KFU
جامعة الملك فيصل
KING FAISAL UNIVERSITY
جـامعة ووطـن..نمـاء..واسـتدامة..

كلية علوم الحاسب وتقنية المعلومات
College of Computer Sciences & Information Technology

Bachelor of Science in Computer Engineering

Course Catalog Version 2.0 (2026)

King Faisal University

King Faisal University (KFU) is a highly-reputed institution for providing higher education and research opportunities in the Kingdom of Saudi Arabia. It was established in 1975 to empower students, enlighten and strengthen them to achieve excellence in education for a true reflection of their creativity. It has served as a source of motivation for them towards development and achieving self-realization of their true potential. KFU is involved in the world of higher education and training, and business and socio-economic development. King Faisal University initiated a new strategic plan in 2025. Based on this new plan, the mission and vision statement of the university was revised.

Vision

A vibrant, inspiring institution enriching future knowledge and cultivating competitive human capabilities

Mission

To serve as a developmental engine and a strategic knowledge partner supporting vital sectors locally and regionally, by delivering future-oriented education and research that drives development and change, while fostering community partnerships for mutual enrichment and sustainable business growth

About CCSIT

College of Computer Sciences & Information Technology (CCSIT) at King Faisal University was established in 2003. It was started with 80 students, eight faculty members, five administrative and technical staff, and three labs. Over the years, the College has grown to over 100 faculty members with more than 2000 students. It has two buildings at the KFU Main Campus; one for men and another for women.

Vision

An energetic college of excellence in teaching and research that promotes national human capital development in IT

Mission

Promoting state-of-art teaching and research in the field of IT; by capitalizing resources, creating a competitive environment for carrying out novel interdisciplinary research that serves the university's identity and community, establishing partnerships and collaborations nationally and internationally.

Goals

- Graduating students equipped with the latest knowledge and skills necessary for direct employment in national and international institutions.
- Developing globally competitive competencies and enhancing student support systems to create an inclusive and supportive educational environment.
- Increasing enrollment in postgraduate programs and strengthening student support.
- Enhancing the quality and impact of scientific research.
- Contributing to King Faisal University's initiatives in innovation and business development.
- Strengthening community partnerships by promoting educational, research, and training initiatives across various information technology applications.

Programs at CCSIT

Demand for highly skilled graduates in Information Technology was the driving force behind the establishment of the College of Computer Science & Information Technology (CCSIT) at King Faisal University (KFU). CCSIT was established in the year 2003. The College branched out from the Department of Computer Information Systems at the School of Business. CCSIT currently has the following four departments:

Computer Science (CS)

Information Systems (IS)

Computer Networks & Communication (CN)

Computer Engineering (CE)

All departments offer separate programs leading to a B.S. degree in Computer Science, Computer Information Systems, Computer Networks & Communication, and Computer Engineering, respectively. The undergraduate programs in Computer Science and Computer Information Systems were started in the academic year 2004-2005. The undergraduate program in Computer Networks and Communication (CN) program was started in the academic year 2012-2013, and the undergraduate program in Computer Engineering in 2019-2020. The undergraduate programs in Computer Science and Computer Information Systems were first accredited by ABET in 2010. The undergraduate program in Computer Networks was accredited by ABET in 2016 while Computer Engineering program is applying for ABET accreditations for the first time.

Computer Engineering Program

CE Vision

Excellence in computer engineering education, research, innovation, and leadership to drive technological advancements and contribute to the sustainable development for societal needs.

CE Mission

Providing outstanding computer engineering education and conducting innovative research that addresses the local and global problems and strengthens the digital economy by developing competitive human capabilities and promoting sustainable research through effective strategic parnerships.

Program Education Objectives

The Program Educational Objectives (PEOs) of the Computer Engineering program that we expect our graduates to achieve within a few years of graduation are as follows:

The graduate of CE program will be:

1. Competent professionals and effective leaders in practicing their profession in industry, academia, or government sectors both individually and as team members.
2. Committed to life-long learning, higher level studies, and professional growth in emerging technologies.
3. Agents of positive change for the betterment of the community by identifying and assimilating state-of-the-art computing and IT solutions for everyday community life.
4. Capable of conducting innovative research to develop solutions for complex industrial problems through the application of computer systems from both hardware and software perspective.

Computer Engineering Program (Cont.)

The Student Outcomes (SOs) of the program describe the knowledge and abilities that we expect our students to attain before they graduate. The SOs of the CE program are:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
8. An ability to apply design and development principles in the construction of computer hardware and interfacing systems of varying complexity.

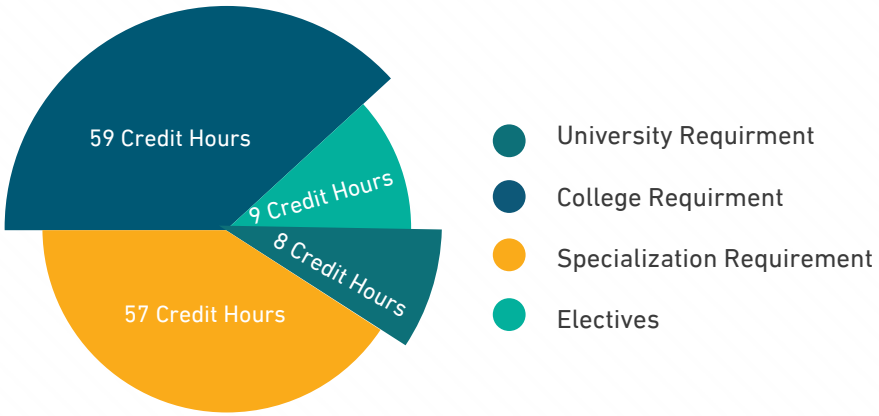
The student outcomes of the program are directly mapped to the program educational objectives. Hence, the success in achievement of general program objectives can be assessed through measurement of the student outcomes.

Computer Engineering Curriculum

The CE program provides students with an educational program that ensures the ability of its graduates to handle current and future needs of the society. The CE program emphasizes on three aspects. First, courses in basic sciences such as mathematics, physics, and biology enable students to develop the necessary analytical abilities and learn the underlying scientific principles. This aspect is complemented by subjects in humanities. Second, courses in Computer Science, Information Systems and Networking provide exposure to programming and problem solving abilities, business concepts and role of information systems in organization, software analysis and design, digital communication and networks. This aspect fulfills the breadth coverage of computer science and IT domain. Third, courses in Computer Engineering cover the fundamental and advanced concepts of computing, as well as allow students to emphasize on certain disciplines through the choice of electives such as Computational Intelligence, Image Analysis, VLSI Design, Robotics, and so on. The BS curriculum in Computer Engineering is structured into **133 credit-hours** spanning over a period of **four academic years** (excluding the preparatory year, in which students are introduced to basic IT skills, Science, Mathematics and English language skills). King Faisal University has a clear academic structure to support the curriculum design, based on levels. The levels' structure also establishes the basis upon which each student's achievement can be measured and upon which progression through the program can be approved. Typically, a level represents a semester of study. A study level is the indicator of the stage within the programs study plan.

The CE program comprises of **eight levels**, and is delivered in a semester system. Each academic year consists of two main semesters of 15 weeks and a summer semester of twelve-week duration. The periods of registration and final examination are not considered part of the period which defines a semester.

Courses in the CE curriculum are divided into four main categories: University Requirement, College Requirement, Specialized Core Requirement and Electives. The courses in each of these categories, their pre-requisites and credit hours are included below.



University Requirements

8 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
DEIC 101	Creed and Doctrines	-	2
DEIC 102	Islamic Culture	-	2

Two other courses for this requirement can be selected from the set of electives below.

Course Code	Course Title	Pre-requisite	Credit-Hours
DEIC 103	Islamic Morals and Occupational Ethics	-	2
DEIC 104	Studies in the Prophet's Biography	-	2
DEIC 105	Medical Jurisprudence	-	2
DEIC 106	Economy and Politics in Islam	-	2
DEIC 107	Social System and Family Behavior	-	2
DEIC 108	Management and Entrepreneurship	-	2
DEIC 109	Health and Fitness	-	2
DEIC 110	Research Skills	-	2
DEIC 111	Voluntary Work	-	2
DEIC 112	Medicine: Type and Usage	-	2
DEIC 113	Human Rights in Islam	-	2
DEIC 114	Food and Nutrition	-	2

College Requirements 59 Credits

The college requirement courses are divided into five categories based on their area of coverage.

Basic Sciences & Mathematics Courses 20 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
PHY132	Physics	-	4
BIO152	Biology	-	3
CE213	Basic Electronics	PHY132	4
MATH111	Calculus	-	3
MATH121	Probability and Statistics	MATH111	3
MATH122	Discrete Math	MATH111	3

English and Business Courses 6 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
ENG111	Academic English	-	3
MGT123	Business and Accounting	ENG111	3

Computer Science Courses 19 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
CS110	Introduction to Computing	-	4
CS120	Fundamentals of Programming	CS110	4
CS211	Data Structure and Algorithms	CS120	4
CS320	Computer Security	CN214	3
CS321	Operating Systems	CE313	4

Information Systems Courses — 6 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
IS312	Technical Reports	ENG111	3
IS322	Professional Responsibility	BIO152, IS312	3

Computer Networks & Communication Courses — 4 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
CN214	Fundamentals of Computer Networks	CS110	4

Computer Engineering Courses — 8 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
CE223	Digital Logic and Design	PHY132	4
CE313	Computer Organization and Architecture	CE223	4

Electives — 9 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
CE 413	Computational Intelligence & Expert Systems	MATH 122	3
CE 414	Digital Signal Processing	CE 310	3
CN 415	Multimedia Networks and Applications	CN 214	3
CN 416	Telecommunication Networks	CN 214	3
CE 423	Robotics	CE 313	3
CE 424	VLSI Design	CE 411	3
CE 425	Image Analysis and Machine Vision	CE 310	3
CE 426	Computer Graphics	MATH 122	3
CE 427	Control Engineering	CE 222	3

Specialization Core Requirements 57 Credits

Course Code	Course Title	Pre-requisite	Credit-Hours
CE 210	Advanced Calculus	MATH 111	3
CS 212	Linear Algebra	MATH 122	3
CE 213	Basic Electronics	PHY 132	4
CS 220	Fundamentals of Software Engineering	CS 211	4
CE 221	Electric Circuits	CE 213	4
CE 222	Differential Equations	CE 210	3
CE 224	Numerical Analysis	CE 210	3
CE 310	Signals and Systems	CS 212	3
CE 311	Electronic Circuits	CE 221	4
CE 323	Embedded Systems	CE 313	4
CE 330	Practical (Co-op) Training	CE 223, CE 311, CE 313	3
CE 410	Project Proposal	Department Approval	2
CE 411	Design and Modeling of Digital Systems	CE 313	4
CE 412	Computer Peripherals and Interfacing	CE 311, CE 313	4
CE 420	Project Implementation	CE 410	3
CE 421	Selected Topics in CE	CE 410	3
CE 422	Parallel and Distributed Systems	CE 313	3

The degree plan shows the semester wise (level) course distribution for the four-year study plan for a student to obtain a bachelor's degree in computer engineering. LT refers to the lecture hours per week, LB refers to the lab hours per week and CR refers to the credit-hours for the course.

