

Academic Program Description Form

University Name: Diyala

Faculty/Institute: College of Engineering

Scientific Department: Communications Engineering

Academic or Professional Program Name: Bachelor

Final Certificate Name: bachelor of Science in Communications Engineering

Academic System: Course

Description Preparation Date: 6-7-2025

File Completion Date: 6-7-2025

Signature:

Head of Department Name:

Assit. Prof. Dr. Mohammed S. Saleh

Date: 6-7-2025

Signature:

Scientific Associate Name:

prof. Dr. Jabbar Kasim Jabbar

Date: 6-7-2025

The file is checked by: *Assist Prof Dr. Salah W. Farhan*

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance

Department:

Date: 6-7-2025

Signature:

Approval of the Dean

prof. Dr. Anees A. Khadom

1. Program Vision

The department going to develop the curriculum in line with modern scientific developments in the field of communications engineering in addition to completing all the special requirements of scientific laboratories in the department. We seek to improve the staffed of teaching by dispatching members of Department of postgraduate in both inside and outside the country, and configure the appropriate conditions for scientific research in order to get Degrees required to be a Department able to compete in its own right and marked with the corresponding sections only local of which or the Arab and international Our ambitions We aspire to open graduate studies for a master's certificate in the disciplines of engineering various communication to be Department of scientific expertise to attract local and international center of which to open the horizons of cooperation through conferences, consulting, training, scientific research and development through broad and orderly opening to the community.

2. Program Mission

Expanding educational base and their applications in modern field of telematics and communications across both the international network and devices and cellular all advanced communication systems form that meets the need of institutions, both belonging to the state or the private sector through education, training and rehabilitation input from Human Resources (students) and make them able to deal with modern techniques and working in different institutions efficiently and effectively serve our dear country march.

3. Program Objectives

Teach students studying in the department on techniques required in all areas of modern communication systems and their applications in scientific and field state departments. Qualify graduates capable of working in government departments and the private sector engineering staff specialist efficiently and effectively. Contribute to provide an advanced level of related activities and the realization of the institutions experience and lead to the fulfillment of their need of human resources in order to achieve their success and the evolution and continuation.

4. Program Accreditation

None

5. Other external influences

None

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution requirements	5	6	4.24%	
College requirements	9	20	14.20%	
Department requirements	46	115	81.56%	
Summer Training				Graduation Requirements
Others				

7. Program Description

Course Name	Course Code	Level/Year	Credit Hours	
			Practical	Theory
Democracy & human Rights	U 101	Second - First	-	2
Workshop skills	COE 107	Second - First	3	-
Computer skills	U 103	First - First	3	1
English Language	U 104	First - First	-	2
Engineering Drawing	COE 106	First - First	3	-
Mathematics -I	E 101	First - First	-	4
Mathematics -II	E 102	Second - First	-	4
Electronic Physics	COE 104	Second - First	-	4
C++ Programming	COE 105	Second - First	3	1
Digital Techniques	COE103	First - First	2	4
Electrical Engineering Fundamentals I	COE 101	First - First	2	6
Electrical Engineering Fundamentals II	COE102	Second - First	2	6
Arabic Language	U 108	Second - First	-	2
Signals and systems	COE 201	First - Second	2	3
Applied mathematics I	COE 202	First -Second	-	3
Electrical circuits	COE 203	First - Second	2	4
Electronic I	COE 204	First - Second	2	3
MatLab Programming	COE 205	First - Second	2	2

