Republic of Iraq
Ministry of Higher Education & Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation

Academic Program Specification Form for the Academic

University: University of Basrah
College: Collage of Engineering
Department: Computer Engineering Department
Date of Form Completion: 2021

Dean's Name	Dean's Assistant for Scientific Affairs	Head of Department
Prof.Dr. Ramzi S. Ali	Assist.Prof.Dr. Haider M. Mohammed	Dr. Mohammed A. Joudah
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Date: / /
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TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
First Year	**CoE 132**	Programming and Problem solving	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The course Indicate some reasons for studying programming fundamentals, covers the basics of programming and the “C++” programming language, including syntax, fundamental data structures, algorithms and basic problem-solving, control structures, string manipulation and list processing, concepts of executive programs.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Programming and Problem Solving CoE132
4. Modes of Attendance offered	on-line
5. Semester/Year	1^{st} semester/ 1^{st} year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	

The theoretical foundations of computer engineering have expanded substantially in recent years. The objective of this course is to introduce students to this fundamental area of computer science which enables students to focus on the study of programming languages. These languages allow the students to assess what could be achieved through computing when they are using it to solve problems in science and engineering. The course exposes students to the programming with C++, as well as to its usage for problem solving. The course introduces basic programming instructions and their properties, and the necessary mathematical libraries to develop different software applications. Upon completion of this course the students are expected to become proficient in key topics of C++ programming, and to have the opportunity to explore the current topics in this area.

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Clarify the basic concepts of logical methods in proofing laws.

A2- Gain new skills in counting methods.

A3- Gain basic skills to building computing systems.

A4- Gain basic understanding of system programming and operating systems.

B. Subject-specific skills

B1 - The ability to transform issues into programs and applications design.
B2 - The ability to think logically in addressing a particular problems.
B3 - The ability to use fast counting methods.
B4 - The ability to gain experience in methods of proof.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.
C2- Response: monitor the student's interaction with the material that displayed on the screen.
C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.
C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.
C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.
D2 - Develop the student's ability to interact with the Internet.
D3 - Develop the student's ability to interact with multimedia.
D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Variables, data types, operations	Introduction to programming	Theoretical	Questions, discussion and Quizzes
2	4	Paradigms: functional, procedural, object oriented	Introduction to programming	Theoretical and Tutorial	Questions, discussion and Quizzes
3	4	Strategies, process, implementation, debugging	Problem- solving algorithms	Theoretical	Questions, discussion and Quizzes
4	4	Concepts of algorithms, structured decomposition	Problem- solving algorithms	Theoretical and Tutorial	Questions, discussion and Quizzes
5	4	Syntax & semantics, variables, types, expressions, math functions	Programming in C++	Theoretical	Questions, discussion and Quizzes
6	4	Logical operations, I/O, functions, encapsulation, hiding,	Programming in C++	Theoretical	Questions, discussion and Quizzes
7	4	Conditional, iterative, control structure	Control structures	Theoretical	Questions, discussion and Quizzes
8	4	Loops, sequencing, selection, iteration functions	Control structures	Theoretical	Questions, discussion and Quizzes
9	4	Primitive types, arrays, strings	Basic data structures	Theoretical and Tutorial	Questions, discussion and Quizzes
10	4	Records, stack, heap allocation	Basic data structures	Theoretical	Questions, discussion and Quizzes

11	4	Static structure programming	Structure programming	Theoretical	Questions, discussion and Quizzes
12	4	Dynamic structured programming	Structure programming	Theoretical and Tutorial	Questions, discussion and Quizzes
13	4	Recursive math functions, divide and conquer strategies	Recursion	Theoretical	Questions, discussion and Quizzes
14	4	Recursive backtracking, implementation	Recursion	Theoretical	Questions, discussion and Quizzes
15	4	Different topics	Discussion and revision	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	
Special requirements (include for example workshops, periodicals, IT software, websites)	C++ Essentials, By Sharam Hekmat, 2005 PragSoft
Community-based facilities (include for example, guest Lectures, internship, field studies)	Websites: www.tutorialspoint.com

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

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various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students 'attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.
Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

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<tr><th colspan="4"></th><th colspan="16">Programme Learning Outcomes</th></tr>
<tr><th rowspan="2">Year / Level</th><th rowspan="2">Course Code</th><th rowspan="2">Course Title</th><th rowspan="2">Core (C) Title or Option (O)</th><th colspan="4">Knowledge and understanding</th><th colspan="4">Subject-specific skills</th><th colspan="4">Thinking Skills</th><th colspan="4">General and Transferable Skills (or) Other skills relevant to employability and personal development</th></tr>
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<tr><td rowspan="2">First Class</td><td>CoE 131</td><td>Electrical Circuits</td><td>Fundamentals</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
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TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Electrical Circuits CoE 131
4. Programme to which it contributes	
5. Modes of Attendance offered	Electronic Attendance
6. Semester/Year	First Semester/ First Class
7. Number of hours tuition (total)	60
8. Date of production/revision of this specification	2021
9. Aims of the Course	
The theoretical foundations of computer engineering have expanded substantially in recent years. The objective of this course is to introduce students to this fundamental area of electrical circuits which enables students to focus on the study of electrical circuits. This course is designed to give the students an introduction to electrical currents, voltages, and the different elements of AC and DC circuits. Also, it teaches them how to analyze DC and AC circuits in steady and transient states.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. To know the fundamentals definition in electrical circuits from some of international methods and application A2. Acquire skills in calculating electrical quantities. A3. Acquire basic skills as an introduction to knowing and addressing complex, broad and applied theories. A4. Gain a basic understanding of how to formulate mathematical models to be ready in control and communication systems and the like.
B. Subject-specific skills B1. The ability to think and calculate the required quantities in all ways and theories. B2. The ability to design for different circuits and create a mathematical model for a specific issue. B3. Writing scientific reports. B4 - The ability to gain experience in dealing with various practical problems related to electrical systems.
Teaching and Learning Methods
- Explanation and clarification through lectures. - The method of displaying scientific materials electronically in the various programs within e-learning. - Self-learning through homework and direct questions within the lectures. - Material practical laboratories.
Assessment methods
Interaction within the lecture. • Homework, direct questions and reports. • Short exams (Quiz). • Semester and final exams.
C. Thinking Skills C1.Attention: Arousing the students' attention by solving one of the questions or examples on the screen within the electronic lecture. C2 - Response: Asking some students to solve the questions within the scientific material displayed on the screen. C3- Attention: Follow up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to be presented. C4 - Forming the direction: meaning that the student is sympathetic to the

presentation and may have an opinion about the direction of the presented topic and defend it. C 5- Formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a stable level in the lesson and does not become lazy or fidgety.
Assessment methods
D. General and Transferable Skills (other skills relevant to employability and personal development) D1- Develop the student's ability to perform the duties and deliver them on time D 2- Logical and programmatic thinking to find software solutions to various problems D 3- Develop the student's ability to dialogue and discussion D4 - Develop the student's ability to deal with modern technology, especially the Internet

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1st	4	Units, atomic structure, conductor, semiconductor and isolator. Electrical current, potential and potential difference.	Introduction to electrical circuits	Theoretical	Questions and discussions
2nd	4	Electromotive force (EMF). Resistance and conductance, resistor types, color code resistance, ohm's law, linear and nonlinear resistance, electrical energy and power, efficiency.	Introduction to electrical circuits	Theoretical +Toutorial	Questions and discussions (Quiz)
3rd	4	Serial and parallel circuits,	DC Circuit analysis	Theoretical	Questions and discussions
4th	4	Kirchhoff's law, internal resistance of source, dependent sources, source transformation.	DC Circuit analysis	Theoretical	Questions and discussions (Quiz)
5th	4	Methods of analysis, Branch current, Mesh analysis, node analysis, examples, delta/ star transformation.	DC Circuit analysis	Theoretical +Toutorial	Questions and discussions
6th	4	Superposition, Thevenin	Network Theory	Theoretical	Questions and discussions
7th	4	Norton, maximum power transfer.	Network Theory	Theoretical +Toutorial	Questions and discussions
8th	4	AC quantities resistance, reactance, and impedance, conductance, susceptance, and admittance,	AC Circuit	Theoretical	Questions and discussions (Quiz)
9th	4	peak values, maximum, average, and r.m.s values,	AC Circuit	Theoretical	Questions and discussions
10th	4	phasor quantities. AC circuit analysis (equivalent impedance,	AC Circuit	Theoretical	Questions and discussions

11th	4	power in AC circuit, power factor,.	AC Circuit	Theoretical	Questions and discussions
12th	4	Complex quantity, complex power, power factor correction	AC Circuit	Theoretical +Toutorial	Questions and discussions
13th	4	Series resonance, quality factor, selectivity, half power frequencies and bandwidth.	Resonance:	Theoretical	Questions and discussions
14th	4	parallel resonance, quality factor, selectivity, half power frequencies and bandwidth.	Resonance:	Theoretical +Toutorial	Questions and discussions
15th	4	Single phase, and three phase circuits, star/delta transformation.	Three Phase Systems	Theoretical +Toutorial	Questions and discussions

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	
Special requirements (include for example workshops, periodicals, IT software, websites)	1- Fundamentals of electric circuits, Charles K. Alexander | Matthew n. o. Sadiku, 5th edition. 2- Introductory to circuit analysis, Boylested,11th edition. 3- Engineering circuit analysis, William Hayte,6th edition
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	40
Maximum number of students	75

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10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

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B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
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Assessment methods

1. Short exams (quizzes).
2. Homework.
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4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
First year	CoE 121	Calculus I	Essential	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This course reviews the basic ideas you need to start calculus for computer science and engineering, also for students intending to continue to more advanced courses in calculus and mathematics in general Topics include a brief review of functions, followed by discussion of limits, derivatives, and applications of differential calculus to real-world problem areas. An introduction to integration concludes the course, with a brief description of vectors and complex geometry.

1. Teaching Institution	Basrah University
2. University Department/Centre	Computer Engineering Dep.
3. Course title/code	Calculus I / CoE121
4. Programme to which it contributes	Computers science and engineering
5. Modes of Attendance offered	Electronic Study
6. Semester/Year	First Year/ First Semester
7. Number of hours tuition (total)	60
8. Date of production/revision of this Specification	2021
9. Aims of the Course	
This course reviews the basic ideas you need to start calculus for computer science and engineering, also for students intending to continue to more advanced courses in calculus and mathematics in general Topics include a brief review of functions, followed by discussion of limits, derivatives, and applications of differential calculus to real-world problem areas. An introduction to integration concludes the course, with a brief description of vectors and complex geometry.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Illustrate the principle of calculus. A2. Gain the required mathematical skills to solve different problems. A3. Improve the essential skills to treat with different mathematical problems. A4. Study the principal criteria for modelling any industrial system mathematically.
B. Subject-specific skills B1. Ability to solve mathematical problems. B2. Ability to analyze and resolve any mathematical problem. B3. Writing scientific reports. B4. Gain the required experience to deal with industrial systems mathematically.
Teaching and Learning Methods
• Reading and self-learning. • Training and activities during lecture. • HomeWorks. • Suggesting some websites for extra reading. • Discussions and workshops.
Assessment methods
• Interaction during lectures. • HomeWorks and reports. • Short exam. • Midterm and final exams.
C. Thinking Skills C1. Attention: calling student's attention from time to time by direct question C2. Response: investigate the interactivity of students with presented subject. C3. Interesting: Follow the more interested student with the subject and suggesting extra uses and application for the subject under consideration. C4. Building the path: investigate how much students are connected to the subject. C5. Improve the understanding skills for student and resolving pouring and carless habits.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1. Improve the student's abilities to solve the requested HomeWorks in time. D2. Building up the logical thinking to analyze the given problem. D3. Enhance the oral discussion skills for students. D4. Improve students capabilities to deal with modern technologies.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Preliminaries	Real numbers and the real line, lines, circles, and parabolas, functions and their graphs,	Theoretical	Discussion & questions
2	4	Preliminaries	Absolute value function, greatest integer function, signum function,	Theoretical &Tutorial	Discussion & questions
3	4	Preliminaries	domain and range algebraic functions, combining functions, shifting and scaling	Theoretical	Discussion & questions
4	4	Preliminaries	function graphs, even and odd functions, trigonometric functions	Theoretical &Tutorial	Discussion & questions Short exam
5	4	Differentiation	Limits, continuity and differentiability. Rules of Differentiation, chain rule,	Theoretical	Discussion & questions
6	4	Differentiation	implicit differentiation, higher order differentiation, application, time rate,	Theoretical &Tutorial	Discussion & questions
7	4	Differentiation	maxima and minima, concave, curve plotting, inverse functions	Theoretical	Discussion & questions
8	4	Differentiation	the limit sinx/x , trigonometric functions and their inverse.	Theoretical &Tutorial	Discussion & questions Short exam
9	4	Integration	Finite integration, rules of integration,	Theoretical	Discussion & questions
10	4	Integration	applications, area, volume, arc-length,	Theoretical &Tutorial	Discussion & questions
11	4	Integration	integration methods, special integrals,	Theoretical	Discussion & questions
12	4	Integration	rotating and shifting of axes, conical sections.	Theoretical &Tutorial	Discussion & questions Short exam
13	4	Vectors	Vectors in the plane, in the space, scalar and vector products, triple products. Equations of lines and planes in the space.	Theoretical	Discussion & questions Short exam
14	4	Complex Geometry	Complex numbers: z = x +jy as an affix on the real point.(x y), modulus, argument, conjugate, addition, subtraction, products.	Theoretical &Tutorial	Discussion & questions
15	4	Complex Geometry	(Cartesian, trigonometric, polar and exponential) forms, transformations: translation, rotation by an angle .	Theoretical &Tutorial	Discussion & questions Short exam

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Calculus, By Anton Bivens Davis, 2002 Anton Textbooks, Inc 2- Advanced Engineering Mathematics, By Erwin Kreyszig, 1999, John Wiley & Sons, Inc
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
First Year	**CoE 13٤**	Digital Logic Circuits	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the program specification.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Digital Logic Circuits CoE134
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	2^{nd} semester - First Year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
By the end of this course, students should be able to: 1- Analyze and design the combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.) 2- Analyze and implement the sequential logic circuits (flip - flops). 3- Analyze and design a different types of register circuits (shift register) 4- Analyze and design the counter circuits (synchronous counters and asynchronous counters).	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1- Recognize the combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.) A2- Identify the design combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.) A3- Identify the design of sequential logic circuits (flip - flops). A4- Identify the design of shift register circuit. A5- Identify the design of counter circuits (synchronous counters and asynchronous counters).
B. Subject-specific skills B1 - Knowledge the combinational logic circuits and their design. B2 - Knowledge the sequential logic circuits and their design. B3 - Knowledge the design of register circuits. B4 - Knowledge the design of counter circuits.
Teaching and Learning Methods
1. Provide lectures and printed sources from the modern, diverse and rich sources including examples. 2. Resolving some questions, with intent to contain mistakes and making the students extracted error. 3. Asking questions and inquiries and solution on the blackboard. 4. Questions directly for all students to learn the extent of interaction between the lecturer and students.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student’s interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Develop the student's ability to interact with technology. D2 - Develop the student's ability to interact with the Internet. D3 - Develop the student's ability to interact with multimedia. D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Binary Adder–Subtractor [Half and Full adders, Half and Full subtractors]	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Arithmetic operations	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Comparator circuits	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Multiplexer	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Multiplexer & Demultiplexer	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Decoder & Encoders	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Discussion	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Sequential Circuits	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Flip - Flops	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Latches	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Discussion	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Registers	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Shift Registers	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Synchronous Counters	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Asynchronous Counters	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Digital Design, 4th Edition, by M. Morris Mano. Prentice-Hall, Inc. 2006 2- Digital Computer Fundamental, by Thomas C. Bartee 3 - Digital System Principle and Application, by Ronald J. Tocci
Special requirements (include for example workshops, periodicals, IT software, websites)	Fundamentals of Logic Design, J. R. Roth.
Community-based facilities (include for example, guest	websites. Libraries sites in international universities.

Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
First year	**CoE 122**	Calculus II	Essential	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This is the second course in calculus, intended for students who have already completed a Calculus I course in limits, differential and integral calculus, and need to extend their skills in this subject.

1. Teaching Institution	Basrah University
2. University Department/Centre	Computer Engineering Dep.
3. Course title/code	Calculus II / CoE122
4. Programme to which it contributes	Computer's science and engineering
5. Modes of Attendance offered	Electronic Study
6. Semester/Year	First Year/ Second Semester
7. Number of hours tuition (total)	60
8. Date of production/revision of this specification	2021
9. Aims of the Course	
This is the second course in calculus, intended for students who have already completed a Calculus I course in limits, differential and integral calculus, and need to extend their skills in **this subject.**	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Illustrate the principle of calculus. A2. Gain the required mathematical skills to solve different problems. A3. Improve the essential skills to treat with different mathematical problems. A4. Study the principal criteria for modelling any industrial system mathematically.
B. Subject-specific skills B1. Ability to solve mathematical problems. B2. Ability to analyze and resolve any mathematical problem. B3. Writing scientific reports. B4. Gain the required experience to deal with industrial systems mathematically.
Teaching and Learning Methods
• Reading and self-learning. • Training and activities during lecture. • HomeWorks. • Suggesting some websites for extra reading. • Discussions and workshops.
Assessment methods
• Interaction during lectures. • HomeWorks and reports. • Short exam. • Midterm and final exams.
C. Thinking Skills C1. Attention: calling student's attention from time to time by direct question C2. Response: investigate the interactivity of students with presented subject. C3. Interesting: Follow the more interested student with the subject and suggesting extra uses and application for the subject under consideration. C4. Building the path: investigate how much students are connected to the subject. C5. Improve the understanding skills for student and resolving pouring and carless habits.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1. Improve the student's abilities to solve the requested HomeWorks in time. D2. Building up the logical thinking to analyze the given problem. D3. Enhance the oral discussion skills for students. D4. Improve students capabilities to deal with modern technologies.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Coordinates	Polar coordinates: areas and lengths in polar coordinates	Theoretical	Discussion & questions
2	4	Coordinates	equivalent points and equivalent equations,	Theoretical &Tutorial	Discussion & questions
3	4	Coordinates	the relation between the Cartesian and the polar systems	Theoretical	Discussion & questions
4	4	Coordinates	Three dimensional coordinates: Cartesian, cylindrical, and spherical	Theoretical &Tutorial	Discussion & questions Short exam
5	4	Determinants and Matrices	Matrix basics, add and subtract matrices, multiply a matrix by a scalar, multiply matrices	Theoretical	Discussion & questions
6	4	Determinants and Matrices	Take the transpose of a matrix, special types of matrices, matrix properties,	Theoretical &Tutorial	Discussion & questions
7	4	Determinants and Matrices	some properties of determinants, system of linear equations, Gramer's rule ,matrice	Theoretical	Discussion & questions
8	4	Determinants and Matrices	some and product of matrices, the inverse of matrix, solution of linear equations by matrices	Theoretical &Tutorial	Discussion & questions Short exam
9	4	Functions of two or more variables	Partial differentiation	Theoretical	Discussion & questions
10	4	Functions of two or more variables	Total differential	Theoretical &Tutorial	Discussion & questions Short exam
11	4	Multiple Integrals	Double integrals over rectangles, double integrals over general regions,	Theoretical	Discussion & questions
12	4	Multiple Integrals	double integrals in polar coordinates, applications of double integrals,	Theoretical &Tutorial	Discussion & questions
13	4	Multiple Integrals	triple integrals, triple integrals in cylindrical coordinates,	Theoretical	Discussion & questions
14	4	Multiple Integrals	triple integrals in spherical coordinate's, change of variables in multiple integrals.	Theoretical &Tutorial	Discussion & questions Short exam
15	4	Different topics	Discussion and revision	Theoretical &Tutorial	Discussion & questions