Degree Plan

First Year – First Semester (Level 1)					
Code		Course Title	LT	LB	CR
CS	110	Introduction to Computing	3	3	4
MATH	111	Calculus	3	0	3
PHY	132	Physics	3	3	4
ENG	111	Academic English	3	0	3
DEIC	101	Creed and Doctrines	2	0	2
Total			14	6	16

First Year – Second Semester (Level 2)					
Code		Course Title	LT	LB	CR
CS	120	Fundamentals of Programming	3	3	4
MATH	121	Probability & Statistics	3	0	3
MATH	122	Discrete Math	3	0	3
MGT	123	Business & Accounting	3	0	3
BIO	152	Biology	3	0	3
Total			15	3	16

Second Year – First Semester (Level 3)					
Code		Course Title	LT	LB	CR
CE	210	Advanced Calculus	3	0	3
CS	211	Data Structure & Algorithms	3	3	4
CS	212	Linear Algebra	3	0	3
CE	213	Basic Electronics	3	3	4
CN	214	Fundamentals of Computer Networks	3	3	4
Total			15	9	18

Second Year – Second Semester (Level 4)					
Code		Course Title	LT	LB	CR
CS	220	Fundamentals of Software Engineering	3	3	4
CE	221	Electric Circuits	3	3	4
CE	222	Differential Equations	3	0	3
CE	223	Digital Logic and Design	3	3	4
CE	224	Numerical Analysis	3	0	3
Total			15	9	18

Third Year – First Semester (Level 5)					
Code		Course Title	LT	LB	CR
CE	310	Signals and Systems	3	0	3
CE	311	Electronic Circuits	3	3	4
IS	312	Technical Reports	3	0	3
CE	313	Computer organization & Architecture	3	3	4
DEIC	102	Islamic Culture	2	0	2
Total			14	6	16

Third Year – Second Semester (Level 6)					
Code		Course Title	LT	LB	CR
CS	320	Computer Security	3	0	3
CS	321	Operating Systems	3	3	4
CE	322	Embedded Systems	3	3	4
IS	323	Professional Responsibility	3	0	3
DEIC	XX	University Elective	2	0	2
Total			14	6	16

Course Code	Course Name	Hours	Pre-requisite
0923330	Practical (Co-op) Training	3	Department Approval and Finishing 95 Credit Hours

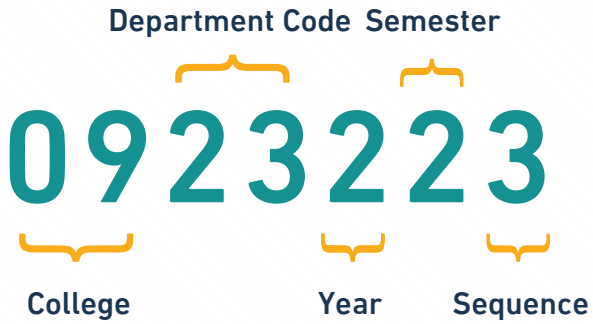
Fourth Year – First Semester (Level 7)					
Code		Course Title	LT	LB	CR
CE	410	Project Proposal	0	6	2
CE	411	Design and Modeling of Digital Systems	3	3	4
CE	412	Computer Peripherals and Interfacing	3	3	4
XX	XX	Program Elective	3	0	3
DEIC	XX	University Elective	2	0	2
Total			11	12	15

Fourth Year – First Semester (Level 8)					
Code		Course Title	LT	LB	CR
CE	420	Project Implementation	0	9	3
CE	421	Selected Topics in CE	3	0	3
CE	422	Parallel and Distributed Systems	3	0	3
XX	XX	Program Elective	3	0	3
XX	XX	Program Elective	3	0	3
Total			12	9	15

Course Description

How to read the course descriptions?

Each course description entry is divided into 5 sections. The first section contains basic information about the course. The course name is included in English and Arabic. Each course is assigned a unique number which indicates the college and the department that offers the course, level of the course, the semester during which it is offered and the course sequence number among other courses offered within the same semester (or level). The course number is a 7-digit number as defined below:



College Codes	
06	College of Business Administration
07	College of Arts
08	College of Science
09	College of Computer Sciences & IT

Department Codes in CCSIT	
21	Computer Science (CS)
22	Information Systems (IS)
23	Computer Engineering (CE)
24	Network & Communications (CN)

Year Codes	
1	First Year
2	Second Year
3	Third Year
4	Fourth Year

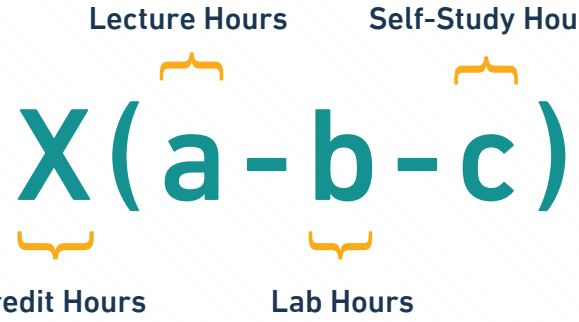
Semester Codes	
1	First Semester
2	Second Semester

Sequence numbers range from 0 to 7

The **course number,** 0923223, is equivalent to a more readable **course code** CE223 where 0923 is mapped to CE (the Computer Engineering Department) at CCSIT which is responsible for the course offering (Digital Logic and Design). Course level represents in which undergraduate semester students are generally required to register for this course. The normal duration of an undergraduate program is four years divided into eight semesters. Hence, a value between 1 and 8 is used.

Course Description

Credit-hour is a measure of amount of effort required to achieve the intended learning outcomes as verified by the evidence of student's achievement. The majority of courses at CCSIT are worth either 2, 3, or 4 credits. A 3-credit course is generally delivered over two 75 minutes lectures per week over the entire semester. Similarly, a 2-credit course may be delivered over two 50 minutes lectures per week throughout the entire semester. All 4-credit hour courses contain two 75 minutes lectures and two 75 minutes lab sessions per week. We consider such lab sessions as part of guided study where lab equipment and necessary supervision is made available to help students gaining hands-on experience alongside their self-study. The credit-hour format used in this course catalogue is as follows:



For lecture intensive 2 and 3 credit-hour courses, the credit-hours are 2(2-0-3) and 3(3-0-6), respectively. For a 4-credit course with a lab component of 3 hours where 1 credit is earned through the lab, the credit-hour is 4(3-3-9) assuming that student will be spending 3 hours preparing for the lab session each week. That is, for a course with 4(3-3-9) credit-hour format the lab is part of a partially guided study similar to a course project where no additional credit is allocated to the project.

Prerequisites are solely determined by the course content dependency. The prerequisite of a course could be one or more courses and are listed in this section. The course codes of the prerequisite courses needed to register for this course are listed in here. Courses in the CE curriculum are grouped into four major **course tracks** namely, University Requirement, College Requirement, Specialized Core Courses and Electives as mentioned earlier.

The next section is the course description that describes both the course contents and course objectives comprehensively. The course outcomes describe what a student must be able to do after completion of the course. Outcomes are measurable and mapped to one or more student outcomes. These student outcomes are listed in square brackets and should be between '1' to '8' which are the student outcomes described earlier for the CE program.

The **assessment policy** section lists out the key assessment components of the course and the percentage of grade that assessment contributes to the overall grade of the student. The **textbook** and **references** section lists the main text and reference books that will be used in the course.

Course Name	Introduction to Computing				مقدمة علم الحاسب
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CS110	0921110	1st	4 (3-3-3)	None
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

The main objective of this course is to present basic concepts of information technology that motivates the study of different disciplines at the College of Computer Sciences and Information Technology. The overall course covers fundamentals concepts categorized in four main modules. The first module introduces the students to key concepts in computer hardware. This includes input, processing and output devices, data representation, analog and digital systems, and number systems. The second module introduces the concepts of data, information and their value to organizations. This module also includes overview of database systems and their role in structuring and organizing data. The third module covers basics of networking including network architecture, technology and the Internet. Finally, the fourth module covers computer software, programming languages and use of computers for problem solving. In this module, basic concepts of programming such as variables, data types, expressions, loops and decision structures are introduced. The course also provides a brief overview of computer security, professional and ethical issues of computers in society.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe basic functions of computer hardware and software components [1]
- Explain fundamental concepts of information systems and its components including hardware, software, database and telecommunication [1, 2]
- Describe fundamental networking concepts including network topologies, intranet and internet technologies [1, 2]
- Analyze and design computing solutions using fundamental programming constructs [1, 2, 6]
- Explain key ethical, legal and social issues related to information technology and how to interpret and comply with ethical principles [2, 4]

Assessment Policy								
	Assignment	5%	Quiz	10%	Lab	25%	Project	-
	Midterm	20%	Final	40%	Others	-		

Textbook

- J. Glenn Brookshear, Dennis Brylow, "Computer Science An Overview", 13th Edition, 2019, Global Edition, ISBN 10: 1-292-26342-3, 978-1-292-26342-7.

References

- Joyce Farrell, "Just Enough Programming Logic and Design" , 1st Edition, 2010, Cengage Learning. ISBN-13: 978-1439039571.
- Behrouz A. Forouzan, Firouz Mosharraf, "Foundations of Computer Science", 3rd Edition, 2018, Cengage Learning. ISBN-13: 978-1473751040.
- Ralph Stair, George Reynolds, "Principles of Information Systems", 13th Edition, 2018, Cengage Learning. ISBN-13: 978-1305971776.

Course Name	Calculus				التفاضل والتكامل
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	MATH111	0817111	1st	3 (3-0-6)	None
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

The main purpose of this course is to introduce the students with methods and applications of differential and integral calculus. It will enable the students to establish the basic concepts of calculus, find the limit of univariate functions, know the continuity of functions, derivate the functions and apply the derivative tests to plot the functions. They will find the integrals and apply definite integrals to compute the area, solids, arc length, and surface of revolutions.

Course Outcomes

After the completion of this course, the student will be able to:

- Interpret a function from an algebraic, numerical and graphical perspective and extract information relevant to the phenomenon modeled by the function. [1]
- Calculate the limit of a function at a point numerically and algebraically using appropriate methods. [1, 2]
- Define derivative of functions and compute derivatives using the rules of differentiation. [1]
- Interpret differentiation and anti-differentiation as inverse operations. [1, 2]
- Analyze the basic techniques of integration to compute integrals. [1, 2]
- Evaluate the definite integral geometrically over the area under a curve. [1, 2]

Assessment Policy								
	Assignment	15%	Quiz	15%	Lab	-	Project	-
	Midterm	30%	Final	40%	Others	-		

Textbook	■ G. Thomas, M. Weir and J. Hass, "Thomas' Calculus Early Transcendentals", 12th Edition, 2010, Pearson. ISBN-13: 978-0321588760.
References	■ George B. Thomas, "Thomas' Calculus", 11th Edition, 2008, Pearson Education. ISBN-13: 9780321526793.

Course Name	Physics	الفيزياء

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	PHY132	814132	1st	4 (3-3-3)	None

Course Track ☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective

Course Description

This course provides a conceptually-oriented exposure to the fundamental principles of electricity, magnetism and optics. Topics include basic concepts of charge, electric field, Coulomb's law, Gauss's theorem, electrostatic potential, resistors in series and parallel circuits, capacitors and inductors, dielectric material in alternating electric field, magnetic effect of an electric current, Biot Savart law, electromagnetic induction, Faraday's Law, Lenz's law, energy stored in magnetic field, Properties of magnetic materials: diamagnetism, paramagnetism and ferromagnetism, properties of light: reflection, refraction and total internal reflection.

Course Outcomes

After the completion of this course, the student will be able to:

- Define the fundamental concepts of electric charge, electrostatic force, electric potential, electric current, current density, magnetic field and magnetic flux. [1]
- Define capacitance and inductance and analyze the effects associated with capacitors and inductors of various symmetries, in series and parallel combination. [1]
- Outline the basic principles and mathematical expressions of Gaus's, Biot-Savart, Ampere's, Faraday's and Lenz's Laws. [1, 7]
- Calculate electric and magnetic fields from a distribution of charges or current. [1, 6]
- Estimate and explain the effects of static, non-uniform and uniform magnetic fields on moving charges and current-carrying wires, loops and the magnetic dipole. [1, 6, 7]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	20 %	Project	-
	Midterm	20%	Final	40%	Others	-		

Textbook

- Douglas C. Giancoli, "Physics for Scientists and Engineers with Modern Physics", Vol. 2, 2008, New Jersey: Pearson Education. ISBN-13: 978-0130215192.

