



**T.C. ESKİŞEHİR OSMANGAZI UNIVERSITY
ENGINEERING AND ARCHITECTURE FACULTY
ELECTRICAL AND ELECTRONICS DEPARTMENT**

COURSE INFORMATION FORM

SEMESTER Spring

COURSE CODE	151228621	COURSE NAME	Optimization Methods For Engineering Applications
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SEMESTER	WEEKLY COURSE PERIOD			COURSE OF			
	Theory	Practice	Laboratory	Credit	ECTS	TYPE	LANGUAGE
8	3	0	0	3	5	COMPULSORY () ELECTIVE (X)	English

COURSE CATAGORY

Basic Science	Basic Engineering	Engineering Subjects [if it contains considerable design, mark with (√)]	Social Science
		X	

ASSESSMENT CRITERIA

	Evaluation Type	Quantity	%
MID-TERM	Mid-Term	1	20
	Quiz		
	Homework	4	20
	Project	1	30
	Report		
	Others (.....)		
FINAL EXAM		1	30

PREREQUIEITE(S)	None
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COURSE DESCRIPTION	Main contents of this course are; Formulation of optimization problems, Unconstrained optimization, Line Search Methods, Descent Methods, Newton's Method, Gradient Method, Derivative free methods, Constrained optimization, Lagrange Multipliers and Kuhn-Tucker conditions, Genetic Algorithm, Differential Evaluation Algorithm, Simulated Annealing Algorithm, Tabu Search Algorithm Particle Swarm Optimization Method, Ant Colony Optimization Methods, Harmony Search Method.
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COURSE OBJECTIVES	To teach the fundamental concepts of mathematical modelling and optimization. To introduce the optimization problems in electrical and electronics engineering.
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ADDITIVE OF COURSE TO APPLY PROFESSIONAL EDUATION	Providing our students with the fundamentals of mathematical modeling and optimization will be very useful in solving the problems they encounter in their business life.
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COURSE OUTCOMES	Students who pass the course will have fundamental knowledge about optimization concept and will be able to solve real time optimization problems by using proper algorithms.
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TEXTBOOK	Singiresu S. Rao, Engineering Optimization: Theory and Practice, 5/e, John Wiley & Sons, 2019. Omid Bozorg-Haddad, Mohammad Solgi, Hugo A. Loáiciga , Meta-heuristic and Evolutionary Algorithms for Engineering Optimization, John Wiley & Sons, 2017.
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OTHER REFERENCES	G. N. Vanderplaats, Numerical optimization techniques for engineering design, McGraw-Hill, 2005
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TOOLS AND EQUIPMENTS REQUIRED	
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COURSE SYLLABUS	
WEEK	TOPICS
1	Formulation of optimization problems.
2	Unconstrained optimization: necessary conditions and sufficient conditions.
3	Line Search Methods, Descent Methods,
4	Newton's Method, Gradient Method
5	Derivative free methods
6	Constrained optimization: necessary conditions and sufficient conditions.
7	Lagrange Multipliers and Kuhn-Tucker conditions.
8	Mid-Term Examination
9	Genetic Algorithm
10	Differential Evaluation Algorithm
11	Simulated Annealing Algorithm
12	Tabu Search Algorithm
13	Particle Swarm Optimization Method
14	Ant Colony Optimization Methods
15	Harmony Search Method
16,17	Final Exam

NO	PROGRAM OUTCOMES	3	2	1
1	Sufficient knowledge of engineering subjects related with mathematics, science and own branch; an ability to apply theoretical and practical knowledge on solving and modeling of engineering problems.	[x]	[]	[]
2	Ability to determine, define, formulate and solve complex engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods.	[x]	[]	[]
3	Ability to design a complex system, a component and/or an engineering process under real life constraints or conditions, defined by environmental, economical and political problems; for that purpose an ability to apply modern design methods.	[]	[]	[x]
4	Ability to develop, select and use modern methods and tools required for engineering applications; ability to effective use of information technologies.	[]	[x]	[]
5	In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results.	[]	[]	[x]
6	Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence.	[]	[]	[x]
7	Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language.	[]	[]	[x]
8	Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement.	[]	[]	[x]
9	Understanding of professional and ethical issues and taking responsibility	[]	[]	[x]
10	Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development.	[]	[]	[x]
11	Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions.	[]	[]	[x]
1:None. 2:Partially contribution. 3: Completely contribution.				

Prepared by: Asst. Prof. Dr. Burak URAZEL

Date:

Signature(s):