YEDİTEPE UNIVERSITY

COURSE DESCRIPTION FORM

2021/2022

COURSE INFORMATON				
Course Code	**MSN 680**	**Course Title**	**ADVANCED CERAMICS**	
Semester	*Credits*	*ECTS*	*C +P + L Hour*	Prerequisites
Spring	3	10	3+0+0	-

Language of Instruction	**Course Level**	**Course Type**
English	PhD	Elective
Course Coordinator	Assoc. Prof. Dr. Ahmet TURAN	
Instructors	Assoc. Prof. Dr. Ahmet TURAN	
Assistants	-	
Goals	To give a deep understanding on properties, synthesis, manufacturing (sintering) and applications areas of advanced ceramics.	
Content	History of ceramics and ceramic engineering from natural ceramics to advanced ceramics; classification, properties and application areas of advanced ceramics; synthesis methods of advanced ceramics; sintering methods of advanced ceramics, furnace engineering and design; advanced-ceramic based thin film coatings; mechanical, thermal, optical and electrical properties of advanced ceramics; techno-economic properties and environmental effects of advanced ceramics.	
Contribution of the Course to the Professional Education	Course will provide students with a knowledge of synthesis, sintering and applications of advanced ceramics.	

Course Learning Outcomes	**Detailed Program Outcomes**	**Teaching Methods**	**Assessment Methods**
Synthesis methods of advanced ceramics.	1a, 1b, 6a, 6c, 7c, 7d	1, 2	A, E, G
Sintering methods of advanced ceramics.	1a, 1b, 6a, 6c, 7c, 7d	1, 2	A, E, G
Application fields of advanced ceramics	1b, 2a, 4a, 6a, 6c, 7c, 7d	1, 2	A, E, G

Teaching Methods:	1: Lecture by instructor, 2: Lecture by instructor with class discussion, 3: Problem solving by instructor, 4: Use of simulations, 5: Problem solving assignment, 6: Reading assignment, 7: Laboratory work, 8: Term research

	paper, 9: Presentation by guest speaker,10: Sample Project Review, 11: Interdisciplinary group working,12: ...
Assessment Methods:	A: Written exam, B: Multiple-choice exam C:Take-home quiz, D: Experiment report, E: Homework, F: Project, G: Presentation by student, H: ...

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Introduction to advanced ceramics	Textbook, Lecture notes
2	From natural ceramics to advanced ceramics, history of ceramics and ceramic engineering	Textbook, Lecture notes
3	Classification of advanced ceramics, their properties and application areas (1): Oxides	Textbook, Lecture notes
4	Classification of advanced ceramics, their properties and application areas (2): Non-oxides and oxynitrides	Textbook, Lecture notes
5	Synthesis methods of advanced ceramics (1): Synthesis at high temperature	Textbook, Lecture notes
6	Synthesis methods of advanced ceramics (2): Synthesis in liquid media and in gas phase	Textbook, Lecture notes
7	Principles of ceramic sintering, sintering technologies for advanced ceramics and, furnace engineering	Textbook, Lecture notes
8	Thin film coatings of advanced ceramics	Textbook, Lecture notes
9	Mechanical properties of advanced ceramics	Textbook, Lecture notes
10	Thermal properties of advanced ceramics	Textbook, Lecture notes
11	Optical and electrical properties of advanced ceramics	Textbook, Lecture notes
12	Techno-economic properties and environmental effects of advanced ceramics	Textbook, Lecture notes
13	Homework assignment and presentations	
14	Homework assignment and presentations	

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RECOMMENDED SOURCES	
Textbook	- Lecture notes, - P. Boch, J.-C. Niepce, Ceramic Materials: Processes, Properties and Applications, ISTE, 2007. - A. G. King, Ceramic Technology and Processing, Noyes, 2002. - M. W. Barsoum, Fundamentals of Ceramics, Institute of Physics Publishing, 2003.
Additional Resources	

MATERIAL SHARING	
Documents	Lecture notes and articles
Assignments	Homework, Presentations

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Homework and Presentations	2	60
Final	1	40
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Field Course

COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES		
No	Program Learning Outcomes	check √
1a	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline,	√
1b	Ability to use theoretical and applied knowledge in these areas in complex engineering problems.	√
2a	Ability to identify, formulate, and solve complex engineering problems,	√
2b	Ability to select and apply proper analysis and modeling methods for this purpose.	
3a	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result,	

3b	Ability to apply modern design methods for this purpose.	
4a	Ability to devise, select and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice.	√
4b	Ability to employ information technologies effectively.	
5a	Ability to design experiments for investigating complex engineering problems or discipline specific research questions,	
5b	Ability to conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions.	
6a	Ability to work efficiently in intra-disciplinary teams,	√
6b	Ability to work efficiently in multi-disciplinary teams,	
6c	Ability to work individually.	√
7a	Ability to communicate effectively in Turkish, both orally and in writing,	
7b	Knowledge of a minimum of one foreign language,	
7c	Ability to write effective reports and comprehend written reports, prepare design and production reports,	√
7d	Ability to make effective presentations,	√
7e	Ability to give and receive clear and intelligible instructions.	
8a	Recognition of the need for lifelong learning, ability to access information, ability to follow developments in science and technology,	
8b	Ability to continue to educate him/herself.	
9a	Consciousness to behave according to ethical principles and professional and ethical responsibility.	
9b	Knowledge on standards used in engineering practice.	
10a	Knowledge about business life practices such as project management, risk management, change management.	
10b	Awareness in entrepreneurship and innovation.	
10c	Knowledge about sustainable development.	
11a	Knowledge about the global and social effects of engineering practices on health, environment, and safety,	
11b	Knowledge about contemporary issues of the century reflected into the field of engineering.	
11c	Awareness of the legal consequences of engineering solutions.	

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ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	14	196
Homework and Presentation	2	5	10
Final	1	2	2
Total Work Load			250
Total Work Load / 25 (h)			10
ECTS Credit of the Course			10

Prepared by:	Preparation date:
Assoc. Prof. Dr. Ahmet TURAN	12.04.2022