Course Description Form

1. Course Name:
Operation Research
2. Course Code:
CE 4202
3. Semester / Year:
2 / 2023-2024
4. Description Preparation Date:
6/4/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
٤٥ hours / 30 units
7. Course administrator's name (mention all, if more than one name)
Name: Israa Hadi Hasan Email: israa.h.hasan@uotechnology.edu.iq
8. Course Objectives

Course Objectives	The main objective of studying Operations Research is to introduce the student to the methodology of Operations Research and its methods and uses in the administrative and military fields in general and to build the student's administrative capacity to address problems in the work environment and to take optimal solution decisions about them in particular. Where the problem is transformed into a mathematical model within linear or linear models. Transportation models and other analytical techniques used in solving problems that help him make the appropriate decision within different environments.
9. Teaching and Learning Strategies	
Strategy	1. Lectures 2. Exercises 3. Homework 4. Reports

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	History of operations research, Applications, Modeling the linear programming	Introduction to operation research	Lectures, Tutorials	Quiz + Exam + HW
2	3	formulate a problem and transform it into a mathematical model	Introduction to operation research	Lectures, Tutorials	Quiz + Exam + HW
3	3	-Linear programming Graphical method - various examples of linear programming problems	Solving the linear programming,	Lectures, Tutorials	Quiz + Exam + HW

4	3	Algorithm of the simplex method	Simplex method	Lectures, Tutorials	Quiz + Exam + HW
5	3	Two-phase method. examples	algorithms for linear programming	Lectures, Tutorials	Quiz + Exam + HW
6	3	Dual simplex method	Duality	Lectures, Tutorials	Quiz + Exam + HW
7	3	Dual problem. examples	Dual theory	Lectures, Tutorials	Quiz + Exam + HW
8	3	Sensitivity analysis or post-optimization	Sensitivity analysis	Lectures, Tutorials	Quiz + Exam + HW
9	3	The effect of optimality	Sensitivity analysis	Lectures, Tutorials	Quiz + Exam + HW
10	3	Integer programming problem	Integer programming problem	Lectures, Tutorials	Quiz + Exam + HW
11	3	Fractional programming	Nonlinear programming	Lectures, Tutorials	Quiz + Exam + HW
12	3	Transportation problems, the general form of the problem, basic definitions	Transportation Model	Lectures, Tutorials	Quiz + Exam + HW
13	3	Methods for solving transportation problems North-West corner method	Methods for solving Transportation Problems	Lectures, Tutorials	Quiz + Exam + HW
14	3	Least-cost method with examples	Least-cost method	Lectures, Tutorials	Quiz + Exam + HW
15	3	Optimal solution of Transportation problem	Optimal solution of Transportation problem	Lectures, Tutorials	Quiz + Exam + HW

11.Course Evaluation

Term Exam	Quizzes + HW	Final Exam
As(30%)	As(10%)	As(60%)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Operations Research: Applications and Algorithms, Fourth Edition, by Wayne L. Winston
Main references (sources)	Operations Research Second addition Principles and Applications, G.Srinivasan 2010
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	N/A

Course Description Form

1. Course Name:
Optical Networks II

2. Course Code:
CEO 4207
3. Semester / Year:
1 / 4th
4. Description Preparation Date:
27/9/2023
5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours / 30 units
7. Course administrator's name (mention all, if more than one name)
Name: Qussay Salim Tawfeeq Email: qussay.tawfeeq@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Study the importance of Wavelength Division Multiplexing WDM in optical communication systems. • How to design WDM optical networks. •What are the key functions and properties of optical networks architectures
9. Teaching and Learning Strategies	
Strategy	Lecture notes, homework, selective topics presentation

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The reasons of using WDM in optical Networks	WDM concept	Lecture	Quiz + Exam + HW
2	2	Properties of WD and channel spacing concepts	Types of WD and Channel spacing	Lecture	Quiz + Exam + HW
3	2	Typical systems of Dense Wavelength Division multiplexing DWDM	DWDM architecture	Lecture	Quiz + Exam + HW
4	2	Typical systems of Dense Wavelength Division multiplexing DWDM	Active and passive components in WDM and DWDM	Lecture	Quiz + Exam + HW
5	2	Understand the operation principles of wavelength add/drop	aim of wavelength add/drop in optical networks	Lecture	Quiz + Exam + HW
6	2	WDM Network Elements	The architecture of optical network based on WDM	Lecture	Quiz + Exam + HW
7	2	WDM Network Elements	Optical Line Terminals (OLT) Optical Add Add-Drop Multiplexers (OADM) Optical Crossconnects (OXC) Optical Line Amplifiers (OLA)	Lecture	Quiz + Exam + HW
8	2	Understand WDM Network Elements	OADM and OXC Architectures	Lecture	Quiz + Exam + HW