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS	1- Calculus, By Anton Bivens Davis, 2002 Anton Textbooks, Inc 2- Advanced Engineering Mathematics, By Erwin Kreyszig, 1999, John Wiley & Sons, Inc

· OTHER	
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

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3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
First	CoE 135	OOP and Data Structure	60 hours	Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
First	CoE 135	OOP and Data Structure		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Universityt of Basrah/College of Engineering
2. University Department/Centre	Computer Engineering Department
3. Course title/code	OOP and Data Structure
4. Programme to which it contributes	
5. Modes of Attendance offered	Electronics
6. Semester/Year	Second semester -2021
7. Number of hours tuition (total)	60 hours
8. Date of production/revision of this specification	
9. Aims of the Course	
The course gives the fundamentals of object-oriented programming, identify data structures useful to represent specific types of information, and also gives an introduction to database systems and data modeling, architectures, and Fundamental concepts of structured query language	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Explain the advanced concepts of OOP and data structure A2. Acquire the skills in solving programming problems A3. Acquire the skills in design applied programs and data structures A4. Acquire the skills in design programming systems A5. A6.
B. Subject-specific skills B1. Ability of programming and design applied programs B2. ability of thinking (solving the problems) B3. writing academic and scientific reports B4. Acquire the skills of managing programmed unites
Teaching and Learning Methods
• Self-learning • Training and activities • Homework • Exploring the scientific webs • Tutorials
Assessment methods
• Interaction with the lecturer • Homework and reports • Quiz • Mid and Final exams
C. Thinking Skills C1. Attention C2. Response C3. Student Interest C4. student desire
D. General and Transferable Skills (other skills relevant to employability and personal development) D1. developing the ability to do the homework's in time D2. Logical thinking in solving the problems D3. Developing the ability of the student in discussion. D4. Developing the ability of the student to use the technologies and internet

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Class hierarchies, object.	Object-oriented programming in C++	Theoretical	Questions, discussion
2	4	Data member and member	Object-oriented programming in C++	Theoretical+	Questions,

		functions, Access specifiers		Tutorial	discussion, and quiz
3	4	Encapsulation, Abstraction Polymorphism, Dynamic binding.	Object-oriented programming in C++	Theoretical	Questions, discussion
4	4	Inheritance, and Operator overloading	Object-oriented programming in C++	Theoretical+ Tutorial	Questions, discussion, and quiz
5	4	Pointers and references	Data Structures	Theoretical	Questions, discussion
6	4	Linked List structures and the types	Data Structures	Theoretical+ Tutorial	Questions, discussion
7	4	Implementation strategies for stacks, queues, and hash tables,	Data Structures	Theoretical	Questions, discussion
8	4	Implementation strategies for graphs and trees.	Data Structures	Theoretical+ Tutorial	Questions, discussion, and quiz
9	4	definition and role in computer engineering. Components.	Database systems	Theoretical	Questions, discussion
10	4	Database management system (DBMS),	Database systems	Theoretical	Questions, discussion
11	4	Database architectures (possibilities, concept, data independence), and query	Database systems	Theoretical	Questions, discussion
12	4	Concepts (key, foreign key, record, relation),	Data modeling	Theoretical	Questions, discussion
13	4	Conceptual models	Data modeling	Theoretical	Questions, discussion, and quiz
14	4	(Possibilities, entity-relationship model and UML; strengths and weaknesses), and object-oriented models.	Structured query language (SQL)	Theoretical	Questions, discussion
15	4	Fundamental concepts including data definition	Structured query language (SQL)	Theoretical+ Tutorial	Questions, discussion

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	• Object Oriented Programming In C++, Forth Edition By Robert Lafore. • Object Oriented Programming With C++, Forth Edition , By Balagurusamy. • C++ Plus Data Structure, Third Edition By Nell Dale. • Fundamentals Of Database System, Sixth Edition By Ramez Elmasri And Shamkant B. Navthe
Special requirements (include for example workshops, periodicals, IT software, websites)	www.cplusplus.com
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
First Year	**CoE 133**	Fundamentals of Digital Techniques	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the program specification.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Fundamentals of Digital Techniques CoE133
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1st semester - First Year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to enable the student to learn basics of digital systems design: Numbering Systems, codes, and Conversion between different numbering systems, principles and laws of Boolean algebra, simplification logical functions using k-map.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Recognize the numbering systems (binary, decimal numbers, octal, hexadecimal and etc.).

A2- Identify the methods of conversion between the number systems.

A3- Identify the codes and the conversion between them.

A4- Identify the basics and rules of Boolean algebra.

A5- Identify on the Karnaugh- maps and using them in simplification the logic circuits.

B. Subject-specific skills

B1 - Knowledge of number systems and conversion between them.

B2 - Knowledge of types of Codes and conversion between them.

B3 - Knowledge the basics and the laws of Boolean algebra and using it to simplify logic circuits.

B4 - Knowledge the design of Karnaugh- maps and using them to simplify logic circuits.

Teaching and Learning Methods

1. Provide lectures and printed sources from the modern, diverse and rich sources including examples.
2. Resolving some questions, with intent to contain mistakes and making the students extracted error.
3. Asking questions and inquiries and solution on the blackboard.
4. Questions directly for all students to learn the extent of interaction between the lecturer and students.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.

D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction to Digital Systems [Decimal, Binary, Octal, Hexadecimal, etc.] and Number – Base Conversions	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Arithmetic operations	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Complements of Numbers	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Binary Logic Gates and Discussion	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Basic Definition and Rules of Boolean Algebra	Boolean Algebra	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Canonical and Standard Forms [sum of products, product of sums]	Boolean Algebra	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Discussion	Boolean Algebra	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	The Karnough Map Method	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Don't- Care Terms	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	NAND and NOR Implementation	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Logic Circuits	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Discussion	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Weighted Codes [BCD, etc.]	Coding systems	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Ex – n Codes and Gray code	Coding systems	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Design of different codes	Coding systems	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Digital Design, 4th Edition, by M. Morris Mano. Prentice-Hall, Inc. 2006 2- Digital Computer Fundamental, by Thomas C. Bartee 3 - Digital System Principle and Application, by Ronald J. Tocci
Special requirements (include for example workshops, periodicals, IT software, websites)	Fundamentals of Logic Design, J. R. Roth.
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Electronic attendance
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A2- Acquiring skill in dealing with problems and dealing with them through computer systems.

A3- Acquiring basic skills for the software industry.

A4- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
First year		Computer's drawing by AutoCAD	fundamental	Bachelor Degree Requires (x) credits

13. Personal Development Planning
This programme is used to create the computer aided designs or software applications using tools included in AutoCAD program. It allows a student to draw and edit digital 2D designs more quickly and easily than he could by hand. AutoCAD provides tools to design the softwares used in the industry, architectures and project management.
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
First year		Computer Drawing by AutoCAD	C	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering department
3. Course title/code	Computer Drawing by AutoCAD/
4. Programme to which it contributes	
5. Modes of Attendance offered	Online Attendance
6. Semester/Year	Semester
7. Number of hours tuition (total)	3 hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	
The objective of this course is to allow students to be able to implement any 2D design in AutoCAD program.	
The objective of this course is to learn students the fundamental concepts of engineering drawing by computer. AutoCAD program is used for drawing by computer. The course includes knowledge about AutoCAD tools and their properties to develop different software designs in different application. After completing this course, the students are expected to become proficient in key topics of computer's drawing by AutoCAD, and to have the opportunity to explore the current topics in this area.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1. Clarifying the basic concepts of computer's drawing using AutoCAD program through a set of available tools and commands.

A2. Acquisition of skills in dealing with problems and Engineering drawing issues.

A3. Acquiring basic skills as an introduction to implement large and applied designs

A4. Gain a basic understanding of how can perform designs in different industrial applications.

B. Subject-specific skills

B1 - Ability to perform a drawing design in different applications.

B2 - The ability to learn how to solve a specific problem or issue.

B3 - Writing scientific reports.

B4 - The ability to gain experience in dealing with Engineering drawing designs.

Teaching and Learning Methods

• Exercises and activities in the lecture.
• give weekly Homework.
• Conducting a tutorial lecture to explain and analyze specific homeworks and find solutions to it.

Assessment methods

- Interacting students in the lecture.
- Homework and reports.
- Quizzes.
- Semester and final exams.

C. Thinking Skills

- C1. Attention: motivate the students' attention by implementing one of the applications' design on the display screen in the hall.
- C2. Response: Follow up the student's interaction with the material displayed on the screen.
- C3. Interesting: follow up the interest of the student who interacted more with the presented material, increasing this interaction by requesting more ideas about designs to be presented.
- C4 - specify the direction: show the student's sympathy to the presentation topics. he may have an opinion about the direction of the presented topic and defend it.
- C5- Formation the valuable behavior: meaning that the student reaches the top of the emotional ladder, so that he has a stable level in the lesson and does not become lazy or fidgety.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to perform the homework on time

D2- Logical thinking to establish the essential ideas and find the solution to various problems.

D3- Develop the student's ability to dialogue and discussion

D4 - Develop the student's ability to deal with modern technology, especially the Internet

.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3		Introduction to AutoCAD by explain the interfaces tools	Theoretical lecture + practical by AutoCAD program	Exercise and discussion
2	3		Coordinate systems and show the method of entering points	Theoretical lecture + tutorial + practical	Homework
3	3		Drawing commands line and rectangle	Theoretical lecture + tutorial	Exercise and discussion
4	3		Circle and Arc commands	Theoretical lecture + tutorial + practical	Exercise and discussion
5	3		Polygon, Ellipse and polyline commands	Theoretical lecture + tutorial + practical	Homework
6	3		Modify tools bar Move, copy and mirror commands	Theoretical lecture + tutorial + practical	Exercise and discussion
7	3		Quiz and discussion	Theoretical lecture + tutorial + practical	Quiz
8	3		Array and offset commands	Theoretical lecture + tutorial + practical	Exercise and discussion
9	3		Fillet, chamfer and strength	Theoretical lecture + tutorial + practical	Exercise and discussion
10	3		Rotate, scale and explode	Theoretical lecture + tutorial + practical	homework

11	3		Trim, extend	Theoretical lecture + tutorial + practical	Exercise and discussion
12	3		Break, lengthen	Theoretical lecture + tutorial + practical	Exercise and discussion
13	3		Text and Dimensions Inserted a Text	Theoretical lecture + tutorial + practical	quiz
14	3		Inserted Dimensions linear and aligned	Theoretical lecture + tutorial + practical	homework
15	3		Insert Leader	Theoretical lecture + tutorial + practical	Exercise and discussion

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	AutoCAD 2014 Fundamentals
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	80
Maximum number of students	120

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	**CoE 223**	Probability and Statistics	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to understand and use the necessary mechanisms and methods that are used in calculating the probability of the expected results of any experiment depending on the type and quantity of results. This course also explains the different methods of calculating the probability and types of distribution functions based on the results of the experiment. This course also explains how to calculate and estimate the expected results of the experiment and calculate the quantities for representing statistics for the results of the experiment. This course also discusses the calculation of functions of the statistical system and the values that are used to clarify the statistics of the data collected in the experiments, and how to relate these quantities to the probability calculations.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Probability and Statistics CoE 223
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	2nd semester/ 2nd year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	

This course aims to introduce students to this basic field of engineering sciences, which enables students to focus on studying mathematics and ways to clarify statistics for experiments or systems that are studied or analyzed and use them to solve problems and design systems in science and engineering such as calculating the rate and the amount of variance and others. The course introduces the principles of calculating the probability distribution and random variables such as the normal, exponential, uniform distribution, etc., and the operations that take place on them. It also introduces students to the principles of counting and its basic methods such as permutations, combinations, counting methods, and methods of proof and proof of mathematical laws. The course enables students to think logically in reasoning and to use rapid methods of counting.

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1- Clarify the basic concepts of methodological methods in proof A2- Gain new skills in counting methods. A3- Gain basic skills to building computing systems. A4- Gain a basic understanding of how to expect results and make a study based on the expected results.
B. Subject-specific skills B1 - The ability to count and clarify the collected data in the simplest possible way. B2 - The ability to think logically in deducing solutions to problems. B3 - The ability to use fast counting methods. B4 - The ability to gain experience in methods of proof.
Teaching and Learning Methods
1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that held by the department. 8. Summer training.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student's interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students 'attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Develop the student's ability to interact with technology. D2 - Develop the student's ability to interact with the Internet. D3 - Develop the student's ability to interact with multimedia. D4 - Develop the student's ability to discuss and debate.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Statistics	Basic of Statistics	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Statistics Graphes	Histogram and Box plot	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Probability	Introduction of Probability	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Counting	Counting Techniques	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Probability Classification	Types of Probability	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Probability Analyzing	Tree Diagrams and Probability Models	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Methods of counting Probability	Conditional Probability	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Methods of counting Probability	Theorem of Total Probability	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Probability Distribution	Random Variables	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Probability Distribution Functions	Continuous Distribution Functions	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Probability Distribution Functions	Discrete Distribution Functions	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Probability Distribution Functions	Some Special Distribution Functions	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Expectation	Principles of Expectation and Moments	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Sampling and Estimation	Principles of Sampling and Estimation	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Estimation	Confidence Interval	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	A First Course in Probability By Sheldon Ross Fundamentals of probability and statistics for engineers , By T. T. Soong
Special requirements (include for example workshops, periodicals, IT software, websites)	Modern introduction to probability and statistics, By F.M. Dekking Applied Statistics , By Mohammed A. Shayib
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	**CoE 232**	Signals and Systems	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to understand and use the necessary tools for continuous-time signal analysis and linear time-invariant (LTI) systems analysis to the student. It also covers the essential concepts of time and frequency domain representation of a signal, as well as, the time and frequency response of an LTI system. In addition, the course discuss the main concepts of signals modulation and the types of modulation by concerning of the applications on computer science.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Signals and Systems CoE 232
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1st semester/ 2nd year
6. Number of hours tuition (total)	60 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of mathematics and mathematical analysis and their use for problem solving and systems design in science and engineering. The course introduces the principles of transforming systems and signals to mathematical equation , set theory, functions and their operations. It also introduces the principles of analyzing the equations into time domain and frequency domain and learning the transformation relations between each other. Also, this course give the student the knowledge of the easiest way in the analyzing and obtaining the results in optimum way.	

10. Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Clarify the basic concepts of mathematical analyzing methods for signals and systems.

A2- Gain new skills in transformation methods between the mathematical equations of different variables.

A3- Gain basic skills to building computing systems and evaluating the systems to obtain the optimum system as properties and application.

A4- Gain basic understanding of system programming and operating systems.

B. Subject-specific skills

B1 - The ability to transform signals and systems into mathematical equations.

B2 - The ability to choose the optimum way in processing a particular problems.

B3 - The ability to use fast counting methods.

B4 - The ability to gain experience in methods of proof.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.

D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Signals Classification	Type of Signals and Signal Operations	Theoretical and Tutorial	Questions, discussion and Quizzes
2	4	Signal Models	Some Useful Signal Models	Theoretical and Tutorial	Questions, discussion and Quizzes
3	4	Signal Spectrum	Phasors and Frequency Spectrum	Theoretical and Tutorial	Questions, discussion and Quizzes
4	4	Frequency Domain	Fourier Series	Theoretical and Tutorial	Questions, discussion and Quizzes
5	4	Frequency Domain	Fourier Transform	Theoretical and Tutorial	Questions, discussion and Quizzes
6	4	Frequency Domain	Fourier Transform Properties	Theoretical and Tutorial	Questions, discussion and Quizzes
7	4	Systems Classification	System Types and Description	Theoretical and Tutorial	Questions, discussion and Quizzes
8	4	Systems Analysis	Time Domain Analysis	Theoretical and Tutorial	Questions, discussion and Quizzes
9	4	System Analysis	Convolution	Theoretical and Tutorial	Questions, discussion and Quizzes
10	4	Frequency Domain Analysis	System Analysis	Theoretical and Tutorial	Questions, discussion and Quizzes
11	4	Laplace Transform	System Analysis	Theoretical and Tutorial	Questions, discussion and Quizzes
12	4	Types of Signals Modulation	Signals Modulation	Theoretical and Tutorial	Questions, discussion and Quizzes
13	4	Amplitude Modulation	Signal Modulation	Theoretical and Tutorial	Questions, discussion and Quizzes
14	4	Frequency Modulation	Signal Modulation	Theoretical and Tutorial	Questions, discussion and Quizzes
15	4	Signal Modulation	Phase Modulation	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Signals-and-Systems - by Oppenheim Analog and Digital Communication - Schaum
Special requirements (include for example workshops, periodicals, IT software, websites)	A Practical Approach to Signals and Systems by D. Sundararajan fundamentals-of-signals-and-systems by Benoit Boulet
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATION

This program specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Program Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	CoE234	Computer Organization	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This course introduces the general microcomputer organization. The topics include the components of a computing system and interactions among them, overview of the memory and memory segmentation and the data exchange between CPU and memory unit. Also, the course includes the fetch and execute cycles, instruction decoding and execution, and addressing modes. The instruction set and assembly language are explained during this course. Memory fundamentals, basic element of the memory, memory interfacing, and address decoding are also studied in this course.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Computer Organization CoE234
4. Program to which it contributes	Computer Organization
5. Modes of Attendance offered	E-Learning
6. Semester/Year	Second Course / Second Year
7. Number of hours tuition (total)	45 Hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	
1- Introduction to computer organization: Indicate some important topic areas such as system organization and architecture, history of computer systems and its development, general model of computer organization (CPU, Memory, I/O).	
2- The software Architecture of the microprocessor unit: Bus interface unit BIU, execution units EU, instruction queue, pipelined and non-pipelined architecture, the software model of 8088/86286/386/Pentium microprocessors, instruction pointer, segment registers, general purpose registers, pointer and index registers, and status register. Memory address space, segmentation and data organization.	
3- Data type: Representation of integers and real numbers, signed and unsigned numbers, packed and unpacked BCD numbers, and ASCII codes.	
4- Instruction set and assembly programming: Introduce the instruction format, instruction fetching, decoding, and executing operations, addressing modes, instruction types (data movement, arithmetic, logic, strings, branching, subroutine	

call and return mechanisms, and interrupt instructions). The course introduces the programming in assembly language for Intel x86-based microcomputers.
5- Real Mode and Protected mode of x86 Microprocessors: Explain the difference between real and protected modes of microcomputer system operations and their memory management and organization.
6- Memory Interface: Clock system, bus cycle and time states, hardware organization of the memory address space, memory control signals, read and write bus cycles, buses buffering and demultiplexing, memory technologies such as SRAM, DRAM, ROM, PROM, EPROM, and FLASH, error detecting and error correcting system, design a complete memory subsystem and its interface. Example Intel processors memory interface.

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Clarifying the basic concepts of computer organization and knowing the difference between computer organization and computer architecture. A2. Clarifying the basic concepts of the memory and memory segmentation and the data exchange between CPU and memory unit. A3. The course includes the fetch and execute cycles, instruction decoding and execution, and addressing modes A4. The instruction set and assembly language are explained during this course. A5. Memory fundamentals, basic element of the memory, memory interfacing, and address decoding.
B. Subject-specific skills B1. The ability to deal with the internal components of computer and write programs in the assembly language. B2. Writing scientific reports. B3. The ability to gain experience in dealing with the physical components of the computer.
Teaching and Learning Methods
• Readings, self-learning, panel discussions. • Training and activities in the lecture. • Home duties. • Direct students to some websites to benefit and develop capabilities. • Contact during discussions to explain and analyze a particular issue and find solutions to it.
Assessment methods
• Interaction within the lecture. • Home duties and reports. • Short tests (Quizzes). • Quarterly and final examinations.

