

*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 Anbar

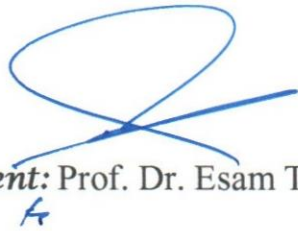
**College:** College of Computer Science and Information Technology

**Department:** Computer Science

**Date Of Form Completion :** 9/6/2024

**Signature:**

**Head of Department:** Prof. Dr. Esam Taha Yaseen



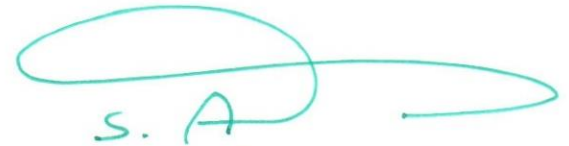
**Signature:**

**Dean's Assistant For  
Scientific Affairs:**



**Quality Assurance And University Performance Manager**

**Signature :**



**Dean Authentication**

# TEMPLATE FOR PROGRAMME SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### PROGRAMME 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 Anbar
2. University Department/Centre	College of Computer Science and Information Technology/ Computer Science Department
3. Programme Title	Computer Science Program
4. Title of Final Award	MSc degree in Computer Science
5. Modes of Attendance offered	The semester system, with students being on campus, full-time, within the face-to-face (day program) method.
6. Accreditation	IAC-Iraqi Accreditation Council
7. Other external influences	N/A
8. Date of production/revision of this specification	5/6/2024
9. Aims of the Programme	
<b>Master in Computer Science:</b>	
<ol style="list-style-type: none"><li>1. Providing students with advanced knowledge and a deep understanding of computer science theories and techniques.</li><li>2. Developing scientific research and innovation capabilities to meet contemporary challenges in specialized fields.</li><li>3. Preparing leaders and experts in fields of specialization to assume leadership positions in academic and industrial circles.</li><li>4. Enabling students to contribute to developing knowledge and employing it to serve society.</li></ol>	

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

### A. Knowledge and Understanding

#### **Master in Computer Science:**

A1- Mastering advanced knowledge and deep understanding of modern theories and principles in computer science.

A2- The ability to analyze and evaluate complex research problems in areas of specialization.

A3- Demonstrate a broad understanding of contemporary trends and developments in computer science.

### B. Subject-specific skills

#### **Master in Computer Science:**

B1 - The ability to design and develop advanced computer systems and applications.

B2 - Demonstrate advanced scientific research skills in conducting innovative studies and research.

B3 - Apply modern techniques and tools to solve complex research problems.

## Teaching and Learning Methods

### **Teaching and learning methods for the Master's degree:**

- Interactive lectures: presenting advanced theoretical concepts while engaging students in discussions and activities.
- Advanced research studies: Assigning students to conduct studies and research in various fields of specialization to develop scientific research skills.
- Specialized workshops and seminars: Organizing workshops and seminars in which experts and researchers participate to discuss recent developments in computer science.
- Applied projects: Assigning students to design and develop advanced computer applications to enhance programming and development skills.
- Self-learning and exploratory learning: encouraging students to conduct research and self-examination to expand their awareness in specialized fields.

### C. Thinking Skills

#### **Master's degree in Computer Science**

C1- Developing positive attitudes towards scientific research and cognitive investigation in the field of computer science

C2- Developing social and environmental responsibility in the use of computer technologies and their applications.

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

**Master's degree in Computer Science**

D1- Advanced scientific research skills: identifying research problems, conducting reference surveys, designing and implementing research.

D2- Scientific analysis and criticism skills: The ability to analyze and interpret data, and conduct constructive criticism of research and theories

11. Programme Structure (MSc)

11. Programme Structure (MSc)				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
MSc 1 <sup>st</sup> Semester		Advanced Data warehouse and DSS	3	Master Degree Requires ( x ) credits
		Advanced Computer Networks	3	
		Embedded Systems	3	
		Digital Image Processing	3	
		English	2	
MSc 2 <sup>nd</sup> Semester		Evolutionary Computation	3	
		Advanced Mobile Computing	3	
		Computer Vision	3	
		Advanced Cryptography	3	
		Research Methodology	1	

## 12. Personal Development Planning

Continuous improvement and focus on students to improve processes that increase the degree of achievement of department and college goals. A periodic study is conducted to examine areas of weakness in order to overcome them. Every teacher must work to continuously improve students' performance and write down the problems and obstacles facing students or the educational process within his specialty.

## 13. Admission criteria .

- Approval of admission requirements for the student in accordance with the regulations of the Ministry of Higher Education and Scientific Research (central admission)
- Personal interview for the department
- Must be fit for medical examination
- Absorptive capacity.

## 14. Key sources of information about the programme

- Department page on the college website.
- Computer Science Department Guide.
- Some committee meetings from the Ministry of Computer Science Department.