9	2	WDM Network Design	Key Terminology in WDM Optical Networks,	Lecture	Quiz + Exam + HW
10	2	WDM Network Design	Problem of light-path Topology Design (LTD)	Lecture	Quiz + Exam + HW
11	2	WDM Network Design	Routing and wavelength assignment RWA problems.	Lecture	Quiz + Exam + HW
12	2	Understand Network Survivability and Robustness	Protection Techniques Classification	Lecture	Quiz + Exam + HW
13	2	Understand Network Survivability and Robustness	Optical Switches	Lecture	Quiz + Exam + HW
14	2	Understanding Optical Access Networks	Architectures of Access Networks,	Lecture	Quiz + Exam + HW
15	2	Understanding Optical Access Networks	Fiber Access Networks	Lecture	Quiz + Exam + HW

11.Course Evaluation

Term Exam	Quizzes + HW	Final Exam
As(30%)	As(10%)	As(60%)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Black, Uyless / "Optical Networks Third Generation Transport Systems"/ Pearson Educations.
Main references (sources)	Ramaswami, Rajiv & Sivarajan, Kumar N. / "Optical Networks a Practical perspective"/ Morgan Kaufmann Publishers / 2nd Ed.
Recommended books and references (scientific journals, reports...)	P.S. Satyanarayana, "Concepts of Information Theory and Coding", Dynaram Publication, 2005
Electronic References, Websites	N/A

Course Description Form

13. Course Name: Digital Signal Processing II
14. Course Code: CE 4206

15. Semester / Year: Semester
16. Description Preparation Date: 18/3/2024
17.Available Attendance Forms: Attending
18.Number of Credit Hours (Total) / Number of Units (Total): 3 / 2
19. Course administrator's name (mention all, if more than one name)
Name: Shayma Wail Nourildean Email: shayma.w.nourildean@uotechnology.edu.iq

20. Course Objectives	
Course Objectives	• **To teach the student the Transform domain analysis of LTI systems.** • **To teach the student the Filter structure and realization.** • **To teach the student the FIR filter design.** • **To teach the student the IIR filter design.**

21. Teaching and Learning Strategies	
Strategy	• Lecture method: By clarifying and explaining subjects that are difficult for the student to understand such as proves the laws, • Discussion Allow the student to participate in the group dialogue. • Tutorial: By giving the students examples to clarify various problems. • Practical presentations by using the video to present the lesson, and this method contributes to make the student master the lesson quickly and the consolidation of information in the mind of the student.

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	3	The ability to understand Impulse response, frequency response and transfer function	Transform domain analysis of LTI systems	Lectures	Quiz+ Exam+ H.W.
2	3	The ability to understand LTI systems with rational transfer functions: difference equations, stability and causality, inverse systems	Transform domain analysis of LTI systems	Lectures	Quiz+ Exam+ H.W.
3	3	The ability to understand Frequency response versus pole-zero plot, Classification of LTI systems: real-valued transfer functions,	Transform domain analysis of LTI systems	Lectures	Quiz+ Exam+ H.W.
4	3	The ability to understand allpass systems, minimum phase systems, systems with generalized linear-phase, FIR/IIR systems	Transform domain analysis of LTI systems	Lectures	Quiz+ Exam+ H.W.
5	3	The ability to understand Direct-form, lattice, and cascade structures for FIR filters.	Filter structure and realization	Lectures	Quiz+ Exam+ H.W.
6	3	The ability to understand Direct-form, for IIR filters.	Filter structure and realization	Lectures	Quiz+ Exam+ H.W.
7	3	The ability to understand lattice, and cascade structures for IIR filters.	Filter structure and realization	Lectures	Quiz+ Exam+ H.W.
8	3	Developing skills in Filter structure and realization of FIR using Window design	FIR filter design	Lectures	Quiz+ Exam+ H.W.
9	3	Developing skills in Filter structure and	FIR filter design	Lectures	Quiz+ Exam+ H.W.

		realization of FIR filters using Frequency sampling design			
10	3	Developing skills in Filter structure and realization of FIR using Chebyshev approximation	FIR filter design	Lectures	Quiz+ Exam+ H.W.
11	3	Developing skills in Filter structure and realization of FIR using Chebyshev approximation	FIR filter design	Lectures	Quiz+ Exam+ H.W.
12	3	Studying Characteristics of commonly used analog filters: Butterworth, Chebyshev.	IIR filter design	Lectures	Quiz+ Exam+ H.W.
13	3	Studying Elliptic, Pole-zero inplacement	IIR filter design	Lectures	Quiz+ Exam+ H.W.
14	3	Studying Impulse invariant design.	IIR filter design	Lectures	Quiz+ Exam+ H.W.
15	3	Studying Bilinear design	IIR filter design	Lectures	Quiz+ Exam+ H.W.

23. 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

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- -Pall A. Lynn, Digital signal processing with Computer applications, 2nd edition, 1998. 2-Emmanuel C. Ifeachor, Digital Signal Processing, 1993.
Main references (sources)	Digital Signal Processing Fundamentals and Applications, Li Tan and Jean Jiang, second edition
Recommended books and references (scientific journals, reports…)	3- Advanced Engineering Mathematics, by O'Neil 4- Robert J. Schilling and Sandra L. Harris, Digital Signal Processing Using MATLAB, 3rd Edition, 2015.

