Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic

Program and Course Description Guide

2024-2025

جامعة الموصل
كلية علوم الحاسوب والرياضيات
قسم البرمجيات

Academic Program Description Form

University Name: University of Mosul

Faculty /Institute: Collage of Computer Science and Mathematics

Scientific Department: Department of Software

Academic or Professional Program Name: Bachelor Science in Software

Final Certificate Name: Bachelor Science in Software

Academic System: Bolonga Process and Courses System

Description Preparation date:3/12/2024

File Completion Date: 8/12/2024

Signature

Head of Department Name:

Asst. Prof Dr.Naktal Moaid Edan

Date: 5/1/2025

Signature

Scientific Associate Name:

Prof Dr. Safwan Omar Hasoon

Date: 7/1/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department

Date: 7/1/2025

Signature:

Dr. Ibrahim Muhmmad Ahmed

كلية علوم الحاسوب والرياضيات
جامعة الموصل
مكتب العميد
DEAN OFFICE
University Of Mosul
College of Computer Science and Mathematic

Approval of the Dean

Prof.Dr. Dhuha Basheer Abdullah

7/1/2025

كلية علوم الحاسوب والرياضيات
Quality Assurance
شعبة ضمان الجودة وتقويم الاداء

Academic Program Description Template

Performance Review of Higher Education Institutions (Academic Program Review)

Academic Program Description

The Academic Program Description provides a concise overview of the program's key features and the expected learning outcomes that students are anticipated to achieve, demonstrating whether they have effectively utilized the available learning opportunities. The description is accompanied by detailed information for each course within the program.

1.	Educational Institution	College of Computer Science and Mathematics / University of Mosul
2.	Department / Centre	College of Computer Science and Mathematics / Department of Software Sciences
3.	Name of the Academic Program	Bachelor of Science in Software Sciences
4.	Name of the Final Degree	Bachelor
5.	Study system	Credit Hour System + Bologna System
6.	Accredited Accreditation Program	Academic Accreditation
7.	Other External Influences	
8.	Centralized Examinations	
9.	Date of Description Preparation	

1.	**Academic Program Objectives** **1. To prepare specialized cadres capable of fulfilling the requirements of the labour market in both the public and private sectors within the fields of Software Engineering and Information Technology, through diversification of learning and teaching methods, and training students to apply acquired knowledge and skills to solve real-world problems.** **2. To create a conducive environment that enables students to apply their knowledge and skills in identifying community needs and issues, as well as social matters related to Software Engineering and Information Technology.** **3. To provide distinguished academic programs in the field of Software Engineering, combining theoretical and practical applications, in accordance with academic quality standards, and addressing labour market needs.** **4. To encourage and promote scientific research in the fields of Software Engineering and Information Technology.** **5. To establish a stimulating environment for faculty members to develop their educational and research skills.**

	6. To build and develop partnerships with governmental, private, and community sectors, along with various institutions within society.
2.	**Intended learning outcomes, teaching and learning methods, and assessment**
A.	Knowledge and Understanding **1. The student learns programming languages.** **2. The ability to develop scientific solutions to societal problems through programming.** **3. Developing the student's skills in building intelligent systems based on analysis and inference.** **4. Providing the student with the foundational principles of constructing software systems based on software engineering fundamentals.** **5. Enhancing the student's knowledge of the fundamentals of implementing software systems by understanding computer mechanisms**
B.	Subject-Specific Skills **1. Theoretical** **2. Practical** **3. Summer Training** **4. Graduation Research**
C.	Teaching and Learning Methods **1. Traditional blackboard** **2. Interactive whiteboard** **3. Data projector**
D.	Assessment Methods **1. Centralized and monthly examinations** **2. Daily quizzes** **3. Scientific reports** **4. Practical examinations** **5. Research projects**
E.	Thinking Skills **1. Deduction and analysis skills** **2. Comparative skills** **3. Discussion skills** **4. Computer and internet usage** **5. Research and investigation** **6. Conducting research and drawing conclusions** **7. Decision-making**
F.	Teaching and Learning Methods **1. Theoretical lectures** **2. Practical laboratories** **3. Research and investigation** **4. Discussion groups within practical sessions**
G.	Assessment Methods **1. Written examinations** **2. Research projects** **3. Summer course discussions** **4. Evaluation of assignments and discussions**

	5. Assessment of individual and group research
H.	**General and Transferable Skills (Other Skills Related to Employability and Personal Development)** 1. Developing the ability to work effectively in teams 2. Developing self-directed learning skills 3. Enhancing the ability to present and discuss ideas 4. Developing systematic problem-solving skills
I.	**Teaching and Learning Methods** 1. Cooperative learning 2. Group discussions 3. Individualized instruction 4. Lectures, laboratory experiments, practical applications, homework assignments, and scientific discussions
J.	**Assessment Methods** 1. Observing student interactions in various contexts 2. Presenting real-world issues/problems and evaluating students' programming-based approaches 3. Evaluating group and individual work 4. Addressing summer training challenges through graduation projects

Certifications and module Hours	

Planning for Personal Development 1. Through student scientific conferences 2. Departmental seasonal scientific seminars 3. Faculty discussion circles 4. Research circles
Centralized Admission through the Ministry of Higher Education and Scientific Research: **According to the regulations set by the Ministry of Higher Education and through the centralized admission system, based on the approved admission criteria determined by the university and college according to the student's preference for applying to the department.**
Key Program Information Resources: • Curriculum textbooks • Faculty lectures

Curriculum Skills Map

Please mark (✓) in the boxes corresponding to the individual module learning outcomes being assessed

	Module Code	Module Name	Core or Elective	Knowledge and Comprehension		Subject-Specific Skills Thinking Skills General and Transferable Skills (or) Other Skills Related to Employability and Personal Development					
Year 1 / Course 1	CMSWU1101	Human Rights	Core	✓		✓		✓		✓	
	CMSWU1102	Computer Organization (1)	Core	✓		✓		✓		✓	
	CMSWU1103	Computer Applications	Core	✓		✓		✓		✓	
	CMSWU1104	Mathematics (1)	Core	✓		✓		✓		✓	
	CMSWU1105	Discrete Structures	Core	✓		✓		✓		✓	
	CMSWU1106	Algorithms and Structured Programming Using C (1)	Core	✓		✓		✓		✓	
Year 1 / Course 2	CMSWU1201	English Language	Core	✓		✓		✓		✓	
	CMSWU1202	Computer Organization (2)	Core	✓		✓		✓		✓	
	CMSWU1203	Computer Statistics	Core	✓		✓		✓		✓	
	CMSWU1204	Mathematics (2)	Core	✓		✓		✓		✓	
	CMSWU1205	Computability Theory	Core	✓		✓		✓		✓	
	CMSWU1206	Algorithms and Structured Programming Using C (2)	Core	✓		✓		✓		✓	