## Curriculum Skills Map

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

				Programme Learning Outcomes															
Year / Level	CourseCode	CourseTitle	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
MSc 1 <sup>st</sup> Semester		Advanced Data warehouse and DSS	C	✓				✓	✓			✓	✓			✓			
		Advanced Computer Networks	C	✓	✓			✓	✓			✓				✓			
		Embedded Systems	C	✓	✓			✓	✓			✓	✓			✓			
		Digital Image Processing	C	✓				✓	✓			✓				✓			
		English	C	✓				✓				✓				✓			
MSc 2 <sup>nd</sup> Semester		Evolutionary Computation	C	✓	✓			✓				✓				✓			
		Advanced Mobile Computing	C	✓	✓			✓	✓			✓	✓			✓			
		Computer Vision	C	✓	✓			✓				✓	✓			✓			
		Advanced Cryptography	C	✓	✓			✓	✓			✓				✓			
		Research Methodology	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	College of CS & IT – University of Anbar
2. University Department/Centre	Computer Science
3. Course title/code	Embedded Systems
4. Programme(s) to which it contributes	MSc in Computer Science
5. Modes of Attendance offered	Direct
6. Semester/Year	1 <sup>st</sup> / MSc Course
7. Number of hours tuition (total)	45
8. Date of production/revision of this specification	
9. Aims of the Course	
The embedded systems curriculum aims to introduce the student to the basics of embedded systems, their uses and architecture, and methods for developing and improving the operation of the physical and software parts of embedded systems.	

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

### A. Knowledge and Understanding

A1- During the semester, the student learns the basics of embedded systems.

A2- Understanding the basics of the hardware and software parts of embedded systems.

A3- Learn how complex embedded systems work.

### B. Subject-specific skills

B1 - Learn how to deal with the basic parts of embedded systems.

B2- Learn the types of memory used in embedded systems.

B3- Familiarity with the basic concepts for developing and accelerating the performance of embedded systems.

B4- Familiarity with the method of working and processing data in embedded systems.

### Teaching and Learning Methods

- The teacher prepares lectures on the subject in paper and electronic form and presents them to the students.
- The teacher delivers lectures in detail.
- The teacher requests reports and homework assignments on the basic vocabulary of the subject.

### Assessment methods

- Daily discussion to determine the students' understanding of the material and evaluate the daily contributions.
- Quick and short daily exams to understand students' understanding of the material.
- Give part of each chapter's grade to homework.
- Monthly examinations and evaluations of the curriculum, with a comprehensive final exam for all curriculum items

### C. Thinking Skills

C1- Urging the student to understand the purpose of studying the subject in general.

C2- Urging the student to understand the operation of each function or code within the language.

C2- Urging the student to think about how to develop himself in the field of computers.

C4- Making the student capable of dealing with computers and how to use programs.



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

D1- Enabling students to write reports on the subject's vocabulary.

D2- Empowering students and providing them with mechanisms to search for information within what scientific sites provide on the Internet.

D3- Raising the student's self-confidence by linking theoretical material to practical reality.

D4- Developing students' skills in how to deal with physical and software computer problems and how to deal with them

## 11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup>	9		Embedded Systems Overview	Lectures PDF power point Video	Daily exams + monthly exams
4 <sup>th</sup>	3		Embedded system hardware	Lectures PDF power point Video	Daily exams + monthly exams
5 <sup>th</sup>	3		System software	Lectures PDF power point Video	Daily exams + monthly exams
6 <sup>th</sup>	3		Complex Embedded Systems	Lectures PDF power point Video	Daily exams + monthly exams
7 <sup>th</sup>	3		Introduction to PIC trainer <ul style="list-style-type: none"> <li>• PIC Trainer Hardware</li> <li>PIC Trainer Software</li> </ul>	Lectures PDF power point Video	Daily exams
8 <sup>th</sup>	3		7 segment display & simple control	Lectures PDF power point Video	Daily exams
9 <sup>th</sup>	3		Traffic lights & sound generator	Lectures PDF power point Video	Daily exams
10 <sup>th</sup>	3		Two digit counter & logic gates	Lectures PDF power point Video	Daily exams
11 <sup>th</sup>	3		Display and keypad	Lectures	Daily exams

			scanner & LCD control	PDF power point Video	
12 <sup>th</sup>	3		Interrupts & timer keypad and display	Lectures PDF power point Video	Daily exams
12 <sup>th</sup>	3		Pic EEPROM access, A-D conversion, & D-A conversion	Lectures PDF power point Video	Daily exams
14 <sup>th</sup> 15 <sup>th</sup>	6		ED-7275 Robot Structure	Lectures PDF power point Video	Daily exams

