GAU, Faculty of Engineering

Course Unit Title	Introduction to Modelling and Optimization
Course Unit Code	ENG204
Type of Course Unit	Compulsory, All engineering students
Level of Course Unit	2nd Year, Core, Undergraduate(BSc)
National Credits	3
Number of ECTS Credits Allocated	5 ECTS
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	2
Semester when the course unit is delivered	4
Course Coordinator	Assoc. Prof. Dr. Zafer Ağdelen
Name of Lecturer (s)	Assoc. Prof. Dr. Zafer Ağdelen(Section 1) Assoc. Prof. Dr. Zafer Ağdelen(Section 2)
Name of Assistant (s)	Kayode David Olafemi
Mode of Delivery	Face to Face, E-learning activities
Language of Instruction	English
Prerequisities and co-requisities	-
Recommended Optional Programme Components	Taking Fundamentals of Industrial Engineering is recommended

Objectives of the Course:

To teach the students the general problem solving approach, the concept of quantitative decision making in the analysis and solution of management and engineering problems encountered in production systems.

When this course has been completed the student should be able to		Assesment.
1	➢ Explain clearly concepts for models, systems and optimization problems.	1
2	➢ Formulate and analze real-world problems in service and manufacturing systems.	1,2
3	➢ Use linear programming in allocating scarce resources to competing activities in order to find optimal solutions.	1,2,5
4	➢ Apply transportation and assignment techniques to help decision makers to find best solutions.	1,2
5	➢ Manipulate optimization techniques in analyzing the results derived from mathematical models	2,5
6	➢ Analyze and synthesis optimization methods and real systems to enhance the performance of real-world systems	1,2

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4.Presentation, 5 Lab. Work

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	5
2	Ability to design and conduct experiments as well as to analyze and interpret data	4
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	3
4	Ability to apply systems thinking in problem solving and system design	4
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	1
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	4
7	Ability to express their ideas and findings, in written and oral form	3
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	5
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	3

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5:Very High)

Course Contents

Week		Topics	Exams
1		Introduction to Modelling and Optimization, Quantitative Decision Making	
2		Overview of Modelling Approach, Steps in Modelling	
3		Introduction to Linear Programming, Model Formulation	
4		Graphical Solution Method	
5		The Simplex Solution Method	
6		Linear Programming: Modelling Examples	
7		Adapting to Other Model Forms	
8			Midterm
9		Sensitivity Analysis	
10		The Transportation Problem	
11		North-west Cornel Rule, Vogel's Approximation Method, Russell's Approximation Method, The Unbalanced Transportation Problem	
12		A Streamlined Simplex Method for the Transportation Problem	Quiz
13		The Assignment Problem	
14		Converting Assignment Problems into Transportation Problem and Solution Methods	
15			Final

Recommended Sources

Textbook: Hillier F. S., Lieberman G. J. 'Introduction to Operations Research ', 9e, McGraw-Hill, Inc., 2009
Supplementary Material(s):
Taylor. B. W., 'Introduction to Management Science', 10e, Prentice Hall, 2009.
Render B. Et. Al., 'Quantitative Analysis for Management', 11e, Prentice Hall, 2011.

Assessment

Attendance & E-learning	10%	
Assignment	10%	
Midterm Exam	25%	
Quiz	15%	
Final Exam	40%	
Total	100%	

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including the Exam week)	15	3	45
Labs and Tutorials	2	2	4
Assignments	6	3	18
Project/Presentation/Report Writing	-	-	-
E-learning Activities	5	1	5
Quizzes	1	6	6
Midterm Examination	1	12	12
Final Examination	1	12	12
Self Study	14	3	42
Total Workload			144
Total Workload/30 (h)			4.8
ECTS Credit of the Course			5