Curriculum Skills Map

Please mark (✓) in the boxes corresponding to the individual module learning outcomes being assessed

	Module Code	Module Name	Core or Elective	Knowledge and Comprehension		Subject-Specific Skills Thinking Skills General and Transferable Skills (or) Other Skills Related to Employability and Personal Development					
Year 2 / Course 1	CMSWU2101	Algorithms Using python (1)	Core	✓		✓		✓		✓	
	CMSWU2102	Introduction to Software Engineering (1)	Core	✓		✓		✓		✓	
	CMSWU2103	Object oriented python (1)	Core	✓		✓		✓		✓	
	CMSWU2104	Systems Software (1)	Core	✓		✓		✓		✓	
	CMSWU2105	Database management	Core	✓		✓		✓		✓	
	CMSWU2106	English Language	Core	✓		✓		✓		✓	
	CMSWU2107	Numerical Methods	Core	✓		✓		✓		✓	
	CMSWU2108	Freedoms	Core	✓		✓		✓		✓	
Year 2 / Course 2	CMSWU2201	Algorithms Using python (2)	Core	✓		✓		✓		✓	
	CMSWU2202	Introduction to Software Engineering (2)	Core	✓		✓		✓		✓	
	CMSWU2203	Object oriented python (2)	Core	✓		✓		✓		✓	
	CMSWU2204	Systems Software (2)	Core	✓		✓		✓		✓	
	CMSWU2205	Design of distributed Database	Core	✓		✓		✓		✓	
	CMSWU2206	Simulation and Computer Modelling	Core	✓		✓		✓		✓	

Curriculum Skills Map

Please mark (✓) in the boxes corresponding to the individual module learning outcomes being assessed

	Module Code	Module Name	Core or Elective	Knowledge and Comprehension		Subject-Specific Skills Thinking Skills General and Transferable Skills (or) Other Skills Related to Employability and Personal Development					
Year 3 / Course 1	CMSWU3101	Artificial Intelligence	Core	✓		✓		✓		✓	
	CMSWU3102	Compilers Design	Core	✓		✓		✓		✓	
	CMSWU3103	Software Project Management (1)	Core	✓		✓		✓		✓	
	CMSWU3104	Software requirements	Core	✓		✓		✓		✓	
	CMSWU3105	Computer Architecture	Core	✓		✓		✓		✓	
	CMSWU3106	Computer Network and Internet	Core	✓		✓		✓		✓	
	CMSWU3107	Files Processing	Core	✓		✓		✓		✓	
	CMSWU3108	English Language	Core	✓		✓		✓		✓	
Year 3 / Course 2	CMSWU3201	Intelligent techniques	Core	✓		✓		✓		✓	
	CMSWU3202	Software engineering tools	Core	✓		✓		✓		✓	
	CMSWU3203	Software Project Management (2)	Core	✓		✓		✓		✓	
	CMSWU3204	Websites Engineering	Core	✓		✓		✓		✓	
	CMSWU3205	Software fault tolerance	Core	✓		✓		✓		✓	
	CMSWU3206	Operating Systems	Core	✓		✓		✓		✓	
	CMSWU3207	Teaching Methods	Core	✓		✓		✓		✓	

Curriculum Skills Map

Please mark (✓) in the boxes corresponding to the individual module learning outcomes being assessed

	Module Code	Module Name	Core or Elective	Knowledge and Comprehension		Subject-Specific Skills Thinking Skills General and Transferable Skills (or) Other Skills Related to Employability and Personal Development					
Year 4/ Course 1	CMSWU4101	Information Security	Core	✓		✓		✓		✓	
	CMSWU4102	Software development techniques	Core	✓		✓		✓		✓	
	CMSWU4103	Image and signal processing (1)	Core	✓		✓		✓		✓	
	CMSWU4104	Software Reliability	Core	✓		✓		✓		✓	
	CMSWU4105	Design of Real Time Systems (1)	Core	✓		✓		✓		✓	
	CMSWU4106	English Language	Core	✓		✓		✓		✓	
	CMSWU4001	Project (Semester1)	Core	✓		✓		✓		✓	
Year 4 / Course 2	CMSWU4201	Computer Network Security	Core	✓		✓		✓		✓	
	CMSWU4202	Open-Source Software	Core	✓		✓		✓		✓	
	CMSWU4203	Software Quality Assurance	Core	✓		✓		✓		✓	
	CMSWU4204	Image and signal processing (2)	Core	✓		✓		✓		✓	
	CMSWU4205	Design of Real Time Systems (2)	Core	✓		✓		✓		✓	
	CMSWU4001	Project (Final)	Core	✓		✓		✓		✓	

Ministry of Higher Education and Scientific Research

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor’s 2023-2024)

Module Title	Computer Organization (1)
Module Code	CMSWU1102
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. Understanding Digital Systems: Learn and understand the core principles of digital systems and how they function. 2. Binary Logic Mastery: Gain a clear understanding of binary logic and how it forms the basis for digital computing and design. 3. Comprehension of Logic Gates: Understand the functioning of basic logic gates (AND, OR, NOT) and more complex gates (NAND, NOR, XOR, XNOR), as well as how to combine these gates to create digital circuits. 4. Boolean Algebra Proficiency: Develop a strong understanding of Boolean algebra, including how to simplify Boolean expressions and how these expressions are used in logic design. 5. Sequential and Combinational Logic: Learn the difference between sequential and combinational logic, and how to design circuits using each type of logic. 6. Logic Minimization Techniques: Understand and apply logic minimization techniques, such as Karnaugh maps and Quine-McCluskey method, to simplify logic designs.
Material Covered	1. Numbering systems_1 (Decimal, Binary, Octal and Hexadecimal) 2. Numbering systems_2 (Decimal, Binary, Octal and Hexadecimal) 3. Base conversion (Decimal, Binary, Octal and Hexadecimal) 4. Base conversion (Gray code) 5. Base conversion (BCD, EX-3, 2421) 6. Arithmetic Operation (Addition) 7. Arithmetic Operation (Subtraction: Normal, 1's complement, 2's complement) 8. Arithmetic Operation (Multiplication) 9. Arithmetic Operation (Division) 10. Basic logic gates_1 11. Basic logic gates_2 12. Logic circuit simplification using Boolean algebra_1 13. Logic circuit simplification using Boolean algebra_2 14. Logic circuit simplification using Karnaugh map_1 15. Logic circuit simplification using Karnaugh map_2
Required Texts	M. M. Mano,2016, “Digital Design”, Prentice Hall Thomas l. Floyd, 2006, “Digital Fundamentals”, Prentice Hall