<b>12. Infrastructure</b>	
<p>Required reading:</p> <ul style="list-style-type: none"> <li>· CORE TEXTS</li> <li>· COURSE MATERIALS</li> <li>· OTHER</li> </ul>	<ul style="list-style-type: none"> <li>· Peter Marwedel, “Embedded System Design”, Springer, Second Edition 2011.</li> <li>· Tim Wilmshurst, “Designing Embedded Systems with PIC Microcontrollers Principles and applications”, Second Edition 2010.</li> </ul>
<p>Special requirements (include for example workshops, periodicals, IT software, websites)</p>	<ul style="list-style-type: none"> <li>• Lectures presented by the subject teacher</li> <li>• Books available in the college library</li> </ul>
<p>Community-based facilities (include for example, guest Lectures, internship, field studies)</p>	<ul style="list-style-type: none"> <li>• Arnold S. Berger, “Embedded Systems Design: An Introduction to Processes, Tools, and Techniques”, 2002.</li> <li>• Frank Vahid and Tony Givargis, “Embedded System Design: A Unified Hardware/Software Approach”, 1999.</li> <li>• James K. Peckol, “Embedded system Design”, John Wiley &amp; Sons, 2010.</li> <li>• Elicia White, “Making Embedded Systems”, O’Reilly Series, SPD, 2011.</li> <li>• Rajkamal, “Embedded Systems”, TMH, 2009.</li> <li>• Lyla B Das, “Embedded Systems-An Integrated Approach”, Pearson 2013.</li> <li>• Timothy D. Green, “Embedded systems programming with the PIC16F877”, Second Edition 2008.</li> <li>• Microchip Technology Inc. (<a href="http://www.microchip.com">www.microchip.com</a>).</li> </ul> <p style="text-align: center;">The PIC-1 Trainer User Guide by Flight Electronics International Ltd. 2008.</p>

13. Admissions	
Pre-requisites	None
Minimum number of students	2
Maximum number of students	10

# 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 Anbar/ College of CSIT,
2. University Department/Centre	Computer Science Department
3. Course title/code	English Language Level 2
4. Programme(s) to which it contributes	MSc in Computer Science
5. Modes of Attendance offered	Direct
6. Semester/Year	1 <sup>st</sup> / 2023-2024
7. Number of hours tuition (total)	30
8. Date of production/revision of this specification	8/6/2024
9. Aims of the Course	
Developing Effective Reading Strategies	
Enhancing Writing Skills	
Building Strong Vocabulary	
Sharpening Research Skills	
Promoting Learner Independence	

## 10. Learning Outcomes, Teaching ,Learning and Assessment Methode

### A Knowledge and Understanding

- A1. Exposing the students to a variety of academic topics
- A2. Teaching how to analyze and interpret information
- A3. Equipping the students with research skills
- A4.
- A5.
- A6 .

### B. Subject-specific skills

- B1. Focus on General Academic Skills
- B2. Variety of Topics
- B3.

### Teaching and Learning Methods

- Assignments
- Homeworks
- Quizzes and exams.

### Assessment methods

- Quizzes
- Vocabulary Self-Quizzes
- Reading Comprehension Exercises
- Writing Tasks

### C. Thinking Skills

- C1. Critical Analysis
- C2. Problem-Solving
- C3. Evaluation
- C4. Synthesis

### Teaching and Learning Methods

### Assessment methods

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

- D1.
- D2.
- D3.
- D4.

### 11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2		International student.	Theoretical	Exercises and discussion
2	2		Where in the world...? .	Theoretical	Exercises and discussion
3	2		Reading and Writing ESP	Theoretical	Exercises and discussion
4	2		Newspaper articles.	Theoretical	Exercises and discussion
5	2		Modern technology .	Theoretical	Exercises and discussion
6	2		First Test	Theoretical	Exam
7	2		Conferences and visits .	Theoretical	Exercises and discussion
8	2		Science and our world .	Theoretical	Exercises and discussion
9	2		Reading and Writing ESP	Theoretical	Exercises and discussion
10	2		People: past and present .	Theoretical	Exercises and discussion
11	2		The world of IT .	Theoretical	Exercises and discussion
12	2		Inventions, discoveries, and processes.	Theoretical	Exercises and discussion
13	2		Second Test	Theoretical	Exam
14	2		Travel and tourism	Theoretical	Exercises and discussion
15	2		Oral Test	Oral	Oral Exam

### 12. Infrastructure

#### Required reading:

- CORE TEXTS
- COURSE MATERIALS
- OTHER

- Headway Academic Skills Level 2, Sarah Philpot and Lesley Curnick, Textbook

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	

# 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 Anbar- College of Computer Science and Information Technology
2. University Department/Centre	Department of Computer Science
3. Course title/code	Evolutionary Computation
4. Programme(s) to which it contributes	MSc in Computer Science
5. Modes of Attendance offered	Personal Attendance
6. Semester/Year	Second/2024
7. Number of hours tuition (total)	30
8. Date of production/revision of this specification	1-9-2023
<ul style="list-style-type: none"><li>- To be able to formulate and assess problems in evolutionary computation.</li><li>- To be able to assess the strengths and weaknesses of several approaches to evolutionary computation.</li><li>- To be able to assess and understand the key commonalities and differences in various evolutionary computation models.</li><li>- To be able to apply techniques in evolutionary computation to problems such as optimization, automatic programming, control, and biological modeling.</li></ul>	



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

### A. Knowledge and Understanding

A1. Understand the basic principles and concepts of evolutionary computation.

A2. Comprehend the working mechanisms of different evolutionary algorithms.

A3. Recognize the strengths and limitations of various evolutionary computation techniques.

A4. Understand the applications and suitability of evolutionary algorithms for different problem domains.

### B Subject-specific skills

B1. Ability to formulate optimization problems suitable for evolutionary computation techniques.

B2. Proficiency in implementing and applying various evolutionary algorithms to solve optimization problems.

B3. Skill in analyzing and interpreting the results obtained from evolutionary computation techniques.

### Teaching and Learning Methods

Class Lectures.