References

- Robert Resnick, David Halliday, and Kenneth S. Krane, "Physics" Vol. 2, 2001, Wiley. ISBN-13: 978-0471401940.
- Raymond A. Serway and John W. Jewett, "Physics for Scientists and Engineers with Modern Physics" , 9th Edition, 2013, Cengage Learning. ISBN-13: 978 1133954057.
- Hugh D. Young and Roger A. Freedman, "University Physics with Modern Physics", 14th Edition, 2015, Pearson. ISBN-13: 978-0321973610.

Course Name	Academic English				اللغة الإنجليزية الأكاديمية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	ENG111	1722111	1st	3 (3-0-6)	None
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

This course aims to provide students with necessary competency in English for academic success. On top of the preparatory year English training, this course tries to enhance academic writing and reading skills in the context of computing and information technology through engaging activities and assignments in and outside the classroom. The course also develops learning skills including practice in listening to lectures, note-taking and group discussion. The course assessment would adopt IELTS-style exams for reading and writing skills along with vocabulary, punctuation, grammar and other academic writing essentials. Various aspects of academic writing including the writing process, grammar and punctuation, sentence and paragraph structure, rhetoric patterns in essays, paraphrasing, summarization, plagiarism and citations and references are covered in this course. After taking this course students will be able to read and write essays describing data or natural phenomenon as well as scientific arguments as found in computing related textbooks, magazines and blogs. This course is a pre-requisite of Technical Report course where students will further develop their English skills for graduation project report and scientific presentation.

Course Outcomes

After the completion of this course, the student will be able to:

- Apply appropriate vocabulary, grammar and punctuation, sentence, paragraph and rhetorical structure in academic English. [3]
- Practice proper process of writing: pre-writing (brainstorming, clustering, and outlining), revising, editing, and proofreading. [3]
- Perform self-editing and peer-editing constructively to improve their own writings as well as the writings of the other. [3, 4, 5]
- Compose focused and well-developed essays of approximately 250 words or more describing data, natural phenomenon and scientific arguments. [3, 4]
- Demonstrate ability to follow university lectures and comprehend textbook materials to answer questions, taking notes and participate in effective group discussions. [3, 4, 5]

Assessment Policy								
	Assignment	20%	Quiz	10%	Lab	-	Project	-
	Midterm	30%	Final	40%	Others	-		

Textbook	
	■ Alice Oshima and Ann Houge, “Introduction to Academic Writing” , 3rd Edition, 2007, Pearson Longman. ISBN-13: 978-0131933958 ■ Diana Hacker and Nancy Sommers, “Rules for Writers”, 7th Edition, 2011, Bedford/St. Martin’s, ISBN-13: 978-0312647360
References	■ Natilene Bowker, “Academic Writing: A Guide to Tertiary Level Writing”, 2007, Massey University. Available at: http://owll.massey.ac.nz/pdf/Academic Writing-Guide

Course Name	Fundamentals of Programming				مبادئ البرمجة
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CS120	0921120	2nd	4 (3-3-3)	0921110 (Introduction to Computing)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

This course aims to provide students with the basic concepts of computer programming. The course focuses on. developing problem solving skills and to design and develop computer programs. The course content includes: an overview of various and common programming paradigms and the difference in between compilers and interpreters. Concepts of variables, data types, operators, arrays & pointers are covered. It provides in depth knowledge of logic building using selection and iteration control structures. It introduces various operations including string operations, functions and along with methods of passing arguments by value or by reference, function overloading, function overriding and recursion. Concepts of classes and objects are also introduced in this course. The lab focuses on practical aspects of all the covered programming concepts through programs writing, compilation, execution, testing and debugging using C++ environment.

Course Outcomes

After the completion of this course, the student will be able to:

- Analyze the requirements for solving basic computing problems and design suitable algorithmic solutions. [1]
- Design and implement programs that use fundamental programming constructs. [1, 2]
- Analyze and explain the behavior and output of simple programs involving fundamental programming constructs. [1]
- Test and debug programs that use the fundamental programming constructs. [1, 6]

Assessment Policy								
	Assignment	-	Quiz	10%	Lab	25%	Project	10%
	Midterm	15%	Final	40%	Others	-		
Textbook	■ Deitel and Deitel, "C++ How to Program" , 10th Edition, 2016, Pearson. ISBN-13: 978-0134448237							
References	■ D.S. Malik, "C++ Programming: From Problem Analysis to Program Design" , 6th Edition, 2013, Cengage Learning. ISBN 13: 978-1-133-62638-1 ■ Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Primer", 5th Edition, 2012, Addison-Wesley. ISBN: 978-0321714114.							

Course Name	Probability and Statistics				الاحتمالات والاحصاء
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	MATH121	0817121	2nd	3 (3-0-6)	0817111 (Calculus)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

This course aims to introduce the students to the basic concepts of probability and statistics with applications in computer science and information technology. Topics include Sample space, events, and probabilities of outcomes, axioms of probability, conditional probability, random variables, discrete and continuous distributions, functions of random variables. In addition, it covers descriptive statistical measures and graphical display of data: sample mean, mode, median, range, variance, stem-and-leaf-diagram, frequency distribution, box-plots and histograms. The students will be introduced to the basics of estimation, test of hypotheses, regression analysis and correlation. Students will use a statistical software to analyze practical datasets.

Course Outcomes

After the completion of this course, the student will be able to:

- Identify probability distributions. [1]
- Compute probabilities by modeling sample spaces. [1, 2]
- Summarize and present data numerically and graphically using descriptive statistics. [1, 2]
- Use correlation and linear regression analysis. [1, 2]
- Compute confidence intervals and test statistical hypotheses. [1, 2]
- Apply the concepts of probability and statistics on sample datasets using a suitable statistical software. [1, 2]

Assessment Policy								
	Assignment	10 %	Quiz	15%	Lab	-	Project	-
	Midterm	30 %	Final	45%	Others	-		

Textbook	■ D.C. Montgomery and C. Runger, "Applied Statistics and Probability for Engineers", 6th Edition, 2013, Wiley. ISBN-13: 978-1118539712
References	■ Dekking, Kraaikamp, Lopuhaa, and Meester, "Modern Introduction to Probability and Statistics: Understanding Why and How", 2005, Springer Science & Business Media. ISBN-13: 978-1852338961

Course Name	Discrete Mathematics				الرياضيات المنفصلة
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	MATH122	0817122	2nd	3 (3-0-6)	0817111 (Calculus)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

The main purpose of this course is to provide a foundation to think logically and employ these techniques in solving science and engineering problems. It will enable the students to reason mathematically about basic data types and structures, such as numbers, sets, functions, graphs, and trees used in computer algorithms and systems. Topics involving relations, recursive functions, combinatorial and counting methods are included to improve their relational, recursive, and quantitative skills.

Course Outcomes

After the completion of this course, the student will be able to:

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers. [1]
- Evaluate mathematical arguments and identify fallacious reasoning. [1, 2]
- List and apply the operations of sets and use Venn diagrams to solve applied problems. [1, 2]
- Reconstruct various recurrence functions and use them effectively in problem solving. [1]
- Calculate numbers of possible outcomes of elementary combinatorial processes such as permutations and combinations. [1]
- Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction. [2]

Assessment Policy								
	Assignment	15%	Quiz	10%	Lab	-	Project	-
	Midterm	25%	Final	50%	Others	-		
Textbook	■ David J. Hunter, "Essentials of Discrete Mathematics", 3rd Edition, 2015, Jones & Bartlett Learning. ISBN-13: 978-1284056242.							
References	■ Kenneth Rosen, "Discrete Mathematics and its Application" , 7th Edition, 2012, McGraw-Hill. ISBN: 978-0073383095.							

Course Name	Business and Accounting				إدارة أعمال والمحاسبة
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	MGT123	0622123	2nd	3 (3-0-6)	1722111 (Academic English)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

This course presents a broad introduction to business and accounting principles for non-business students primarily focusing on accounting. First, the business portion focuses on the nature, structure and working of contemporary business organizations. Second, the accounting part provides a complete vision for recording (using double entry system), classifying and summarizing all the financial transactions by extracting a trial balance to present financial statements. This will cover topics including accounting principles, balance sheet equation, recording financial transactions in journal, posting entries to ledger, preparing trial balance, and financial statements.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe the basic concepts of Business Administration. [1]
- Describe the objectives of financial accounting, basic accounting terminologies, and Generally Accepted Accounting Principles (GAAP). [1]
- Identify the balance sheet equation, record financial transactions, and prepare financial statements. [1]
- Evaluate the accounting transactions according to the effect on balance sheet equation, and apply the double entry basis. [1]
- Prepare recording in the journal, posting to the ledger, trial balance, final accounts, financial statements, and correcting accounting errors. [1]

Assessment Policy								
	Assignment	15%	Quiz	10%	Lab	-	Project	-
	Midterm	30%	Final	45%	Others	-		

Textbook

- Ronald Ebert and Ricky Griffin, "Business Essential" , 11th Edition, 2016, Pearson. ISBN-13: 978-0134129969
- Jerry Weygand, Paul Kimmel and Donald Kieso, "Accounting Principle" , 12th Edition, 2015, Wiley & Sons. ISBN-13: 978-1119133018

References

- John Wild, Ken Shaw and Barbara Chiappetta, "Fundamental Accounting Principle" , 23rd Edition, 2016, McGraw-Hill Education. ISBN-13: 978 1259536359.
- David Grant and Robert McLarty, "Business Basic" , Business Basics International Edition, 2006, Oxford University Press. ISBN-13: 978-0194577793

Course Name	Biology				علم الاحياء
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	BIO152	0816152	2nd	4 (3-3-3)	None
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

Biology is a general science course with a lab component, which is designed for non-biology majors. The course covers the concepts of life, cell, and genetics; different cellular processes; and the forms and functions of human organ systems. The course emphasizes on biological phenomenon in our daily life that relates to human body functions, health and well-being. Students will be made aware of current advances and applications of biology in medicine, agriculture, environment and the society in general and computing in particular. After taking this course, students will also be aware of the challenges in biological research and how computing technologies can help in solving them, and vice versa.

Course Outcomes

After the completion of this course, the student will be able to:

- Recognize the concepts of life, biological organization, evolution, cell, genetics and various cellular activities such as molecular transports, cell metabolism, reproduction and gene expression. [1, 7]
- Define the components, functions and organization of cell and human organ systems. [1]
- Perform basic scientific calculation. [1]
- Apply scientific methods to carry out experiments, interpret results and draw conclusions. [6]
- Demonstrate ability to work independently and as a team member to perform lab experiments. [5]
- Collect, analyze, document, and report biology and computing related information clearly, concisely, logically, and ethically using authentic source with proper citation, reference and acknowledgment. [3, 4, 7]
- Operate related equipment and perform laboratory experiments according to the instruction. [6]

Assessment Policy	Assignment	10%	Quiz	10%	Lab	20%	Project	-
	Midterm	20%	Final	40%	Others	-		
Textbook	■ Jane B. Reece, Martha R. Taylor, Eric J. Simon, Jean L. Dickey, “Campbell Biology - Concepts and Connection” , 8th Edition (Global Edition), 2015, Pearson Benjamin Cummings. ISBN-13: 978-1292057804							
References	■ Jane B. Reece, Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Robert B. Jackson, “Campbell Biology” , 9th Edition, 2011, Pearson. ISBN-13: 978-0321739759							

Course Name	Advanced Calculus				التفاضل والتكامل المتقدمه
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE210	923210	1st	4 (3-3-3)	None
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

Advanced Calculus is a continuation of Calculus course to cover the advanced calculus concepts focusing on sequences and series, convergence tests, polar coordinates, cylindrical and spherical coordinates. It will enable the students to establish the basic concepts of Taylor and Maclaurin series, vectors, lines, planes and surfaces, and functions of two and three variables. They will also learn how to calculate partial derivatives, directional derivatives, double integrals and triple integrals.