C. Thinking Skills C1- Attention: Attracting the attention of students by implementing one of the applied programs on the display in the hall. C2- Response: Follow up on the student's interaction with the material displayed on the screen. C3- Attention: Follow the interest of the student who interacted more with the subject displayed, by increasing this interaction by requesting other programs and applications to display it. C4- Trend configuration: Meaning that the student is sympathetic to the offer and may have an opinion on the subject on offer and defend it. C5- The formation of value behavior: meaning that the student reaches the top of the emotional ladder and has a fixed level in the lesson and does not laziness and does not get bored.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1- Develop the student's ability to perform duties and deliver them on time D2- Logical and software thinking to find software solutions to different issues D3- Developing the student's ability to talk and discuss D4-Developing the student's ability to deal with modern technology, especially the Internet

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Comparison between Computer Organization and Computer Architecture	Introduction to Computer Organization	Theoretical	Questions and Discussion
2	3	The History and Evolution of Computers	Introduction to Computer Organization	Theoretical and Tutorial	Questions and Discussion
3	3	Types of Computers Based on Memory type, CPU type, and Instruction Set	Introduction to Computer Organization	Theoretical	Questions and Discussion
4	3	Microarchitecture of the Intel x86 Microprocessors	Software Model of the Intel x86 Microprocessors	Theoretical	Questions, Discussion and Quiz
5	3	Software Model of the Intel x86 Microprocessors	Software Model of the Intel x86 Microprocessors	Theoretical	Questions and Discussion
6	3	Memory Address Space, Data Organization and Data Types	Software Model of the Intel x86 Microprocessors	Theoretical and Tutorial	Questions and Discussion
7	3	Instruction Cycle (Fetch-Decode-Execute Cycle)	Instructions set	Theoretical	Questions and Discussion
8	3	Instruction Formats	Instructions set	Theoretical	Questions,

					Discussion and Quiz
9	3	Assembly Language and Addressing Modes	Assembly language for Intel x86-based microcomputers	Theoretical and Tutorial	Questions and Discussion
10	3	Data Transfer Instructions	Assembly language for Intel x86-based microcomputers	Theoretical	Questions and Discussion
11	3	Arithmetic Instructions	Assembly language for Intel x86-based microcomputers	Theoretical	Questions and Discussion
12	3	Logic and Shift Instructions	Assembly language for Intel x86-based microcomputers	Theoretical and Tutorial	Questions, Discussion and Quiz
13	3	Control Flow Instructions and Program Structures	Assembly language for Intel x86-based microcomputers	Theoretical	Questions and Discussion
14	3	Clock system, bus cycle and time states, hardware organization of the memory address space, memory control signals, read and write bus cycle	Memory Interface	Theoretical	Questions and Discussion
15	3	Design a complete memory subsystem and its interface	Memory Interface	Theoretical and Tutorial	Questions, Discussion and Quiz

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1.“Computer Organization and Architecture: Designing for Performance” by William Stallings, Prentice Hall, 10th Edition,2016. 2.“The 8088 and 8086 Microprocessor: Programming, Interfacing, Software, Hardware and Applications” by Walter A. Triebel and Avatar Singh, Prentice Hall, 4th Edition,2003. 3. “The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386,80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2with 64-Bit Extensions: Architecture, Programming, and Interfacing” by Barry B. Brey, Prentice Hall, 8th Edition,2009.
Special requirements (include for example workshops, periodicals, IT software, websites)	

Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	CoE233 Digital System Design
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	**CoE 211**	ELECTRONIC DEVICE PHYSICS	C				x		x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to give basic background about electronic elements and devices.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Electronic Device Physics CoE 211
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1^{st} semester/ 2^{nd} year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to introduce students to the fundamental field of electronic elements and their applications. .	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Clarify the basic concepts of logical methods in proofing laws.

A2- Gain new skills in counting methods.

A3- Gain basic skills to building electronic systems.

B. Subject-specific skills

B1 - The ability to transform issues into programs and applications design.
B2 - The ability to think logically in addressing a particular problem.
B3 - The ability to use fast counting methods.
B4 - The ability to gain experience in methods of proof.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.
C2- Response: monitor the student's interaction with the material that displayed on the screen.
C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.
C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.
C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.
D2 - Develop the student's ability to interact with the Internet.
D3 - Develop the student's ability to interact with multimedia.
D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Basics	The Crystal Structure of Solids	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Basics	The Crystal Structure of Solids	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Basics	Introduction to Quantum Mechanics	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Basics	Introduction to Quantum Mechanics	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Analyze movement of particles	Introduction to Quantum Theory of Solids	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Analyze movement of particles	Introduction to Quantum Theory of Solids	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Charge carriers in semiconductors	The Semiconductor in Equilibrium	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Charge carriers in semiconductors	Carrier Transport Phenomena	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Charge carriers in semiconductors	Carrier Transport Phenomena	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Background for diodes	The pn Junction	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Background for diodes	The pn Junction	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Applications	Diodes and Applications	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Applications	Diodes and Applications	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Background for BJT	The Bipolar Junction Transistor	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Background for BJT	The Bipolar Junction Transistor	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	D. A. Neamen, *Semiconductor Physics and Devices: Basic Principles*. USA: McGraw-Hill, 4th ed., 2014. 2012.
Special requirements (include for example workshops, periodicals, IT software, websites)	D. A. Neamen, *Microelectronics: Circuit Analysis and Design*. USA: McGraw-Hill, 4th ed., 2010.
Community-based facilities (include for example, guest Lectures, internship, field	websites. Libraries sites in international universities.

studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
2^{nd} year	CoE221	Mathematics III	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Basrah University
2. University Department/Centre	Computers Engineering Deptartment
3. Course title/code	Mathematics III/ CoE221
4. Programme to which it contributes	
5. Modes of Attendance offered	Online
6. Semester/Year	Semester
7. Number of hours tuition (total)	60 hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Acquisition of mathematical knowledge to understand the environment and deal with society. A2. Understand the nature of mathematics as an integrated system of knowledge and its role in explaining some natural phenomena. A3. Realizing the integration of experience, for example, in investing mathematical knowledge in other fields of study. A4. Expressing attitudes stemming from reality and trying to find an explanation or a solution to them.
B. Subject-specific skills B1. Using the language of mathematics in communicating and expressing life situations. B2.The ability to build mathematical models of engineering structures. B3.The ability to present and discuss mathematical ideas and acquire the skill of mathematical proof. B4. Employs reading and listening skills to explain mathematical ideas and provide convincing justifications.
Teaching and Learning Methods
• Reading, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit and develop their capabilities. • Conducting seminars to explain and analyze a specific issue and find solutions to it.
Assessment methods
• Interacting within lectures. • Homework and reports. • Quiz • Semester and final exams
C. Thinking Skills C1. Attention: By implementing one of the applied programs on the display screen. C2. Response: Follow up the student's interaction with the material displayed on the screen C3.Follow up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display. C4. Formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a stable level in the lesson and does not become lazy.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Developing the student's ability to perform the duties and deliver them on time

D2. Logical and programmatic thinking to find programmatic solutions to various problems

D3.Developing the student's ability to dialogue and debate

D4.Developing the student's ability to deal with modern technology.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Sequences and subsequences, limits, uniqueness of limits.	Sequences and series.	Theoretical + Tutorial	Discussion and Question
2	4	series convergence and divergence: comparison test, comparison of ratios, integral test, test of alternating series, absolute and conditional convergence.	Sequences and series.	Theoretical + Tutorial	Discussion and Question
3	4	infinite series test for convergence, power series for functions, Taylor's theorem, Mclaurian series,	Sequences and series.	Theoretical + Tutorial	Discussion and Question+ Quiz
4	4	convergence of power series, differentiation and integration.	Sequences and series.	Theoretical + Tutorial	Discussion and Question
5	4	solution of differential equations by series, Legender and Bessel equations.	Sequences and series.	Theoretical + Tutorial	Discussion and Question
6	4	scalars and vectors, components of a vector, addition	Vector Analysis	Theoretical + Tutorial	Discussion and Question + Quiz

		of vectors, multiplication by scalars, vector in space, dot product, cross product, forms of equation of a curve in space			
7	4	parametric representation, tangential and normal, vectors, curvature, radius of curvature, forms of equation of a surface in space,	Vector Analysis	Theoretical + Tutorial	Discussion and Question
8	4	gradient and normal vectors, vector function in Cartesian cylindrical and spherical coordinates,	Vector Analysis	Theoretical + Tutorial	Discussion and Question + Quiz
9	4	speed, and acceleration, line, surface, and volume integrals and Divergence theorem.	Vector Analysis3	Theoretical + Tutorial	Discussion and Question
10	4	Functions of two or more variables, tangent plane and normal line, the directional derivative, the gradient, the chain rule for partial derivatives, the total differential,	Partial Differentiation:	Theoretical + Tutorial	Discussion and Question
11	4	Maximum and minimum of two independent variables.	Partial Differentiation	Theoretical + Tutorial	Discussion and Question + Quiz
12	4	Laplace Transform: transforms and properties.	Laplace Transform.	Theoretical + Tutorial	Discussion and Question
13	4	inverse transform, partial fraction, application	Laplace Transform.	Theoretical + Tutorial	Discussion and Question + Quiz
14	4	DE solutions using Laplace	Laplace Transform.	Theoretical + Tutorial	Discussion and Question

		transform.			
15	4	Different topics	Discussion and revision	Theoretical + Tutorial	Discussion and Question

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1. Thomas, "Calculus and Analytic Geometry". 2. Kreyszig, "Advanced Engineering Mathematics".
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	University of California San Diego: https://www.library.cornell.edu/ Virginia Commonwealth University: https://www.library.vcu.edu/

13. Admissions	
Pre-requisites	Calculus I and Calculus II
Minimum number of students	15
Maximum number of students	70

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
2nd year	CoE222	Differential Equations	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Basrah University
2. University Department/Centre	Computers Engineering Deptartment
3. Course title/code	Differential Equations/ CoE222
4. Programme to which it contributes	
5. Modes of Attendance offered	Online
6. Semester/Year	Semester
7. Number of hours tuition (total)	60 hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Acquisition of mathematical knowledge to understand the environment and deal with society. A2. Understand the nature of mathematics as an integrated system of knowledge and its role in explaining some natural phenomena. A3. Realizing the integration of experience, for example, in investing mathematical knowledge in other fields of study. A4. Expressing attitudes stemming from reality and trying to find an explanation or a solution to them.
B. Subject-specific skills B1. Using the language of mathematics in communicating and expressing life situations. B2.The ability to build mathematical models of engineering structures. B3.The ability to present and discuss mathematical ideas and acquire the skill of mathematical proof. B4. Employs reading and listening skills to explain mathematical ideas and provide convincing justifications.
Teaching and Learning Methods
• Reading, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit and develop their capabilities. • Conducting seminars to explain and analyze a specific issue and find solutions to it.
Assessment methods
• Interacting within lectures. • Homework and reports. • Quiz • Semester and final exams
C. Thinking Skills C1. Attention: By implementing one of the applied programs on the display screen. C2. Response: Follow up the student's interaction with the material displayed on the screen C3.Follow up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display. C4. Formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a stable level in the lesson and does not become lazy.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Developing the student's ability to perform the duties and deliver them on time

D2. Logical and programmatic thinking to find programmatic solutions to various problems

D3.Developing the student's ability to dialogue and debate

D4.Developing the student's ability to deal with modern technology.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Separation of variables.	First order Differential Equation	Theoretical + Tutorial	Discussion and Question
2	4	Homogeneous Differential Equations .Solutions by substitutions.	First order Differential Equation	Theoretical + Tutorial	Discussion and Question
3	4	Exact Differential Equations .	First order Differential Equation	Theoretical + Tutorial	Discussion and Question+ Quiz
4	4	Linear Differential Equations .	First order Differential Equation	Theoretical + Tutorial	Discussion and Question
5	4	2^{nd} order Homogeneous Differential Equations	Linear Differential Equations of 2^{nd} and higher order	Theoretical + Tutorial	Discussion and Question
6	4	Eular Cauchy 2^{nd} order Homogeneous Differential Equations	Linear Differential Equations of 2^{nd} and higher order	Theoretical + Tutorial	Discussion and Question + Quiz
7	4	2^{nd} order Non-Homogeneous Differential Equations	Linear Differential Equations of 2^{nd} and higher order	Theoretical + Tutorial	Discussion and Question
8	4	Higher order Differential Equations	Linear Differential Equations of 2^{nd} and higher order	Theoretical + Tutorial	Discussion and Question + Quiz
9	4	Linear models; exponential growth and decay,	Modeling with First-Order Differential Equations:	Theoretical + Tutorial	Discussion and Question
10	4	Newton's law	Modeling with	Theoretical +	Discussion and

		of cooling, mixture problems, series circuits	First-Order Differential Equations:	Tutorial	Question
11	4	Non-linear models; logistic growth, chemical reactions. Systems of differential equations; radioactive series, mixtures, predator-prey models,	Modeling with First-Order Differential Equations:	Theoretical + Tutorial	Discussion and Question + Quiz
12	4	Linear models with initial value problems; spring/mass systems with free undamped motion,	Modeling with Higher-Order Differential Equations	Theoretical + Tutorial	Discussion and Question
13	4	Linear models with initial value problems; spring/mass systems with free damped motion, and driven motion.	Modeling with Higher-Order Differential Equations	Theoretical + Tutorial	Discussion and Question + Quiz
14	4	Series circuit analogue. Linear models with boundary value problems. Nonlinear models.	Modeling with Higher-Order Differential Equations	Theoretical + Tutorial	Discussion and Question
15	4	Different topics	Discussion and revision	Theoretical + Tutorial	Discussion and Question

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS	1. Thomas, "Calculus and Analytic Geometry". 2. Kreyszig, "Advanced Engineering Mathematics".

· OTHER	
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	University of California San Diego: https://www.library.cornell.edu/ Virginia Commonwealth University: https://www.library.vcu.edu/

13. Admissions	
Pre-requisites	Calculus I and Calculus II
Minimum number of students	15
Maximum number of students	70

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students 'attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	**CoE 231**	Discrete Structures	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to understand and use discrete structures that are backbones of computer science. In particular, this class is meant to introduce logic, proofs, sets, relations, functions, with an emphasis on applications in computer science.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Discrete Structures CoE 231
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1st semester/ 2nd year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of discrete mathematics and structures and their use for problem solving and systems design in science and engineering. The course introduces the principles of logic, set theory, relations, functions, number systems, and their operations. It also introduces the principles of counting and its basic ways, such as permutations, combinations, counting methods, and methods of proof and their mathematical laws. The course enables students to think logically in reasoning and to use rapid methods of counting.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Clarify the basic concepts of logical methods in proofing laws.

A2- Gain new skills in counting methods.

A3- Gain basic skills to building computing systems.

A4- Gain basic understanding of system programming and operating systems.

B. Subject-specific skills

B1 - The ability to transform issues into programs and applications design.
B2 - The ability to think logically in addressing a particular problems.
B3 - The ability to use fast counting methods.
B4 - The ability to gain experience in methods of proof.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.
C2- Response: monitor the student's interaction with the material that displayed on the screen.
C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.
C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.
C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.
D2 - Develop the student's ability to interact with the Internet.
D3 - Develop the student's ability to interact with multimedia.
D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	propositional logic	Mathematical Logic	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	logical reasoning	Mathematical Induction	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	basics	Set Theory	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	set operations	Set Theory	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	properties, Combining relations	Relations	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Closures, Equivalence, partial ordering	Relations	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	one-to-one, onto, inverse, composition, graphs	Functions	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Predicates, preconditions and postconditions	Predicates	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Universal Quantifier, Existential Quantifier, Restricted Domains, Using Quantifiers in System Specifications	Quantifiers	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Primes, Greatest Common Divisors, Least Common Multiple, Euclidean Algorithm	Integer Representations	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Sequences, Recurrence Relations, Summations	Sequences and Summations	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Product rule, Sum rule, Subtraction Rule, Division Rule, Tree Diagrams, Pigeonhole Principle	Counting	Theoretical and Tutorial	Questions, discussion and Quizzes

13	3	Permutations	Permutations	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Combinations, Binomial Coefficients and Identities, Repetitions	Combinations	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Recursively Defined Functions, Sets and Structures, Structural Induction	Structural Induction	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Fundamentals Approach to Discrete Mathematics, D.P Acharjya Discrete Mathematics and Its Applications, Rosen
Special requirements (include for example workshops, periodicals, IT software, websites)	Fundamentals Approach to Discrete Mathematics, D.P Acharjya Discrete Mathematics and Its Applications, Rosen
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATION

This program specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.
Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Program Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	CoE233	Digital System Design	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This course introduces the general microcomputer organization. The topics include the components of a computing system and interactions among them, overview of the memory and memory segmentation and the data exchange between CPU and memory unit. Also, the course includes the fetch and execute cycles, instruction decoding and execution, and addressing modes. The instruction set and assembly language are explained during this course. Memory fundamentals, basic element of the memory, memory interfacing, and address decoding are also studied in this course.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Digital System Design CoE233
4. Program to which it contributes	Digital System Design
5. Modes of Attendance offered	E-Learning
6. Semester/Year	First Course / Second Year
7. Number of hours tuition (total)	60 Hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	
1. Introduction and Overview: combinational versus sequential circuits, Hierarchical design of combinational circuits using logic modules, PLA, Random-access memory (RAM), realization of logic functions using PLA and/ or RAM.	
2. Analysis of Sequential logic circuits: Finite state machines (FSMs), clocked and un-clocked, Mealy vs. Moore models of FSMs, Modeling FSM behavior: State diagrams and state tables, timing diagrams, algorithmic state machine charts, Analysis of synchronous and asynchronous circuits.	
3. Design of Sequential logic circuits: Design of synchronous sequential circuits: State minimization, state assignment, next state and output equation realization. Sequential functional units: Data registers, shift registers, counters, sequence detectors, synchronizers, controllers.	
4. Realization using field-programmable gate arrays (FPGAs): Control concepts: Register transfer notation, major control state, sequences of micro-	

operations, conditional execution of micro-operations. Programmable logic devices (PLDs) and field-programmable gate arrays (FPGAs), PLAs, ROMs, PALs, complex PLDs.
5. Realization using ASM Charts: Using Algorithmic State Machine to represent the physical hardware circuits.
6. VHDL: Write programs in VHDL for combinational and sequential circuits.