### Assessment methods

Exams and Assignments.

### C. Thinking Skills

C1. Ability to critically evaluate the performance and efficiency of different evolutionary algorithms.

C2. Capacity to analyze and compare the results obtained from different evolutionary computation techniques.

C3. Skill in identifying and addressing potential issues and challenges in the application of evolutionary algorithms.

C4. Ability to design and develop new or improved evolutionary computation techniques.

### Teaching and Learning Methods

Class Lectures.

### Assessment methods

Exams and Assignments.

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

D1. Problem-solving skills.

D2. Analytical and critical thinking skills.

D3. Research and investigation skills.

D4. Communication and presentation skills.

## 11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Understanding the concept of evolutionary computation	Introduction to Evolutionary Computation	Lecture	Assignment
2	2	Understanding concept of genetic algorithms	Genetic Algorithms	Lecture	Assignment
3	2	Understanding concept of genetic algorithms	Genetic Algorithms Applications and Implementations Issues	Lecture	Assignment
4	2	Understanding concept of simulated annealing algorithm	Simulated Annealing Algorithm	Lecture	Assignment
5	2	Understanding	Threshold Algorithm	Lecture	Assignment

		concept of threshold algorithm			
6	2	Understanding the concept of record to record algorithm	Record to Record Algorithm	Lecture	Assignment
7	2	Understanding concept of great deluge algorithms	Great Deluge Algorithm	Lecture	Assignment
8	2	Understanding the implementation issues of the above algorithms	Simulated Annealing, Threshold, Record to Record and Great Deluge Algorithms Applications and Implementation Issues	Lecture	Assignment
9	2	-	Mid Term Exam	-	-
10	2	Understanding concept of particle swarm optimization algorithm	Particle Swarm Optimization Algorithm	Lecture	Assignment
11	2	Understanding concept of particle swarm optimization	Particle Swarm Optimizations Applications and Implementation Issues	Lecture	Assignment

		ion algorithm			
12	2	Understand concept of ant colony algorithm	Ant Colony Algorithm	Lecture	Assignment
13	2	Understand concept of ant colony algorithm	Ant Colony Algorithm Applications and Implementation Issues	Lecture	Assignment
14	2	Understand concept of honey bees algorithm	Honey Bees Algorithm	Lecture	Assignment
15	2	Review	-	-	-

## 12. Infrastructure

### Required reading:

- CORE TEXTS
- COURSE MATERIALS
- OTHER

- Metaheuristics: From Design to Implementation, El-Ghazali Talbi, Wiley Publishing, 2009, ISBN:0470278587 9780470278581.
- Handbook of Evolutionary Computation, Thomas Back et. al., IOP Publishing Ltd. Bristol, UK, 1997, ISBN:0750303921.
- Genetic Algorithms, Kumara Sastry et. al., book chapter in Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques by Edmund Burke and Graham Kendall, 2nd edition, Springer Publishing Company, Incorporated, 2013, ISBN:1461469392 9781461469391.

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	None
Minimum number of students	3
Maximum number of students	25

# 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	<b>University of Anbar</b>
2. University Department/Centre	<b>Career Development Center \Computer Science and Information Technology</b>
3. Course title/code	<b>Advanced Mobile Computing</b>
4. Programme(s) to which it contributes	<b>MSc.</b>
5. Modes of Attendance offered	<b>Physical attendance</b>
6. Semester/Year	<b>Second semester 2024-2023</b>
7. Number of hours tuition (total)	<b>45</b>
8. Date of production/revision of this Specification	<b>8/6/2024</b>
9. Aims of the Course	

Upon completion of the course, you should be able to:

- Design and develop a mobile application and system to enable new / enhanced user experience.
- Understand new concepts and state-of-the art technologies in mobile and ubiquitous computing.
- Build soft skills –for example, critiquing technology and share ideas in a constructive manner.
- Discuss various examples of life-immersive mobile applications
- Understand exemplary techniques and challenges for activity sensing and recognition
- Understand exemplary techniques and challenges for activity and gesture recognition

- To understand basics of localization techniques
- To understand the opportunities for pervasive healthcare and techniques to capture various health-related metrics
- Come up with a novel project idea
- 

## 10. Learning Outcomes, Teaching ,Learning and Assessment Method:

### A- Knowledge and Understanding

- A1. Understand the uniqueness of mobile applications
- A2. Understand the state-of-the art examples of life-immersive mobile applications
- A3. Find seed ideas for a strong course project
- A4. Understand human behavior and context sensing
- A5. Understand the basics of activity recognition
- A6. Understand the basics of gesture recognition
- A7. Understand widely-used device localization techniques.
- A8. Understand the opportunities for pervasive healthcare
- A9. Understand physiological sensing techniques

### B. Subject-specific skills

- B1.
- B2.
- B3.

### Teaching and Learning Methods

- 1- Lecture.**
- 2- Home works**
- 3- Assignment**
- 4- Projects**

### Assessment methods

#### Presentation and Class Participation (20%)

- Presentation & Discussion:10 %
- Paper Critique: 10 %

#### Project (40%)

- Presentations
- Novelty of the idea
- Process of the development
- Quality of the final application / research paper

#### Final Exam (40%)

- Scope: Lecture materials and papers in the reading list.
- No official textbooks.