Course Outcomes

After the completion of this course, the student will be able to:

- State and explain alternating series, power series, Taylor and Maclaurin series. [1]
- Define extrema of functions of two variables. [1]
- Describe polar, cylindrical and spherical coordinates and compute integrals in these coordinates. [1]
- Compute the double integrals in polar coordinates. [1]
- Compute the triple integrals in cylindrical and spherical coordinates. [1]
- Compute the partial derivatives and directional derivatives. [1]

Assessment Policy	Assignment	15%	Quiz	15%	Lab	-	Project	-
	Midterm	30%	Final	40%	Others	-		

Textbook	■ John Srdjan Petrovic, “Advanced Calculus Theory and Practice”, CRC Press, 2nd Edition, 2022, ISBN: 978-0-203-70514-8.
References	■ Patrick M. Fitzpatrick, “Advanced Calculus”, American Mathematical Society, 2nd Edition, 2010, ISBN: 978-0821847916. ■ R. Creighton Buck, “Advanced Calculus”, CRC Press, 3rd Edition, 2022, ISBN: 978-1-57766-302-7. ■ William Briggs and Lyle Cochran, “Calculus” Pearson, International Edition, 2011, ISBN: 617-671-3447

Course Name	Data Structure and Algorithms	هيكلة البيانات والخوارزميات

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CS211	0921211	3rd	4 (3-3-3)	0921120 (Fund. of Programming), 0817122 (Discrete Math)

Course Track ☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective

Course Description

The aim of this course is to describe the concept of structuring data for use in solving problems by writing efficient algorithms. The concepts of algorithm analysis using flops and memory requirements, and their comparison based on best, worst and average case behavior is reviewed along with asymptotic notation. The concepts of data types, user defined data types, abstract data types are discussed along with methods of static and dynamic memory allocation. Some linear data structures like arrays, stacks and queues are introduced and their common applications using iterative and recursive methods are discussed. Dynamic data structures like linked Lists, Linked stacks and queues, trees and graphs are introduced along with their applications to searching and sorting. The data structures are implemented in lab sessions with a practical application as a team project.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe the concept of structuring various types of data. [1]
- Differentiate between different types of data structures with respect to program efficiency. [1, 6]
- Use searching and sorting algorithms using suitable data structures. [1, 6]
- Analyze the complexity of various searching and sorting algorithms. [1, 6]

Assessment Policy								
	Assignment	-	Quiz	10%	Lab	20%	Project	10%
	Midterm	20%	Final	40%	Others	-		

Textbook

- Mark A. Weiss, "Data Structures & Algorithm Analysis in C++" , 4th Edition, 2013 Pearson. ISBN-13: 978-0132847377.

References

- Michael T. Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++" , 2nd Edition, 2011, John Wiley. ISBN-13: 978-0470383278.
- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithm" , 3rd Edition, 2009, MIT Press. ISBN-13: 978-0262033848.
- Robert Sedgewick, "Algorithms in C: Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithm" , 3rd Edition, 2002, Addison Wesley. ISBN-13: 978-0201726848.

Course Name	Linear Algebra				الجبر الخطي
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CS212	0921212	3rd	3 (3-0-6)	0817122 (Discrete Mathematics)
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

Linear algebra covers systems of linear equations, properties of matrices, vector spaces, and linear transformations. Solving systems of linear equations is a basic tool of many mathematical procedures used for solving problems in computing. The aim of this course is to familiarize the students with the mathematical theory and methods of linear algebra. The course begins with fundamental properties of matrices including matrix algebra, operations, inverses and factorization. Systems of linear equations and basic concepts of the theory of vector spaces in the concrete setting of real linear n space Rn are also included. The course will enable students to solve linear equations, perform matrix decomposition, linear transformations, calculate determinants, and find eigenvalues and eigenvectors. Students will be able to apply the knowledge of linear algebra in applications related to computer graphics, computer vision and intelligent systems.

Course Outcomes

After the completion of this course, the student will be able to:

- Perform the basic manipulations of vectors and matrices. [1]
- Use vectors and matrices to model and solve systems of linear equations. [1, 2]
- Apply Linear Algebra techniques in intelligent systems and computer graphics applications. [1, 2]
- Solve optimization problems using eigenvalue and matrix decomposition techniques. [1]

Assessment Policy								
	Assignment	15%	Quiz	15%	Lab	-	Project	-
	Midterm	30%	Final	40%	Others	-		

Textbook	■ Steven R. Lay and Judi J. McDonald, “Linear Algebra and Its Applications”, 5th Edition, Pearson, 2015. ISBN-13 978-0321982384
References	■ Phillippe G. Ciarlet, “Introduction to Numerical Linear Algebra and Optimization”, 1st Edition, 1989, Cambridge University Pres. ISBN-13: 978 0521339841 ■ Phil Kein, “Coding the Matrix: Linear Algebra Through Computer Science Application” , 1st Edition, 2013, Newtonian Press. ISBN-13: 978-0615880990

Course Name	Basic Electronics				مبادئ الالكترونيات
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE213	0923213	1st	4 (3-3-3)	None
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

The principal objective of this course is to develop an understanding of basic electronics and the physical mechanisms governing electronic device characteristics. The course commences on mathematical modeling, representation and circuit analysis techniques such as Ohm's law and Kirchhoff's laws to analyze them accordingly. The course also addresses the physics of semiconductor devices including p-n junction, diodes, bipolar transistor, field effect transistor, and optoelectronic devices. The course will provide students the insight useful for understanding modern semiconductor devices and technologies.

Course Outcomes

After the completion of this course, the student will be able to:

- Define basic concept of: DC Circuits and Compute the voltage, current resistance and power in dc circuits. [1]
- Compute the voltage, current resistance and power in dc circuits. [1]
- Analyze the circuit using Ohms Law and Kirchoff's Laws. [1, 5, 6]
- Explain the basic physical properties of semiconductors and the p-n junction. [1, 5, 6]
- Understand the basic electronic components, their device structure, principle of operations, mathematical modeling and analysis, circuit representations and integrations. [1, 5, 6]

Assessment Policy	Assignment	5%	Quiz	10%	Lab	25%	Project	-
	Midterm	20%	Final	40%	Others	-		
Textbook	■ Thomas L. Floyd, David M. Buchla, and Gary D. Snyder, "Electronics Fundamentals: Circuits, Devices, and Applications", 9th Edition. Pearson (2022), ISBN: 13-97880137467839							
References	■ Thomas L. Floyd and David M. Buchla, "Principles of Electric Circuits : Conventional Current Version", 10th Edition, Pearson (2022), ISBN: 13-9780137408993.							

Course Name	Fundamentals of Computer Networks	أساسيات شبكات الكمبيوتر

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CN214	0924214	3rd	4 (3-3-6)	0921110 (Introduction to Computing)

Course Track ☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective

Course Description

The course covers the five layers of the computer networks layering model: TCP/IP focusing on the upper four layers Top-down approach is implemented in teaching this course. The course starts by an overview of computer networks: network edges concepts and network core concepts: network switching and packet switching, Shannon and Nyquist theorem. Then starting from the application layer towards the data link layer, the main functions and protocols in each layer is discussed in this course. The topics of the course includes: application layer protocols: HTTP, FTP, SMTP, DNS, Transport layer protocols: TCP and UDP, basics of network layer: Addressing, IP protocols (IPv6), circuit-switched networks, datagram networks, virtual-circuit networks, routing protocols, and data link layer concepts: framing, error detection and corrections, examples of flow control protocols, examples of MAC protocols. The course contains a laboratory component in which a network packet analyzer is used to understand network protocol internals.

Course Outcomes

After the completion of this course, the student will be able to:

- Define the different computer networks layering models. [1]
- Describe the main functions and protocols in the five layers of the TCP/IP model. [1]
- Compare between different protocols in each layer of TCP/IP model. [2]
- Analyze the performance of different protocols in each layer of TCP/IP model. [2]
- Use a network packet analyzer to understand network protocol internals. [5, 6]

Assessment Policy								
	Assignment	-	Quiz	10%	Lab	25%	Project	-
	Midterm	25%	Final	40%	Others	-		

Textbook

- James Kurose and Keith Ross, "Computer Networking: A Top-Down Approach", 7th Edition, 2017, Pearson Education.

References

- Behrouz A. Forouzan, "Data Communications and Networking" , 5th Edition (Global Revised), 2012, McGraw-Hill. ISBN-13: 978-0071315869
- William Stallings, "Data and Computer Communication" , 10th Edition, 2013, Pearson Education. ISBN-13: 978-0133506488
- Andrew S. Tanenbaum, "Computer Network" , 5th Edition, 2010, Pearson Education. ISBN-13: 978-0132126953

Course Name	Fundamentals of Software Engineering	أساسيات هندسة البرمجيات

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CS220	0921220	4th	4 (3-3-3)	0921120 (Fund. of Programming)

Course Track ☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective

Course Description

This course aims to provide basic principles and practices of software engineering while emphasizing various phases of software development process. The course provides detailed overview about the system analysis and design while discussing software development processes to help students understand the key activities in systematic engineering of software systems. Concepts and related techniques are covered that are used in each phase of the software development process. This includes requirements elicitation and analysis for gathering and elaborating software requirements specification, system modeling and architectural design, detailed design "" based on object-oriented concepts using the UML tools, implementation concerns and software testing methods to verify and validate the specifications. This course also introduces basic concepts of software project management, the importance of managing cost, schedule, and team management during a software development project. The course project aims to provide students with practical skills to analyze, design and develop real world software systems by exercising the software development process and project management techniques. The lab work is organized to enable the students to grasp the technical knowledge about using tools (e.g. Star UML, Gantt Charts, MS Project) and techniques required for conducting system analysis, design and testing of software systems.

Course Outcomes

After the completion of this course, the student will be able to:

- Recognize system development life cycle phases and various software development process models. [1, 7]
- Analyze problems systematically to formulate software requirements specifications. [1]
- Design software systems using requirements specification and software engineering principles. [1, 2]
- Create software systems while working in project teams and apply project management skills. [2, 5, 6]

Assessment Policy	Assignment	10%	Quiz	10%	Lab	15%	Project	15%
	Midterm	20%	Final	30%	Others	-		

Textbook

- Ian Sommerville, "Software Engineering" , 10th Edition, 2015, Pearson Education Limited, ISBN-13: 978-0133943030

Course Name	Electric Circuits				الدوائر الكهربائية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE221	0923221	4th	4 (3-3-3)	0923213 (Basic Electronics)
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

The main purpose of the course is to provide a comprehensive and clear coverage of basic electrical concepts and practical applications. This course focuses on DC and AC Circuits. This course will enable the students to analyze circuits using basic theorems and apply them to design and develop various electrical circuits.

Course Outcomes

After the completion of this course, the student will be able to:

- Define series and parallel resistive circuits and describe rules for voltage and current dividers. [1]
- Describe energy storage elements and their voltage-current relationships. [1]
- Analyze DC circuits using node-voltage and mesh current methods, Thevenin and Norton equivalent, Source transformation, maximum power transfer and superposition theorems. [1, 5, 6]
- Analyze AC circuits including Phasor steady-state sinusoidal circuit's analysis. [1, 5, 6]
- Elucidate responses of first order LR and LC circuits, and second order circuits. [1, 5, 6]

Assessment Policy								
	Assignment	5%	Quiz	10%	Lab	25%	Project	-
	Midterm	20%	Final	40%	Others	-		

Textbook	■ James W. Nilssen and Susan Riedle, "Electric Circuits", 12th Edition, Pearson (2022), ISBN: 9780137648160
References	■ Charles Alexander and Matthew Sadiku, "Fundamentals of Electric Circuits", 7th Edition. McGraw Hill (2021), ISBN: 9781260477672.