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Computer Applications (1)
Module Code	CMSWU1103
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. Understand the two essential components of a computer system: hardware and software. 2. Gain knowledge about different hardware components, including input and output devices, storage devices, CPU, motherboard, and RAM. 3. Comprehend the role of software in computer operation, distinguishing between system software and application software. 4. Learn how hardware components work together to process data and execute software instructions. 5. Gain proficiency in basic file and folder operations such as renaming files, copying and pasting files, sorting files, searching for files, and organizing files in folders and subfolders. 6. Learn how to format a removable device. 7. Understand the concepts of the Internet, World Wide Web (WWW), and email. 8. Gain knowledge about different types of computer networks and their significance in the development of the Internet. 9. Explore the history of computer networks and how they evolved to become popularly known as the Internet and the Web. 10. Familiarize students with web browsers, their tools, and search engines for effective web browsing and information retrieval. 11.
Material Covered	1. Understand the two essential components of a computer system: hardware and software. 2. Gain knowledge about different hardware components, including input and output devices, storage devices, CPU, motherboard, and RAM. 3. Comprehend the role of software in computer operation, distinguishing between system software and application software. 4. Learn how hardware components work together to process data and execute software instructions. 5. Gain proficiency in basic file and folder operations such as renaming files, copying and pasting files, sorting files, searching for files, and organizing files in folders and subfolders. 6. Learn how to format a removable device. 7. Understand the concepts of the Internet, World Wide Web (WWW), and email. 8. Gain knowledge about different types of computer networks and their significance in the development of the Internet. 9. Explore the history of computer networks and how they evolved to become popularly known as the Internet and the Web.
Required Texts	• Computer Organization and Design" by David A. Patterson and John L. Hennessy

	- Computer Architecture: A Quantitative Approach" by Joh Hennessy and David A. Patterson

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Mathematics
Module Code	CMSWU1104
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. Provide the basic base for the elementary types of coordinates and applications. 2. Integration of algebraic functions and transcendental functions and the application of integrals to solve problems of mathematics, engineering and physics. 3. The student learned matrices and learned the properties of matrices 4. The student's ability to calculate a system of equations using matrices 5. Learn sequences and series.
Material Covered	1. Integration: Introduction of Integrations, Types of integrations, Integrations of special functions, such as: 2. Algebraic functions, celling and floor functions. 3. Trigonometric functions, Natural logarithm function, Exponential function, Exponential and Logarithmic function bases other than e. 4. Hyperbolic functions, Inverse of trigonometric functions, Inverse of hyperbolic functions. 5. Techniques of integration: Integration using substitution, Integration by parts, Integration of Trigonometric (power, product). 6. Trigonometric substitutions, Rational functions and partial fractions. 7. Rationaling substitutions, Integration of rational function in sine and cosine, Integral by hyperbolic substation. 8. Mid-term Exam + Improper Integral, Comparison test for improper Integrals, King property integration. 9. Applications of integration: Definition of Areas and types of areas, Definition Volumes, Types of volumes. 10. Matrices 11. Properties of matrices and finding the determinant 12. inverse of the matrix 13. System of linear equations using matrices. 14. Maclaurin polynomial 15. Introduction about Sequences, formula of sequences, types of sequences 16. Introduction of polynomials, Maclaurin polynomial, Taylor polynomial. 17. Preparatory week before the final Exam
Required Texts	- THOMAS' CALCULUS, 4th edition, 2018 - BY: GEORGE B. THOMAS, JR., JOEL HASS, CHRISTOPHER HEIL and MAURICE D. WEIR - CALCULUS, 9th edition, 2020 - BY: JAMES STEWART, DANIEL CLEGG and SALEEM WATSON.

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Discrete structures
Module Code	CMSWU1105
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. The course aims to study discrete structures in terms of the use of algebraic laws. 2. Charts and shapes 3. To reach an easy and clear way for students 4. To solve all material issues related to discontinuous structures. 5. In addition to studying quantifiers and predicates logic 6. Studying the different groups, theories and schemes so that the student can solve the duties required of him and the exercises with simplicity, ease and clarity.
Material Covered	1. Definition to discrete structure 2. Biconditional statement, Type of statements 3. Algebra propositions 4. Laws of Algebra propositions 5. Define of Predicates logic 6. Define quantifiers and examples 7. Sets theory 8. Type of set operation 9. Venn diagram in detail 10. Laws of set operation and type 11. Define of Cartesian product 12. types of relations 13. Graphs of relation, construct the relation 14. How to solve laws of relations 15. Other approaches to computability 16. Preparatory week before the final Exam
Required Texts	Discrete Mathematics and Its Applications_7th_Edition

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor’s 2023-2024)

Module Title	Algorithms and Structured Programming using C (1)
Module Code	CMSWU1106
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. To develop problem solving skills and understanding of programing through the application of instruction. 2. To understand input, output instruction. 3. This course deals with the basic operation in any program code. 4. This is the basic subject for all programs. 5. To understand how to analysis any problem to solve it by programs. 6. To perform as a good programmer.
Material Covered	1. Introduction - simple sequential flowchart 2. branched flowchart 3. Identifier names, variables and data types 4. Input and output statements 5. Operators (arithmetic, relational and logical) 6. precedence of operator 7. The control statements (first type) 8. Nested control statement 9. The control statements (second type) 10. Looping, for (first type) 11. Looping, while (second type) 12. Looping, do…. While (third type) 13. Nested loops 14. Statement working with loop 15. Functions (Simple function)
Required Texts	C++ from control structures through objects, eighth edition, by Tony Gaddis