Electromagnetic fields I	COE 206	First - Second	-	3
Analog communication	COE 207	Second- Second	2	3
Applied Mathematics II	COE 208	Second- Second	-	3
Electronic II	COE 209	Second- Second	2	3
Probability and random processing	COE 210	Second -Second	-	5
Electromagnetic fields II	COE 211	Second -Second	-	3
Computer 2	UD23	Second -Second	2	1
English Language 2	UD21	Second -Second	-	2
Arabic Language 2	UD22	Second -Second	-	2
Ba'ath Regime Crimes in Iraq	UD24	First -Second	-	2
Engineering Economy	E301	First - Third	-	2
Engineering Analysis	COE301	First - Third	-	2
Digital Communication I	COE302	First - Third	2	3
Antenna Theory and Design	COE303	First - Third	2	3
Digital Signal Processing	COE304	First - Third	2	3
Microcontroller and DSP Systems	COE305	First - Third	2	2
Communication Electronics -I	COE306	First - Third	2	3
Optical Communication Systems	COE307	First - Third	-	2
Detection and Estimation Theory	COE308	Second -Third	-	3
Digital Communication II	COE309	Second -Third	2	3
Image Processing	COE310	Second -Third	2	2
Information Theory	COE311	Second -Third	-	3
Radar Systems	COE312	Second -Third	2	2
Computer Networks	COE313	Second -Third	2	2
Waves Propagation	COE314	Second -Third	-	2
Communication Electronics -II	COE315	Second -Third	2	2
Engineering Profession Ethics	E401	First - Fourth	-	1
Graduation Project	E402	Fourth	8	-
Microwave Engineering-I	COE401	First - Fourth	2	3
Modern Communication Systems	COE402	First - Fourth	-	3
Cellular Mobile Networks	COE403	First - Fourth	-	2
Cryptography for Communication Systems	COE404	First - Fourth	-	2
Satellite Communication Systems	COE405	First - Fourth	-	2
Microwave Engineering-II	COE406	Second - Fourth	2	3
Global Positioning Systems	COE407	Second - Fourth	-	2
Multimedia Communication	COE408	Second - Fourth	-	2
Telecom Switching Systems	COE409	Second - Fourth	-	2
Television and Broadcasting Systems	COE410	Second - Fourth	-	2

8. Expected learning outcomes of the program

Knowledge

A. Cognitive goals

- A1. - Understanding and teaching the student the principles of how signal work and how to deal with communication algorithms.
- A2- Enabling students to obtain knowledge and understanding in working on and designing signal and system .
- A3- The student understands the methods of forming signal and system parts and their interconnection.
- A4- Enabling students to obtain knowledge and understanding of designing everything related to optical signal and system.
- A5- Enabling students to obtain knowledge and understanding of diagnosing faults and maintaining various signal and system devices.
- A6- The student understands the foundations of solving communication problems, cellular networks, and etc.

Skills

A. The skills goals special to the program.

- B1 - Explanation of communication principles topics by specialists in the subject, with an emphasis on the use of mathematics as a basis for understanding and learning.
- B2 - Providing them with skills to solve practical problems related to various communication systems and algorithms for addressing and solving technical problems in various fields of Communication engineering.
- B3 – Obtaining experience to explore and develop communication systems and its algorithms.

Ethics

A. Affective and value goals

- C1- Enabling students to think and analyze topics related to the engineering framework, such as various logical circuits.
- C2- Enabling students to think and analyze topics related to Communication systems related to the engineering framework.
- C3- Enabling students to think and analyze topics related to solving practical problems.

9. Teaching and Learning Strategies

- ☐ Providing students with the basics, additional topics, and field experiences related to the outcomes of thinking and analysis.
- ☐ Forming discussion circles during or outside lectures to discuss scientific engineering topics that require thinking and analysis.
- ☐ Asking students a set of thinking questions during lectures, such as (what, how,

when, why) for specific topics.

10. Evaluation methods

- ☐ Daily exams with practical and scientific questions.
- ☐ Participation marks for difficult competition questions among students.
- ☐ Assigning grades to homework assignments and reports assigned to them.
- ☐ Semester exams for the curriculum in addition to the final exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Electronic & communications	Communications			1	
Assist. Prof.	Communications	Communications techniques			1	
Assist. Prof.	Electronic & communications	Communications			3	
Assist. Prof.	Electric Eng.	Electronic & communications			3	
Assist. Prof.	Physics	Electro=optics			1	
Assist. Prof.	Physics	Nano technology			1	
Assist. Prof.	Communications	Communications			1	
Assist. Prof.	Info. & Comm. Eng.	Image processing			1	
Assist. Prof.	Elect. & Electronic Eng.	Communications				1
Assist. Prof.	Electro-optics and laser	Optoelectronics			1	
Lecturer	Elect. & Electronic Eng.	Electronics			1	1
Lecturer	Communications	Communications			1	1

Assist. Lecturer	Communications	Communications			3	
Assist. Lecturer	Elect. & Electronic Eng.	Electronics			1	
Assist. Lecturer	Electronic & communications	Communications			2	
Assist. Lecturer	Electric Eng.	Electronic & communications			1	

Professional Development

Mentoring new faculty members

Faculty members are instructed to hold regular meetings and review questionnaires received from students with the Scientific Committee.