### C. Thinking Skills

- C1.
- C2.
- C3.
- C4.

Teaching and Learning Methods	
<b>1- Lecture.</b> <b>2- Home works</b> <b>3- Assignment</b> <b>4- Projects</b>	
Assessment methods	
Midterm Examination	20%
Course Work and Assignments	10%
Final Examination	70%
<hr/>	
Total	100 %
<b>D. General and Transferable Skills (other skills relevant to employability and personal development)</b> D1. D2. D3. D4.	

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1.	3		<b>Class Introduction</b> <b>Introduction to Mobile Computing</b> <b>Movement to Advance mobile computing</b> <b>Evolution of Computing</b> <b>Life-Immersive Mobile Computing</b>		
2.	3		<b>Human Behavior and Context Sensing/Analytics:</b> <b>Activities</b> <b>Locations</b> <b>Emotions and Health</b>		
3.	3		<b>Special Topics</b>		
4.	3		<b>Project Review and Demonstration of Initial Prototype</b>		
5.	3		<b>Mobile and Embedded Machine Learning Systems:</b> <b>Basics</b> <b>Power and Optimization</b> <b>Cloud and Edge</b>		
6.	3		<b>Mobile and Embedded Machine Learning Systems:</b> <b>Privacy and Other Issues</b>		
7.	3		<b>Project Final Presentation and Demo</b>		
8.	3		<b>Mobile Cloud Computing</b>		



			<b>Introduction</b> <b>Motivation to Mobile</b> <b>Cloud Computing</b> <b>Architecture of Mobile</b> <b>Cloud Computing</b> <b>Platform and</b> <b>Technologies</b> <b>Mobile Augmentation</b> <b>Approaches</b> <b>Issues of Mobile Cloud</b> <b>Computing</b>		
9.	3		<b>End-User Issues</b> <b>Service-Level and</b> <b>Application-Level Issues</b> <b>Security and Privacy</b> <b>Privacy</b> <b>Context Awareness</b> <b>Mobile Data</b> <b>Management</b> <b>Advantages and</b> <b>Applications of Mobile</b> <b>Cloud Computing</b> <b>Research Challenges in</b> <b>Mobile Cloud</b> <b>Computing</b>		
10.	3		<b>Green Mobile Cloud</b> <b>Computing</b> <b>Introduction</b> <b>Green Mobile</b> <b>Computing</b> <b>Green Cloud Computing</b> <b>Green Mobile Cloud</b> <b>Computing</b> <b>Green Femtocell Using</b> <b>Mobile Cloud</b> <b>Computing</b> <b>Green Seamless Service</b> <b>Provisioning with Mobile</b> <b>Cloud Computing</b> <b>and Challenges of Mobile</b> <b>Ad Hoc Cloud</b> <b>Green Location Sensing</b> <b>within Mobile Cloud</b> <b>Computing Environment</b>		
11.	3		<b>Sensor Mobile Cloud</b> <b>Computing</b> <b>Introduction</b> <b>Wireless Sensor Network</b> <b>Sensor Cloud</b> <b>Sensor Mobile Cloud</b> <b>Computing</b> <b>Internet of Things</b> <b>Urban Sensing</b> <b>Application</b> <b>Challenges of Sensor</b> <b>Mobile Cloud</b>		

			<b>Computing</b>		
12.	3		<b>Vehicular Mobile Cloud Computing Introduction</b> <b>Vehicular Ad Hoc Network Architecture and Working Model of Vehicular Privacy and Security in Vehicular Mobile Cloud Computing Mobile Cloud Computing Privacy and Security in Vehicular Mobile Cloud Computing Limitations of Vehicular Mobile Cloud Computing Challenges in Vehicular Mobile Cloud Computing</b>		
13.	3		<b>5G Concepts</b> <b>5G Objectives and Usage Scenarios.</b> <b>5G Activities.</b> <b>Channel Access Method/Air Interface Multiple Access/Waveform Cognitive Radio Standardization Spectrum Management Massive Centralized RAN Centralized RAN/Cloud RAN</b>		
14.	3		<b>The 5G architecture NFV and SDN Basics about RAN architecture High-level requirements for the 5G architecture Functional architecture and 5G flexibility Functional optimization for specific applications Integration of LTE and new air interface to fulfill 5G requirements Physical architecture and 5G deployment Deployment enablers Flexible function</b>		

			<b>placement in 5G deployments</b>		
15.	3		<b>Final Exam</b>		

<b>12. Infrastructure</b>	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	- There is no textbook. - We will use lecture slides and research papers.
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures , internship , field studies)	

<b>13. Admissions</b>	
Pre-requisites	Assume that you have an undergrad degree in computer science or other related field. •You should be able to self-learn development of mobile applications. •If you are aware of Java and Linux, it should not take too long to program on Android.
Minimum number of students	10
Maximum number of students	20

**Assist. Prof. Dr. Ahmed Subhi Abdalkafor**  
**Lecturer Dr. Muntaser Abdulwahed Salman**

# 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	College of CS & IT – University of Anbar
2. University Department/Centre	Computer Science
3. Course title/code	Computer Vision
4. Programme(s) to which it contributes	M.Sc. in Computer Science
5. Modes of Attendance offered	Direct
6. Semester/Year	Second / 2023-2024
7. Number of hours tuition (total)	45
8. Date of production/revision of this specification	9 – 6 - 2024
9. Aims of the Course	
	1- To provide students with solid technical introduction to Computer Vision
	2- To know and apply the concepts, methodologies and technologies of computer vision.
	3- To conceive, develop and evaluate complex computer vision systems.
	4- To analyze and apply state-of-the-art methods in computer vision.
	5- To know and apply the fundamentals of image acquisition and machine vision systems.