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	English Language
Module Code	CMSWU1201
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. To Develop English skills by listening and writing . 2. Learning English and conversation training 3. Conversations in English in the field of computers (Information Technology). 4. The student receives all the information about the computer and at the same time learns and trains the correct pronunciation in this language. 5. Conversations between students about everything related to Information Technology.
Material Covered	1. Working in the IT industry/ meeting people+ listen, language and vocabulary. 2. Working in the IT industry/ Jobs in IT+ listen, reading, writing, speaking and vocabulary. 3. Working in the IT industry/ Schedules + listen, reading, writing, speaking and vocabulary. 4. Working in the IT industry/ Spelling + listen, reading, writing, speaking and vocabulary. 5. Computer systems / computer hardware + listen, reading, writing, speaking and vocabulary. 6. Computer systems / computer Software + listen, reading, writing and vocabulary. 7. Computer systems / work with computers + listen, reading, writing, speaking and vocabulary. 8. Computer systems / computer usage + listen, reading, writing, speaking and vocabulary. 9. Website purpose/ talk about website + listen, reading, writing, speaking and vocabulary. 10. Website analytics/ Getting information about websites + listen, reading, speaking and vocabulary. 11. Website development / Developing a website + listen, reading, writing, speaking and vocabulary. 12. Database basics / Understanding database products + listen, writing, speaking and vocabulary. 13. Data processing / describing data processing steps + listen, reading, speaking and vocabulary. 14. Data storage and back-up / talking about data storage and devices + listen, reading and writing. 15. Database systems benefits / using data in company departments + listen, speaking and vocabulary. 16. Preparatory week before the final Exam
Required Texts	English for information technology , 1 vocational English, course book, Maja Olejniczak, series editor David Bonamy.

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor’s 2023-2024)

Module Title	Computer Organization (2)
Module Code	CMSWU1202
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	6. Design and Analysis: Gain the ability to design and analyze various types of digital circuits, including adders, multiplexers, decoders, memory units, and more. 7. Understanding of Flip Flops and Memory Elements: Develop a comprehension of various types of flip-flops and memory elements and understand their use in creating larger systems such as registers and counters. 8. Problem-Solving Skills: Enhance problem-solving skills, critical thinking, and creativity in the context of digital logic design.
Material Covered	17. Digital logic design circuits - 1 18. Digital logic design circuits - 2 19. Arithmetic circuits (Adders) 20. Arithmetic circuits (Subtractors) 21. Arithmetic circuits (Multiplication) 22. Comparators 23. Digital logic design circuits using arithmetic components 24. Decoders 25. Encoders 26. Multiplexers 27. De-Multiplexers 28. Latches and Flip Flops - 1 29. Latches and Flip Flops - 2 30. Asynchronous counters 31. synchronous counters
Required Texts	M. M. Mano,2016, “Digital Design”, Prentice Hall Thomas l. Floyd, 2006, “Digital Fundamentals”, Prentice Hall

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Algorithms and Structured Programming (2)
Module Code	CMSWU1206
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. To develop problem solving skills and understanding of programing through the application of instruction. 2. To understand the function, arrays, structures and files instruction. 3. This course deals with the basic operation in any program code. 4. This is the basic subject for all programs. 5. To understand how to analysis any problem to solve it by programs. 6. To perform as a good programmer.
Material Covered	1. Review of the simple function 2. Default argument function 3. Recursive function 4. Call by reference function 5. one Dimensional Array 6. Two-Dimensional Array 7. String of characters 8. Function to manipulate strings 9. Structures 10. Array of structures 11. Nested structure 12. Files 13. Files working with characters 14. Files working with string 15. fread and fwrite instruction
Required Texts	C++ from control structures through objects, eighth edition , by Tony Gaddis

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Introduction to Software Engineering (1)
Module Code	CMSWU2102
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. Defining what software engineering is and its special terminology in this field. 2. Study of software development life cycle models with their advantages and disadvantages. 3. Focus on the requirements-gathering stage.
Material Covered	1. Introduction – What is Software engineering 2. Software engineering terminology, its importance, and its difference from other engineering sciences 3. Software Application 4. Goals of Software Engineering and The Process Framework 5. Software Development Life Cycle (SDLC) Models 6. Exam 1 7. Software Project Management 8. Resources and Software Risks 9. Software Project Estimation 10. Project Scheduling 11. Exam2 12. Requirement Engineering 13. Requirement Modeling Approaches 14. Software Requirement Specification (SRS) 15. An Example of (SRS)
Required Texts	• Roger, S. Pressman, and R. Maxin Bruce. Software engineering: a practitioner's approach. McGraw-Hill Education, 2019. • Mall, Rajib. Fundamentals of software engineering. PHI Learning Pvt. Ltd., 2018.

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Object-Oriented Programming (1)
Module Code	CMSWU2103
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. How to write readable, reusable, and modular code. 1. Fundamental object-oriented programming concept. 2. Apply OOP concepts to your Python code. 3. Promotes students to enhance their coding ability.
Material Covered	1. Introducing Programming Concepts 2. Arithmetic, logic, and comparison Operations 3. Introducing Lists, and control statements 4. Dictionaries, Accessing, Adding and Modifying Values 5. Functions (Defining Functions, Passing Arguments, Return Values) 6. Functions, Modules, Bug Busting and Exceptions 7. Classes and Objects (Creating and Using a Class) 8. Classes and Objects (Inheritance) 9. Classes and Objects (Examples on Class Inheritance) 10. Classes and Objects (Importing Classes and Modules) 11. Python Standard Library –Part 1 12. Python Standard Library –Part 2 13. Files and Exceptions 14. Testing code (Testing Functions) 15. Testing code (Testing Classes) 16. Preparatory week before the final Exam
Required Texts	• How to Think Like a Computer Scientist: Learning with Python • Python Crash Course, 2nd Edition. Copyright © 2019 by Eric Matthes.

