



A) COURSE

Course Id:	Course
5927	OPERATIONS RESEARCH I

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
3	0	3	6	48

B) GENERAL COURSE INFORMATION:

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:		IV	IV	VIII	VIII
Course Type (Required/Elective)		Required	Required	Required	Required
Prerequisite Course:		Probability and statistics for engineers	Algebra B	315	Algebra B, Principles of Administration
CACEI Classification:		CI	CI	CI	CI

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:

1. Introduction of the student to the administrative problems in the field of decision making, for which tools are based on mathematics and logic. 2. The student knows the reasoning and criteria for generating mathematical models. 3. The student learns and knows how to apply the basic models of operations research

D) TOPICS (CONTENTS AND METHODOLOGY)

1. (EXPOSURE TO STUDENTS ON COURSE STANDARDS)		4 Hours
Specific Objective:	The student will know the course methodology and evaluation forms .	
	0.1. Rationale, purpose and content. Methodology, evaluation and bibliography. 0.2. Application of three exams throughout the course.	
Readings and other resources	Books, Articles, Further literature, Internet Links.	
Teaching Methodologies	Exhibition themes, concept analysis, problem resolution and discussion, group work and individual.	
Learning Activities		

2.- (INTRODUCTION TO OPERATIONS RESEARCH)		3 Hours
Specific Objective:	The student will acquire knowledge of the development and creation of operations research through time , their characteristics and limitations; acquire and develop the concept of decision decisions and the importance of developing ingenuity in building models.	



1.1 Description historic and the nature of OR. 1.2 Approach to developing systems and models. 1.3 Development of Current Operations Research	
Readings and other resources	Books, Articles, Further literature, Internet Links.
Teaching Methodologies	Exhibition themes, concept analysis, problem resolution and discussion, group work and individual.
Learning Activities	

3. - (LINEAR PROGRAMMING)		15 Hours
Specific Objective:	Students will be able to generate and apply mathematical models and algorithms optimizing criteria resources.	
2.1 Brief reminder of basic concepts of linear algebra. 2.2 Interpretation of a linear programming problem and model formulation. 2.3 Graphical method. 2.4. Standard formulation. Slack variables. 2.5. Simplex Method: Maximization, criteria and computational algorithms. 2.6. Minimization: variables and artificial functions. 2.7. Introduction to duality. 2.8. Introduction to sensitivity analysis		
Readings and other resources	Books, Articles, Further literature, Internet Links.	
Teaching Methodologies	Exhibition themes, concept analysis, problem resolution and discussion, group work and individual.	
Learning Activities		

4.- (TRANSPORT PROBLEMS)		8 Hours
Specific Objective:	El alumno resolverá problemas de transporte, aplicará el modelo y algoritmos para su solución e interpretación.	
3.1 Description of the problem and model creation. Symbolic matrix. 3.2 Getting a basic solution. Degeneration. 3.3 Method optimization (minimization, balanced problem). Marginal costs.		
Readings and other resources	Books, Articles, Further literature, Internet Links.	
Teaching Methodologies	Exhibition themes, concept analysis, problem resolution and discussion, group work and individual.	
Learning Activities		

5. - (ALLOCATION PROBLEMS)		5 Hours
Specific Objective:	The student will recognize allocation problems required to apply the model and algorithm solutions	
4.1 Description of the model and model creation. 4.2 Method of solution (Hungarian). Minimization. 4.3 Duality (Maximization). Balancing. 4.4 Example: Problem of crews		
Readings and other resources	Books, Articles, Further literature, Internet Links.	
Teaching Methodologies	Exhibition themes, concept analysis, problem resolution and discussion, group work and individual.	
Learning Activities		

6. - (PROJECT MANAGEMENT)		6 Hours
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Specific Objective:	The student will identify the term " project control " and their use , application and interpretation of the relevant algorithms .
5.1 PERT, CPM and arrow diagram. 5.2 Critical path and floating times. 5.3 Scheduling (Gantt chart) and resource allocation. 5.4 Economic Analysis. 5.5. Probabilistic analysis.	
Readings and other resources	Books, Articles, Further literature, Internet Links.
Teaching Methodologies	Exhibition themes, concept analysis, problem resolution and discussion, group work and individual.
Learning Activities	

7. - SIMULATION		7 Hours
Specific Objective:	The student will apply the option of simulation as mathematical method to assist in solving problems in decision making.	
6.1 Need for Simulation and statistical registration. 6.2 Probability distributions. 6.3 Typical problems. 6.4 Simulating computer. Languages.		
Readings and other resources	Books, Articles, Further literature, Internet Links.	
Teaching Methodologies	Exhibition themes, concept analysis, problem resolution and discussion, group work and individual.	
Learning Activities		

E) TEACHING AND LEARNING METHODOLOGIES

Masterly exposition, questioning students (dialogue). Assigning troubleshooting class (individual and group). Homework. Using application software in solving problems that come in the new editions of the books in the bibliography. Research literature.

F) EVALUATION CRITERIA:

Evaluation:	Schedule	Suggested Form of Evaluation and weighing	Topics
1er. Evaluation Partial	Session 22	Exam 12.5%	0.1 – 2.8
2º Evaluation Partial	Session 13	Exam 12.5%	3.1 – 4.4
3er. Evaluation Partial	Session 13	Exam 12.5%	5.1 – 6.4
Final Evaluation	All Sessions	Exam 12.5%	0.1 – 6.4
Homework and / or projects		20 %	
Quizzes		30 %	
Evaluation Final Ordinary		100% Average partial evaluations	
Exam Extraordinary	Week 17 of the semester in	100% Exam	100% Program



	progress		
Exam of title	According to schedule school secretary	100% Exam	100% Program
Exam regularization	According to schedule school secretary	100% Exam	100% Program

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

GONZÁLEZ HERNANDEZ, FRANCISCO JAVIER, Breve introducción a la investigación de operaciones, Editorial Universitaria Potosina, México, 1998. }

IZAR LANDETA JUAN MANUEL, Investigación de Operaciones, Editorial Trillas, 2008

EPPEN, G. D., LARRY R. WEATERFORD, JEFFREY H. MOORE Investigación de operaciones en la ciencia administrativa, Prentice-Hall Hispanoamericana, S. A. México, 2000.

HILLIER F. & LIEBERMAN, G. J., Introducción a la investigación de operaciones., Mc Graw-Hill Book Co. México, 2003.

TAHA, HAMDY A., Operation research, An introduction, 9th. Edition, Prentice Hall, 2010.

COMPLEMENTARY BIBLIOGRAPHY

DAELLENBACH, H.G. ET AL, Introducción a técnicas de investigación de operaciones, compañía Editorial Continental, S.A. de C. V., México, 1987.

MOSKOWITZ, H. & WRIGHT, G.P. , Investigación de operaciones Prentice-Hall Hispanoamericana, S. A., México, 1982.

RENDER, BARRY & HEIZER, JAY., Principios de administración de operaciones, Prentice Hall Hispanoamericana, S. A., México, 1996.

SOFTWARE TO USE

Programas y/o paquetes que vienen disponibles con las nuevas ediciones de los libros (EPPRN, HILLIER Y TAHA).

TICS

http://www.archertoolbox.com/linear_programming_software.htm