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

### A. Knowledge and Understanding

A1. Familiarity with scientific knowledge in computer vision.

A2. Understand the foundational principles of computer vision, including image formation, camera models, and image processing techniques such as filtering, edge detection, and feature extractio

A3. Gain knowledge of how machine learning and deep learning techniques are applied to computer vision problems.

A4. Develop an understanding of the diverse applications of computer vision, such as in autonomous driving, medical imaging, and augmented reality.

### B. Subject-specific skills

B1. Learn to code basic image processing tasks like filtering, edge detection, and object recognition using tools like OpenCV and Python.

B2. Gain skills in creating and training AI models (like neural networks) for tasks such as recognizing objects in images.

B3. Practice analyzing images and videos to find and track objects, recognize patterns, and understand actions.

### Teaching and Learning Methods

- Assignments of various chapters should be performed individually by students.
- Quizzes and exams.
- Seminar presentations based on state-of-the-art knowledge.

### Assessment methods

Midterm Examination	20 %
Course Work and Assignments	10 %
Final Examination	70 %

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Total	100 %
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### C. Thinking Skills

C1. Analytical problem solving.

C2. Creative innovation.

C3. Data interpretation and insight generation.

C4.

### Teaching and Learning Methods

- 1- Collaborative learning and group discussion.
- 2- Problem based learning
- 3- Seminars
- 4- Peer review and feedback

#### Assessment methods

- Doing the required tasks within the specified deadlines.
- Following the course discipline and academic integrity.
- Evaluating the student response in various exams and seminars.

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

- D1. Effective communication
- D2. Teamwork and collaboration
- D3. Project management
- D4.

### 11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1 <sup>st</sup>	3	Familiarity with basic contents	<b>Introduction to Computer Vision</b>	Theoretical	Assignment and discussion
2 <sup>nd</sup>	3	Understanding the main methods for features detection and matching	<b>Feature Detection and Matching Techniques</b>	Theoretical	Quiz
3 <sup>rd</sup>	3	Familiarity with 3D and cameras	<b>Three Dimension (3D) Computer Vision</b>	Theoretical	Group work
4 <sup>th</sup>	3	Understanding the Machine learning for computer vision	<b>Machine Learning For Computer Vision</b>	Theoretical	Assignment and discussion
5 <sup>th</sup>	3	Dealing with deep learning for computer vision	<b>Deep Learning For Computer Vision</b>	Theoretical	Assignment and discussion
6 <sup>th</sup>	3	Understanding the main issues for object detection based on deep learning	<b>Object Detection Based Deep Learning 1</b>	Theoretical	Assignment and discussion
7 <sup>th</sup>	3	Understanding the advanced	<b>Object Detection Based Deep Learning 2</b>	Theoretical	Group work

		issues for object detection based on deep learning			
8 <sup>th</sup>	3	Understanding the main concepts of fixed shape matching	<b>High-level feature extraction: fixed shape matching</b>	Theoretical	Quiz
9 <sup>th</sup>	3	Dealing with segmentation using deformable models	<b>High level feature extraction: Deformable shape analysis</b>	Theoretical	Group work
10 <sup>th</sup>	3	Dealing with objects description	<b>Object Description 1</b>	Theoretical	Assignment and discussion
11 <sup>th</sup>	3	Using more advanced methods for objects description	<b>Object Description 2</b>	Theoretical	Quiz
12 <sup>th</sup>	3	Dealing with region segmentation	<b>Region-based analysis</b>	Theoretical	Seminar Presentation
13 <sup>th</sup>	3	Understanding the feature detectors for images	<b>Image Feature Detectors</b>	Theoretical	Assignment and discussion
14 <sup>th</sup>	3	Dealing with moving objects detection and description	<b>Moving object detection and description</b>	Theoretical	Seminar Presentation
15 <sup>th</sup>	3	Understanding the main concepts of tracking moving features	<b>Tracking moving features</b>	Theoretical	Group work



12. Infrastructure	
Required reading: <ul style="list-style-type: none"> <li>· CORE TEXTS</li> <li>· COURSE MATERIALS</li> <li>· OTHER</li> </ul>	<ul style="list-style-type: none"> <li>· Feature Extraction and Image Processing for Computer Vision, Fourth Edition, 2019 Mark S. Nixon and Alberto S. Aguado Foundry</li> <li>· COMPUTER VISION A MODERN APPROACH, second edition, 2012, David A. Forsyth and Jean Ponce</li> </ul>
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	Image Processing
Minimum number of students	2
Maximum number of students	16