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Object-Oriented Programming (1)
Module Code	CMSWU2103
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. Reviewing the architecture and internal organization of the 8086 microprocessors, including registers, flags, and memory addressing modes. 2. Learn about the structure and organization of instructions in the 8086 microprocessors, including instruction formats. 3. Reviewing various addressing modes in the 8086 microprocessor and learning how to effectively access data from different memory locations. 4. Develop a deep understanding of instruction encoding schemes for different instructions in the 8086 microprocessors. 5. Acquire knowledge of two-pass assembler and one-pass assembler concepts and their role in software systems. 6. Understand the purpose and role of a loader in the execution of computer programs. 7. Learn about the different types of loaders and their functions. 8. Familiarize Students with the basic concepts and terminology related to loaders. 9. Gain a comprehensive understanding of absolute loaders and their operation.
Material Covered	1. Introduction - Review about Signed & Unsigned Numbers, Multiplication & division, and Floating Point Numbers Representation 2. Review about Register Addressing, Immediate Addressing and Memory Addressing. 3. Three-Address Instructions, Two-Address Instructions, One-Address Instructions And Zero-Address Instructions 4. Assembly language in _ASM blocks within C/C+-01 5. Assembly language in _ASM blocks within C/C+-02 6. Classification of instruction, and converting assembly language instructions into machine code-01 7. Classification of instruction, and converting assembly language instructions into machine code-02 8. Mid-term Exam-01 9. One assembler algorithm supported with examples 10. Two-pass assembler algorithm supported with examples 11. Introduction to Loader, Absolute Loader, and Relocating Loader . 12. Introduction to Linker: Linking Loader and Linkage Editor. 13. Macro processor In Assembly Language 14. Macro Operators. 15. Mid-term Exam-02 16. Preparatory week before the final Exam.
Required Texts	• The 8086 Microprocessor: Architecture, Programming, and Interfacing" by Kenneth Ayala. • The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II,

	Pentium III, Pentium 4, and Core2 with 64-bit E Barry B. Brey.

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor’s 2023-2024)

Module Title	Numerical Methods
Module Code	CMSWU2107
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The main objective is for the student to possess capabilities related to the knowledge and skills he acquires through the vocabulary of the theoretical scientific material and practical application. As the student, after completing the numerical methods course in the software section, will have, and learn about the numerical methods used in solving nonlinear equations, complementation, integration, and solving equations and their types. An ability to apply knowledge of computing and mathematics in the field of specialization and in the labor market. The possibility of analyzing problems, determining the appropriate computing requirements, and defining them in order to solve them. And have a distinguished style in designing, implementing and evaluating computer-based systems, processes, components or programs, to meet the required needs in the field of specialization and be able to work effectively in groups to achieve common goals and to serve the public or private sector, and investment companies.
Material Covered	1. Introduction to Numerical methods & least interval: 2. Error Analysis: Absolute & relative Error 3. Truncation Error. & relative Error 4. The Solution of Non-Linear fun: Mid-point 5. The Solution of Non-Linear fun: FP & NR. 6. The Solution of Non-Linear fun. 7. The Solution of Linear System AX=B: direct method, Inverse of a Matrix Method 8. The Solution of Linear System AX=B, d: Gauss Elimination Methods 9. The Solution of Linear System AX=B, Iterative Method: Jacobi iterative Method 10. Interpolation & Extrapolation: Numerical Differentiation 11. Interpolation Method: Lagrane Polynomial Method & Inverse Interpolation Method 12. Numerical Integration: Simpson & Trapezoidal Rules 13. Introduction to The Solution Of ordinary DE: The Solution Of DE: Euler's Method 14. The Solution Of DE: Rung-Kutta Method 15. Preparatory week before the final Exam
Required Texts	• MATLAB Programming for Numerical Analysis, copyright © 2014 by César Pérez López • Numerical Methods Using MATLAB®, third Edition, G.R. Lindfield & J.E.T. Penny

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Introduction to Software Engineering (2)
Module Code	CMSWU2202
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. Introducing the design stage and its concepts 2. Install user interface design rules 3. Introduction to software testing techniques
Material Covered	1. Introduction –Software engineering Design 2. Design Concepts and Principles 3. Design Concepts 4. cohesion 5. coupling 6. Exam 1 7. Layered Arrangement of Modules 8. Transform mapping 9. Transaction mapping 10. User Interface Design 11. Exam2 12. Types of User Interface Design 13. Component-Level Design 14. Structured Programming 15. Software Testing Techniques
Required Texts	• Roger, S. Pressman, and R. Maxin Bruce. Software engineering: a practitioner's approach. McGraw-Hill Education, 2019. • Mall, Rajib. Fundamentals of software engineering. PHI Learning Pvt. Ltd., 2018.

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Object Oriented Programming (2)
Module Code	CMSWU2203
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. How to write readable, reusable, and modular Project. 2. How to refactor their code periodically. 3. Manipulate programming errors. 4. How to test and maintain their code.
Material Covered	1. OOP Concepts (Quick Glance) 2. Planning and Requirements Definition 3. Class Diagram Designing 4. Main Phases Definition 5. Defining Related Libraries 6. Main Screen Designing 7. Classes Development (Create the main class) 8. Classes Development (Create the other classes) 9. Modules and Classes Importing (Connect the classes by importing) 10. Code Refactoring I 11. Classes Inheritance Managing 12. Display Elements Managing 13. Code Refactoring II 14. Testing and Maintenance 15. Experimental Results 16. Preparatory week before the final Exam
Required Texts	• Python Crash Course, 2nd Edition. Copyright © 2019 by Eric Matthes. • How to Think Like a Computer Scientist: Learning with Python.

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Software Systems (2)
Module Code	CMSWU2204
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. Reviewing the architecture and internal organization of the 8086 microprocessors, including registers, flags, and memory addressing modes. 2. Learn about the structure and organization of instructions in the 8086 microprocessors, including instruction formats. 3. Reviewing various addressing modes in the 8086 microprocessor and learning how to effectively access data from different memory locations. 4. Develop a deep understanding of instruction encoding schemes for different instructions in the 8086 microprocessors. 5. Acquire knowledge of two-pass assembler and one-pass assembler concepts and their role in software systems. 6. Understand the purpose and role of a loader in the execution of computer programs. 7. Learn about the different types of loaders and their functions. 8. Familiarize Students with the basic concepts and terminology related to loaders. 9. Gain a comprehensive understanding of absolute loaders and their operation.
Material Covered	1. Introduction - Review about Signed & Unsigned Numbers, Multiplication & division, and Floating-Point Numbers Representation 2. Review about Register Addressing, Immediate Addressing and Memory Addressing. 3. Three-Address Instructions, Two-Address Instructions, One-Address Instructions and Zero-Address Instructions 4. Assembly language in _ASM blocks within C/C+-01 5. Assembly language in _ASM blocks within C/C+-02 6. Classification of instruction, and converting assembly language instructions into machine code-01 7. Classification of instruction, and converting assembly language instructions into machine code-02 8. Mid-term Exam-01 9. One assembler algorithm supported with examples 10. Two-pass assembler algorithm supported with examples 11. Introduction to Loader, Absolute Loader, and Relocating Loader. 12. Introduction to Linker: Linking Loader and Linkage Editor. 13. Macro processor In Assembly Language 14. Macro Operators. 15. Mid-term Exam-02 16. Preparatory week before the final Exam.
Required Texts	• The 8086 Microprocessor: Architecture, Programming, and Interfacing" by Kenneth Ayala.