Course Name	Differential Equations				المعادلات التفاضلية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE222	0923222	4th	3 (3-0-6)	0923210 (Advanced Calculus)
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

This course aims to give mathematical foundations to the students to apply differential equations in Engineering perspectives. Topics include differential equations and their solutions, first-order differential equations, linear equations of higher order separable equations and singular solutions, applications of Laplace transform and introduction to partial differential equations.

Course Outcomes

After the completion of this course, the student will be able to:

- Define the terminologies associated with differential equations and their solutions. [1]
- Analyze the direction field associated with a first-order differential equation and be able to use a numerical method of solution. [1]
- Describe the analytical methods of solution by direct integration; separation of variables; and the integrating factor method. [1]
- Analyze real world scenarios to recognize when ordinary differential equations (ODEs) or systems of ODEs are appropriate. [1, 2]

Assessment Policy								
	Assignment	15%	Quiz	15%	Lab	-	Project	-
	Midterm	30%	Final	40%	Others	-		
Textbook	■ Dennis G Zill, "A First Course in Differential Equations with Modeling Application" Loyola Marymount University, 10th Edition, 2013.							
References	■ R. Kent Nagle, Edward B. Saff, and Arthur David Snide, "Fundamentals of Differential Equations", 9th Edition , Pearson Publication Year: 2018. ■ William E. Boyce, Richard C. Di Prima, Douglas B. Meade, "Elementary Differential Equations and Boundary Value Problems", 12th Edition, Wiley, (2021/2022).							

Course Name	Digital Logic and Design				المنطق الرقمي والتصميم
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE223	0923223	4th	4 (3-3-3)	0814132 (Physics)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

The main purpose of the course is to study the principles and techniques of modern digital systems. This course will focus on floating-point numbers, basic logic gates, logic expressions, simplification of logic functions using Boolean algebra rules and K-maps. The students will be able to analyze, design and implement various combinational and sequential circuits using logic gates and programmable logic devices.

Course Outcomes

After the completion of this course, the student will be able to:

- Define and describe basic concepts of digital systems and logic circuits: adders, subtractors, decoders, encoders, multiplexers, de-multiplexers. [3]
- Analyze Boolean expression to simplify logic circuits. [1]
- Design and develop various types of combinational and sequential logic circuits. [6]
- Reconstruct the logic circuits using Boolean Algebra and K-map. [1]
- Develop and analyze synchronous and asynchronous counter circuit [1, 6]

Assessment Policy	Assignment	-	Quiz	10%	Lab	20%	Project	10%
	Midterm	20%	Final	40%	Others	-		
Textbook	■ R. Tocci, N. Widmer, and G. Moss, "Digital Systems: Principles and Applications", 12th Edition, Pearson, 2022, ISBN: 978-1292162003.							
References	■ Thomas L. Floyd, "Digital Fundamentals", 11th edition, Pearson, 2022. ■ Banani Ghosh, "Basics of Digital Electronics", 1st edition, CRC Press / Routledge, 2024.							

Course Name	Numerical Analysis	التحليل العددي

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE224	0923224	4th	3 (3-0-6)	0923210 (Advanced Calculus)

Course Track	☐ University Requirement	☐ College Requirement	■ Specialized Core	☐ Elective

Course Description

This course aims to develop and understand of numerical methods aided by technology to solve algebraic, transcendental, and differential equations, and to calculate derivatives and integrals. The course will also discuss about the elements of error analysis for numerical methods. This course will further develop problem solving skills.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe how to solve a system of linear equations using direct and iterative methods. [1]
- Develop and Approximate functions by using methods of numerical interpolation. [1]
- Evaluate derivatives/integrals using methods of numerical differentiation/integration. [1]
- Analyze errors and rates of convergence of different numerical methods. [1]
- Demonstrate computer algorithms to implement different numerical methods. [1, 5, 7]

Assessment Policy								
	Assignment	15%	Quiz	15%	Lab	-	Project	10%
	Midterm	20%	Final	40%	Others	-		

Textbook	■ Steven Chapra , Raymond Canale, "Numerical Methods For Engineers" McGraw-Hill Education; 8th edition (March 3, 2020)

References	■ Timothy Sauer, "Numerical Analysis", Pearson; 3rd edition (October 30, 2017). ■ Kendall E. Atkinson, "Elementary Numerical Analysis", Wiley , 3rd Edition, 2012. ■ Dr. S. Nakamura, "Foundation of Numerical Analysis: Implementation with GNU Octave/Matlab", 2nd edition (February 25, 2016).

Course Name	Signals and Systems				الاشارات والنظم
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE310	0923310	5th	3 (3-0-3)	CS212 (Linear Algebra)
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

The main objective of this course is to study mathematical theories of responses of systems for variety of signals stimuli. This course discusses basics of signals, systems and their mathematical representations both in discrete-time and continuous-time domains. The course covers linear time invariant signals and their frequency response in Fourier, Laplace and Z domains. This course is a foundation course for different fields of engineering, such as feedback and control engineering, communication engineering, and digital signal processing.

Course Outcomes

After the completion of this course, the student will be able to:

- Obtain the response of a continuous/discrete LTI system by using convolution. [1]
- Use Fourier transform to outline frequency response of several functions. [1]
- Evaluate the Laplace transform and Z-transform for a continuous/discrete LTI. [1]
- Model linear time invariant systems and solve them using Laplace transform and Z-transform techniques. [1, 2, 7]
- Use modern engineering tools to simulate and solve linear systems. [1, 2, 7]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	15%
	Midterm	25%	Final	40%	Others	-		

Textbook	■ BP Lathi and Roger Green, "Linear Systems and Signals", 3rd Edition, Oxford University Press, 2022. ISBN: 978-0190200190.
References	■ Charles L. Phillips, John Parr, and Eve Riskin, "Signal, Systems, and Transforms", 5th Edition, 2013, Pearson. ISBN-13: 978-0133506471.

Course Name	Electronic Circuits				الدوائر الإلكترونية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE311	0923311	5th	4 (3-3-3)	CE221 (Electric Circuits)
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

The main purpose of the course is to provide a comprehensive understanding of electronic circuits and the related concepts. This course focuses on diodes, transistors, operational amplifiers and their applications. This course will enable the students to analyze and design various electronics circuits.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe basic concepts of Diodes, Transistors and Operational Amplifiers. [1]
- Describe operating principles of digital logic families (TTL, ECL, and CMOS circuits). [1]
- Design and analyze diode rectifiers and regulator circuits. [1, 2, 5, 6]
- Design and analyze BJT and FET amplifiers, and switching circuits. [1, 2, 5, 6]
- Design and analyze operational amplifiers circuits. [1, 2, 5, 6]

Assessment Policy	Assignment	5%	Quiz	10%	Lab	25%	Project	-
	Midterm	20%	Final	40%	Others	-		

Textbook	■ Adel S. Sedra and Kenneth C. Smith, “Microelectronic Circuits”, 8th Edition. Oxford University Press, 2019, ISBN: 978-0190853501.
References	■ Robert Boylestad, Louis Nashelsky, “Electronic Devices and Circuit Theory”, 11th Edition, Prentice Hall, 2013, ISBN: 978-0-13-262226-4.

Course Name	Technical Reports				كتابة التقارير التقنية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	IS312	0922312	5th	3 (3-0-6)	1722111 (Academic English)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

This course is designed to prepare students to develop their technical writing and presentation skills as needed to successfully conduct course projects as well as Co-op report and the graduation project. Unlike the Academic English course, this course focuses on the aspects of writing full-length papers and reports as well as making oral presentations in professional settings. The skills covered include: methods of planning, researching, organizing, designing and editing technical documents and presentations. The rhetorical strategy and the deductive organization found in computing discipline are particularly emphasized. This course will review in detail the function, the organization and the design of each part of technical documents of various types. This course introduces the basic techniques and methods for writing technical documents collaboratively with other students in the form of writing assignments including a major report on IT related topics like a graduation project. This course requires intensive writing, reading and participation in editing and peer-review as assignments, projects and exams.

Course Outcomes

After the completion of this course, the student will be able to:

- Apply technical information and knowledge in practical report and presentation for a variety of audiences (including technical, managerial and public). [3]
- Collect, analyze, document, and report technical information clearly, concisely, logically, and ethically using authentic source with proper citation, reference and acknowledgment. [1, 3, 4]
- Recognize, explain, and use the rhetorical strategies and the formal elements of these specific genres of technical communication: technical abstracts, data and system based research reports, instructional manuals, technical descriptions, web pages, wikis and blogs. [3]
- Practice the unique qualities of professional writing style, including sentence conciseness, readability, clarity, accuracy, honesty, avoiding wordiness or ambiguity and plagiarism, unbiased analysis, summarizing and coherence. [3, 4]
- Participate actively in writing activities (individually and in collaboration) that model effective scientific and technical communication in the IT workplace. [3, 5]

Assessment Policy								
	Assignment	25%	Quiz	-	Lab	-	Project	20%
	Midterm	15%	Final	35%	Others	5%		
Textbook	■ K. Woolever, "Writing for the Technical Profession" , 4th Edition, 2007, Longman. ISBN- 13: 978-0-321-47747-7.							
References	■ Gerald Alred, "Handbook of Technical Writing" , 10th Edition, 2011, St. Martin's Press. ISBN-13: 978-1250004413							

Course Name	Computer Organization and Architecture				معمارية الحاسب وتنظيم
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE313	0923313	5th	4 (3-3-3)	0923223 (Digital Logic and Design)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

The main objective of this course is to familiarize students about the basic structure and various functional modules of the computer system. It introduces the modern computer organization and architecture concepts and deals with instruction sets, CPU structure, memory system organization, system I/O and multiprocessors. The emphasis is on analyzing issues in architecture design and their impact on performance.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe the simple computer by explaining its basic organization. [1]
- Explain the different instruction set architectures and addressing modes. [1, 2]
- Elucidate memory hierarchy by defining different types of memory. [1, 2, 6]
- Discuss different Input / Output storage systems. [1, 2]
- Differentiate and analyze different parallel and multiprocessor architectures. [1, 2, 6]

Assessment Policy	Assignment	-	Quiz	10%	Lab	20%	Project	10%
	Midterm	20%	Final	40%	Others	-		
Textbook	■ Morris Mano, "Computer System Architecture", Revised 3rd Edition, 2017, Morgan Koufman, ISBN-13: 978-9332585607							
References	■ L. Null, "Essentials of Computer Organization and Architecture", 6th Edition, 2024, Jones & Bartlett Learning. ISBN-13: 978-1284259438. ■ D. A. Patterson, J. L. Hennessy, "Computer Organization and Design", 4th Edition, 2009, Morgan Kaufmann, ISBN-13: 978-0123744937. ■ William Stallings, "Computer Organization and Architecture: Designing for performance", 9th Edition, 2012, Pearson Education, ISBN-13: 978-0273769194.							