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Learn how to design logic circuits, and sequential circuits. A2. Learn to analyze synchronous and asynchronous networks using state machine charts. A3. Learn digital system modeling with hardware description languages HDL
B. Subject-specific skills The ability to analyze and design sequential circuit and digital system modeling with hardware description languages HDL.
Teaching and Learning Methods
• Readings, self-learning, panel discussions. • Training and activities in the lecture. • Home duties. • Direct students to some websites to benefit and develop capabilities. • Contact during discussions to explain and analyze a particular issue and find solutions to it.
Assessment methods
• Interaction within the lecture. • Home duties and reports. • Short tests (Quizzes). • Quarterly and final examinations.
C. Thinking Skills C1- Attention: Attracting the attention of students by implementing one of the applied programs on the display in the hall. C2- Response: Follow up on the student's interaction with the material displayed on the screen. C3- Attention: Follow the interest of the student who interacted more with the subject displayed, by increasing this interaction by requesting other programs and applications to display it. C4- Trend configuration: Meaning that the student is sympathetic to the offer and may have an opinion on the subject on offer and defend it. C5- The formation of value behavior: meaning that the student reaches the top of the emotional ladder and has a fixed level in the lesson and does not laziness and

does not get bored.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1- Develop the student's ability to perform duties and deliver them on time

D2- Logical and software thinking to find software solutions to different issues

D3- Developing the student's ability to talk and discuss

D4-Developing the student's ability to deal with modern technology, especially the Internet

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Design read only memory (ROM), ROM structure that generate a function (or functions), and Realization of PAL and PLA devices.	Programmable logic Devices	Theoretical	Questions and Discussion
2	4	Realization of FPGA.	Programmable logic Devices	Theoretical and Tutorial	Questions and Discussion
3	4	Design of synchronous network	Derivation of State graphs and Tables	Theoretical	Questions and Discussion
4	4	Reduction of state tables (find the equivalent states in the state table). Determination of state equivalence using an implication table	Reduction of State Tables State assignment	Theoretical	Questions, Discussion and Quiz
5	4	Determination of equivalence states	Reduction of State Tables State assignment	Theoretical	Questions and Discussion
6	4	Analysis of asynchronous sequential network using the fundamental mode operations	Analysis of asynchronous sequential Circuits	Theoretical and Tutorial	Questions and Discussion
7	4	analysis of asynchronous networks with S-R FFs	Analysis of asynchronous sequential Circuits	Theoretical	Questions and Discussion

8	4	Analysis of an asynchronous gate network (without using flip-flops).	Analysis of asynchronous sequential Circuits	Theoretical	Questions, Discussion and Quiz
9	4	Derivations of primitive flow table	Derivations and reduction of primitive flow tables	Theoretical and Tutorial	Questions and Discussion
10	4	Reduction of primitive flow table	Derivations and reduction of primitive flow tables	Theoretical	Questions and Discussion
11	4	State assignment and realization	State assignment and realization of flow Tables	Theoretical	Questions and Discussion
12	4	static and dynamic hazard and design of hazard free combination network using NAND gates or NOR gates	Hazards	Theoretical and Tutorial	Questions, Discussion and Quiz
13	4	Introduction to ASM Chart	ASM Chart	Theoretical	Questions and Discussion
14	4	Realization of ASM Chart	ASM Chart	Theoretical	Questions and Discussion
15	4	VHDL	Introduction to VHDL	Theoretical and Tutorial	Questions, Discussion and Quiz

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Roth, "Fundamentals of logic Design". 1-M. Morris, “Digital Design”. 2- M. Morris,” Logic and Computer Design Fundamentals”.
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	CoE 133, and CoE 134

Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students 'attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

11. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	**CoE ٢٣5**	Algorithms	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

Studying the general topics of algorithms Design and the analysis techniques for solving domain specific problems, algorithm design strategies, distributed algorithms, sorting and searching algorithms, graph searching algorithms, algorithm evaluation and complexity, non-algorithmic solution, and incompatibility.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Algorithms CoE 235
5. Modes of Attendance offered	Presence and on-line
6. Semester/Year	2^{nd} semester/ 2^{nd} year
7. Number of hours tuition (total)	45 Hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	
This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study data structures and programming background and make them expert in programming the common algorithms and data structures, using the JAVA and C++ programming languages. The students will perform laboratory exercises in programming the commonplace algorithms in C++. The students will also be exposed to computation models and computational complexity.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1. Clarify the basic concepts of data structures

A2. Gain new skills in finding the growing and the complexity of functions.

A3. Gain the skills to compute the complexity of the programming code.

A4. Understanding searching and sorting algorithms.

A5. Understanding simple table problems with modern solutions.

A6. Gain basic understanding in Graph algorithms.

B. Subject-specific skills

B1 - The ability to transform issues into programs and applications design.

B2 - The ability to think logically in addressing a particular problem.

B3 - The ability to design algorithms to solve problems.

B4 - The ability to gain experience in simplify complex problems.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.

D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Basic algorithms, algorithm using,	**Introduction**	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	complexity, the purpose and role of algorithms in computer engineering.	**Introduction**	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	behavior (best, average, and worst case), Big "O," little "o," omega, and theta notation, measurements	**Algorithmic analysis**	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Time and space tradeoffs, recursive algorithms. Distributed algorithms Concurrency and Scheduling.	**Algorithmic analysis**	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Dynamic connectivity, quick find, quick union, improvements	Art of Algorithms	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Trees, graphs, Binary tree, and Binary search tree.	**Data Structure**	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Selection, Insertion, Bubble, and Shell sort	**Sorting**	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Merge sort, Quick sort, duplicate keys, system sorts	**Sorting**	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Binary heap, and heap sort	**Sorting**	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	API, sequential search, binary search, ordered operations.	**Symbol Tables**	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	BST, ordered operations, deletion	**Binary Search Trees**	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	2-3 Search trees, red-black BSTs	**Binary Search Trees**	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Hash functions, sperate chaining, linear probing	**Hash Tables**	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	DFS, BFS, connected components	**Undirected Graph**	Theoretical and Tutorial	Questions, discussion and Quizzes

15	3	Searching, topological sorting, MST	Directed Graph	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Algorithms 4th edition by R. Sedgewick and K. Wayne, Addison-Wesley Professional, 2011, ISBN 0-321-57351-X. Algorithms 3rd edition by R. Sedgewick, Addison-WesleyProfessional.
Special requirements (include for example workshops, periodicals, IT software, websites)	Sorting demos
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	C++ or Java
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021

9. Aims of the Program

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Learn about topics of sensors and instrumentation, and their use within measurement systems, as an integrated and coherent subject. A2- Understanding the principles and theory of measurement. A3- Acquisition of knowledge in determining the general characteristics of measuring instruments, and their behavior in different operating environments, are well established before the student is introduced to the procedures involved in choosing a measurement device for a particular application A4- Present all the items in the typical measurement system in a logical order, starting with data acquisition from sensors and then proceeding through the stages of signal processing, sensor output transducing, signal transmission, and signal display or recording. A5- Introduce a review of the different classes of instruments and sensors available, and the sorts of applications in which these different types are typically used. A6- Gain the required skills, includes analysis of the static and dynamic characteristics of instruments and exploration of how these affect instrument usage. A7- Covering the range of electrical indicating and test instruments that are used to monitor electrical measurement signals. A8- Presenting the range of variable conversion elements (transducers) and techniques that are used to convert non-electrical sensor outputs into electrical signals, with particular emphasis on electrical bridge circuits.
B. Subject-specific skills B1 - Ability to appreciate and critically evaluate the various advantages and characteristics of different instruments when faced with the task of selecting a suitable machine. B2 - The ability to obtain data from sensors and then proceed through the stages of signal processing, sensor output conversion, signal transmission, and signal display or recording. B3 - Ability to troubleshoot and maintain measuring devices and sensors. B4 - Ability to analyze static and dynamic properties of instruments and explore how they affect tool use.
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods

1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students 'attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.
Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

<table>
<tr><td colspan="4">11. Programme Structure</td><td rowspan="2">12. Awards and Credits</td></tr>
<tr><td>Level/Year</td><td>Course or Module Code</td><td>Course or Module Title</td><td>Credit rating</td></tr>
<tr><td></td><td></td><td></td><td></td><td rowspan="2">Bachelor Degree
Requires (x) credits</td></tr>
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13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Second stage	**CoE 237**	Instrumentation	C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of basrah
2. University Department/Centre	Department of Computer Engineering
3. Course title/code	Instrumentation / CoE 237
4. Programme to which it contributes	IEEE Computer Engineering Body of Knowledge, and ABET
5. Modes of Attendance offered	Electronic
6. Semester/Year	Second semester / second stage
7. Number of hours tuition (total)	45
8. Date of production/revision of this specification	2021
9. Aims of the Course	
Providing the students with the theoretical foundations that related to principle of measurement, measuring electrical quantities, analogue and digital transducers, measurement of level, pressure, flow, temperature, and other industrial measurements.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Clarify the basic concepts of Instrumentation and measurement systems. A2- Gain new skills in types of instruments, precision, and accuracy. A3- Gain basic skills to building the Electrical Measurements
B. Subject-specific skills B1. The ability to transform issues into programs and applications design. B2 - The ability to think logically in addressing a particular problem. B3 - The ability to use fast counting methods. B4 - The ability to gain experience in methods of proof
Teaching and Learning Methods
1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that held by the department. 8. Summer training.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student’s interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.
Teaching and Learning Methods
D1 - Develop the student's ability to interact with technology. D2 - Develop the student's ability to interact with the Internet. D3 - Develop the student's ability to interact with multimedia. D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Instrumentation and measurement systems applications, SI Units, Fundamental and derived units.	Introduction to Instrumentation and Measurement Systems	Theoretical	Questions and discussion
2	3	Elements of measuring instrument, Feedback system.	Introduction to Instrumentation and Measurement Systems	Theoretical	Questions and discussion
3	3	Types of instruments, precision, and accuracy. Primary measurement and secondary measurement.	Introduction to Instrumentation and Measurement Systems	Theoretical	Questions and discussion
4	3	Galvanometer, Voltage measurement, Current measurement	Electrical Measurements	Theoretical	Questions and discussion
5	3	Resistance measurements. Electronic measurement devices.	Electrical Measurements	Theoretical	Questions and discussion
6	3	D.C. and A.C. Bridges.	Electrical Measurements	Theoretical	Questions and discussion
7	3	Resistive, Inductive and Capacitive transducers	Electrical Transducers	Theoretical	Questions and discussion
8	3	measurement of transducer output	Electrical Transducers	Theoretical	Questions and discussion

9	3	Capacitive transducers, measurement of transducer output,	Electrical Transducers	Theoretical	Questions and discussion
10	3	Level measurement, Pressure measurement: Burden tube, Bellows, Diaphragms	Industrial measurements	Theoretical	Questions and discussion
11	3	Differential pressure measurement, Flow measurement.	Industrial measurements	Theoretical	Questions and discussion
12	3	Temperature measurement, Force, Load cell.	Industrial measurements	Theoretical	Questions and discussion
13	3	Opt couplers and OID, optical detection.	Digital Transducers	Theoretical	Questions and discussion
14	3	magnetic pickups, Speed measurement, Position measurement	Digital Transducers	Theoretical	Questions and discussion
15	3	Different topics	Digital Transducers	Theoretical	Questions and discussion

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Measurement and Instrumentation: Theory and Application.

Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This program specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
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6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the program
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Program Learning Outcomes are being assessed																			
				Program Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year	**CoE 236**	Digital electronics	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to understand the design and analysis of digital electronic circuits depending on theoretical mathematical methods for design and analysis and introduce simulation programs such as SPICE for running digital circuits implementation. Small class projects are also given to facilitate students skills.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Digital electronics CoE 236
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	2^{nd} semester/ 2^{nd} year
6. Number of hours tuition (total)	60 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
The theoretical foundations of computer engineering have expanded substantially in recent years. The objective of this course is to introduce students to this fundamental area of computer science which enables students to focus on the study of design and analysis of digital electronic circuits using the theoretical methods and simulation programs. This course is the fundamental of many other courses such as: computer architecture, digital control, logic design, VLSI, etc.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1- Clarify the basic concepts of logical digital electronic circuits A2- Gain new skills in counting methods. A3- Gain basic skills to build integrated circuits and microprocessors A4- Gain basic understanding to fabrication of digital integrated circuits
B. Subject-specific skills B1 - The ability to design, analyze, and simulate digital electronic circuits B2 - The ability to think logically in addressing a particular problems. B3 - The ability to use fast counting methods. B4 - The ability to gain experience in methods of dealing with digital electronics systems.
Teaching and Learning Methods
1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that held by the department. 8. Summer training.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student’s interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Develop the student's ability to interact with technology. D2 - Develop the student's ability to interact with the Internet. D3 - Develop the student's ability to interact with multimedia. D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Introduction to digital electronics	Knowledge of logic design goals	Theoretical and Tutorial	Questions, discussion and Quizzes
2	4	Ideal logic gates	Design of basic logic gates	Theoretical and Tutorial	Questions, discussion and Quizzes
3	4	Logic levels and noise margin	Understand the need for noise rejection and related topics	Theoretical and Tutorial	Questions, discussion and Quizzes
4	4	Dynamic response and NMOS logic design	Understand dynamic behavior of logic gates	Theoretical and Tutorial	Questions, discussion and Quizzes
5	4	NOMS NAND and NOR gates	Build another logic gate	Theoretical and Tutorial	Questions, discussion and Quizzes
6	4	Complex Logic and power dissipation and PMOS logic	Build complex logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
7	4	CMOS logic: inverter, NOR, NAND, and complex logic circuits	build logic circuits with CMOS technology	Theoretical and Tutorial	Questions, discussion and Quizzes
8	4	Static and dynamic characteristics	Measure the static and dynamic parameters	Theoretical and Tutorial	Questions, discussion and Quizzes
9	4	Power dissipation and power delay product	Study the power and propagation delay	Theoretical and Tutorial	Questions, discussion and Quizzes
10	4	MOS Memory and storage circuits	Principles of MOSFET memories	Theoretical and Tutorial	Questions, discussion and Quizzes
11	4	SRAM, DRAM, Sense amplifier, decoders	Building of different types of memories with its supplement circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
12	4	ROM, PLA, Flip Flops	Build another type of storage circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
13	4	Bipolar log circuits: ECL, TTL	Knowing other technology for logic circuit design	Theoretical and Tutorial	Questions, discussion and Quizzes
14	4	OR, NOR gates and emitter follower	Building of NOT, OR, NOR Bipolar gates	Theoretical and Tutorial	Questions, discussion and Quizzes
15	4	BiCMOS	Understanding the BiCMOS new technology	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS	MICROELECTRONIC CIRCUIT DESIGN Richard C. Jaeger and Travis N. Blalock

· OTHER	
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

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9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
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10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

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A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

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B1 - The ability to design simple and advanced programs in different programming languages.

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B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
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5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the program
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map

please tick in the relevant boxes where individual Program Learning Outcomes are being assessed

				Program Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Third Year	**CoE 3٣4**	Analog electronics	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to understand the design and analysis of analog electronic circuits depending on theoretical mathematical methods for design and analysis and introduce simulation programs such as Multisim for running analog circuits implementation. Small class projects are also given to facilitate students' skills.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Analog electronics CoE 334
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1^{st} semester/ 3^{rd} year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
The theoretical foundations of computer engineering have expanded substantially in recent years. The objective of this course is to introduce students to this fundamental area of computer science which enables students to focus on the study of design and analysis of analog electronic circuits using the theoretical methods and simulation programs. This course is the fundamental of many other courses such as: control, embedded systems.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Clarify the basic concepts of analog electronic circuits

A2- Gain new skills in counting methods.

A3- Gain basic skills to build analog integrated circuits, control, and embedded systems

A4- Gain basic understanding to building analog industrial integrated circuits

B. Subject-specific skills

B1 - The ability to design, analyze, and simulate analog electronic circuits

B2 - The ability to think logically in addressing a particular problem.

B3 - The ability to use fast counting methods.

B4 - The ability to gain experience in methods of dealing with analogelectronics systems.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.

D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Knowledge of op amps parameters and characteristics	Introduction to op-amp, input mode & parameters, negative feedback	Theoretical and Tutorial	Questions, discussion and Quizzes
2	4	Knowledge of other op amps parameters and characteristics	Bias current & voltage, open- & closed-loop frequency response	Theoretical and Tutorial	Questions, discussion and Quizzes
3	4	Design of special op amp circuits	Comparators, amplifiers	Theoretical and Tutorial	Questions, discussion and Quizzes
4	4	Design of other special op amp circuits	Integrators/differentiators	Theoretical and Tutorial	Questions, discussion and Quizzes
5	4	Build another special industrial analog circuits	Instrumentation amplifier/ isolation amp,	Theoretical and Tutorial	Questions, discussion and Quizzes
6	4	Build complex analog circuits	OTA, analog multiplier	Theoretical and Tutorial	Questions, discussion and Quizzes
7	4	Build oscillator circuits	Oscillator/ feedback osc., osc. With RC circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
8	4	Build oscillator circuits	Osc. With LC circuits, relaxation, 555 timer	Theoretical and Tutorial	Questions, discussion and Quizzes
9	4	Study the voltage regulation	Voltage regulation, linear series reg.,	Theoretical and Tutorial	Questions, discussion and Quizzes
10	4	Design of series and shunt regulators	Shunt regulators	Theoretical and Tutorial	Questions, discussion and Quizzes
11	4	Building of different power amplifiers	Class A power amplifier, Class B	Theoretical and Tutorial	Questions, discussion and Quizzes
12	4	Build another type of power amplifiers	Class AB, Class C power amplifiers	Theoretical and Tutorial	Questions, discussion and Quizzes
13	4	Knowing responses and characteristics of active filters	Active filter responses, characteristics	Theoretical and Tutorial	Questions, discussion and Quizzes
14	4	Building LPF/HPF	Active LPF, HPF	Theoretical and Tutorial	Questions, discussion and Quizzes
15	4	Building other types of active filters	Active BPF, BSF	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading:	Floyd, Thomas L. Electronic devices:

· CORE TEXTS · COURSE MATERIALS · OTHER	electron flow version / Thomas L. Floyd. 9th edition.
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The course provides the ability to understand the basics of the role of engineering economics analysis in making-decisions, managing and planning projects in a manner of knowing the methods and alternative solutions to the problem in evaluating engineering or commercial projects. Engineers try to find solutions to engineering problems taking into account both the economic feasibility (cost estimates, capital financing, revenue, time value of money, depreciation) for each potential solution as well as the technical aspects for a specific period of years or during the estimated life of the project. The outcomes of this course should comply with the objectives of course and the requirements of Labor Market in the field of engineering projects and micro-economic business investments.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Department of Computer Engineering
3. Course title/code	Digital Communications/ CoE322
4. Programme to which it contributes	Undergraduate
5. Modes of Attendance offered	E-learning
6. Semester/Year	1st Semester/Year 3
7. Number of hours tuition (total)	30 Hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	

The Engineering Economics, previously known as engineering economy, is a subset of economics concerned with the use and "application of economic principles" in the analysis of engineering decisions. The objective of this course is to introduce the fundamental area of Engineering Economics science which enables the Engineering Students to have the knowledge of basic concepts of Engineering Economics as a decision-making tool to select the suitable alternatives or engineering projects. As a discipline, it is focused on the branch of economics known as microeconomics in that it studies the behavior of individuals and firms in making decisions regarding the allocation of limited resources. The decision-making process can be by integrating economic theory with engineering practice. The course is related to statistics, mathematics, and cost accounting. Considering the time value of money is central to most engineering economic analyses. Cash flows are discounted using an interest rate, except in the most basic economic studies. Some other topics are inflation, depreciation, cost estimations, or capital financing. All these topics are primary skills and knowledge areas in the field of cost engineering. Engineers seek solutions to problems, and along with the technical aspects, thus for each problem, there are usually many possible alternatives. Costs as well as revenues are considered, for each alternative, for an analysis period

that is either a fixed number of years or the estimated life of the project. The salvage value is often forgotten, but is important, and is either the net cost or revenue for decommissioning the project.