	• The Intel Microprocessors: 8086/8088, 80186/80 80486, Pentium, Pentium Pro Processor, Pentiu Pentium 4, and Core2 with 64-bit Extensions, 8e"

College of Computer Science and Mathematics - Department of Software Curricula

Bologna System (bachelor's 2023-2024)

Module Title	Design of Distributed Database
Module Code	CMSWU2205
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	1. To know the benefits of database systems. 2. To understand general database concepts. 3. To be able to analyze the business rules. 4. To know how to design database systems using E-R diagrams. 5. To understand all E-R diagrams concepts. 6. To implement database operations using SQL language
Material Covered	1. Basic Concepts and Definitions 2. Traditional File Processing Systems 3. The Database Approach 4. Data Modeling 5. Modeling Entities 6. Modeling Attributes 7. Modeling Relationships 8. Degree of A Relationship 9. Cardinality Constraints 10. Other Subjects about Modeling Relationships 11. The Enhanced E-R Model 12. Representing Specialization and Generalization 13. Specifying Constraints in Supertype/Subtype Relationships 14. Defining Supertype/Subtype Hierarchies 15. Case Study 16. Preparatory week before the final Exam
Required Texts	• Modern Database Management, Jeffrey A. Hoffer, Twelfth Edition • SQL complete references

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Artificial Intelligence
Module Code	CMSWU3101
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The main purpose of the course is to provide basic knowledge to students so that they can understand what artificial intelligence is. We will study the basic knowledge to understand artificial intelligence. We will introduce some basic search algorithms to solve the problems; Knowledge representation and reasoning; pattern recognition; Fuzzy logic
Material Covered	1. Introduction in AI 2. Problem Solving 3. Search Methods 4. Search Methods 5. stochastic methods 6. Knowledge representation 7. Predicate Logic 8. Predicate Logic 9. Semantic Networks 10. Building control algorithms for state space search 11. Production rules 12. Frame and scripts 13. Expert system 14. nature language process
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Compiler Design
Module Code	CMSWU3102
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Introducing the student to how to convert the program inside the calculator from a high-level language to a low-level language
Material Covered	1. Introduction 2. Compiler definitions 3. Brief definitions 4. Scanners 5. Parsing 6. Top-down parsing 7. Functions 8. Examples 9. Multiple defined 10. LL (1) grammar 11. LL (1) grammar 12. Rules of LL1 13. Rules of LL1 14. Errors in the parser 15. Example.
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Software project management
Module Code	CMSWU3103
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	How to manage projects through modern technologies and methods
Material Covered	1. Projects and programs 2. Classifying projects 3. Process groups 4. Quality and risk 5. Planning 6. WBS 7. Projects proposal 8. Managing people 9. Managing people 10. Project management methods 11. Project management methods 12. Project management methods 13. Project management methods 14. Project management methods
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Software Requirements
Module Code	CMSWU3104
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The curriculum aims to make the student familiar with the basic concepts and definitions associated with software requirements, and aims to provide the basic principles and methods used to achieve that ability and apply it correctly and at the required level according to the needs of the market.
Material Covered	1. Software Requirements Introduction 2. Key Success Factors in Requirements Engineering 3. How to distinguish between functional and nonfunctional requirements 4. Characteristics of Good Requirement 5. Characteristics of Good Requirement 6. Requirements Engineering Artifact Modeling 7. RE Taxonomy 8. Dynamic Tailoring of an Artifact Model 9. Organizational Artifact Model Tailoring 10. Eliciting Requirements 11. Issues and problems in Requirements Eliciting.Part1 12. Issues and problems in Requirements Eliciting.Part2 13. Requirements Elicitation methods. 14. Function Deployment Elicitation methods. 15. Managing Requirements
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Computer architecture
Module Code	CMSWU3105
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	To learn about internal computer architecture
Material Covered	16. Basics of computer Engineering 17. Classification of computer architecture 18. Central Processing Unit (CPU) 19. Memory System Architecture 20. Cache 21. Replacement Algorithms 22. Introduction to file system management 23. Manage network storage, deal with your problems 24. File system implementation (FAT, NTSF, VFS) 25. Direct Memory Access (DMA) 26. Characteristics of memory devices 27. Main memory- Virtual memory 28. Virtual memory 29. Main memory 30. Main memory
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Computer Network and Internet
Module Code	CMSWU3106
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Enrichment Student information regarding the types of wired and wireless networks, methods of configuring networks and their types, in addition to identifying the most important benefits and disadvantages of each type and methods of solving problems that appear during the configuration and operation of networks, in addition to the types of protocols and the benefit and use of each type of network addressing to reach the final concept of the subject of transferring data on the network in the fastest and least expensive ways.
Material Covered	1. Introduction 2. Network Models & Network Criteria 3. Local Area Network &Wide Area Network 4. Physical Structures & Data Communication 5. Components- and topology 6. Data Representation 7. Data Flow 8. Internet Protocol 9. AS WELL & TCP IP model 10. Network Addressing class full and class less 11. Routing protocol Most Popular Routing Protocols 12. SDN 13. SDN challenges: • Deployment challenges • Infrastructure research challenges SDN accessible to a typical user Programming abstraction support Security 14. Scalability SDN • Controller scalability Topology, - Frequency of control updates – Data structure
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	File processing
Module Code	CMSWU3107
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Explain the concept of file systems, and data storage management, describe the interfaces to file systems, and file system structure for FAT and NTFS, discuss filesystem design tradeoffs, including access methods, file sharing, file locking, and directory structures and explore filesystem protection and system consistency
Material Covered	1. Introduction on file system management 2. Network Storage management, handling dick problems 3. File system interface 4. File operation and types 5. Types of access methods 6. types of directories and storage structure 7. Continuing types of directories and storage structure 8. File System Partitioning and Mounting 9. File system structure 10. File System Implementation (FAT, NTSF, VFS) 11. Directory implementation and allocation methods 12. Linked and index allocation and performance 13. Free space management 14. Efficiency and Performance: 15. Introduction to file system management 16.
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	English language
Module Code	CMSWU3108
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Learning the English language and training in conversation within the field of information technology
Material Covered	1. Working in the IT / IT Jobs and duties + listen 2. Working in the IT / IT originations + listen 3. Working in the IT / IT work Rules + listen 4. Working in the IT / Meeting + listen 5. Working in the IT / agenda + listen 6. Working in the IT / Multimedia hardware + listen 7. Working in the IT / Multimedia hardware + listen 8. Working in the IT / Operating System + listen 9. Working in the IT / Multimedia hardware + listen 10. Data Communications / internet browsing + listen 11. Data communications/ networks + listen 12. Data communications/ Mobile Computing + listen 13. listen + Email /communications Data 14. listen + Email /communications Data
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Intelligent technologies
Module Code	CMSWU3201
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	This course aims to teach students the basics of neural networks, genetic algorithms, and swarm algorithms using the MATLAB language
Material Covered	1. Introduction in neural network 2. The perception, delta rule and its Variants 3. Multilayer perceptron neural network 4. Adaptive Linear Neuron (Adaline), Medline neural network 5. Back propagation neural network 6. Radial Basis Function Networks, Function approximation, Data Interpolation 7. Self-Organizing Maps, Introduction in Genetic algorithm 8. A Simple Class of Gas, Analysis 9. Messy Genetic Algorithms, 10. Evolutionary Algorithms for Optimization and Search 11. Ant colony optimization. 12. Fuzzy logic 13. Fuzzy logic 14. Fuzzy logic
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Software engineering tools
Module Code	CMSWU3202
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	• To help students understand the CASE tools in the software developments process. • To introduce the many features of using the CASE tools throughout the project process. • To enable students to use different tools during the software development progress.
Material Covered	1. Introduction to software engineering tools 2. Case tools, their benefits and goals 3. Building Blocks for Case 4. Revision and Summary 5. Classification of CASE tools 6. Classification of CASE tools 7. Classification of CASE tools. Continue 8. Classification of CASE tools Continue 9. Upper and Lower CASE 10. THE INTEGRATION ARCHITECTURE 11. THE CASE REPOSITORY1 12. THE CASE REPOSITORY2 13. Revision For Exam 14. Features and Content 15. Features and Content2
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Website Engineering
Module Code	CMSWU3204
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Enabling the student to be able to design and develop web pages and learn about the languages and methods available for creating, dealing with and programming web pages.
Material Covered	1. Introduction 2. What is an HTML file 3. Attribute Attributes and how to use them 4. Add elements to the page 5. Introduction to the JavaScript language 6. Properties 7. Numbers, dates or languages and processing Texts 8. Programming expressions 9. Iterative Loops 10. Expression and Operations 11. Attributive Expressions 12. Treatment Comparisons 13. Use JavaScript
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Software fault tolerance
Module Code	CMSWU3205
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The curriculum aims to make the student familiar with the basic concepts and definitions related to software fault tolerance by living with them. It aims to present the basic principles and methods used to achieve this tolerance and apply them correctly and at the required level according to the needs of the labor market
Material Covered	1. Introduction of Fault Tolerance 2. Reliability & Availability with Fault Tolerant Systems 3. Fault, Error, and Failure 4. Dependable Fault-tolerant Systems 5. Fault -tolerance scope of systems 6. Failures and Failure Modes 7. Faults and Fault Classes 8. Fault-Tolerance Techniques 9. Error recovery 10. Types of Redundancy for Software Fault Tolerance 11. Redundancy Software 12. Redundancy Information 13. Validation of Fault-Tolerance 14. Fault Tolerance Tools 15. Criteria for fault-tolerant design
Required Texts	•