Professional development of faculty members

The teaching staff undergoes development through training, workshops, and seminars. Progress is evaluated by subject performance.

12. Acceptance Criterion

According to the rules and regulations of Ministry of Higher Education and Scientific Research.

13. The most important sources of information about the program

- College website.
- The department's website and contact the department by email.

14. Program Development Plan

- The courses are updated annually to keep up with developments of the world.
- The laboratories are also updated under academic curricula.
- Additionally, postgraduate programs are now being offered.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Third /2 nd	COE308	Detection and Estimation Theory	Basic	√	√	√	√	√	√	√		√	√	√	

- Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

Course Description Form

1. Course Name: Detection and Estimation Theory	
2. Course Code: COE308	
3. Semester / Year: 2 nd / 3 rd	
4. Description Preparation Date:	
24-4-2024	
5. Available Attendance Forms: mandatory	
None	
6. Number of Credit Hours (Total) / Number of Units (Total): 30	
7. Course administrator's name (mention all, if more than one name)	
Lectur e :Name : wisam hayed mahdi Email: wisam _haide r@uo diyala. edu.iq 	
8. Course Objectives	
Course Objectives	The curriculum of the Detection and Guessing Theory course aims to study the detection of signals without having any prior information using statistical signal processing through several algorithms to detect several types of signals. In addition to calculating the error rate during detection. Then applying the algorithms to signals of different generations of mobile communications.
9. Teaching and Learning Strategies	

Strategy		☐ The Lecture gives detailed theoretical lectures. ☐ The Lecture requests periodic reports on the basic topics of the subject.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2	The student learns an introduction to statistical signal processing and the definition of noise	Introduction to classical signal detection theory and statistical signal processing, Law of large numbers and central limit theorem.	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Second	2	The student learns an introduction to statistical signal processing and the definition of noise	Introduction to classical signal detection theory and statistical signal processing, Law of large numbers and central limit theorem.	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Third	2	The student learns different detection theories	Jointly Gaussian random vectors and their properties. Hypothesis testing and detection: Maximum likelihood (ML), maximum a posterior probability (MAP), and Bayes criteria;	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Fourth	2	The student learns different detection theories	Jointly Gaussian random vectors and their properties. Hypothesis testing and detection: Maximum likelihood (ML), maximum a posterior probability (MAP), and Bayes criteria;	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Fifth	2	The student learns different detection theories	Jointly Gaussian random vectors and their properties. Hypothesis testing and detection: Maximum likelihood (ML), maximum a posterior probability (MAP), and Bayes criteria;	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams

Sixth	2	The student learns different estimation theories	Likelihood ratios, Neyman-Pearson test. Estimation: Minimum mean-square (MMSE) and linear least square estimation, orthogonality principle;	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Seventh	2	The student learns different estimation theories	Likelihood ratios, Neyman-Pearson test. Estimation: Minimum mean-square (MMSE) and linear least square estimation, orthogonality principle;	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Eighth	2	The student learns different estimation theories	Likelihood ratios, Neyman-Pearson test. Estimation: Minimum mean-square (MMSE) and linear least square estimation, orthogonality principle;	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Ninth	2	The student learns different estimation theories	Likelihood ratios, Neyman-Pearson test. Estimation: Minimum mean-square (MMSE) and linear least square estimation, orthogonality principle;	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Tenth	2	The student learns error reduction methods for the previous theories	Recursive estimation, Kalman filtering; Parameter estimation, Cramer-Rao bound; Sparsity and compressed sensing.	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Eleventh	2	The student learns error reduction methods for the previous theories	Recursive estimation, Kalman filtering; Parameter estimation, Cramer-Rao bound; Sparsity and compressed sensing.	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Twelfth	2	The student learns error reduction methods for the previous theories	Recursive estimation, Kalman filtering; Parameter estimation, Cramer-Rao bound; Sparsity and compressed sensing.	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams

Thirteenth	2	The student learns error reduction methods for the previous theories	Recursive estimation, Kalman filtering; Parameter estimation, Cramer-Rao bound; Sparsity and compressed sensing.	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams
Fourteenth	2	The student learns error reduction methods for the previous theories	Recursive estimation, Kalman filtering; Parameter estimation, Cramer-Rao bound; Sparsity and compressed sensing.	Lectures, PDF, power point and Video	Daily exams + practical experiments + monthly exams

11. Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports.....etc					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)					
Main references (sources)					
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					