	5-Joan C. Proakis and Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications.
Electronic References, Websites	Lecture Notes and videos.

Course Description Form

25.Course Name:
Mobile communication system
26.Course Code:
CEO4203
27.Semester / Year:
2 / 2023-2024
28.Description Preparation Date:
21/3/2024
29.Available Attendance Forms:
30.Number of Credit Hours (Total) / Number of Units (Total)
45 hours / 3 units
31.Course administrator's name (mention all, if more than one name)
Name: Asst. prof. Dr. wael A. H. Hadi Email:wael.a.hadi@uotechnology.edu.iq
32.Course Objectives

Course Objectives	• To provide the student with knowledge the history of mobile communications. • To provide the student with knowledge the types of systems of mobile communications. • Knowledge how to make communication and handover. • To have knowledge types of cells and how calculate the size of cell and base stations location and users distributions. • To have knowledge on GSM system.
33.Teaching and Learning Strategies	
Strategy	1. Lectures 2. Exercises 3. Homework 4. Reports

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
3	9	Overview of mobile communications and history of generations	**Introductions and History**	Lectures, Tutorials	Quiz + Exam + HW

3	9	Study the hand off management and drop calls	**Handoff management**	Lectures, Tutorials	Quiz + Exam + HW
3	9	Study the cell design and frequency reuse and call procedure	**Cell design and frequency management**	Lectures, Tutorials	Quiz + Exam + HW
3	9	study the GSM design	**GSM system**	Lectures, Tutorials	Quiz + Exam + HW
3	9	Study the GSM protocols	**GSM protocols**	Lectures, Tutorials	Quiz + Exam + HW

35.Course Evaluation

Term Exam	Quizzes + HW	Final Exam
As(30%)	As(10%)	As(60%)

36.Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	William C. Y. Lee " wireless and cellular telecomunications" 3rd edtion 2006
Recommended books and references (scientific journals, reports...)	Saad Z. Asif "5G mobile communications concept and technology " 2019.
Electronic References, Websites	N/A

Course Description Form

1. Course Name:
Spread-Spectrum
2. Course Code:
CE4205
3. Semester / Year:
1 / 2023-2024
4. Description Preparation Date:
19/3/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
٤٥ hours 45/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Mustafa Dheyaa Hassib Email: mustafa.d.hassib@uotechnology.edu.iq

8. Course Objectives

Course Objectives	• Study the basic principles of the error probability in communications systems. • Study the basic principles of the coding theory in communications systems. • Providing the student with knowledge in the theoretical and analytical aspect of how to design efficient communication system.

9. Teaching and Learning Strategies

Strategy	1. Lectures 2. Exercises 3. Homework 4. Reports

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Overview of Spread-Spectrum Overview	Introduction to Spread-Spectrum	Lectures, Tutorials	Quiz + Exam + HW
2	3	Pseudo-noise Sequences	Generate Pseudo-noise Sequences	Lectures, Tutorials	Quiz + Exam + HW
3	3	Direct-Sequence Spread-Spectrum Systems	Modeling of Direct-Sequence Systems	Lectures, Tutorials	Quiz + Exam + HW
4	3	Frequency Hopping Spread-Spectrum Systems	Modeling of Frequency Hopping Systems	Lectures, Tutorials	Quiz + Exam + HW
5	3	Time Hopping Spread-Spectrum Systems	Modeling of Time Hopping Systems	Lectures, Tutorials	Quiz + Exam + HW
6	3	Hybrid Spread-Spectrum Systems	Modeling of Hybrid Spread Spectrum Systems	Lectures, Tutorials	Quiz + Exam + HW
7	3	Process Gain and Jamming Margin	Jamming Margin	Lectures, Tutorials	Quiz + Exam + HW
8	3	Code Sequences of Spread-Spectrum Systems	Generate Maximal length Sequences	Lectures, Tutorials	Quiz + Exam + HW
9	3	Code Sequences of Spread-Spectrum Systems	Generate other code Sequences	Lectures, Tutorials	Quiz + Exam + HW
10	3	Synchronization	Modeling of Initial Synchronization	Lectures, Tutorials	Quiz + Exam + HW
11	3	Synchronization	Modeling of Tracking	Lectures, Tutorials	Quiz + Exam + HW
12	3	Overview of Jamming Considerations	Type of Jamming	Lectures, Tutorials	Quiz + Exam + HW
13	3	Multiple Access Techniques	Time and Frequency Division Multiple Access	Lectures, Tutorials	Quiz + Exam + HW
14	3	Multiple Access Techniques	Code Division Multiple Access	Lectures, Tutorials	Quiz + Exam + HW
15	3	Preparatory Week	Comprehensive exercises and discussion	Lectures, Tutorials	Quiz + Exam + HW

11.Course Evaluation

Term Exam	Quizzes + HW	Final Exam
As(30%)	As(10%)	As(60%)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Dixon, Robert C. Spread spectrum systems: with commercial

	applications. John Wiley & Sons, Inc., 1994.
Main references (sources)	Sklar, Bernard. Digital communications: fundamentals and applications. Pearson, 2021.
Electronic References, Websites	N/A