Module Title	Operating systems
Module Code	CMSWU3206
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Learn about operating systems, their functions, and how they work
Material Covered	1. Operating-System overview 2. Process 3. Process 4. Threads 5. Treads 6. Process Synchronization 7. Process Synchronization 8. CPU Scheduling 9. CPU Scheduling 10. CPU Scheduling 11. CPU Scheduling 12. CPU Scheduling 13. Deadlocks 14. Main Memory 15. Main Memory
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Teaching methods
Module Code	CMSWU3207
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The course aims to teach the student how to follow scientific methods and methods in communicating the scientific idea and teach scientific methods in teaching and achieving the scientific goal and objective that are presented to students at all scientific levels, taking into account following methods that suit the scientific stages and facilitating the means to keep pace with scientific progress and modern technology.
Material Covered	1. The concept of teaching methods 2. Basic teaching methods 3. Scientific knowledge (components of science) 4. The importance and types of teaching concepts 5. Characteristics of science 6. Objectives of science 7. Science thinking skills Science Trends 8. Educational objectives 9. Teaching methods 10. Educational Games 11. Laboratory in science teaching 12. Educational technologies 13. Planning in teaching 14. Levels of teaching planning
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Information security
Module Code	CMSWU4101
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Give Introduction to the attacks and their types that can occur during the transmission process between two parties, methods of protecting data, either by traditional encryption methods, block encryption, or public key encryption, how to choose the appropriate protection method, description of attacks, and study of protection mechanisms according to requirements.
Material Covered	1. Introduction to data security 2. Security attack 3. Security mechanism 4. Authentication, integrity, and non-repudiation 5. Classical transposition method for cryptography 6. Classical substitution method for cryptography 7. Classical substitution method for cryptography 8. Feistel structure 9. Data Encryption Standard (DES) 10. Number theory 11. Euler function 12. Public key cryptography 13. Secrecy and Authentication 14. Encrypt and decrypt using RSA 15. Authentication using RSA Algorithm 16.
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Software Development Techniques
Module Code	CMSWU4102
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Teaching the student about old and new software development techniques, the benefits and harms of each technology, and how to choose the appropriate technology for the project
Material Covered	1. Introduction 2. Traditional Models: waterfall model 3. Traditional Models: incremental model 4. Traditional Models: Prototype 5. Traditional Models: Spiral mode 6. Exam 7. Agile models 8. Agile models 9. Agile models: Extreme programming model 10. Agile models: Extreme programming model 11. Agile models: scrum model 12. Agile models: Feature Driven Development 13. Agile models: Ci cd 14. Difference between traditional and agile models 15. Exam
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Image and signal Processing 1
Module Code	CMSWU4103
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Defining about dealing with images and signal processing, in addition to using techniques and methods for image processing and signal by converting the image from one domain to another, improving image and signal conversion methods, studying the properties of the transfers used in the study, as well as the process of enhancement the images and signals to improve their quality and luminance.
Material Covered	1. Introduction of Image and Signal Processing 2. Image Types and files formats 3. Fourier transformation 4. Fourier transformation 5. properties of the two-dimensional Fourier transform 6. properties of the two-dimensional Fourier 7. properties of the two-dimensional Fourier 8. The Fast Fourier Transform 9. Enhancement methods 10. Enhancement methods: Smoothing method in spatial and frequency domain 11. Lowpass Filtering in frequency domain 12. Image Sharpening 13. High pass filter 14. Enhancement Based on An Image Model 15. pseudo-color image processing 16.
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Software Reliability
Module Code	CMSWU4104
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The curriculum aims to make the student familiar with the basic concepts and definitions associated with software reliability, the principles of measuring the extent of trust granted by the software, and the rules for its use. Required according At the level of labor market needs.
Material Covered	1. Hardware and Software Reliability Defining Software Reliability 2. Software Reliability Engineering (SRE) 3. System Reliability Analysis 4. Component Configurations 5. Component Configurations 6. Component Configurations 7. Basic Reliability Metrics 8. Basic Reliability Metrics 9. Exam 10. Software Metric related to Reliability 11. Software Reliability Tools 12. Software Reliability Tools 13. Failure Mode and Effect Analysis (FMEA) 14. Software Reliability Models 15. Software Reliability Improvement Techniques
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Design of Real time systems 1
Module Code	CMSWU4105
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The course aims to provide the student with basic knowledge of real-time systems, their types, and their impact on human life. The types of real-time tasks, methods for scheduling these tasks, calculating them.
Material Covered	1. Real Time systems Concepts 2. Limits Of Current Real Time Systems 3. Desirable Features of Real-Time Systems 4. Achieving Predictability/ /DMA 5. Achieving Predictability 6. Task Classes 7. Earliest Deadline First Algorithm 8. Fixed Priority Server 9. Fixed Priority Server 10. Resource Access Protocols 11. Resource Access Protocols 12. Priority Inheritance Protocol 13. Priority Inheritance nested - critical section 14. Transitive priority inheritance 15. Priority Ceiling Protocol 16.
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Computer Network security
Module Code	CMSWU4201
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Teaching students to protect data with different hiding methods or how to choose and study the mechanisms of protection from the appropriate hiding method, giving a description of the intruder, methods of choosing passwords, and how to achieve reliability and integrity of data when sending, in addition to giving computer viruses, their types and methods of protection from them.
Material Covered	1. Steganography techniques 2. Steganography communication 3. Image Steganography 4. Lest Significant bit (LSB) 5. Pseudo random permutation 6. Image downgrading 7. Cover regions 8. Steganography in DCT domain 9. Intruders-part1 10. Intruders-part2 11. Password management 12. Message authentication 13. Hash function 14. Computer Viruses 15. Virus detection
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Open-source Software
Module Code	CMSWU4202
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	This course covers the fundamentals of Free and Open-Source software development by considering the previous design and programming courses. The course introduces students to the technological, social, and pragmatic aspects of developing open-source software through direct involvement in an open-source project.
Material Covered	1. Course Introduction 2. Intro to Programming and The Python Language, Variables 3. Conditionals 4. Jupyter Notebook, and IDLE 5. Intro to Lists, Loops 6. Functions 7. Classes 8. Classes 9. More with Lists, Strings, Tuples, Sets, and PyCharm 10. Introduction to Inheritance 11. Polymorphism 12. Dictionaries, Files, and GUI. 13. WORKING IN OSS PROJECTS. 14. Building Better OSS Projects 15. Building Better OSS Projects.
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Software quality assurance
Module Code	CMSWU4203
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Teaching the student how to test software, methods and types of software testing strategies, and achieving quality assurance
Material Covered	1. Software Quality Assurance (introduction) 2. Software Testing Techniques 3. Test case design 4. Basic path Testing 5. White box testing - Black box testing 6. Fault avoidance, Verification and Validation Testing 7. Loop testing Software testing Strategies 8. Unit testing 9. Integration Testing 10. Validation Testing-Acceptance testing 11. Exam 12. SOFTWARE REVIEWS 13. Software Testing tools 14. Software quality models 15. Exam
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor's 2023-2024)

