

**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** -

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

**SUBJECTS, PRELIMINARY PREPARATIONS AND POST-LECTURE ACTIVITIES**

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

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

#### SOURCES/REFERENCES

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

#### MATERIAL SHARING

<b>Documents</b>	The lecturing slides of the course are shared on canvas or another online application
<b>Homeworks</b>	The homeworks are shared on canvas or another online application.
<b>Exams</b>	
<b>Projects</b>	

#### EVALUATION METHODS

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

<b>ECTS / WORK LOAD TABLE</b>			
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
<b>Total Work Load</b>			295
<b>Total Work Load / 30</b>			9.83
<b>ECTS Credits</b>			10