

**ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING AND SCIENCE
ADVANCED MATERIALS AND NANOTECHNOLOGY MSc. PROGRAM
COURSE DESCRIPTION**

Course Name	Code	Semester	T+P Hour	Credit	ECTS
Sol-Gel Processing of Ceramics	AMN 534	FALL - SPRING	2+2	3	10

Prerequisite Courses -

Type of the Course	Selective
Language of Instruction	English
Coordinator of the Course	Assist. Prof. İlker ERDEM
Lecturer(s) of the Course	Assist. Prof. İlker ERDEM
Assisting Personnel	-
Objective of the Course	Introduction of fundamentals and laboratory applications on preparation of ceramic materials via sol-gel method enabling production of ceramic materials in various forms controlling the elemental content of them
Learning Outcomes	<ol style="list-style-type: none"> 1. Learning types of sol-gel techniques and their utilization in different applications 2. Learning raw materials and techniques for their usage for sol-gel techniques 3. Learning properties of different structures which may be prepared via sol-gel techniques 4. Learning techniques used for characterization of technical properties during ceramic material preparation and of the final product 5. Learning utilization of ceramic materials prepared via sol-gel techniques for different purposes
Course Content	<ul style="list-style-type: none"> • Introduction of types of sol-gel technique and its application areas, • Introduction of precursors used in sol-gel techniques • Introduction of preparation techniques and chemical reactions for in sol-gel technique, • Introduction of characteristics of ceramics prepared via sol-gel techniques, • Introduction of characterization methods for mid- and final products during ceramic material preparation via sol-gel technique,

SUBJECTS, PRELIMINARY PREPARATIONS AND POST-LECTURE ACTIVITIES

Week	Subjects	Practice
1	Introduction: Sol-gel technique and its technologic importance	
2	Precursors and reactions for sol-gel technique: Different precursors and possible reactions during sol-gel method	
3	Precursors and reactions for sol-gel technique: Different precursors and possible reactions during sol-gel method	Sol preparation /drying /heat treatment
4	Different structures to be prepared via sol-gel technique: Shaping the sol, drying, heat treatment parameters and their effects	Sol preparation /drying /heat treatment
5	Different structures to be prepared via sol-gel technique: Shaping the sol, drying, heat treatment parameters and their effects	
6	Characterization for sol-gel: Characterization techniques for sol-gel	Particle size distribution analysis of the sol
7	Characterization for sol-gel: Characterization techniques for sol-gel	Porosity analysis
8	Applications of ceramics prepared via sol-gel: Sol-gel for different applications	

9	Applications of ceramics prepared via sol-gel: Sol-gel for different applications	
10	Midterm	
11	Term project topic determination	
12	Term project proposals	
13	Term project work	Laboratory
14	Term project work	Laboratory
15	Term project work	Laboratory

SOURCES/REFERENCES	
Course Notes	The notes and the slides of the course
Other References	<ul style="list-style-type: none"> C. J. Brinker, G. W. Scherer, "Sol-Gel Science: The Physics and Chemistry of Sol-Gel Processing", Academic Press Inc., 1990. A. C. Pierre, "Introduction to Sol-Gel Processing", Springer, 1998. K. Li, "Ceramic Membranes for Separation and Reaction", John Wiley & Sons Ltd., West Sussex, 2007. R.R. Bhave, "Inorganic Membranes Synthesis, Characteristics and Applications", Van Nostrand Reinhold, NY, 1991. W.D. Callister, "Material Science and Engineering: An Introduction", Seventh Edition, John Wiley & Sons, Inc., NY, 2007. W.D. Kingery, "Introduction to Ceramics", Second Edition, Wiley Interscience, NY, 1975. M. Anzo, P. V. Kamat (editors), "Environmentally Benign Photocatalysts: Applications of Titanium Oxide-based Materials", Springer, 2010.

MATERIAL SHARING	
Documents	The lecturing slides of the course are shared on canvas or another online application
Homeworks	The homeworks are shared on canvas or another online application.
Exams	
Projects	

EVALUATION METHODS		
IN-TERM ACTIVITIES	QUANTITY	WEIGHT, %
Midterm Exam	1	30
Homework	4	5
Term Project	1	25
Final Exam	1	40
TOTAL		100
Effect of in-term Activities on Success		60
Effect of Final Exam on Success		40
TOTAL		100

Course Category	
Basic Sciences and Mathematics	
Engineering Sciences	X
Social Sciences	

RELATIONSHIP BETWEEN LEARNING OUTCOMES OF THE COURSE WITH THE QUALIFICATIONS OF THE PROGRAM						
No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	PQ1. Ability of Working Independently and Taking Responsibility					X

2	PQ2. Learning Competence					X	
3	PQ3. Communication and Social Activity					X	
4	PQ4. Field-specific Competence						X

*from 1 to 5 the score increases.

ECTS / WORK LOAD TABLE			
Activities	Activities	Duration (Hour)	Total Work Load (Hour)
Lectures (including exam week: 16x total lecture hours)	15	3	45
Midterm Exam (Preparation)	1	35	35
Final Exam (Preparation)	1	45	45
Homeworks	4	10	40
Repetition of the Topics	14	5	70
Report Preparation for Term Project	1	40	40
Presentation Preparation for Term Project	1	20	20
Total Work Load			295
Total Work Load / 30			9.83
ECTS Credits			10