# 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	College of Computer science and information technology
2. University Department/Centre	Computer science
3. Course title/code	Advanced Cryptography and Code Design
4. Programme(s) to which it contributes	M.S.c
5. Modes of Attendance offered	Present
6. Semester/Year	Semester 2 <sup>nd</sup> 2023-2024
7. Number of hours tuition (total)	45
8. Date of production/revision of this specification	3-2-2024
9. Aims of the Course	<p>This course covers the fundamental concepts in information security on the basis of methods of modern cryptography and algorithms like (Symmetric–Block cipher and Asymmetric ciphers–Public Keys), signatures, Authentications and hash functions- MAC, Network Layer Security, Electronic Mail Security: PGP, S/MIME, SET for E-commerce Transactions and Internet Firewalls for Trusted Systems</p> <p>The objective of this curriculum course is to explore foundational knowledge in the area of cryptography and information security. The overall aim is to gain an understanding of fundamental cryptographic concepts, protocols and algorithms like encryption, code-design, signatures and cryptographic privileges and use of them to build and analyses Information security, communications and networks.</p>

## 10. Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Knowledge and Understanding A1. On completion of this subject the student is expected to:

- Identify security issues and objectives in cryptography and networks.
- Apply various security mechanisms derived from cryptography to networks security.
- Explain the workings of fundamental public key and symmetric key cryptographic. algorithms including RSA, El-Gamal, Diffie-Hellman, Knapsack schemes and Elliptic-Curve in addition to the stream ciphers.
- Explain the protocols which ensure security in contemporary networked systems and E-mail security.
- Describe the interaction between the underlying theory and working computer security infrastructure in addition to the Firewalls and countermeasure of attacks and viruses.
- Figure out The basis of Number Theory and abstract algebra.

B. Subject-specific skills

- B1.
- B2.
- B3.

Teaching and Learning Methods

(ex. Lectures, homework, Seminar, Proposal Methods).

Assessment methods

(ex. Quizzes, Monthly-Exam, Report, Assignment)

Midterm Examination	20 %
Course Work and Assignments	10 %
Final Examination	70 %

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Total	100 %
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C. Thinking Skills

- C1.
- C2.
- C3.
- C4.

Teaching and Learning Methods

(ex. Lectures, homework, Seminar, Proposal Methods).

Assessment methods	
(ex. Quizzes, Monthly-Exam, Report, Assignment)	
Midterm Examination	20 %
Course Work and Assignments	10 %
Final Examination	70 %
<hr/>	
Total	100 %
D. General and Transferable Skills (other skills relevant to employability and personal development)	
D1.	
D2.	
D3.	
D4.	

Week	Hours	ILOs	Unit/Module or Topic Title	Assessment Method
1	3		Introduction to the Modern Advance Cryptography	Dr. Omar
2	3		Number Theory and Polynomial Methods	Dr. Omar
3	3		Symmetric Block Ciphers Principles	Dr. Omar
4	3		AES, DES, Triple-DES, IDEA Algorithms	Dr. Omar
5	3		RC4, RC5, RC6, Blowfish Algorithms	Dr. Omar
6	3		MARS, Serpent, Twofish Algorithms	Dr. Omar
7	3		Block Cipher Modes, CBC, CFB, OFB, ECB	Dr. Omar
8	3		Asymmetric ciphers and Mathematical Problems	Dr. Baraa
9	3		Diffie-Hellman, RSA, Knapsack Algorithms	Dr. Baraa
10	3		Elliptic Curve Mathematical Operations & Encryption/Decryption	Dr. Baraa
11	3		Hash Function, Message Digest and Message Authentication Code-MAC	Dr. Baraa
12	3		Network Layer Security	Dr. Baraa
13	3		Electronic Mail Security: PGP, S/MIME	Dr. Baraa
14	3		Internet Firewalls for Trusted Systems	Dr. Baraa
15	3		Reviewing All the Above Lectures	Dr. Omar

12. Infrastructure	
Required reading: <ul style="list-style-type: none"> <li>· CORE TEXTS</li> <li>· COURSE MATERIALS</li> <li>· OTHER</li> </ul>	1) (ex. Stallings, William. "Cryptography and Network Security: Principles and Practice, ISBN: 0133354695, ISBN: 9780133354690.", © Pearson Education Limited 2017).

	2) Rhee, Man Young. Internet security: cryptographic principles, algorithms and protocols. ISBN 0-470-85285-2 John Wiley & Sons, 2003.
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	5
Maximum number of students	20

# 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 Anbar- College of Computer Science and Information Technology
2. University Department/Centre	Department of Computer Science
3. Course title/code	Research Methodologies
4. Programme(s) to which it contributes	Master in Computer Science
5. Modes of Attendance offered	Personal Attendance
6. Semester/Year	Second/2024
7. Number of hours tuition (total)	30
8. Date of production/revision of this specification	1-2-2024
<ul style="list-style-type: none"><li>- Understand the meaning, objectives, motivation, importance, and approaches of research</li><li>- Learn about different types of research (basic, applied, quantitative, qualitative, etc.)</li><li>- Understand the research process (topic selection, literature review, data collection, analysis, etc.)</li><li>- Learn about ethics, professionalism, and social responsibility in research</li><li>- Understand the structure and components of a research report/thesis</li><li>- Learn how to write and publish a research paper</li><li>- Learn how to write and publish a systematic review paper</li><li>- Learn how to write and select and communicate the journals</li></ul>	

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

### A. Knowledge and Understanding

- A1. Define research and explain its objectives, motivation, and importance.
- A2. Describe different types of research approaches and methods.
- A3. Understand the steps involved in the research process.

