1. Course Description

COURSE DESCRIPTION FORM	
Course Code and Title	KM343 Porous Materials
Course Semester	5
Catalog Description (Content) of the Course	Porous structures. Zeolites, clay minerals etc. natural materials and their properties. Porous material synthesis. Industrial applications. Determination of properties of natural and synthetic porous materials**.**
Main Textbook	Lu, G.Q., Zhao, X.S., (Ed.) "Nanoporous Materials. Science and Engineering", Chem.Eng.Ser. Vol.4., Imperial Collloge Press, Signapore, 2004.
Supporting Textbooks	• Yang, R.T., "Adsorbents. Fundamentals and Applications", Wiley, Newyork, 2003. • Beck, J.S., Lobo, R.F., Davis, M.E., Zones, S.I., Iton, L.E., Corbin, D.R., Suib, S.L., "Microporous and Macroporous Materials, 1996. • Karge, H.G., Weitkamp, J., (Ed.), "Molecular Sieves, Synthesis", Vol1., Springer-Verlag New York, 1998. • Occelli, M.L., Kessler, H., "Synthesis of Porous Materials: Zeolites, Clays and Nanostructures, Vol.69, Marcel Dekker, Newyork, 1996. • Smith, J.S, Lobo, R.F., Davis, M.E., Zones, S.I., Iton, L.E., Corbin D.R., Suib, S.L., "Microporous and Macroporous Materials, Material, 1996. • Lowel, S., Shields, J.E., Characterization of Porous Solids and Powders: Surface Area, Pore Size and Density, Kluwer, Newyork, 2004. • McEnaney, B., Rouquerol, J., "Characterization of Porous Solids IV", Royal Soc. of Chem., 1998.
Course Credit (ECTS)	3
Prerequisites of the Course (Compulsory attendance should be indicated here.)	This course has no prerequisites . Compulsory attendance is 70%.
Type of the Course	Elective
Instruction Language of the Course	English
Object and Target of the Course	The aim of the course is to give information about the definition and classification of porous structures, synthesis and modification methods necessary to control pore structure, usage areas of porous material, characterization methods and applications of advanced materials. It is targeted to acquire the ability to make appropriate material decisions in applications where porous materials are used.
Learning Outcomes of the Course	1. Learning to identify and classify porous materials, 2. To learn synthesis and modification methods necessary to control pore structure, 3. To learn porous material characterization methods, 4. To learn the usage areas of porous materials, 5. To learn about new developments on porous materials.
Mode of Delivery	The mode of delivery of this course is face to face
	1st Week: Identification and classification of porous materials 2nd Week. Transport mechanisms in porous materials 3rd Week: Adsorption / desorption mechanisms 4th Week: Porous materials characterization techniques: structural

features
5th Week: Porous materials characterization methods: the pore structure
6th Week: Porous material / catalyst synthesis and characterization methods measurement of acidity
7th Week: Porous material / catalyst synthesis and characterization methods measurement of acidity
8th Week: Carbon-containing materials: activated carbon
9th Week: Nanotubes, carbon nanotubes, (fiber, nanotube, nanotop)
10th Week: Silica-based materials
11th Week: Silica-based materials
12th Week: Silica-based materials
13th Week: Silica-based materials
14th Week: Other layer structures (metal oxide and hydroxyl structures), and other issues

Educative Activities
(Credit will be determined based on the time given for these activities. Should be filled carefully.)

Theoretical Study Hours of Course Per Week
Reading
Searching in Internet and Library
Mid-Term and Studying for Mid-Term
Final and Studying for Final

Assessment Criteria

	Quantity	**Total Contribution (%)**
Midterm	2	50
Homework	2	10
Assignment	0	0
Projects	0	0
Practice	0	0
Quiz	0	0
Contribution of In-term Studies to Overall Grade		60
Contribution of Final Examination to Overall Grade		40
Attendance	0	0

Workload of the Course

Activity	**Total Week Count**	**Weekly Duration (in hour)**	**Total Workload in Semester**
Theoretical Study Hours of Course Per Week	14	3	42
Practicing Hours of Course Per Week			
Reading	7	2	14
Searching in Internet and Library	7	2	14
Designing and Applying Materials			
Preparing Reports			
Preparing Presentation			
Presentation			
Mid-Term and Studying for Mid-Term	2	3	6
Final and Studying for Final	1	5	5
Other			

Total work load			81	
Total work load/25			3,24	
ECTS of the course			3	

Course's Contribution To Program

No	Program Learning Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.			X		
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.	X				
3	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; ability to apply modern design methods for this purpose.	X				
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.	X				
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	X				
6	Ability to work efficiently in intra-disciplinary teams.	X				
7	Ability to work efficiently in multi-disciplinary teams;	X				
8	Ability to work individually.				X	
9	Ability to communicate effectively in Turkish/English, both orally and in writing; Ability to write effective reports and comprehend written reports, make effective presentations,	X				
10	prepare design and production reports, give and receive clear and intelligible instructions.	X				
11	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.			X		
12	Awareness of professional and ethical responsibility.	X				
13	Information about business life practices such as project management, risk management, and change management.	X				
14	Information about awareness of entrepreneurship, innovation, and sustainable development.			X		
15	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety.				X	
16	Knowledge about awareness of the legal consequences of engineering solutions.	X				
17	Knowledge on standards used in engineering practice.	X				

Name of Lecturer(s) and Contact Information	Prof. Dr. Meltem Doğan (meltem@gazi.edu.tr)