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Clarify the basic concepts in engineering economics through a set of solutions or alternatives. A2. Gain skills in analyzing the economic feasibility of engineering or industrial projects or investments. A3. Acquisition of basic skills as an introduction to the economic analysis of engineering projects and cost engineering. That is because engineering is an important part of the industrial sector of the economy. A4. Identify and apply various alternative evaluation methods in economic decision-making processes faced by engineers.
B. Subject-specific skills B1. The ability to understand the role of economic analysis methods in order to make the right decisions to work in engineering or commercial projects. B2. Ability to think about solving a problem or issue in engineering economics principles. B3. Writing scientific reports in the economic evaluation study for any engineering project or commercial investment. B4. The ability to gain basic experience in dealing with funds and investment projects.
Teaching and Learning Methods
• Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework & Assignments. • Directing students to some websites to benefit and develop capabilities. • Conducting seminars to explain and analyze a specific issue and find solutions to it
Assessment methods
• Interaction within the lecture. • Homework and reports. • Short exams (Quiz). • Semester and final exams
C. Thinking Skills C1. **Attention:** Arousing the students' attention by implementing one of the

practical examples on the display screen in the hall.

C2. **Response**: Follow up the student's interaction with the material displayed on the screen.

C3. **Interest**: following up on the student who interacted more with the presented material, by increasing this interaction by requesting reports or examples on some topics in engineering economics.

C4. **Direction Formation**: the student is interested to the topic and may have an opinion about the direction of the presented topic and defend it.

C5. **Formation of value behavior**: the student reaches the top of the emotional step , so that he has a stable level in the lesson and does not become lazy or fidgety.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D.1 Develop the student's ability to perform assignments and deliver them on time.

D.2 Develop the students ability to use the logical and analytical thinking in appropriate solutions to the problems in various engineering projects or investments.

D3. Develop the student's ability to dialogue and discussion

D4. Develop the student's ability to deal with modern technology, especially the Internet Websites

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Concepts and Definitions in Economics	Introduction to Engineering Economics	E-learning/ Presentation	Questions &Tutorial
2	2	Type of Economics Systems, Engineering Economic and Decision-Making	Introduction to Engineering Economics	E-learning/ Presentation	Questions &Tutorial
3	2	Engineering Costs Types, Break-even Graph (Costs & Revenues),Profit/Loss	Engineering Costs & Cost Estimating	E-learning/ Presentation	Questions &Tutorial (Quiz or Assignment)
4	2	Concepts of Margin Costs, Project Life-Cycle Phases,	Engineering Costs & Cost Estimating	E-learning/ Presentation	Questions &Tutorial
5	2	Break-Even (Cost-Profit-Volume) Analysis, Marginal Costing, Income Statement	Break-Even Analysis	E-learning/ Presentation	Questions &Tutorial
6	2	Type of Cost Estimates Cost Estimating Models: Power-Sizing, Cost Index, Learning Curve	Cost Estimating Models	E-learning/ Presentation	Questions &Tutorial (Quiz or assignment)
7	2	Interest Rate Types, Concepts of Cash Flow Diagram	Interest Rate & Time Value of Money	E-learning/ Presentation	Questions &Tutorial
8	2	Economic Equivalence, Types of Payments: Single, Annual and Gradient	Cash Flow Diagram	E-learning/ Presentation	Questions &Tutorial

9	2	Gradient Payment Series,	Cash Flow Diagram	E-learning/ Presentation	Questions &Tutorial (Quiz or Assignment)
10	2	Equivalence Methods, Net Present Value: Single Investment, Multiple Investments	Projects Evaluation Methods	E-learning/ Presentation	Questions &Tutorial
11	2	Rate of Return Methods (ROR): IRR, ERR, Payout	Projects Evaluation Methods	E-learning/ Presentation	Questions &Tutorial
12	2	Types of Depreciations, Depreciation Methods (SL and MSL)	Depreciation Methods	E-learning/ Presentation	Questions &Tutorial (Quiz or Assignment)
13	2	Inflation Rate Estimation, CPI Indicator, GDP Deflator	Inflation Analysis	E-learning/ Presentation	Questions &Tutorial
14	2	Energy-Pay-Back Time, Renewable Energy Economics	Energy Economics	E-learning/ Presentation	Questions &Tutorial
15	2	Different topics	Discussion and revision	E-learning/ Presentation	Questions &Tutorial

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Chan S. Park. Fundamentals of Engineering Economics. Pearson Education (2012), (2004). 2- (Synthesis Lectures on Engineering) David L. Whitman, Ronald E. Terry-Fundamentals of Engineering Economics and Decision Analysis, Morgan & Claypool Publishers (2012) 3- Donald C. Newnan et al., Engineering Economic Analysis, 9th Ed., 2004, Oxford University
Special requirements (include for example workshops, periodicals, IT software, websites)	- Internet websites. - Libraries sites in some international universities.
Community-based facilities (include for example, guest Lectures, internship, field studies)	https://easyengineering.net/engineering-economics-by-panneerselvam-book/

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

11. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Third Year	**CoE 332**	Operating System	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

Introduction to operating systems. Types of operating systems, Process management, Scheduling, memory management, File management, Protection and security.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Operating System CoE 332
5. Modes of Attendance offered	Presence and on-line
6. Semester/Year	1st semester/ 3rd year
7. Number of hours tuition (total)	45 Hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	
This course aims to convey a thorough understanding of the basics of an operating system by studying techniques and algorithms for providing services in a computer system, and to understand implementation aspects of popular systems by means of case studies.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Clarify the basic concepts of computer organization. A2. Gain new skills in Process management, synchronization. A3. Gain the skills to deal with processes scheduling and deadlocks A4. Understanding Memory management, virtual memory. A5. Understanding I/0 management, file systems. A6. Gain basic understanding in Protection and Security.
B. Subject-specific skills B1 - The ability to transform issues into programs and applications design. B2 - The ability to think logically in addressing a particular problem. B3 - The ability to apply new techniques for process scheduling. B4 - The ability to gain experience in detecting deadlocks and prevent it.
Teaching and Learning Methods
1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that held by the department.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student's interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students 'attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Develop the student's ability to interact with technology. D2 - Develop the student's ability to interact with the Internet. D3 - Develop the student's ability to interact with multimedia. D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction, Hardware: CPU, memories, Memory hierarchy, I/O devices, I/O interrupts, DMA, Firmware: BOIS, Software, Operating systems review and its roles, Types of operating systems, Time sharing, Concurrency, System programs,	**History and overview**	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Operating system structures, Operating system components, Microkernel, System calls and APIs, Interrupts, General definitions: Buffering, resources, device management, device driver, caching, crash…etc.	**History and overview**	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Processes, Process state diagram, Process control block (PCB), Context switch, Process scheduling,	**Process Management**	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Queuing diagram, Schedulers, Types and operation of processes., Bounded-buffer problem	**Process Management**	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Definition, Benefits, Types of	**Threads**	Theoretical and Tutorial	Questions, discussion and

		threads, Multithreading models, Java threads, Java thread management, Java thread states, Producer-consumer problem.			Quizzes
6	3	CPU-I/O burst cycle, Preemptive and non-preemptive scheduling,	**Scheduling and dispatch**	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Dispatcher, Scheduling criteria, Multi-processor and multiple core scheduling.	**Scheduling and dispatch**	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Define the problem, Race condition, Critical section problem, Mutual exclusion,	**Process Synchronization**	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Semaphore, Starvation, Producer-consumer problem, Monitors	**Process Synchronization**	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Definition, Deadlock characterization, Necessary conditions, Resource allocation graph	**Deadlock**	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Deadlock prevention, avoidance, and recovery. Process termination.	**Deadlock**	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Address binding, Logical vs. physical address space, Static and dynamic loading and linking	**Memory Management**	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Overlaying and swapping, paging, segmentation, fragmentation,	**Memory Management**	Theoretical and Tutorial	Questions, discussion and Quizzes

		Memory hierarchy.			
14	3	Definition, attribute, types, access methods, Directory, Allocation methods, Consistency checking, Backup and restore, Disk management.	**File systems**	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Goals of protection, Domain of protection, Access matrix, Access control and rights, Cryptography, User authentication, Firewall.	**Protection and Security**	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Silberschatz, Galvin, and Gagne. Operating System Concepts. John Wiley & Sons.
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	C++ or Java
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Third Year	**CoE 333**	Digital Signals Processing	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to introduce students to this fundamental field of computer science, which enables students to focus on the study of Digital processing of signals, sampling, z-transforms, difference equations, discrete-time Fourier transforms, discrete and fast Fourier transforms, digital filter design.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Digital Signals Processing CoE 333
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1^{st} semester/ 3^{rd} year
6. Number of hours tuition (total)	60 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of Digital processing of signals, sampling, z-transforms, difference equations, discrete-time Fourier transforms, discrete and fast Fourier transforms, digital filter design.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Clarify the basic concepts of Fundamentals of discrete time signals systems.

A2- Gain new skills relationships between system representations.

A3- Gain basic skills in computation of frequency response.

A4- Gain basic understanding of discrete system programming and Digital filter design.

B. Subject-specific skills

B1 - The ability to transform to Z domain and applications design.
B2 - The ability to sampling the continuous time signals.
B3 - The ability to realize the digital filters.
B4 - The ability to understand Discrete Fourier transform.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.
C2- Response: monitor the student's interaction with the material that displayed on the screen.
C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.
C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.
C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.
D2 - Develop the student's ability to interact with the Internet.
D3 - Develop the student's ability to interact with multimedia.
D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	٤	introduction, basic definitions, important Discrete Time (DT) signals	Fundamentals of discrete time systems	Theoretical and Tutorial	Questions, discussion and Quizzes
2	4	introduction, basic definitions, important Discrete Time systems	Fundamentals of discrete time systems	Theoretical and Tutorial	Questions, discussion and Quizzes
3	4	Fourier transform of sequences	Fundamentals of discrete time systems	Theoretical and Tutorial	Questions, discussion and Quizzes
4	4	definition of Z-transform, inverse Z-transforms	The Z transform	Theoretical and Tutorial	Questions, discussion and Quizzes
5	4	relationships between system representations, computation of frequency response	The Z transform	Theoretical and Tutorial	Questions, discussion and Quizzes
6	4	direct form realizations of IIR filters, cascade realizations of IIR filters	Realizations of digital filters	Theoretical and Tutorial	Questions, discussion and Quizzes
7	4	parallel realizations of IIR filters, and realizations of FIR filters	Realizations of digital filters	Theoretical and Tutorial	Questions, discussion and Quizzes
8	4	Sampling of continuous time signals	Sampling	Theoretical and Tutorial	Questions, discussion and Quizzes
9	4	changing the sampling rate	Sampling	Theoretical and Tutorial	Questions, discussion and Quizzes
10	4	multidate signal processing, interpolation, and decimation	Sampling	Theoretical and Tutorial	Questions, discussion and Quizzes
11	4	design of IIR	Digital filter design	Theoretical and Tutorial	Questions, discussion and Quizzes
12	4	design of FIR	Digital filter design	Theoretical and Tutorial	Questions, discussion and Quizzes
13	4	properties	Discrete Fourier transform	Theoretical and Tutorial	Questions, discussion and Quizzes
14	4	circular convolution	Discrete Fourier transform	Theoretical and Tutorial	Questions, discussion and Quizzes
15	4	Fast Fourier Transform “FFT”	Discrete Fourier transform	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Applied Digital Signal Processing South Asian Edition G. Manolakis
Special requirements (include for example workshops, periodicals, IT software, websites)	Fundamentals of Radar Signal Processing Mark A. Richards
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Third Year	**CoE 335**	**Microprocessor Interface**	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to understand and use the input and output units associated with microprocessors, which are one of the most important basic units of a computer. The course aims to learn students the basics of creation input and output units of all kinds, isolated and memory-mapped interfacing, fixed and programmable. The course also introduces most important information of input and output devices, interrupt management devices, and parallel and serial data transmission devices.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	**Microprocessor Interface CoE 335**
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	2nd semester/ 3rd year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course introduces input/ output interface, memory mapped input/output, design of input/output ports with specific addresses, programmable input/output, programmable timers, interrupt address pointer, masking of interrupt, software interrupt, non-mask able interrupt, reset, programmable interrupt controller, and direct memory access DMA.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Learn the basic concepts of input and output processes.

A2- Learn how to design input and output ports.

A3- Designing input and output data management programs.

A4- Understanding the operation of programmable input and output devices.

B. Subject-specific skills

B1 - The ability to implement the hardware designs for specific problems.
B2 - The ability to deal with hardware designs by software.
B3 - The ability to design private and public ports, fixed and programmable.
B4 - The ability to deal with interrupts and data transmission to and from CPU.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student's interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students 'attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.

D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Handshaking, buffering	I/O fundamentals	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	I/O read and write bus cycles	I/O fundamentals	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Design of isolated and memory-mapped I/O	Design of I/O ports	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Specific Decoded port address.	Design of I/O ports	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	(8255 PPI) internal architecture,	Programmable I/O	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	port description, programming and modes of operation	Programmable I/O	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	interfacing with microprocessor.	Programmable I/O	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Programmable interval timer (8254 PIT) internal architecture	Programmable Timers	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	counters, programming and modes of operation	Programmable Timers	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Vectored and prioritized interrupts, interrupt handling, interrupts service routines structure	Interrupt structures	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	software interrupt, internal interrupt, non-maskable interrupt, reset, external hardware interrupt.	Interrupt structures	Theoretical and Tutorial	Questions, discussion and Quizzes

12	3	Programmable interrupt controller (8259 PIC) internal architecture and programming	Interrupt structures	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	programmable direct memory access controller (8237 DMA controller), programming and interfacing	Direct memory access DMA	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Bus protocols, local and global buses, bus arbitration	Buses	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Floppy, Optical disk, Hard disk, RAID	Mass storage Devices	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	THE 8088 AND 8086 MICROPROCESSORS Programming, Interfacing, Software, Hardware, and Applications, Fourth Edition, Walter A. Triebel and Avtar Singh. THE INTEL MICROPROCESSORS, Eighth Edition, BARRY B. BREY.
Special requirements (include for example workshops, periodicals, IT software, websites)	THE 8088 AND 8086 MICROPROCESSORS Programming, Interfacing, Software, Hardware, and Applications, Fourth Edition, Walter A. Triebel and Avtar Singh. THE INTEL MICROPROCESSORS, Eighth Edition, BARRY B. BREY.
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
third Year	**CoE 431**	Software Design	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to study the infrastructure of the operating system in terms of software and with regard to dealing with the computer resources represented by random memory, permanent memory and networks, as well as managing the implementation of a number of operations that may be issued by a number of users. In this course, we use the Linux system for implementation, as well as writing programs in C language that are used in programming the operating system, as well as the use of Linux commands. In addition, the course is enhanced with a short introduction to some modern computing technologies such as: mobile computing, cloud computing, and Android programming.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	CoE 336 Operating Systems
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	2nd semester/ 3nd year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to introduce students to operating system components and how the users' program can interact with these resources according to the operating system scheduling algorithms. beside learning using linux/unix command line, the student will learn to use C programs to interact with the internal operating system components. this course also include the linux commands and system call that require to make connection among the process that can be located at same or in multiple operating systems.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

1- Clarify the concepts associated with operating system scheduling tasks.

2- Clarify the mechanism of interacting the programs with operating system components by adopting system calls.

3- Acquire the programming skills to re-program the linux commands

4- Acquire basic skills to improve the security aspect to protect the files and preventing of unauthorize access.

5- Acquiring the skills to track the potential operating system failure due to damaging in operating system file

6- Gain the skills to make access among operating system process.

7- Clarify the concepts associated with android operating system

B. Subject-specific skills

B1 - The ability to customize the linux commands to be suitable for specific tasks

B2 - The ability to do automate tasks by using linux commands.

B3 - The ability to automate tasks by using C programs.

B4 - The ability to interact in safe with operating system aspects.

B5- The ability to analysis the network connection performance by applying a list of commands.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student's interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students 'attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.
D2 - Develop the student's ability to interact with the Internet.
D3 - Develop the student's ability to interact with multimedia.
D4 - Develop the student's ability to discuss and debate.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction, UNIX Architecture, Logging In, Files and Directories, Input and Output, Programs and Processes, UNIX Standardization, Feature Test Macros, Primitive System Data Types, Conflicts Between Standards.	UNIX System Overview	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	File Descriptors, function file functions, I/O functions , file traction, Link, Unlink, directory and its functions.	File and directories	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Programming in c to explore file system and creating file and folders	File and directories2	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Streams and FILE Objects, Standard Input, Standard Output, and Standard Error, Buffering,	Standard I/O Library	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Opening , reading , writing a Stream, Formatted I/O stream, Temporary	Standard I/O Library2	Theoretical and Tutorial	Questions, discussion and Quizzes

		Files, Alternatives to Standard I/O.			
6	3	Process Identifiers, fork and vfork Functions, wait functions, Race Conditions, exec Functions, User ID and group ID functions	Process Control	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Interpreter and system functions, Process Accounting, User Identification, Process time.	Process Control	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Thread Concepts, Identification, Creation, Termination, Synchronization, Thread Limits, Attributes, Cancel Options. Threads	Threads	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Threads and Signals, Threads and fork, Threads and I/O.	Threads	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Pipes, popen and pclose Functions, Coprocesses, FIFOs, XSI IPC, Message Queues, Semaphores, Shared Memory, Client–Server Properties.	Inter-process Communication	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Sockets: Socket Descriptors, Addressing, Connection Establishment, Data Transfer, Socket Options, Out-of-Band Data,	Network IPC	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Nonblocking and Asynchronous I/O, STREAMS-Based Pipes, UNIX Domain Sockets, Passing File Descriptors, An Open Server.	Network IPC	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	-mobile computing	Introduction, Types of wireless devices,	Theoretical and Tutorial	Questions, discussion and Quizzes

			Mobile objects , Moving object databases (MOD), Query language for MOD, Applications and challenges, future.		
14	3	Introduction, architecture, characteristics, service models, SaaS maturity model, Layers, virtualization and virtual machines, sourcing,, taxonomy, storage, Modular datacenter, platforms	Cloud Computing:	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Introduction, Making and testing android projects, Basic program structure, Java-based layout, XML-based layout, Android studio, Eclipse ADT visual layout editor, Hybrid layout, Project structure, Accessing sensors on android devices, Database connections.	Android programming:	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Understanding the LINUX KERNEL Daniel P. Bovet and Marco Cesati OPERATING SYSTEM CONCEPTS ABRAHAM SILBERSCHATZ
Special requirements (include for example workshops, periodicals, IT software, websites)	LINUX Network Administrator's Guide: Tony Bautts, Terry Dawson, and Gregor N. Purdy THE DESIGN OF THE UNIX® OPERATING SYSTEM: Maurice J. Bach MODERN OPERATING SYSTEMS: ANDRW S. TANENBAUM
Community-based facilities (include for example, guest	websites. Libraries sites in international universities.

Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This program specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications, and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing a partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning, and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts, and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and online meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
٣rd Year	CoE E35	Knowledge Engineering	45h	Bachelor Degree Requires (x) credits

13. Personal Development Planning
D1 - Develop the student's ability to deal with technical means. D2 - Develop the student's ability to deal with the Internet. D3 - developing the student's ability to deal with multiple means. D 4 - Develop the student's ability to dialogue and discussion.
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the program
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Program Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
3rd Year	CoE E35	Knowledge Engineering	O	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the program specification.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Courses
4. Programme to which it contributes	Bachelors of Computer Engineering
5. Modes of Attendance offered	Online
6. Semester/Year	Semester
7. Number of hours tuition (total)	45
8. Date of production/revision of this specification	2021
9. Aims of the Course	
Teach students the main techniques used in computer knowledge and artificial intelligence. Expert systems, artificial neural networks, fuzzy systems, evolutionary genetic algorithms, and hybrid intelligent systems powered by hundreds of smart tools to solve specific problems and rely on intelligent machines that can capture experiences similar to humans. This intelligent behavior of the computer can achieve human-level performance in a cognitive task or more accurately	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Clarify the basic concepts about the smart behavior of the computer. A2. Acquiring skills in dealing with problems and programming issues by using intelligent systems. A3.Acquisition of basic skills that qualify for building large and applied smart programs in line with technological developments A4.Acquiring the skills of understanding how intelligent systems work and the possibility of improvements in various industrial applications.
B. Subject-specific skills B1. The ability to program, design, and control using Intelligent devices. B2. The ability to develop and redress a process in dealing with a specific problem or issue. B3. Writing scientific reports on smart computer applications. B4 - The ability to gain an idea about dealing with intelligent programming systems in various locations.
Teaching and Learning Methods
• Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit and develop their capabilities. • Conducting seminars to explain and analyze a specific issue and find solutions to it.
Assessment methods
• Interacting within the lecture. • Homework and reports. • Short exams • Graduation Projects • Semester and final exams.
C. Thinking Skills C1.Attention: Arousing students ’attention by implementing one of the application programs on the computer display. C2. Response: Follow up the student's interaction with the material displayed on the screen. C3. Attention: Follow up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display. C4. Forming the direction: meaning that the student is sympathetic to the presentation and may have an opinion about the direction of the presented topic and defend it.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1.Develop the student's ability to perform the duties and deliver them on time

D2. Logical and programmatic thinking to find programmatic solutions to various problems

D3. Developing the student's ability to dialogue and debate

D4. Develop the student's ability to deal with modern technology, especially the Internet

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
first	3	programming features required for intelligent systems	Introduction on knowledge	Theoretical	Questions and discussion
second	3	methods of knowledge representation	Introduction to knowledge	Theoretical	Questions and discussion
third	3	artificial intelligence programming languages	Introduction to artificial intelligence	Theoretical + tutorial	Questions and discussion
fourth	3	Expert systems	Introduction to artificial intelligence	Theoretical	Questions, discussion, and quiz
Fifth	3	Introduction to fuzzy set	Fuzzy set theory	Theoretical	Questions and discussion
VI	3	design of fuzzy systems	Fuzzy set theory	Theoretical + tutorial	Questions and discussion
seventh	3	stability methods for fuzzy controllers.	Introduction to Intelligent control systems	Theoretical	Questions and discussion
VIII	3	Introduction to artificial neural network	Principles of neural networks	Theoretical	Questions, discussion, and quiz
ninth	3	learning methods for ANN	Principles of neural networks	Theoretical	Questions and discussion
The tenth	3	learning methods, Back-propagation	Principles of neural networks	Theoretical	Questions, discussion, and quiz
eleventh	3	Introduction Genetic algorithms	Genetic algorithms	Theoretical + tutorial	Questions and discussion
twelfth	3	Genetic algorithms application	Genetic algorithms	Theoretical + tutorial	Questions, discussion, and quiz
Thirteenth	3	Neuro-fuzzy systems design	hybrid Intelligent systems	Theoretical	Questions and discussion
fourteenth	3	Geno-fuzzy systems	hybrid Intelligent systems	Theoretical+ tutorial	Questions and discussion

Fifteenth	3	Different topics	Discussion and revision	Theoretical	discussion

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- Negnevitsky", Artificial Intelligence A Guide to Intelligent Systems,2002 2- Russel, "Artificial Intelligence", 2003. 3- Razwick, "Fuzzy Controllers", 2000. 4- Zilouchian, "Intelligent Control Systems using Soft Computing Methodologies", 2007.
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Third Year	**CoE 321**	**Linear Algebra**	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The theoretical foundations of engineering systems have been explained simply in recent years. The objective of this course is to introduce students to the fundamentals of linear systems and how to proceed in solving and obtaining suitable and acceptable processes in solving those using matrices. The course also makes the students familiar with ordinary and partial differential equations and how to treat them as linear systems. Based on certain types of software programming and algorithm.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	**Linear Algebra CoE 321**
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1st semester/ 3rd year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
At its root, linear algebra is the study of systems of linear equations. Systems of linear equations are ubiquitous in the natural and social sciences. One major contribution to the topic was made by Gauss (1777–1855), who was confronted with large systems of linear equations in his work on astronomy and developed the famous method of least squares to cope with measurement errors. Later in the nineteenth century Cauchy, Sylvester, Cayley and others developed the concept of a matrix, which provides the most convenient language for the theory and practice of linear equations. Matrices are intricate algebraic objects with many fascinating properties, but they also provide a bridge between linear equations and vectors, so infusing the subject of linear algebra with a strong geometric flavor. We will delve into all these topics, as well as the notions of determinant and eigenvalues, which are important numbers associated with any square matrix.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1- Clarify the basic concepts of linear systems and their applications in practical fields. A2- Acquire the skill of solving linear systems. A3- Acquire basic skills in the use of matrices and their applications in solving linear systems. A4- Acquire the skill of how to use the computer to process solving matrices that represent linear systems. A5- Introducing some applications to problems related to ordinary differential equations as an important application of linear systems A6- Introducing some applications to problems related to partial differential equations as an important application of linear systems A 7- Achieving the a to k criterion.
B. Subject-specific skills B 1 - quick dealing with matrices that represent linear systems. B 2 - Quick dealing with ordinary differential equations and how to convert them into linear systems. B 3 - Quick dealing with partial differential equations and how to convert them into linear systems. B 4 - Writing and organizing algorithms in different programming languages to solve linear systems.
Teaching and Learning Methods
1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that held by the department. 8. Summer training.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student’s interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.
D2 - Develop the student's ability to interact with the Internet.
D3 - Develop the student's ability to interact with multimedia.
D4 - Develop the student's ability to discuss and debate.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction to systems of linear equations	Introduction	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	How to solve systems of linear equations. Row reduction method	Introduction	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Echelon forms	Introduction	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Pivot variables	Solution of linear systems via row reduction	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	General and parametric solutions	Solution of linear systems via row reduction	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Augmented matrix	Matrices	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Pivot and free variables	Matrices	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Transformation matrices	Elementary matrix operations	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Scaling and interchanging matrices	Elementary matrix operations	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	LU Decomposition	Methods of solving matrices	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Solving using LU Decomposition	Methods of solving matrices	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Inverse of a Matrix	Methods of solving matrices	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Gause – Jordan elimination method	Methods of solving matrices	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Adding and Scaling Vectors	Geometry of linear equations	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Linear combination	Geometry of linear equations	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Linear Algebra and its Applications by David C. Lay
Special requirements (include for example workshops, periodicals, IT software, websites)	Linear Algebra and its Applications by David C. Lay
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

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1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

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A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
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5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Third Year	**CoE 323**	**Random Signals & Systems**	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This is an introduction course to random analysis which helps to build the theoretical foundation for students in communication, signal processing and networking areas. Topics include probability and random variables; random processes and sequences; linear system response to random input; special classes of random processes. Applications to signal detection and estimation are discussed throughout the course.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	**Random Signals & Systems CoE 323**
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1^{st} semester/ 3^{rd} year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	

The purpose of the course is to:
• Provide students with a formal treatment of probability theory.
• Equip students with the essential tools for the treatment of probability problems in several areas of electrical engineering
• Introduce random variables as they apply in the electrical and computer engineering discipline
Upon completion of the course the students will be able to:
• Calculate the probability of events and solve applications involving probabilities
• Demonstrate knowledge and understanding of probability theory as it applies in the electrical and computer engineering discipline.
• Have a good understanding of the standard distributions and their properties.
• Apply selected probability distributions to solve problems.

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1- Clarify the basic concepts of random variables and their applications in the field of communications and antennas A2- Acquire the skill in dealing with probability theory, random signals and their complex systems and their processing A3- Acquire basic theoretical skills, probability and random signals. A4- Gaining experience in random signal systems. A5- Building the basic units for dealing with random signals A6- Seeing the potentialities of probability theory and how to harness it to understand random signals A 7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to deal with both probability theory and random signals B2 - The ability to think about problems related to probability and random signals. B3 - Writing scientific reports and analyzing random signals.
Teaching and Learning Methods
1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that held by the department. 8. Summer training.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student’s interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Develop the student's ability to interact with technology. D2 - Develop the student's ability to interact with the Internet. D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Probability	Introduction to probability theorem	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	conditional probability (1)	Introduction to probability theorem	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	conditional probability (2)	Introduction to probability theorem	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Discrete random variables	Random variables	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Continuous random variables	Random variables	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Discrete multiple random variables,	Random variables	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Continuous multiple random variables	Random variables	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Limit theorems	Special topics	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Random processes, stationarity (1)	Random process	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Random processes, stationarity (2)	Random process	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Linear systems and stationary processes (1)	stationary processes	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Linear systems and stationary processes (2)	stationary processes	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Gaussian and Poisson processes	Distribution functions	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Markov chains	Chains	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Review		Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	**Intuitive probability and random process using MATLAB** Steven Kay Springer, 2006
Special requirements (include for example workshops, periodicals, IT software, websites)	**Introduction to Random Signals and Noise** Wim C. Van Etten
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
3^{rd}	**CoE 331**	Computer Architecture	3	Bachelor Degree Requires (x) credits

14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map

please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
3rd	**CoE 331**	Computer Architecture	Core	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

Introduction to the design and performance analysis of Digital Arithmetics,, the trade-off analysis in designing various components of computer architecture, which includes , arithmetic (fixed and floating point) units design, ALU design, memory hierarchy, control unit design.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering
3. Course title/code	**Computer Architecture/ CoE 331**
4. Programme to which it contributes	3rd Class/ 1st semester
5. Modes of Attendance offered	Electronic
6. Semester/Year	Semester
7. Number of hours tuition (total)	45
8. Date of production/revision of this specification	2021

9. Aims of the Course

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating-point arithmetic.
- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the techniques used in designing the control unit
- To learn the different ways of communication with I/O devices

10· Learning Outcomes, Teaching, Learning and Assessment Method
A1- Describe the basic structure and operations of digital computer. **A2-** Knowledge and understanding A3. **Design** of arithmetic and logical unit. A4. **Learn** the organization of different memory systems, Control unit design and its design techniques, register transfer language, and I/O processor and its communication
B. Subject-specific skills B1. The students must be able to choose appropriate methods and apply given knowledge to design desired applications. B2. Be able to design user-friendly software according with customer demand. B3. Programming techniques for parallel processing systems, to apply object-oriented techniques to the problem of extending a larger software system
Teaching and Learning Methods
• Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit from developing capabilities. • Interviews are seminars to explain and analyze a specific issue and find solutions to it.
Assessment methods
• Interacting within the lecture. • Homework and reports. • Short exams (Quiz). • Semester and final exams.
C. Thinking Skills C1. Attention: Attracting students' attention by implementing one of the applied programs on the display screen in the hall. C2. Response: Follow up the student's interaction with the material displayed on the screen. C3. Attention: Follow up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to be presented. C4. Forming the direction: meaning that the student is sympathetic to the presentation and may have an opinion about the direction of the presented topic and defend it. C5. Formation of value behavior: meaning that the student reaches the top of the emotional ladder, so he has a stable level in the lesson and does not become lazy or fidget

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Develop the student's ability to perform assignments and deliver them on time

D2. Logical and programmatic thinking to find software solutions to various problems

D3. Develop the student's ability to dialogue and discussion

D4. Develop the student's ability to deal with modern technology, especially the Internet

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction and Overview	General definition, purpose of Digital Arithmetic and Introduction to computer architecture,CPU organization and its parts, sketch CPU organization, definition of the performance factors, reasons for binary arithmetic with computers. Review of basic fixed- point number representation systems (non-negative and signed integers), sign detection.	Theoretical	Questions and discussion
2	3	Algorithms and design of the common Fixed- Point arithmetic operations	design of two operand addition/ subtraction: (CRA, CLA), , recoding (coding).	Theoretical	Theoretical
3	3	Algorithms and design of the common Fixed- Point arithmetic operations	data compression, multi-operand addition (carry save adder CSA), sequential multiplier	Theoretical	Theoretical
4	3	Algorithms and design of the common Fixed- Point arithmetic operations	Booth recoding multiplier, division algorithms: (restoring and non-restoring) division	Theoretical	Theoretical
5	3	Design of High speed CPU components	design of combinational shifters (barrel shifters).	Theoretical	Theoretical
6	3	Design of High speed CPU components	general- purpose registers (GPR), Timers	Theoretical	Theoretical

7	3	Design of High speed CPU components	Tri- state buffers, arithmetic and logic unit (ALU).	Theoretical	Theoretical
8	3	Real number representations	IEEE754 FP representation and format (sign, exponent, and magnitude) of floating-point numbers, exceptions, special values, single-precision and double-precision format, dynamic range, integer to real numbers conversion.	Theoretical	Theoretical
9	3	Floating- point Algorithms and Implementation	FP addition/ subtraction, multiplication, multiply- add fused (MAF) unit, division.	Theoretical	Theoretical
10	3	Memory system hierarchy	role of memory system, High-Speed Memories: locality of reference, Cache Memory: Organization and Mapping Techniques. Replacement Algorithms.	Theoretical	Theoretical
11	3	Memory system hierarchy	Write policies. Main memory systems: Types of main memories: (SRAM, DRAM), main memory characteristics and performance: (latency, cycle time, and bandwidth).	Theoretical	Theoretical
12	3	Virtual Memory System	(Paging, Segmentation, and hybrid), fault trap, Address Translation Virtual to physical, translation look-aside buffer TLB.	Theoretical	Theoretical
13	3	Control Unit Design	Single Bus Organization, Control Unit Operations: Instruction sequencing, Micro operations and Register Transfer. Hardwired Control: Design methods – State table and classical method.	Theoretical	Theoretical
14	3	Control Unit Design	Design Examples - Multiplier CU. Micro-programmed Control: Basic	Theoretical	Theoretical

			concepts, Microinstructions and micro- program sequencing.		
15	3	Processor Design	Datapath and control; single cycle design and implementation; simplifying control design; multicycle implementation of datapath and control.	Theoretical	Theoretical

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	M. RAFIQUZZAMAN, “Fundamentals of Digital Logic and Microcomputer Design”, Fifth Edition
Special requirements (include for example workshops, periodicals, IT software, websites)	Reputable websites. Libraries sites in some international universities
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

<table>
<tr><td colspan="4">11. Programme Structure</td><td rowspan="2">12. Awards and Credits</td></tr>
<tr><td>Level/Year</td><td>Course or Module Code</td><td>Course or Module Title</td><td>Credit rating</td></tr>
<tr><td></td><td></td><td></td><td></td><td rowspan="2">Bachelor Degree
Requires (x) credits</td></tr>
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13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

It provides a concise summary of the main fundamentals of the digital communications and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided to find solutions in various digital/analogue communication systems like, multiplexing, guided/unguided systems of optical, cellular and wireless transmission, and data transmission. The educational outputs must comply with the objectives of the course and the requirements of the labor market in the field of information and communication technology (ICT).

1. Teaching Institution	University of Basrah
2. University Department/Centre	Department of Computer Engineering
3. Course title/code	Digital Communications/ CoE337
4. Programme to which it contributes	Undergraduate
5. Modes of Attendance offered	E-learning
6. Semester/Year	2^{nd} Semester/Year 3
7. Number of hours tuition (total)	45 Hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	
This course introduces a theoretical foundation of knowledge in digital communication theory and information transmission technology which have a wide area of applications; i.e. distributed computer systems and communication systems of all types. The course is forwarded to the advanced undergraduate students in the computer engineering to expand their knowledge and skills in the field of Information and Communication Technology (ICT). The fundamentals and basics of data communication, data networking and OSI and TCP/IP models (Internet) are presented including overview on packet and message switching techniques. The data communications includes Shannon theory, channel capacity, channel impairments, and data line coding. The course focuses on types of analog-to-digital modulations, types of multiplexing, guided media in optical communication and unguided (wireless) transmission media, spread spectrum techniques, and error control techniques for detection and correction data. Also, the course introduces the principles of cellular networks.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Clarify the basic concepts of Digital communication obstacles through a set of solutions or techniques. A2. Acquire skills in understanding digital transmission methods and how to increase transmission efficiency in communication networks A3. Gain of basic skills as an introduction and a decision-making tool in practical problems in communications engineering and information technology facing engineers. A4. Gain a basic understanding of the various communication systems like optical, cellular, wireless and satellite communication systems.
B. Subject-specific skills B1. Ability to understand the fundamentals of digital communication systems and Information transmission according to the need of the user or the application. B2. Ability to think about addressing a problem or issue in digital or analog transmission systems B3. Writing scientific reports in the field of communications and information technology in various networks B4. The ability to gain basic experience in dealing with networks based on digital transmission.
Teaching and Learning Methods
• Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework & Assignments. • Directing students to some websites to benefit and develop capabilities. • Conducting seminars to explain and analyze a specific issue and find solutions to it
Assessment methods
• Interaction within the lecture. • Homework and reports. • Short exams (Quiz). • Semester and final exams
C. Thinking Skills C1. **Attention:** Arousing the students' attention by implementing one of the practical examples on the display screen in the hall. C2. **Response**: Follow up the student's interaction with the material displayed on the screen. C3. **Interest**: following up on the student who interacted more with the presented material, by increasing this interaction by requesting reports or examples on some topics in digital communication systems. C4. **Direction Formation**: the student is interested to the topic and may have

an opinion about the direction of the presented topic and defend it.

C5. **Formation of value behavior**: the student reaches the top of the emotional step , so that he has a stable level in the lesson and does not become lazy or fidgety.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D.1 Develop the student's ability to perform assignments and deliver them on time.

D.2 Develop the students ability to use the logical and analytical thinking in appropriate solutions to the problems in various digital communication systems.