Course Name	Computer Security				حماية الحاسوب
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CS320	0921320	6th	3 (3-0-6)	0924214 (Fundamentals of Computer Networks)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

The course introduces the basic concepts of computer security and focuses on the need of computer security for keeping the systems and networks secure. The course begins with the introduction of objectives of computer security, and identifying threats and vulnerabilities. The course demonstrates implementation of system access control via authentication mechanism including password, token based, and biometric approaches. Furthermore, data access control techniques will be demonstrated that includes discretionary, mandatory, and role based access control; The types and counter measures of malicious code will be demonstrated. Concepts of cryptography including notion of public key, private key, classic cryptographic algorithms, digital signatures, key management, and cryptographic protocols will be taught. The network security fundamentals and basic concepts of firewalls, intrusion detection, and intrusion prevention systems, DoS attacks will be introduced. Finally, the students will learn the skills of security management including risk management and analysis, security plans, security policies, security audit, and legal aspects of security.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe security management & policy rules for organizations. [1]
- Explain system and data access control mechanism. [1]
- Analyze the tradeoffs of balancing key security properties (Confidentiality, Integrity, Availability). [2, 4]
- Identify and classify various types of vulnerabilities and threats that exist for computers and networks. [7]
- Practice encryption & decryption using variety of simple cryptographic algorithms. [7]

Assessment Policy								
	Assignment	15%	Quiz	10%	Lab	-	Project	15%
	Midterm	20%	Final	40%	Others	-		
Textbook	■ W. Stallings & L. Brown, "Computer Security, Principles and Practice" , 3rd Edition, 2015, Prentice Hall. ISBN-13: 978-0133773927.							
References	■ Rick Lehtinen, Deborah Russel, G.T. Gangemi, Sr., "Computer Security Basic" , 2nd Edition, 2006, O'Reilly Media. ISBN-13: 978-0-596-00669-3. ■ Charles P. Pfleeger, Shari Lawrence, Jonathan Marglies, "Security in Computing", 5th Edition, 2015, Prentice Hall. ISBN-13: 978-0134085043.							

Course Name	Operating Systems				نظم التشغيل
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CS321	0921321	6th	4 (3-3-3)	0923313 (Computer Organization and Architecture)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

This course aims to provide a strong foundation for students to understand the Operating System. It covers the main objectives, functions, evolution, characteristics and architectures of modern operating systems. In addition, process description and control including process definition, states, description and process synchronization will be illustrated. The needs for threads and relationship between processes and threads are demonstrated. Introduction to the Concurrency, mutual exclusion and deadlock concepts will be covered. Moreover, this course covers the main memory and virtual memory concepts, requirements, policies and techniques. Uni-processor scheduling and I/O scheduling concepts, algorithms and criteria will be explained. Finally, this course discusses the file and storage managements, security and protection. Lab sessions and projects in this course provide an in-depth experience with operating system internals through kernel programming to develop and test several data structures and algorithms.

Course Outcomes

After the completion of this course, the student will be able to:

- Explain the main concepts, objectives and functions of the typical and modern operating systems. [1]
- Describe the design of the process description and control and uni-processor and I/O scheduling algorithms. [1]
- Compare the structuring methods of the operating systems. [1]
- Differentiate the processes and threads concepts and their uses. [1]
- Discuss and analyze main memory and virtual memory concepts, policies techniques and uni-processor and I/O scheduling. [2, 6]
- Use Unix commands and kernel programming to develop and test several data structures and algorithms. [2, 6]

Assessment Policy								
	Assignment	-	Quiz	10%	Lab	20%	Project	10%
	Midterm	20%	Final	40%	Others	-		

Textbook

- Avi Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concept" , 10th Edition, 2018, John Wiley & Sons, Inc. ISBN- 978-1-118-06333-0

References

- William Stallings, "Operating Systems: Internals and Design Principle" , 9th Edition, 2017, Prentice Hall International. ISBN-13: 978-0134670959.
- Robert Love, "Linux Kernel Development" , 3rd Edition, 2010, Addison-Wesley Professional. ISBN-13: 978-0672329463.

Course Name	Professional Responsibility				المسؤولية المهنية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	IS322	0922322	6th	3 (3-0-6)	0816152 (Biology) and 0922312 (Technical Reports)
Course Track	☐ University Requirement ■ College Requirement ☐ Specialized Core ☐ Elective				

Course Description

This course introduces the students to the legal, social and ethical aspects of Information Technology and makes them understand selected codes of ethics and professional conducts to apply in real situations. In addition, it aims to foster student' ability to communicate, both in written and oral form, for the analysis and reporting of real situations indicating potential ethical problems in professional context. Topics included are: information rights, intellectual property rights, liability, accountability, privacy, security, cybercrime, ethical principles, codes of ethics, role of government, role of law enforcement, role of business and industry, professional conduct, and social responsibility. Students are required to read, write, discuss, and present reports on topics such as fraud and abuses, security, privacy protection, copyright and patent statute, communication decency, IT law as well as software engineering code of ethics.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe the social and ethical impacts of Information Technology. [1, 4]
- Describe the concept of rights and laws related to intellectual property, privacy and computer crimes. [1, 4]
- Make ethical decisions based on ethical principles, professional code of ethics and laws. [4]
- Analyze and report realistic ethical cases involving Information Technology in the professional context. [3, 4]
- Prepare ethical guidelines for Information Technology professionals. [3, 4]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	15%
	Midterm	25%	Final	35%	Others	5%		

Textbook	■ Sara Baase, Timothy Henry, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet" , 5th Edition, 2017, Pearson. ISBN-13: 978 0134615271
References	■ John P. Grillo, Ernest A. Kallman, "Ethical Decision Making & Information Technology: An Introduction with Case" , 2nd Edition, 1995, McGraw Hill. ISBN-13: 978-0134615271. ■ Michael J. Quinn, "Ethics for the Information Age" , 7th Edition, 2016, Pearson. ISBN-13: 978-0134296548. ■ Saudi Anti-Cyber-Crime Law: http://www.citc.gov.sa/English/RulesandSystems/CITCSyste/Documents/LA_0 04_%20E_%20Anti-Cyber%20Crime%20Law.pdf

Course Name	Embedded Systems	الأنظمة المدمجة

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE323	0923323	6th	4 (3-3-6)	0923313 (Computer Organization and Architecture)

Course Track: ☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective

Course Description

Introduction to embedded systems, Embedded hardware units and devices in a system, Microcontroller organization, Advanced processor architectures, Memory organizations and interfacing, CPU and bus systems, serial and parallel communication devices, Embedded programming techniques, Programming elements, Object oriented programming, Programming modeling concepts, development and debugging, Network and multi processors, inter process communication, synchronization of process, Real time operation systems, system design techniques and examples.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe microcontrollers, components of microcontrollers, and embedded systems. [1]
- Describe the special requirements for embedded systems. [1]
- Evaluate the interaction of microprocessor, memory, peripheral components and buses in an embedded system. [1, 7]
- Evaluate how architectural and implementation decisions influence the performance and power dissipation of the embedded systems. [1, 7]
- Optimize code for embedded systems. [6]

Assessment Policy								
	Assignment	5%	Quiz	5%	Lab	20%	Project	10%
	Midterm	20%	Final	40%	Others	5%		

Textbook

- Wayne Wolf, "Computers as Components: Principles of Embedded Computing System Design", Third Edition, Morgan Kaufmann, 2012.

References

- C. Noviello, Mastering STM32, 2nd ed. Leanpub, 2025. [Online]. Available: http://leanpub.com/mastering-stm32-2nd
- Getting-started-with-esp32, [online available] : https://randomnerdtutorials

Course Name	Practical (Co-op) Training				التدريب (التعاوني) العملي
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE330	0923330	After 6th	3	95 Credits Completed, CE223, CE311, and CE313
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

The Cooperative (Co-op) training program is a joint venture between King Faisal University and employers to better prepare students for employment upon graduation. The training must constitute a link between theoretical and scientific academic background with the work environment to provide a better understanding and a clear view of the real-world experiences. It also provides students with complementary knowledge and training such as confronting real world issues and working as part of a team. Co-op training is a 3-credit-hours course and is taken by those students who have completed at least 95 credit hours. Student must be oriented in one of the companies for a period of 24 weeks in the (Summer Semester + First Semester or Second Semester + Summer Semester), and well supervised by a faculty supervisor and a site supervisor, to accomplish the training objectives correctly. Courses to be completed before training for Computer Engineering students are:

- CE223: Digital Logic and Design (0923223)
- CE311: Electronic Circuits (0923311)
- CE313: Computer Organization and Architecture (0923313)

Course Outcomes

After the completion of this course, the student will be able to:

- Develop practical skills through real-world applications. [1, 2, 4]
- Apply acquired knowledge to different domains. [1, 2, 7]
- Relate the courses studied in the university with real world application. [1, 2, 4, 5]
- Relate the attitude and the manner of the work environment. [4, 5]
- Write a comprehensive report according to predetermined guidelines summarizing the training. [3, 4]
- Perform oral presentation to convey in a limited time, the range of experience obtained and the skills learned. [4]

Assessment Policy				
	Faculty Supervisor (Follow-up)	20%	Report	40%
	Site Supervisor Evaluation	30%	Presentation	10%
Textbook	■ No specific textbook for the course.			
References	■ No specific reference book for the course.			

Course Name	Project Proposal				مقترح مشروع
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE410	0923410	7th	2 (0-6-6)	Department Approval
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

In this course, students form a group of two to four members and choose an applied or theoretical project topic under the supervision of a faculty member. The course enables the students to apply the skills learned in other courses to define and analyze a computing problem, define its solution requirements, review related work, identify and compare candidate solutions and select/justify the chosen solution. A logical design is developed using the selected approach. The writing skills of students are developed and assessed from their project report, and oral communication skills are assessed through presentations. The students learn how to work in a group. Awareness of their ethical, professional and legal responsibilities in the society is also inculcated in the students through this course. The progress of students is monitored and evaluated by the supervisor and committee members at three milestones. Constant feedback is provided by the supervisor and two committee members to improve the quality of students' work.

Course Outcomes

After the completion of this course, the student will be able to:

- Analyze a theoretical or applied computing problem and develop its solution requirements. [1, 7]
- Design a computer based system or solution based on a set of requirements or goals. [1, 2]
- Work in a team to accomplish a common goal under time and design constraints. [5]
- Use written and oral communications skills to communicate with diverse audiences. [3]
- Practice professional, ethical, legal and social issues related with Computer Engineering discipline. [4]

Assessment Policy	Committee Evaluation	40%	Supervisor Evaluation	60%

Textbook	■ There is no single textbook for this course. The students are encouraged to select and read various related texts under the recommendation of their supervisor.
References	■ Jeremy T. Miner and Lynn E. Miner, "Proposal Planning & Writing", 5th Edition, 2013, Greenwood. ISBN-13: 978-1440829697. ■ Graduation Project Handbook, CCSIT, King Faisal University, 2013. ■ Christian Dawson, "Projects in Computing and Information Systems: A Student's Guide", 3rd Edition, 2015, Pearson. ISBN-13: 978-1292073460.

Course Name	Design and Modeling of Digital Systems	تصميم ونمذجة النظم الرقمية

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE411	0923411	7th	4(3-3-6)	0923313 (Computer Organization and Architecture)

Course Track ☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective

Course Description

This course introduces the principles, methodologies, and practical techniques used in the design and implementation of modern digital systems. The course covers hardware versus software design paradigms, design space exploration, digital design methodologies and design flows, and the design of combinational and sequential logic using Verilog HDL. Students learn synthesizable Verilog coding practices, including the proper use of blocking and non-blocking assignments, hardware synthesis, and implementation on programmable logic devices and FPGAs, with emphasis on Xilinx FPGA architectures. The course further explores design partitioning techniques, finite state machine (FSM) design, controller implementation, and microprocessor design. Performance analysis topics include clock frequency, throughput, latency, and factors affecting the speed of digital systems. Numerical computation techniques are examined through fixed-point (Q-format) arithmetic, including addition, multi-operand addition, multiplication, and Booth recoding multiplication. Additional topics include CORDIC-based computation of trigonometric functions and division, pipelined FIR filter design, and clock-domain crossing techniques using buffers and circular FIFOs. Through hands-on design exercises, FPGA implementation, and a comprehensive design project, students gain practical experience in modeling, synthesizing, verifying, and optimizing digital systems, culminating in a project demonstration and viva examination.