Module Title	Image and signal processing 2
Module Code	CMSWU4204
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	Getting acquainted with dealing with images and signals, in addition to the use of methods and techniques for image and signal processing to enhance images and signals to improve their quality and illumination, in addition to identifying both types of compression methods and quality standards for the method used by pressing, adding methods for defining edges and other ways of improving and preparing data for the image and signal.
Material Covered	1. Image Compression 2. Lossless Compression 3. Lossless Compression 4. Lossless Compression 5. Fidelity criteria 6. Clustering Method 7. Image Segmentation 8. EDGE DETECTOR 9. structure of Special Digital Signal Processors 10. Signals and Systems 11. Systems Adaptive for Signal Process 12. Systems Adaptive for Signal Process 13. Linear Filter Structures 14. Approaches to the Development of Linear Adaptive Filtering Algorithms 15. Nonlinear Adaptive Systems: Neural Networks
Required Texts	•

College of Computer Science and Mathematics - Department of Software Curricula

Credit Hour System (bachelor’s 2023-2024)

Module Title	Design of Real time systems 2
Module Code	CMSWU4205
Module Type	Core
Module Hours	2
Module Hours	2
Module Objectives	The course aims to provide the student with basic knowledge of real-time systems, their types, and their impact on human life. The types of real-time tasks, methods for scheduling these tasks, calculating their priorities, and the languages used in programming them.
Material Covered	1. Review of First Course 2. Using primary and alternative schedule tasks 3. Initializing valid schedule 4. Scheduling with precedence constraints 5. Scheduling of IRIS Tasks Increased Reward with Increased Service 6. Scheduling of IRIS Tasks Increased Reward with Increased Service 7. Task Assignment: Next – fit algorithm for Rate Monotonic Scheduling 8. A Bin – Packing Assignment algorithm 9. A Bin – Packing Assignment algorithm 10. Myopic Offline Scheduling Algorithm 11. Myopic Offline Scheduling Algorithm 12. Assignment With Precedence Conditions Algorithm 13. Assignment With Precedence Conditions Algorithm 14. Focused Addressing and Bidding (FAB) algorithm 15. Focused Addressing and Bidding (FAB) algorithm
Required Texts	•