D3. Develop the student's ability to dialogue and discussion

D4. Develop the student's ability to deal with modern technology, especially the Internet Websites

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Concepts and Definitions in Digital and Data Communications	Introduction to Digital Communications	E-learning/ Presentation	Questions &Tutorial
2	3	Type of Nodes and Networks, Packet/Message Store-and Forward Transmission, Bit-Character oriented Transmissions	Introduction to Data Communications	E-learning/ Presentation	Questions &Tutorial
3	3	Transmission Modes. Synchronization & Framing	Introduction to Data Communications	E-learning/ Presentation	Questions &Tutorial (Quiz or Assignment)
4	3	Network Models: OSI Model and TCP/IP Model	Network Models	E-learning/ Presentation	Questions &Tutorial
5	3	Digital/Analogue Bandwidth, Noiseless Channel (Nyquist Bit Rate), Noisy Channel (Shannon Capacity)	Physical Layer	E-learning/ Presentation	Questions &Tutorial
6	3	Transmission Impairments: Attenuation, Delay Distortion, Noise	Physical Layer	E-learning/ Presentation	Questions &Tutorial (Quiz or Assignment)
7	3	Line Coding, Analog Modulations, Pulse Modulations (PTM, PCM, DM)	Digital Transmission	E-learning/ Presentation	Questions &Tutorial
8	3	Digital-To-Analogue Modulation Techniques (ASK, PSK, FSK, QAM)	Digital Transmission	E-learning/ Presentation	Questions &Tutorial
9	3	FDM, WDM, TDM, CDM/CDMA	Multiplexing Techniques	E-learning/ Presentation	Questions &Tutorial (Assignment)
10	3	Error Detection and Correction Methods (Checksum, Hamming, CRC)	Error Control Techniques	E-learning/ Presentation	Questions &Tutorial

11	3	Transmission Loss in Guided (Optical Transmission system)	Transmission Media	E-learning/ Presentation	Questions &Tutorial
12	3	Transmission Loss in Unguided Media (Wireless Transmission), Satellite Networks	Transmission Media	E-learning/ Presentation	Questions &Tutorial (Quiz or Assignment)
13	3	Principle of Spread Spectrum, Direct Sequence Spread Spectrum, Frequency Hopping	Spread Spectrum Techniques	E-learning/ Presentation	Questions &Tutorial
14	3	Cellular System Principles, Frequency Re-Use ,Increasing Capacity	Cellular Networks	E-learning/ Presentation	Questions &Tutorial
15	3	Different topics	Discussion and revision	E-learning/ Presentation	Questions &Tutorial

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1- B. Forouzan, Data Communications and Networking, 3rd Ed. 2003 (2007) 2- W. Stallings, Data and Computer Communications, 8th Edition, International 2009. 3- W. Tomasi, Introduction to Data Communications and Networking, (2000) الكتب المجانية 4- A. Carlson, Communication Systems, 1998
Special requirements (include for example workshops, periodicals, IT software, websites)	- Internet websites. - Libraries sites in some international universities.
Community-based facilities (include for example, guest Lectures, internship, field studies)	https://www.mhhe.com/engcs/compsci/forouzan/

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems.
2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market.
3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular.
4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills.
5. Building and developing partnership with governmental and private sectors and society in all its various institutions.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
				Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Fourth year	**CoE 422**	Project managment	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This course is intended as an introduction to the different concepts, skills, tools, and techniques needed to successfully manage projects; especially, projects involving Computer Engineering.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering
3. Course title/code	CoE 422 - Project Management
4. Programme to which it contributes	Computer Engineering
5. Modes of Attendance offered	online (during COVID-19 pandemic lockdown)
6. Semester/Year	2^{nd} semester / 4^{th} year
7. Number of hours tuition (total)	45 hours
8. Date of production/revision of this specification	1/6/2021 (by dr. Ali Haddad)
9. Aims of the Course	
This course is specifically designed to provide the knowledge and techniques required to properly manage projects of all types and sizes. Course material covers the approaches and practices in project management over the life cycle of the project. This course is highly interactive, with hands-on, in-class practice projects and analysis of real-world project examples. While providing the knowledge needed for project planning, monitoring, and control, it focuses on the development of leadership, teamwork, and problem solving skills.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Project, Program, Portfolio, Organizational, and Operations Management. A2. The Systems View of Project Management.

A3. The Project and Product Life Cycles. A4. The 5 Project Management Process Groups. A5. The 10 Project Management Knowledge Areas. A6. Using Microsoft Project Professional.
B. Subject-specific skills B1. Project Management. B2. Trade-offs management. B3. How Organizations Work.
Teaching and Learning Methods
During the COVID-19 pandemic lockdown, lectures and discussions are held online through live, weekly-scheduled Google Meet sessions, with the aid of Microsoft Power Point slides. Videos of recorded online sessions and lecture notes (slides) are also made available to students online.
Assessment methods
1. Class participation. 2. Homework. 3. Mini projects. 4. Quizzes. 5. Midterm exam. 6. Final exam.
C. Thinking Skills C1. Problem solving. C2. Entrepreneurship. C3. Risk handling.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1. Communications. D2. Teamwork. D3. Leadership. D4. Networking.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction to Project Management	Project, Project Management, Program Management, Portfolio Management	Lecture	
2	3	Systems View of Project Management	Systems View, Organizations	Lecture	
3	3	Project and Product Life Cycles	Project and Life Cycle, Operations, Product Life Cycle	Lecture	

4	3	The Project Management Process Groups	The Project Management Process Groups,	Lecture	
5	3	Microsoft Project Professional	Microsoft Project Professional	Lecture	
6	3	Project Integration Management	Project Integration Management	Lecture	
7	3	Project Scope Management	Project Scope Management	Lecture	
8	3	Project Schedule Management	Project Schedule Management	Lecture	
9	3	Project Cost Management	Project Cost Management	Lecture	
10	3	Project Quality Management	Project Quality Management	Lecture	
11	3	Project Resource Management	Project Resource Management	Lecture	
12	3	Project Communications Management	Project Communications Management	Lecture	
13	3	Project Risk Management	Project Risk Management	Lecture	
14	3	Project Procurement Management	Project Procurement Management	Lecture	
15	3	Project Stakeholder Management	Project Stakeholder Management	Lecture	

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1. K. Schwalbe, *Information Technology Project Management*, 9th ed., Boston, MA: Cengage Learning, 2019. 2. *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*, 6th ed., Newtown Square, PA: Project Management Institute, 2017.
Special requirements (include for example workshops, periodicals, IT software, websites)	Microsoft Project Professional
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions

Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students 'attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map

please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Fourth Year	**CoE 431**	Software Design	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to study the steps of building a software project, which includes all stages of project formation, starting with strategies for collecting information from the user, and based on that, software is designed using graphical modeling that provides a formula to describe the main elements of software systems depending on the required functions so that it explains to the programmer the project building plan. Then we move on to ways to build software to make it easier for the developer to track and develop programs and find problems, if any. The course also includes methods of calculating and estimating the cost of building the project, including the period, human resources, and size of the project. The course also includes a discussion of methods for testing and maintaining software projects.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	CoE 431 Software Design
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1^{st} semester/ 2^{nd} year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to introduce students to the importance of accuracy in building a software project and the problems that the developer may face in building the project. For this, the student will learn about the stages of building the engineering project and how to organize the project construction so that it is easy to track and develop the project. The student will learn to use and make diagrams to describe computer programs in terms of their component elements or the process line of the program.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

1- Clarify the concepts associated with creating a software project.

2- Clarify the stages required to set up a project and the required technologies

3- Acquire the basic skills of program design using graphics and technical reports

4- Acquire basic skills for tracking programs and finding potential problems.

5- Acquiring the skills to estimate the period required to build the project and the required human resources

6- Gain the skills required to manage the project and track the construction phases of the project

B. Subject-specific skills

B1 - The ability to elicit the necessary requirements for the establishment of the project.

B2 - The ability to convert aggregate requirements into graphs to paint a clear picture of the project.

B3 - The ability to convert designs into programs.

B4 - The ability to test programs and find software problems.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.
D2 - Develop the student's ability to interact with the Internet.
D3 - Develop the student's ability to interact with multimedia.
D4 - Develop the student's ability to discuss and debate.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	life cycle, life cycle model, quality, phases, Process improvement, Process assessment models, metrics, standards and guidelines	Software life cycle and process models	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Requirements analysis modeling techniques, Prototyping, formal specification techniques, functional and non-functional requirements	Software requirements and specifications	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	design concepts, architecture, structured design, Object-oriented analysis and design	Software design 1	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Component-level design, Design for reuse, Quality in relation to specification (completeness, consistency, simplicity, verifiability).	Software design 2	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	The guiding strategies to build structure	Software implementation1	Theoretical and Tutorial	Questions, discussion and Quizzes

		program			
6	3	The characteristic of object orient program	Software implementation2	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Testing fundamentals, tools, test plan creation, test case generation Validation planning, Black-box and white-box testing techniques	Software testing1	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Unit integration, validation, system testing, Object-oriented testing, , Measures of Reliability and Availability, and inspections	Software testing 2	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Software maintenance, forms of maintenance, defect removal, upgrade, enhancement	Software evolution 1	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Patterns of behavior, bottlenecks measurement, regression testing version control, Software re-use, and Reengineering	Software evolution 2	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Programming environments, Requirements analysis and design modeling tools, teams composition, project management difficult		Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Resource allocation, Gantt charts, Project planning, costing, and timely compliance and delivery	Project management 2	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	performance	Concurrent Design	Theoretical and	Questions, discussion

		constraints, real-time features remands, Hardware and software co-design.		Tutorial	and Quizzes
14	3	define HCI, context, reasons, web interface, Human performance	Computer Interfaces 1	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	usability testing, graphical user interfaces GUI, web interfaces	Computer Interfaces	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Fundamentals Approach to Discrete Mathematics, D.P Acharjya Discrete Mathematics and Its Applications, Rosen
Special requirements (include for example workshops, periodicals, IT software, websites)	Fundamentals Approach to Discrete Mathematics, D.P Acharjya Discrete Mathematics and Its Applications, Rosen
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.
D2 - Develop the student's ability to deal with the Internet.
D3 - Develop the student's ability to deal with multiple media.
D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
4th year	CoE 433	Control system		Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Program Learning Outcomes are being assessed																			
				Program Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific Skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
4th year	CoE 433	Control system		x															

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This course is designed to teach the students the concepts of open loop, closed loop and feedback, mathematical models for some electrical and mechanical systems, time response and steady state error . The course also teaches them the stability of control systems, and state space model.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Department of computer engineering
3. Course title/code	Control system CoE 433
4. Program to which it contributes	4^{th} year / First semester
5. Modes of Attendance offered	Electronic
6. Semester/Year	2021
7. Number of hours tuition (total)	60
8. Date of production/revision of this Specification	2021

9. Aims of the Course

1. The objective of this course is to introduce the students to the fundamental principles of control systems. The topics of open loop , closed loop and feedback and modelling of system are studied. The performance of systems and stability analysis will also be introduced. state space model will be considered .

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1- Clarify the basic concepts of control A2- Gaining experience in developing mathematical models for different systems A3- Study methods for testing stability and accuracy of systems
B. Subject-specific skills B1- Identify ways of representing and modeling control systems B2 - the ability to address questions of the form of the response B 3- To identify the way control systems work and ways to determine the stability of systems B4- The ability to solve problems in the representation of the state space
Teaching and Learning Methods
Readings, self-learning, panel discussions. • Exercises and activities in the lecture. • Homework. • Directing students to some websites to benefit and develop capabilities. • Conducting seminars to explain and analyze a specific issue and find solutions to it.
Assessment methods
Interaction within the lecture. • Homework and reports. • Short exams . • Semester and final exams

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4	Introduction, Definition ,concept of open, feedback and closed loop, Laplace and inverse Laplace transform	Introduction to control system, Laplace transform	theoretical	Questions and discussion
2	4	Basic principles, definition of transfer function, Impulse response, modeling of some examples of electrical and mechanical systems	Modeling and Mathematical Models	theoretical	Questions and discussion

3	4	DC servo motor, operating principle, Types of control, Field control, Armature control	Modeling of systems	theoretical	Questions and discussion
4	4	Introduction, closed loop system, Block diagram simplification rules , Examples	Block diagram representation	theoretical	Questions and discussion
5	4	Test signals, Response of first order system,	Analysis of control system	theoretical	Questions and discussion
6	4	response of second order system, examples, Transient response specifications.	Analysis of control system	theoretical	Questions and discussion
7	4	Types of systems, Error coefficients, steady state error, examples	Analysis of control system	theoretical	Questions and discussion
8	4	Basic concept, Routh - Hurwitz criterion, special cases, examples	Stability analysis	theoretical	Questions and discussion
9	4	Introduction, Rules of construction root locus	Root locus method	theoretical	Questions and discussion
10	4	Examples on root locus, applications	Root locus method	theoretical	Questions and discussion
11	4	Response to sinusoidal input, sinusoidal transfer function, example	Frequency response	theoretical	Questions and discussion
12	4	Bode plot, polar plot, Examples	Frequency response	theoretical	Questions and discussion
13	4	Nyquist stability criterion Relative stability, Gain margin, Phase margin, Examples	Frequency response	theoretical	Questions and discussion
14	4	Introduction, definitions, state space representation of systems, solving state equation, state transition matrix	State space analysis of control system	theoretical	Questions and discussion
15	4	Transfer function and transfer function matrix, Controllability and observability, State feedback	State space analysis of control system		Questions and discussion

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1. K. Ogata, Modern control engineering
Special requirements (include for example workshops, periodicals, IT software, websites)	2. Dazzo, Linear control systems
Community-based facilities (include for example, guest	

Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map

please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Fourth Year	**CoE 435**	Embedded Computing Systems	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

Introducing microcontrollers for embedded system design. I/O interfacing analogue and digital signals, Real time OS, Multiprocessor systems, Networking for embedded systems, hardware and software design techniques.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Embedded Computing Systems COE**435**
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	2st semester/ fourth year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
This course aims to introduce the students to real time system and its requirements. In addition, it introduces the embedded systems represented with ARM and Arduino system from hardware and software respective. This Course also demonstrate the interfacing and communication in synchronous and asynchronous manner. also, the course introduces the Robotic system with regard to control system.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding 1- Clarify the concepts associated with real time system regarding resource management. 2- Clarify the requirements to establish a real time project using embedded system 3- Acquire the basic skills for synchronizing the process in foreground and background aspects. 4- Acquire basic skills for interfacing, Synchronous serial interface and I/O programming. 5- Acquiring the skills to Analog to digital conversion, Real-time data acquisition, Digital to analog conversion 6- Gain the skills required to build a networked embedded system, Reentrant programming, Critical section, Network topologies.
B. Subject-specific skills B1 - The ability to program the real time system B2 - The understanding the syntax and the semantic of the collecting data from sensors and transfer to embedded system B3- The ability to program the embedded system to collect and process the collected data and make action accordingly. B4 - The ability to simple network embedded system.
Teaching and Learning Methods
1. Explanation and clarification using the lectures. 2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that held by the department. 8. Summer training.
Assessment methods
1. Short tests (quizzes). 2. Homework. 3. Mid-terms and final exams for both theoretical and practical subjects. 4. Small projects during the lecture. 5. Student’s interacting during the lecture. 6. Reports.
C. Thinking Skills C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom. C2- Response: monitor the student's interaction with the material that displayed on the screen. C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed. C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it. C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1 - Develop the student's ability to interact with technology. D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia. D4 - Develop the student's ability to discuss and debate.

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Indicate some reasons for studying embedded systems, Product life cycle, Quality design, Debugging, Computers, processors, memory, and microcontrollers, Digital logic and open collector, Types of real-time systems.	Introduction to embedded systems	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	ARM processor architecture, Software model, Addressing modes, programming instructions,	Embedded ARM microcontrollers	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Fundamental concepts of assembly language and linking: labels, address management.	Embedded ARM microcontrollers2	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Microcontroller I/O pins, I/O programming and the direction register, Phased-lock loop, SysTick timer, Measurement of dynamic efficiency, Power management, Fault tolerant system	Microcontroller Hardware	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Fundamentals, Foreground/Background, Delay tasks, Round Robin scheduler, Semaphores, Thread synchronization or rendezvous	Real-time operating systems	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Resource sharing, non-reentrant code or mutual exclusion, Thread communication using: mailbox and FIFO queue, Switch debouncing, Deadlocks, Monitors, Free RTOS	Real-time operating systems2	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Introduction to interfacing, , Synchronous serial interface SSI, LCD	Interfacing and Communication:	Theoretical and Tutorial	Questions, discussion and Quizzes

		interface, Scanned keyboard, Actuators, Pulse width modulation, Motors drivers, I2C interface			
8	3	USB interface, High speed interfacing: Hardware FIFO, Dual-port memory, DMA controllers sensors interface.	Interfacing and Communication	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	I/O synchronization, Interrupt concepts, Polled I/O vs. interrupt-driven I/O, NVIC on ARM processor, SysTick periodic interrupts, Timer periodic interrupt, Ballast code timing, Multithreading.	Interrupt programming and real-time systems	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Analog to digital conversion, Real-time data acquisition, Digital to analog conversion, 4~20mA signal standards.	Analog I/O Interfacing	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Quality programming, Modular software design, and Threads, Call graph, Data-flow graph, Top-down vs. bottom-up design, Memory management and the Heap	Software design	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	: Networked embedded systems, Reentrant programming, Critical section, Network topologies: ring, bus, multi-hop.,	Networked embedded systems 1	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Producer- consumer using FIFO queue, Distributed systems, Wireless communication, Internet-enabled embedded systems	Networked embedded systems	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Fundamentals, CAN, Ethernet, Internet of Things.	High speed network:	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Introduction to Digital Control, Closed-loop control, PID controllers, Fuzzy logic control	Robotic systems	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Making Embedded Systems: Design Patterns for Great Software Book by Elecia White

Special requirements (include for example workshops, periodicals, IT software, websites)	Embedded System Design Book by P. Marwedel and Peter Marwede
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields. A٢- Acquiring skill in dealing with problems and dealing with them through computer systems. A٣- Acquiring basic skills for the software industry. A٤- Acquiring experience in industrial computer systems. A5- Designing programmed home systems. A6- Making websites and databases for various engineering systems. A7- Achieving the a to k criterion.
B. Subject-specific skills B1 - The ability to design simple and advanced programs in different programming languages. B 2 - the ability to think in addressing the issues by algorithms and methods of work. B3 - Writing scientific reports, reading charts and analyzing digital data
Teaching and Learning Methods
1. Explanation and clarification through lectures. 2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings. 3. Self-learning through homework and mini-projects within the lectures. 4. Laboratories. 5. Graduation projects. 6. Scientific visits. 7. Seminars that are held in the department. 8. Summer training.
Assessment methods
1. Short exams (quizzes). 2. Homework. 3. Quarterly and final exams for theoretical and practical subjects. 4. Small projects within the lesson. 5. Interacting within the lecture. 6. Reports.
C. Thinking Skills C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall C2- Response: Follow up the student's interaction with the material displayed on the screen C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it. C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Fourth year	**CoE 436**	Network Technology	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

Introduction to the design and performance analysis of computer networks Architectures, protocols, standards and technologies of computer networks. Including different computer networks types, media, models, switching, retransmission, flow and error control.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Network Technology CoE 436
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	2^{nd} semester/ 4^{th} year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
The concepts of internetworking, internetwork architecture, protocols, network services and applications. Server based operation. Networking problem notification and control. Authentication and security issues.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- obtain the ability of network problem solving.

A2- obtain the ability of connecting networks

A3- obtain the ability of analyzing networks.

A4- obtain the ability of estimating network requirements

B. Subject-specific skills

B1 - The ability to deal with information systems.

B2 - The ability to analyze different problems in the network and problems fixing.

B3 - The ability to design a network for a given purpose .

B4 - The ability to write technical reports.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.

D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

Week	Hours	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	٣	Internet protocols and Transport protocols	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	TCP/IP Internet, ISDN and B-ISDN(Addressing and address mapping)	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Computer network routing: Routing Algorithms	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Routing tables (for datagram and virtual circuit network)	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Routing protocols RIP, OSPF	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	routing strategies (flooding, spanning tree, static routing, and Hierarchical routing)	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	TCP/IP Transport and Application Protocols	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	TCP/IP Transport and Application Protocols	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Congestion control strategies	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Close loop and open loop congestion control	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Close loop and open loop congestion control	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Network security	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Encryption and Decryption	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Network Evaluation and performance	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Internet protocols and Transport protocols	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Data Communication and Networks (2007) by B. Forouzan Local Area Networks (2003) by B. Forouzan
Special requirements (include for example workshops, periodicals, IT software, websites)	G. E. Keiser, "Local Area Networks". J. Walrand, "Communication Networks".
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	Computer Network
Minimum number of students	10
Maximum number of students	50

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This program specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
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6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
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C. Thinking Skills

C1- Attention: Arousing students 'attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

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C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Developing the student's ability to deal with technology.

D2 - Develop the student's ability to deal with the Internet.

D3 - Develop the student's ability to deal with multiple media.

D4 - Developing the student's ability to dialogue and debate.