### B Subject-specific skills

- B1. Ability to select an appropriate research topic and formulate a research problem.
- B2. Conduct an effective literature review and reference collection.
- B3. Develop hypotheses and determine suitable research designs.

### Teaching and Learning Methods

Class Lectures.

### Assessment methods

Exams and Assignments.

### C. Thinking Skills

- C1. Critically analyze research articles and literature.
- C2. Evaluate and interpret research data and findings.
- C3. Synthesize information from multiple sources.

### Teaching and Learning Methods

Class Lectures.

### Assessment methods

Exams and Assignments.

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

- D1. Effective written and oral communication skills.
- D2. Time management and project execution skills.
- D3. Data management and organizational skills.
- D4. Ethical and professional conduct in research.

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Understanding the meaning of research	What is Research (Meaning of Research) <ul style="list-style-type: none"> <li>- Objectives of Research</li> <li>- Motivation of Research</li> </ul>	Lecture	Assignment
2	2	Understanding the meaning of research	What is Research (Meaning of Research) <ul style="list-style-type: none"> <li>- Thesis Research</li> <li>- Importance of Research</li> <li>- Approaches of Research</li> </ul>	Lecture	Assignment
3	2	Understanding the types of research	Types of Research <ul style="list-style-type: none"> <li>- Basic Research</li> <li>- Applied Research</li> </ul>	Lecture	Assignment
4	2	Understanding the types of research	Types of Research <ul style="list-style-type: none"> <li>- Normal and Revolutionary Researches</li> <li>- Quantitative and</li> </ul>	Lecture	Assignment



			<p>Qualitative Methods</p> <ul style="list-style-type: none"> <li>- Other Types of Research</li> </ul>		
5	2	Understanding the research process life cycle	<p>Research Process Selection of a Research Topic and Problem</p> <ul style="list-style-type: none"> <li>- Can a Researcher Choose a Topic by Himself?</li> <li>- Identification of a Research Topic and Problems</li> <li>- Definition and Formulation of a Problem</li> <li>- What Makes a Good Proposal?</li> <li>- Reasons Why Research Proposals Fail</li> </ul>	Lecture	Assignment
6	2	Understanding the research process life cycle	<p>Research Process</p> <ul style="list-style-type: none"> <li>- Effective Time Management</li> <li>- Literature Survey and Reference Collection</li> <li>- Development of Working Hypothesis</li> </ul>	Lecture	Assignment
7	2	Understanding the research process life cycle	<p>Research Process</p> <ul style="list-style-type: none"> <li>- Determining Sample Design</li> <li>- Collecting the Data</li> </ul>	Lecture	Assignment

			<ul style="list-style-type: none"> <li>- Data Management and Backups</li> <li>- Executing the Project</li> </ul>		
8	2	Understanding the research process life cycle	<p>Research Process</p> <ul style="list-style-type: none"> <li>- Data Analysis'</li> <li>- Hypothesis Test</li> <li>- Results and Conclusions</li> </ul>	Lecture	Assignment
9	2	-	Exam	-	-
10	2	Understanding the research ethics	<p>Ethics and Professionalism in Science</p> <ul style="list-style-type: none"> <li>- What are 'Scientific Ethics'?</li> <li>- Fraud (Plagiarism)</li> <li>- Authorship</li> </ul>	Lecture	Assignment
11	2	Understanding the research ethics	<p>Ethics and Professionalism in Science</p> <ul style="list-style-type: none"> <li>- Intellectual Property and Fair Use</li> <li>- Professionalism</li> <li>- The Social Responsibility of the Scientist</li> </ul>	Lecture	Assignment
12	2	Understanding the layout of PhD thesis	<p>Layout of Master Thesis</p> <ul style="list-style-type: none"> <li>- Preliminary Pages</li> <li>- Main Text</li> <li>- Introduction.</li> <li>- Actual Research Work Performed and the Findings.</li> </ul>	Lecture	Assignment
13	2	Understanding the	Layout of master Thesis	Lecture	Assignment

		layout of PhD thesis	- Summary and Conclusion - End Matters - Appendices - Citation References/Bibliography		
14	2	Understanding how to write a research paper	Writing a Research Paper - What is Research Paper or Article? - Why Should a Researcher Report his Findings?	Lecture	Assignment
15	2	Understanding how to write a research paper	Writing a Research Paper - Research Paper Structure. - Finding a Proper Place to Publish the Research Work.	Lecture	Assignment

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	<ul style="list-style-type: none"> <li>· Nayak, J.K. and Singh, P., 2021. Fundamentals of research methodology problems and prospects. SSDN Publishers &amp; Distributors.</li> <li>· <i>Research Methodology: An Introduction, Lecture Notes.</i></li> <li>· <i>Mukherjee, S.P., 2019. A guide to research methodology: An overview of research problems, tasks and methods. CRC Press.</i></li> </ul>
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	None
Minimum number of students	3
Maximum number of students	25