Course Outcomes

After the completion of this course, the student will be able to:

- Recognize the difference between various state of the art technologies ranging from software, hardware & hybrid architectures that form the basics of digital design space exploration and knowing the design steps. [1]
- Design advanced combinational and sequential circuits for digital systems. [2]
- Design the Micro-Architecture & planning for Design Partitioning (Data path FSM & Controller) for Digital Systems. [2, 7]
- Evaluate the specification of complex digital designs for the selection of a particular optimization scheme from either Latency, Throughput or Timings based optimization. [7]
- Use hardware description language (HDL) programming to implement digital systems on FPGAs. [6, 7]

Assessment Policy								
	Assignment	5%	Quiz	5%	Lab	20%	Project	10%
	Midterm	20%	Final	40%	Others	-		

Textbook

- Shoab A Khan, "Digital Design of Signal Processing Systems: A Practical Approach" , Wiley, 2011.

References

- M. Morris Mano and M.D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog", 6th Edition, Pearson, 2017.
- Morris Mano and Charles R. Kime, "Logic and Computer Design Fundamentals", Prentice Hall, ISBN: 013140539X, Latest Edition.
- Steve Kilts , "Advanced FPGA Design: Architecture, Implementation, and Optimization" August 2007, Wiley-IEEE Press.

Course Name	Computer Peripherals and Interfacing				التواصل مع طرفيات الحاسب
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE412	0923412	7th	4(3-3-6)	0923311 (Electronic Circuits), 0923313 (Computer Organization and Architecture)
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

Introduction to Microcomputer hardware systems and interface design, Hardware and software considerations in developing a microcomputer instrumentation and control system, Processor and Busses: PC Processor, Memory, I/O ports; Explanation of standard bus types: ISA, EISA, PCI, PXI busses, Introduction to IEEE 488 (GPIB) and RS-232 standards, Interrupts: Hardware and software interrupts, programmable interrupt controllers, interrupt service routines, DMA control and DMA controllers, Parallel Port Interfacing: Introduction to parallel port; Parallel port as output port; Parallel port as input port; applications involving programming for parallel port interfacing, Serial Port Interfacing: Introduction to serial port; Serial port as output port; Serial port as input port; Applications involving programming for serial port interfacing, USB Port Interfacing: Introduction to USB port; USB port as output port; USB port as input port; Applications involving programming for USB port interfacing, Data Acquisition using Plug-in Cards: Introduction to plug-in multifunction cards and their specifications. Signal conditioning and Analog to Digital Conversion. Digital to Analog (D/A) conversion and Analog to Digital (A/D) conversion. Interfacing digital inputs/outputs. Timers and Counters.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe the features and functions of different I/O peripheral devices and their interfaces. [1]
- Describe processor communication mechanisms including interrupts, DMA, and I/O techniques. [1]
- Design and develop programs for programmable peripheral devices by applying hardware interfacing, device connection, and interrupt-driven communication techniques in microcomputer systems. [2, 6]
- Analyze and design peripheral interfacing and communication solutions for different data transfer methods and system bottlenecks, including bus throughput evaluation and inter-bus communication mechanisms. [2, 7]
- Demonstrate teamwork and technical reporting skills during laboratory and project activities. [5, 6]

Assessment Policy								
	Assignment	5%	Quiz	5%	Lab	20%	Project	10%
	Midterm	20%	Final	40%	Others	-		

Textbook

- D. A. Patterson, and J.L. Hennessy, "Computer organization and design: the hardware/software interface", 5th Edition, Elsevier Morgan Kaufmann, 2014.

References

- 80X86 IBM PC and Compatible Computers Assembly Language, Design, and Interfacing Volumes I II (4th Edition) (Muhammad Ali Mazidi, Janice Gillispie-Mazidi)
- H.W. Huang, "PIC microcontroller: an introduction to software and hardware interfacing", Thomson/Delmar Learning, 2005.

Course Name	Project Implementation	تنفيذ مشروع

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE420	0923420	8th	3 (0-9-6)	0923410 (Project Proposal)

Course Track ☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective

Course Description

This course is the continuation of Project Proposal course completed in the previous semester. Students focus on the implementation of the Project Proposal they defended earlier by using the selected technology, methodology and approach. The implemented solution is generally tested and results are validated. These results are compared against the objectives and solution requirements identified during Project Proposal phase. The writing skills of students are developed and assessed through project report and oral communication skills are improved through presentations. The students learn how to work in a group. They also gain awareness of their ethical, professional and legal responsibilities in the society. The progress of students is monitored and evaluated by the supervisor as well as two committee members over two milestones during the semester. Necessary feedback is provided by the supervisor and committee members at each milestone to improve the quality of students' work.

Course Outcomes

After the completion of this course, the student will be able to:

- Develop and evaluate a computer-based system to meet a set of solution requirements. [1,2,6,8]
- Work in a team to accomplish a common goal under time and design constraints. [5]
- Use written and oral communication skills to communicate with diverse audience. [3]
- Practice professional, ethical, legal and social issues related with Computer Engineering discipline. [4]
- Test, validate, and evaluate the implemented system against requirements and objectives through iterative milestones. [6,8]

Assessment Policy	Committee Evaluation	40%	Supervisor Evaluation	60%

Textbook

- There is no single textbook for this course. The students are encouraged to select and read various related texts under the recommendation of their supervisor.

References

- Jeremy T. Miner and Lynn E. Miner, "Proposal Planning & Writing", 5th Edition, 2013, Greenwood. ISBN-13: 978-1440829697.
- Graduation Project Handbook, CCSIT, King Faisal University, 2013.
- Christian Dawson, "Projects in Computing and Information Systems: A Student's Guide", 3rd Edition, 2015, Pearson. ISBN-13: 978-1292073460.

Course Name	Selected Topics in CE				موضوعات مختارة في هندسة الحاسب
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE421	923421	1st	4 (3-3-3)	None
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

This course is an advanced course to include special topics that are newly emerging or applied in the area that are not covered in the normal curriculum. The aim of this course is to provide the students of computer engineering with an insight into newer trends in the field and to excite them to discover new knowledge and to apply it in their own domains.

Course Outcomes

After the completion of this course, the student will be able to:

- Recognize the new trends and technologies in computer engineering [1, 4, 7].
- Develop skills in collecting information about global issues in computing [1, 4, 7].
- Demonstrate team work and organization skills [3,5].
- Demonstrate skills in oral presentation and report writing [3,5].
- Research impact of new technology and analyze their potential for future applications. [3, 4, 7].

Assessment Policy								
	Assignment	5%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	5%		
Textbook	■ W. Burger and M.J. Burge, "Digital Image Processing An Algorithmic Introduction Using Java", Springer, 2nd Edition, 2023, ISBN:978-3031063435.							
References	■ M. Petrou and C. Petrou, "Image Processing: The Fundamentals", Wiley, 2nd Edition, 2025, ISBN: 978-0470745861. ■ I. Maglogiannis, L. Iliadis, A. Andreou, "Artificial Intelligence Applications and Innovations, Springer, 1st Edition, 2025, ISBN: 978-3031962271.							

Course Name	Parallel and Distributed Systems				النظم الموزعة و المتوازية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE422	0923422	8th	3(3-0-3)	0923313 (Computer Organization and Architecture)
Course Track	☐ University Requirement ☐ College Requirement ■ Specialized Core ☐ Elective				

Course Description

The main purpose of this course is to provide a comprehensive study of parallel and distributed systems concepts and designs. This course will focus on the principles of parallel and distributed systems and the implementation and performance issues associated with them. It enables the students to examine programming models/interfaces to parallel and distributed computing, inter-process communication, synchronization and consistency models, fault tolerance, and reliability. This course will also focus on distributed process management, parallel machine architectures, parallel program optimization, and the interaction of the compiler, run-time, and machine architecture.

Course Outcomes

After the completion of this course, the student will be able to:

- Define the fundamental concepts of parallel and distributed programming models. [1]
- Describe parallel and distributed computing architectures, including shared memory and message passing systems. [1]
- Apply parallel program optimization techniques and distributed resource management methods. [1,5]
- Explain fault tolerance, reliability, consistency, and coherence concepts in parallel and distributed systems. [1]
- Compare shared memory, message passing, remote procedure call (RPC), and global address space models in parallel and distributed computing environments. [1]

Assessment Policy								
	Assignment	10%	Quiz	15%	Lab	-	Project	10%
	Midterm	20%	Final	40%	Others	5%		

Textbook	■ Maarten van Steen, and Andrew S. Tanenbaum, “Distributed Systems”, 3rd Edition, 2020.
References	■ References Anantha Grama, George Karypis, Vipin Kumar, and Anshul Gupta, “Introduction to Parallel Computing”, 2nd Edition, Addison-Wesley, 2013. ■ Thomas Rauber, Gudula Reunger, “Parallel Programming For Multicore and Cluster Systems”, Springer 2013. ■ Darryl Gove, “Multicore Application Programming: for Windows, Linux, and Oracle Solaris”, Addison Wesley Professional, 2011.

Course Name	Computational Intelligence and Expert Systems				الذكاء الحوسبي والنظم الخبيرة
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE413	0923413	7th	3 (3-0-3)	MATH122 (Discrete Math)
Course Track	☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective				

Course Description

Computational Intelligence and Expert Systems (CIES) course introduces design and analysis of solutions for real-life problems that cannot be solved efficiently using classical methods. It deals with the approaches that identify appropriate representations and reasoning mechanisms for a problem and to implement and evaluate the solution. This course will offer the basic concepts of Artificial Intelligence (AI), different kinds of knowledge representations, search algorithms, learning paradigms, and expert systems. This course will enable the students to apply appropriate AI concepts and variety of search algorithms to develop efficient solutions for expert systems.

Course Outcomes

After the completion of this course, the student will be able to:

- Define the basic concepts of artificial intelligence and expert systems. [1]
- Outline standard algorithms for uncertainty and inconsistence in knowledge representation. [2]
- Interpret knowledge symbolically in a form suitable for automated reasoning such as procedural representations, predicate logic, semantic net and frame based approach. [2]
- Analyze and justify different planning and learning paradigms suitable for recent expert systems. [2]
- Demonstrate search problems and expert systems employing Lisp, PROLOG, MATLAB or Java programming. [2,6]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	-		

Textbook	
	■ Stuart J. Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 4th Edition, Pearson, 2022.
References	■ David L. Poole. Alan K. Mackworth - Artificial Intelligence_ Foundations of Computational Agents, 3rd Edition-Cambridge University Press (2023). ■ I. Gupta, G. Nagpal - Artificial Intelligence and Expert Systems-Mercury Learning & Information (2020). ■ Chowdhary K.R - Fundamentals of artificial intelligence-Springer (2020)

Course Name	Digital Signal Processing				معالجة الاشارات الرقمية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE414	0923414	7th	3 (3-0-6)	CE310 (signals and Systems)
Course Track	☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective				

Course Description

The aim of this course is to study the basic concepts of signal processing and to design and implement digital signal processing in the fields of electrical, communication and control engineering. The course discusses Linear Time Invariant (LTI) systems, frequency responses, Fourier Transforms, Z-Transforms, Fast Fourier Transforms, Discrete Time Fourier Transform, FIR and IIR Filters and their frequency and magnitude responses and system canonical forms.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe FIR, IIR filters, various Transforms and inverse transforms to meet specific magnitude and phase requirements. [1]
- Perform Fourier transform and inverse Fourier transform transforms using the definitions, Tables of Standard Transforms and Properties. [1]
- Perform Z and inverse Z using tables, Partial Fraction Expansion, and power series expansion. [1]
- Design digital filters and implement using Matlab. [1,2, 7]
- Elicit and analyze system requirements. [1, 2, 7]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	-		

Textbook

- J.G. Proakis, and D.G. Manolakis, "Digital Signal Processing", 5th Edition, Prentice Hall, 2021.

References

- E.C. Ifeachor, and B.W. Jervis, "Digital Signal Processing: A Practical Approach", 2nd Edition, Addison Wesley, 2001.
- Alan V. Oppenheim and Ronald W. Schafer, "Discrete Time Signal Processing", 3rd Edition, Pearson, 2010.
- Vinay K. Ingle and John G. Proakis, "Digital Signal Processing Using MATLAB", 3rd Edition, Cengage, 2011.