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit Rating	
4^{th} year	CoE E3x	Discrete control		Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
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Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific Skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
4th year	CoE E3x	Discrete control																	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This course is designed to teach the students the concepts of discrete time control system: Introduction to discrete time control system, z transform and inverse z transform, impulse sampling and data hold , pulse transfer function concept , Realization of digital controller, pulse transfer function of cascaded elements, pulse transfer of closed loop control system, time response and steady state error , frequency response and stability analysis of discrete time system.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Department of computer engineering
3. Course title/code	Discrete Control CoE E3x
4. Programme to which it contributes	4th year / 2nd semester
5. Modes of Attendance offered	Electronic
6. Semester/Year	2021
7. Number of hours tuition (total)	45
8. Date of production/revision of this Specification	2021

9. Aims of the Course

The objective of this course is to introduce the students to the fundamental principles of discrete time system control system. Introduction to discrete time control system, z transform and inverse z transform, impulse sampling and data hold , pulse transfer function, time response and frequency response are studied. The performance of systems and stability analysis will also be introduced. .

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- Clarify the basic concepts of discrete time control system

A2- Gaining experience in developing and analyzing mathematical models for different systems

A3- Studying the response and accuracy of systems

A4- Study methods for testing the stability and accuracy of systems.

B. Subject-specific skills

B1- Learn about discrete time control systems

B 2- Identify the basic components of the system and their mathematical models

B 3- The ability to address questions of the form of the response

B4- Identifying the mode of operation of discrete time control systems and ways to determine the stability of the systems

.

Teaching and Learning Methods

- Readings, self-learning, panel discussions.
- Exercises and activities in the lecture.
- Homework.
- Directing students to some websites to benefit and develop capabilities.
- Conducting seminars to explain and analyze a specific issue and find solutions to it

Assessment methods

- Interaction within the lecture.
- Homework and reports.
- Short exams .
- Semester and final exams

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction, Definition ,concept of discrete time control , structure	Introduction to discrete time control system,	Theoretical	Questions and discussion
2	3	Z- transform and inverse z – transform , solving difference equation, examples	Fundamental of discrete time control system,	Theoretical	Questions and discussion
3	3	Time response of discrete time system , convolution summation, frequency	Time response and frequency response	Theoretical	Questions and discussion

		response			
4	3	Introduction, basic structure, ADC and DAC , concept of sampling and sample. Hold device, transfer function of ZOH and z- transfer function	Modeling of discrete time control system	Theoretical	Questions and discussion
5	3	Effect of sampler on the z-transfer function, z - transfer function of cascaded elements, examples	Analysis of discrete time control system	Theoretical	Questions and discussion
6	3	Pulse transfer function of closed loop discrete time system Different configuration, examples	Analysis of discrete control system	Theoretical	Questions and discussion
7	3	Block diagram realization of digital controller, direct programming, standard programming ..	Realization of digital controller	Theoretical	Questions and discussion
8	3	Basic concept, mapping between the s-plane and the z- plane, stability analysis of closed loop discrete time system, examples	Stability analysis of discrete time control system	Theoretical	Questions and discussion
9	3	Methods of testing stability, The Jury stability test , bilinear transformation and Routh criterion, examples	Stability analysis of discrete time control system	Theoretical	Questions and discussion
10	3	Transient response of discrete time system, transient response specifications	Stability analysis of discrete time control system	Theoretical	Questions and discussion
11	3	Steady state error in closed loop discrete time system, types of system, examples	Steady state error analysis of discrete time control system	Theoretical	Questions and discussion
12	3	Root locus in z- plane, general rules for constructing root loci	Root locus diagram of discrete time system	Theoretical	Questions and discussion
13	3	Different examples on root locus plot	Root locus diagram of discrete time system	Theoretical	Questions and discussion
14	3	Introduction, definitions, state space representation of discrete time systems, solving state equation, state transition matrix	State space analysis of discrete time system	Theoretical	Questions and discussion
15	3	Solving state equation, z - transfer function matrix, Controllability and observability test ,introduction to State feedback	State space analysis of discrete time system	Theoretical	Questions and discussion

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1. K. Ogata, Discrete time control system
Special requirements (include for example workshops, periodicals, IT software, websites)	2. M. Sami Fadali, digital control engineering
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A2- Acquiring skill in dealing with problems and dealing with them through computer systems.

A2- Acquiring basic skills for the software industry.

A2- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)				
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.				
11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
Fourth		Ethics	fundamental	Bachelor Degree Requires (x) credits

13. Personal Development Planning
Studying the Engineering ethics increases the engineer's ability to face the ethical issues that arise during his engineering work and responsibly.
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
fourth		Ethics	C	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Ethics/
4. Programme to which it contributes	increase the engineer's ability to face the ethical issues that arise during his engineering work and responsibly
5. Modes of Attendance offered	Electronic Attendance
6. Semester/Year	Course/ fourth
7. Number of hours tuition (total)	60 hours
8. Date of production/revision of this specification	2021
9. Aims of the Course	
Engineering ethics is the study of the ethical issues and decisions facing individuals and organizations working in the field of engineering. The purpose of studying the ethics of the engineering profession is to increase the engineer's ability to face the ethical issues that arise during his engineering work and responsibly. Any profession must have rules of ethics regulating the general behavior of the members of this profession with each other and with others. ABET has called for the integration of ethics into education to teach future engineers ethical practices and ethical thinking.	

10· Learning Outcomes, Teaching, Learning and Assessment Method
A- Knowledge and Understanding A1. Provide clear, regulated rules of conduct for the purpose of restraining the disorderly aspect, helping to protect the profession's reputation, and promoting respect for the engineer's profession and engineering activities. A2- It provides criteria and bases for evaluating the degree of conformity of professional practice with ethical principles. A3- It limits corrupt practices and improper behavior and prevents violations of the ethics principles of practicing the profession.
B. Subject-specific skills • B1. knowing the basic ethical principles of how to deal with co-workers, employers and subordinates • B2. Identify the ethical bases to be followed towards the environment and society • B3 - The ability to acquire the ethical rules to be followed when practicing the engineering profession.
Teaching and Learning Methods
• Activities in the lecture. • Homework. • Conducting discussion groups
Assessment methods
• Interacting students in the lecture. • Homework and reports. • Quizzes. • Semester and final exams.
C. Thinking Skills • C1. Attention: Arousing the students' attention to the laws and regulations that the engineer must abide by and showing their importance in improving society as a whole, so that unfair practices decline, equal opportunities are provided to people, and work is carried out by the highest efficiency. • C2- Response: Monitoring the student's interaction with the material • C3 - Attention: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting seminars to present it. • C4 - Forming the direction: meaning that the student is sympathetic to the presentation and may have an opinion about the direction of the presented topic and defend it. • C5- Formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a stable level in the lesson and does not become lazy or fidgety.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Overview about Ethics	Introduction to Ethics	Theoretical lecture	discussion
2	2	What is an engineering ethics concept	General components of professional ethics	Theoretical lecture	Exercise and discussion
3	2	What is the purpose of studding Ethics	Ethics related to professional ethics	Theoretical lecture	Quizzes
4	2	Rules Codes of ABET	Engineering disasters	Seminar	Exercise and discussion
5	2	Knowing the impact of Ethics codes on society	Ethics Codes	Theoretical lecture	discussion
6	2	Knowledge the self-Obligations of an engineer	Obligations of the engineer under the ethics of practicing the engineering profession and self-obligations1	Theoretical lecture	discussion
7	2	Knowledge the self-Obligations of an engineer	Obligations of the engineer under the ethics of practicing the engineering profession and self-obligations2	Theoretical lecture	discussion
8	2		Biography Ibn Sina	Seminar	discussion
9	2	Ethics rules towards co-workers	Ethical obligations towards co-workers	Theoretical lecture	Exercise and discussion
10	2	Ethics rules towards	Obligations to employers	Theoretical lecture	Quizzes

		employers			
11	2	Ethics rules towards society, the environment and the profession	The engineer's commitments to society, the environment and the profession	Theoretical lecture	discussion

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	قواعد و اخلاقيات ممارسة مهنة الهندسة د. نبيل عبد الرزاق
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	40
Maximum number of students	60

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATIO

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	
1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in the private and public sectors in computer engineering through diversifying the methods of learning and teaching and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of computer engineering, both theoretical and practical, that comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of computer engineering in general and the fields of artificial intelligence, robotics, computer software, computer networks, communications and control in particular. 4. Prepare a stimulating environment for faculty members to develop their educational and research knowledge and skills. 5. Building and developing partnership with governmental and private sectors and society in all its various institutions.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1- Clarify the basic concepts of computer systems and their applications in social and industrial fields.

A٢- Acquiring skill in dealing with problems and dealing with them through computer systems.

A٣- Acquiring basic skills for the software industry.

A٤- Acquiring experience in industrial computer systems.

A5- Designing programmed home systems.

A6- Making websites and databases for various engineering systems.

A7- Achieving the a to k criterion.

B. Subject-specific skills

B1 - The ability to design simple and advanced programs in different programming languages.

B 2 - the ability to think in addressing the issues by algorithms and methods of work.

B3 - Writing scientific reports, reading charts and analyzing digital data

Teaching and Learning Methods

1. Explanation and clarification through lectures.
2. The method of displaying scientific materials on display devices: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning through homework and mini-projects within the lectures.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that are held in the department.
8. Summer training.

Assessment methods

1. Short exams (quizzes).
2. Homework.
3. Quarterly and final exams for theoretical and practical subjects.
4. Small projects within the lesson.
5. Interacting within the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: Arousing students ’attention by implementing one of the application programs on the display screen in the hall

C2- Response: Follow up the student's interaction with the material displayed on the screen

C3- Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

C4- Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

C5 - The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

Assessment methods
• Active participation in the classroom, a guide to student commitment and responsibility. • Commitment to the deadline in submitting the duties and research required of the student to submit them. • The quarterly and final exams express commitment and cognitive and skill achievement.

D. General and Transferable Skills (other skills relevant to employability and personal development)
D1 - Developing the student's ability to deal with technology. D2 - Develop the student's ability to deal with the Internet. D3 - Develop the student's ability to deal with multiple media. D4 - Developing the student's ability to dialogue and debate.

١١. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
١٢. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Fourth year	**CoE 432**	Computer Network	C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

Introduction to the design and performance analysis of computer networks Architectures, protocols, standards and technologies of computer networks. Including different computer networks types, media, models, switching, retransmission, flow and error control.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Course title/code	Computer Network CoE 432
4. Modes of Attendance offered	Presence and on-line
5. Semester/Year	1st semester/ 4th year
6. Number of hours tuition (total)	45 Hours
7. Date of production/revision of this specification	2021
8. Aims of the Course	
Introduction to the design and performance analysis of computer networks Architectures, protocols, standards and technologies of computer networks. Including different computer networks types, media, models, switching, retransmission, flow and error control.	

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1- obtain the ability of network problem solving.

A2- obtain the ability of connecting networks

A3- obtain the ability of analyzing networks.

A4- obtain the ability of estimating network requirements

B. Subject-specific skills

B1 - The ability to deal with information systems.

B2 - The ability to analyze different problems in the network and problems fixing.

B3 - The ability to design a network for a given purpose .

B4 - The ability to write technical reports.

Teaching and Learning Methods

1. Explanation and clarification using the lectures.
2. The methods of displaying the scientific materials using: data show, smart boards, plasma screens, and on-line meetings.
3. Self-learning using homework and small projects.
4. Laboratories.
5. Graduation projects.
6. Scientific visits.
7. Seminars that held by the department.
8. Summer training.

Assessment methods

1. Short tests (quizzes).
2. Homework.
3. Mid-terms and final exams for both theoretical and practical subjects.
4. Small projects during the lecture.
5. Student’s interacting during the lecture.
6. Reports.

C. Thinking Skills

C1- Attention: draw the students ’attention by running one of the application programs on the screen in the classroom.

C2- Response: monitor the student's interaction with the material that displayed on the screen.

C3- Interest: monitor the interest level of the student who interacted more, through extra request for other programs and applications to be displayed.

C4- The direction formation: meaning that the student is agreed with the presentation and may have a supportive opinion towards the presented topic and defend it.

C5 - The formation of the value behavior: it means the student reaches the stage that he/she doesn't feel inactive or fidget.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1 - Develop the student's ability to interact with technology.

D2 - Develop the student's ability to interact with the Internet.

D3 - Develop the student's ability to interact with multimedia.

D4 - Develop the student's ability to discuss and debate.

Week	Hours	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	٣	Fundamental concepts of network	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	types of computers networks	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	LANs, MANs, WANs	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Network architecture	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Protocol suits and layering concepts	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	OSI and TCP/IP reference models	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Retransmission techniques: ARQ system utilization of networks	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Stop and wait protocol, Goback N and selective repeat protocols.	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Switching techniques and communication services	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Circuit and packet switching, broad cast method,	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	types of communication services connection, connectionless and expedited service	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Local Area Networks Technology: ALOHA (pure and slotted),	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Ethernet (CSMA/CD), Token ring, Token bus, FDDI network, DQDB network.	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Network Devices	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Network Evaluation and performance	Theoretical and Tutorial	Questions, discussion and Quizzes

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	Data Communication and Networks (2007) by B. Forouzan Local Area Networks (2003) by B. Forouzan
Special requirements (include for example workshops, periodicals, IT software, websites)	G. E. Keiser, "Local Area Networks". J. Walrand, "Communication Networks".
Community-based facilities (include for example, guest Lectures, internship, field studies)	websites. Libraries sites in international universities.

13. Admissions	
Pre-requisites	Digital Communication
Minimum number of students	10
Maximum number of students	50

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAM SPECIFICATION

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering Department
3. Program Title	Computer Engineering
4. Title of Final Award	Bachelors of Computer Engineering
5. Modes of Attendance offered	Courses
6. Accreditation	ABET
7. Other external influences	Field and scientific visits
8. Date of production/revision of this specification	2021
9. Aims of the Program	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

11. Programme Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
4^{th}	**CoE 437**	Parallel Processing	3	Bachelor Degree Requires (x) credits

13. Personal Development Planning
14. Admission criteria
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually
15. Key sources of information about the programme
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry’s standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

Curriculum Skills Map																			
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																			
				Programme Learning Outcomes															
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
4^{th}	**CoE 437**	Parallel Processing	Core	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

The purpose of this course is to present students with an introduction to computer architecture of multiprocessor systems, Flynn's classification, architecture of parallel processing systems, memory models, advantages and disadvantages of different models as shared memory, distributed memory systems, the structure and evaluation of static and dynamic interconnection networks, pipelining and pipelined data processing, algorithms of parallel processing, and array processors.

1. Teaching Institution	University of Basrah
2. University Department/Centre	Computer Engineering
3. Course title/code	**Parallel Processing/ CoE 437**
4. Programme to which it contributes	4^{th} Class/ 2^{nd} semester
5. Modes of Attendance offered	Electronic
6. Semester/Year	Semester
7. Number of hours tuition (total)	45
8. Date of production/revision of this specification	2021

9. Aims of the Course
- Demonstrate an understanding of uniprocessor computer architecture.
- Explain the operation of parallel hardware including cache-coherence and mutexes on shared-memory machines, and interconnect performance (bisection bandwidth, bandwidth and latency) characteristics on distributed-memory machines.
- Demonstrate an understanding of parallel hardware and general parallel program design techniques, understanding of shared-memory machines by designing, and distributed-memory machines by designing.

10· Learning Outcomes, Teaching, Learning and Assessment Method

A- Knowledge and Understanding

A1. Knowledge and understanding

A2. understand the basics of parallel processing systems architecture, terminology, methodology, programming techniques like object-oriented programming, using modern libraries of parallel processing and in building Windows components to design personal parallel applications

A3. know and understand the principles of modern parallel programs design: the structure of parallel program, basics of parallel program design, multithreading, how to configured a parallel cluster, how to start up a parallel processing system.

B. Subject-specific skills

B1. The students must be able to choose appropriate methods and apply given knowledge to design desired applications.

B2. Be able to design user-friendly software according with customer demand.

B3. Programming techniques for parallel processing systems, to apply object-oriented techniques to the problem of extending a larger software system

Teaching and Learning Methods

• Readings, self-learning, panel discussions.
• Exercises and activities in the lecture.
• Homework.
• Directing students to some websites to benefit from developing capabilities.
• Interviews are seminars to explain and analyze a specific issue and find solutions to it.

Assessment methods

• Interacting within the lecture.
• Homework and reports. • Short exams (Quiz).
• Semester and final exams.

C. Thinking Skills

C1. Attention: Attracting students' attention by implementing one of the applied programs on the display screen in the hall.

C2. Response: Follow up the student's interaction with the material displayed on the screen.

C3. Attention: Follow up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to be presented.

C4. Forming the direction: meaning that the student is sympathetic to the presentation and may have an opinion about the direction of the presented topic and defend it.

C5. Formation of value behavior: meaning that the student reaches the top of the emotional ladder, so he has a stable level in the lesson and does not become lazy or fidget

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Develop the student's ability to perform assignments and deliver them on time

D2. Logical and programmatic thinking to find software solutions to various

problems
D3. Develop the student's ability to dialogue and discussion
D4. Develop the student's ability to deal with modern technology, especially the Internet

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3	Introduction	Necessity of high performance, constraints of conventional architecture, Von Neuman architecture, limitations, evolution of parallel processors	Theoretical	Questions and discussion
2	3	Parallelism	parallelism of Uniprocessor architecture, parallel processing mechanisms, multiple function units.	Theoretical	Theoretical
3	3	Parallelism	parallelism and pipelining within CPU, overlapped CPU, use of memory hierarchy system.	Theoretical	Theoretical
4	3	Architectural Classifications of parallel computers	Flynn's classifications (SISD, SIMD, MISD, and MIMD) computer organizations, classification based on computing between processing elements, SIMD.	Theoretical	Theoretical
5	3	Memory architecture of Parallel Processing	shared, distributed, and hybrid distributed- shared memory, UMA and NUMA, COMA	Theoretical	Theoretical
6	3	Multiprocessor Architecture	multiprocessor systems, loosely coupled, tightly coupled, multiprocessor characteristics	Theoretical	Theoretical
7	3	Multiprocessor Architecture	inter processor communication networks (time shared buses, crossbar switches	Theoretical	Theoretical
8	3	Vector and array Processors	basic vector architecture, vector processor, vector instruction types, array processors (array, wave front array.	Theoretical	Theoretical
9	3	Vector and array Processors	systolic array, bus architecture), matrix multiplication systolic array, processors, switching methodology, network topology. Multithread architecture	Theoretical	Theoretical
10	3	Pipeline Mechanism	instruction pipelining, multiple function units, internal data forwarding, linear pipeline processors, speedup, efficiency, throughput, classification of pipeline processors (arithmetic, instruction).	Theoretical	Theoretical

11	3	Pipeline Mechanism	Hazard types (data, structural, and control), hazards handling and reducing, role of cache memory on pipeline system.	Theoretical	Theoretical
12	3	Branch Handling	Techniques of branch handling (pipelining, looping, out of order execution, software scheduling), predicted execution, speculative loading,	Theoretical	Theoretical
13	3	Branch Handling	superscalar processors, very large instruction word processor VLIW, case study (Pentium Processor).	Theoretical	Theoretical
14	3	Interconnection Networks	static versus dynamic SIMD networks, network performance static networks (linear, tree, torus, cube, hypercube, mesh, ring).	Theoretical	Theoretical
15	3	Interconnection Networks	Dynamic interconnection networks; switches versus links, single stage network (shuffle exchange), multistage interconnection networks MIN (perfect shuffle, inverse shuffle, bit reversal, and butterfly) Omega MIN	Theoretical	Theoretical

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	M. RAFIQUZZAMAN, “Fundamentals of Digital Logic and Microcomputer Design”, Fifth Edition
Special requirements (include for example workshops, periodicals, IT software, websites)	Reputable websites. Libraries sites in some international universities
Community-based facilities (include for example, guest Lectures, internship, field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	