles, techniques, and technologies involved in the design, development, and production of computer games and animation. Through theoretical concepts, practical exercises, and hands-on projects, students will explore the creative and technical aspects of game design, animation production, and interactive storytelling.

Course category: General/ university required

Course Name: Entrepreneurship and Business Development (SOSC5003) Credit Hour: 3
Prerequisite: None

Course description (Synopsis):

This interdisciplinary course in general is designed to introduce students to the concept of sustainable entrepreneurship, a manageable process that can be applied across careers and work settings. It focuses on building entrepreneurial attitudes and behaviors that will lead to creative solution within community and organizational environments. This course is designed to prepare individuals for ownership of their own

innovative business, and assist start-ups to function more effectively, increase the chances of new business success, enhance profitability, and increase employment.

More specifically, the course provides students with an introduction to the concepts and skills necessary to successfully commercialize new products and services. Entrepreneurship is not just about starting a business. It is also about identifying good opportunities and then creating, communicating, and capturing value from those opportunities; including innovation in a corporate context. It will also teach students the skills to analyses business opportunities, and articulate them as a compelling business description, and pitch to an audience of investors, customers, or business partners. It focuses on building entrepreneurial attitudes and behaviors that will lead to creative solution within community and organizational environments.