Course Name	Multimedia Networks and Applications				شبكات الوسائط المتعددة وتطبيقاتها
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CN415	0924415	7th / 8th	3 (3-0-6)	CN214 (Fundamentals of Computer Networks)
Course Track	☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective				

Course Description

Multimedia Networks and Applications is an introductory course to the architecture of multimedia networks designed to transport multimedia contents. The objective of this course is to provide an in depth details of various types of network architectures, protocols, and mechanisms designed especially to support multimedia content. This course examines and explores recent advances in multimedia networking technologies. Major topics include Multimedia(audio/video) compression and standards, multimedia Protocols, (RTP,RTCP,SIP), quality of service (QoS) support mechanisms and protocols, multimedia applications (e.g., IPTV, VOIP, Podcasting), streaming in peer-to-peer networks, and multimedia transport over wireless networks.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe multimedia compression techniques and standards. [1]
- Describe various types of network architectures, protocols, and mechanisms to support multimedia. [1]
- Define the key characteristics of multimedia transport over wireless networks. [1]
- Analyze the functionality of multimedia protocols and justify the functionality of multimedia applications. [1, 2]
- Design and implement multimedia solution(s) using the latest techniques and tools within a group. [2, 5]

Assessment Policy								
	Assignment	-	Quiz	15%	Lab	-	Project	15%
	Midterm	30%	Final	40%	Others	-		

Textbook	■ Multimedia Networks : Protocols, Design and Applications EPUB, Hans W. Barz, Gregory A. Bassett, January 2016.
References	■ Multimedia Networking From Theory to Practice, Jenq-Neng Hwang, University of Washington, ISBN:9780521882040, April 2009.

Course Name	Telecommunication Networks				شبكات الاتصالات السلكية واللاسلكية
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CN416	0924416	6th or 8th	3 (3-0-6)	CN214 (Fundamentals of Computer Networks)
Course Track	☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective				

Course Description

The purpose of this course is to develop the concepts of networking principles and techniques of design, implementation, and analysis of various telecommunication architectures. It includes the basis of voice, video and data communication, SONET/SDH, network architecture and its topologies, network design and basic queuing analysis, routing techniques, PSTN, broadband infrastructure, cellular networks, and introduction to telecommunication network management.

Course Outcomes

After the completion of this course, the student will be able to:

- Explain the general architecture of a Telecommunication Network and its importance in society. [1]
- Define the basic standards of telecommunication networks and its signaling protocols. [1]
- Evaluate problem solving approaches as applied in telecommunication networking domains. [1, 2]
- Demonstrate the characteristics of telephony, broadband and cellular systems. [2]
- Illustrate telecommunication network design techniques and its practical implementation issues. [2, 7]

Assessment Policy	Assignment	-	Quiz	10%	Lab	-	Project	25%
	Midterm	20%	Final	40%	Others	5%		

Textbook

- Fundamentals of Telecommunications by Roger L. Freeman, 2nd Edition, 2013, Wiley-IEEE Press. ISBN-13: 978-0-471-71045-5.

References

- Data Communications and Networking by Behrouz A. Forouzan, 5th Edition (Global Revised), 2012, McGraw-Hill. ISBN-13: 978-0-07-131586-9.
- Data and Computer Communication by William Stallings, 10th Edition, 2013, Pearson Education. ISBN-13: 978-0-133-50648-8.
- Communication Networks by Sheram Hekmat, 2005, Pragsoft Corporation. Online at http://www.pragsoft.com.

Course Name	Robotics	تصميم وتشغيل الإنسان الآلي

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE423	0923423	8th	3 (3-0-3)	CE313 (Computer Organization and Architecture)

Course Track ☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective

Course Description

This course aims to provide a hands-on approach to introduce the basic concepts in robotics. The course focuses on the fundamental concepts of robotics, including coordinate transformations, sensors, path planning, forward and backward kinematics, feedback and control for robotic operations. It will motivate the students to design, analyze and implement robotic operations.

Course Outcomes

After the completion of this course, the student will be able to:

- Define the basic concepts of robotics: coordinate transformations, end-effector configurations parameters, manipulators, robotic vision. [1]
- Describe the forward and reverse kinematic operations. [1]
- Design and develop various types of manipulator, tele robots and entertainment robots using Legos. [2, 8]
- Estimate the location and orientation parameters for forward and inverse kinematics. [1, 2]
- Develop vision based applications for robotic operations. [1, 2]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	-		

Textbook

- S.B. Niku, "Introduction to Robotics: Analysis, Control, Applications", 3rd Edition, Wiley, 2020.

References

- H.D. Taghirad, "Fundamentals of Roboics Applied case Studies with Matlab® & PYTHON, Taylor & Francis, 1st Edition, 2025.
- Peter Corke, Robotics Vision and Control Fundamental Algotithms in MATLAB®, Second Edition Robotics, 2022, ISBN 978-3-319-54412-0.

Course Name	VLSI Design	تصميم الدوائر المتكاملة ذات الكثافة العالية جداً

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE424	0923424	8th	3 (3-0-6)	CE411 (Design and Modeling of Digital Systems)

Course Track: ☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective

Course Description

The main objective of this course is to introduce the modern integrated circuit design and testing technology. This course will expose the students to MOS & BIOS circuits, and VLSI circuit design. The students will learn VLSI implementation of basic gates and subsystems like ALUs, shifters and adders. It will enable the students to estimate and optimize combinational circuit delays using RC delay models, understand the importance of CPLDs and FPGAs for implementing different logic functions, and demonstrate the fabrication of IC using cadence tools.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe IC technology, list of fabrication steps, and the advantages of BICOS technology. [1]
- Define the basic electrical properties of MOS and BICMOS circuits. [1]
- Compare CMOS and BIPOLAR Technologies. [6]
- Design the logic gates and counters, and ALUs. [2]
- Apply design rules to get Layout of IC. [1, 2]
- Calculate/compute electrical properties of MOS circuits. [1,2]
- Demonstrate the fabrication of IC using cadence tools and different strategies for testing of IC's. [2]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	-		

Textbook

- N.R. Chandrakasan, "Digital Integrated Circuits: A Design Perspective", Pearson Education India, 2017, ISBN: 978-9332573925.

References

- Sung-Mo Kang and Yusuf Leblebici, "CMOS Digital Integrated Circuits: Analysis and Design", 4th Edition, McGraw-Hill Education, 2016, ISBN: 978-0070380462.

Course Name	Image Analysis and Machine Vision				تحليل الصور والرؤيا بالحاسب
Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE425	0923425	8th	3 (3-0-6)	CE310 (Signals and Systems
Course Track	☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective				

Course Description

The main objective of this course is to introduce the fundamental concepts, techniques, and algorithms of image analysis, enhancement, segmentation and stereo vision. This course will focus on image digitization, data structures for image analysis, segmentation, shape representation and description. This will provide a solid foundation for students to apply image analysis techniques in image transformation, image compression and 3D vision.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe appropriate data structures for image representation [1].
- Evaluate the different image segmentation techniques [2].
- Analyze and interpret the different image enhancement and transformation techniques [2].
- Compare and contrast different lossless and lossy compression methods [1, 2].
- Illustrate the fundamental image analysis techniques for object recognition [1, 2].
- Demonstrate stereo vision algorithms to reconstruct the 3D scene [2].

Assessment Policy	Assignment	10%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	-		
Textbook	■ Gonzalez, R. & Woods, R., "Digital Image Processing", 4th edition, Prentice-Hall, 2018							
References	■ Gonzalez, R., Woods, R., & Eddins, S., "Digital Image Processing Using MATLAB", 3rd edition, Pearson, 2020							

Course Name	Computer Graphics	الرسم باستخدام الحاسب

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE426	0923426	8th	3 (3-0-3)	Math122 (Discrete Math)

Course Track ☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective

Course Description

This course aims to provide fundamental concepts of 2D and 3D computer graphics. Topics include basic image synthesis techniques, geometric transformations, projections, BÃ©zier and B-Spline functions for geometric modeling, animation, and rendering through ray tracing, shading and lighting. Students will use a standard computer graphics API in OpenGL to reinforce the concepts of computer graphics algorithms through projects.

Course Outcomes

After the completion of this course, the student will be able to:

- Evaluate line, circle, and ellipse drawing algorithms. [1,2]
- Define and describe 2D and 3D points by applying affine transformations.[1]
- Analyze curves and surfaces using both implicit and parametric forms. [2]
- Develop algorithms using OpenGL API for 2D and 3D graphics applications. [1,2]
- Compare and contrast the different rendering techniques like ray tracing, shading and lighting. [2]
- Interpret the transformations and clipping operations on 2D images. [2]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	-		

Textbook

- D. J. Eck, Introduction to Computer Graphics, ver. 1.4. Geneva, NY, USA: Hobart and William Smith Colleges, 2023. [Online]. Available: https://math.hws.edu/graphicsbook

References

- Hughes, J. F., van Dam, A., McGuire, M., Sklar, D., Foley, J., Feiner, S., & Akeley, K. (2021). Computer Graphics: Principles and Practice (3rd Edition). Addison Wesley.
- Marschner, S., & Shirley, P. (2021). Fundamentals of Computer Graphics (5th Edition). CRC Press.
- Munshi, A., Ginsburg, D., & Shreiner, D. (2021). OpenGL ES 3.2 Programming Guide (3rd Edition). Addison Wesley.
- Parisi, T. (2021). WebGL: Up and Running – A Fast, Easy Way to Learn WebGL. O'Reilly Media.
- Dirksen, J. (2020). Learning Three.js – The JavaScript 3D Library for WebGL (3rd Edition). Packt Publishing.

Course Name	Control Engineering	هندسة التحكم

Course Information	Code	No.	Level	Credit Hrs	Prerequisite(s)
	CE427	0923427	8th	3 (3-0-6)	CE222 (Differential Equations)

Course Track ☐ University Requirement ☐ College Requirement ☐ Specialized Core ■ Elective

Course Description

This course aims to introduce the principles and applications of control systems. It will provide comprehensive study of various systems exhibiting control mechanisms and understand their operations, relate mathematical representations in feedback control systems. It will enable the students to know the importance of a control system model and its applicability and motivate them to design the feedback controllers.

Course Outcomes

After the completion of this course, the student will be able to:

- Describe control systems and transfer functions of linear systems. [1]
- Describe root locus technique and frequency response methods. [1]
- Evaluate differential equations of physical systems. [1, 2]
- Analyze, design and evaluate feedback control systems. [1, 2]
- Apply control system theories to complex real world problems. [1, 2, 7]
- Evaluate root locus technique and frequency response methods. [1, 2]
- Demonstrate computer aided design applications. [1, 2]

Assessment Policy								
	Assignment	10%	Quiz	10%	Lab	-	Project	20%
	Midterm	20%	Final	40%	Others	-		

Textbook

- Richard C. Drof and Robert H. Bishop, "Modern Control Systems", 14th Edition, Pearson(2021), ISBN:9780137307098.

References

- Norman S. Nise, "Control Systems Engineering", 8th Edition, Wiley (2019), ISBN: 978-1119721406
- Farid Golnaraghi and Benjamin C.Kuo, "Automatic Control Systems", 10th Edition, McGraw Hill (2017), ISBN: 978-1259643842.

Final Note

This catalog reflects the academic structure, course content, and educational standards of the Bachelor of Computer Engineering program. It serves as a guide for students, faculty, and stakeholders, outlining the pathway toward academic and professional success.

The program remains committed to continuous improvement, innovation, and excellence in education to prepare graduates for leadership roles in the global technology landscape.

“Empowering Innovation, Engineering the Future.”

CONTACT INFORMATION

For further information, please contact:

Department of Computer Engineering
College of Computer Science and IT
King Faisal University
Al Ahsa - Eastern Province - Saudi Arabia
013-589-9219
cee.ccsit@kfu.edu.sa