

Faculty of Metallurgy and Technology / /

Course:				
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
12244	Mandatory	3	6	2+1+1
Programs				
Prerequisites	No mutual dependence			
Aims	This course has been designed to offer the conceptual frame for understanding of production process, performances and application of advanced materials in the average exploitation conditions as well as the identification of the materials characteristics responsible for the application response.			
Learning outcomes	After completion of this course student should: • Be familiar with the structure and composition of the certain classes of advanced materials, • Have the knowledge about the production of certain classes of advanced materials as a function of physico- mechanical characteristics and application conditions, Make a proper choice of material for the adequate application, • Analyze the structural deficiencies as the consequences of processing			
Lecturer / Teaching assistant	Prof. dr Mira Vukčević			
Methodology	Lectures, exercises, colloquia, final exam			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Classification of functional and advanced materials			
I week exercises	Structure of reinforced composites, optical microscopy , SEM analysis of prepared specimen			
II week lectures	Functional composites as the typical represents of advanced materials , classification, characteristics, application etc			
II week exercises	Preparation of functional composites for adhesive application in combination with FOS (Fiber optic sensors)			
III week lectures	matrix materials in functional composites, borderline ntephases surfaces, reinforcements			
III week exercises	Microstructure analysis of composite reinforced by nanofillers (nanotubes) on already prepared specimen			
IV week lectures	Reinforcement types			
IV week exercises	Case studies: fiber optics, sensors, fibres			
V week lectures	Materials for magnetic applications			
V week exercises	Case study: Examination of the already prepared specimen with inserted FOS			
VI week lectures	Materials for optic application			
VI week exercises	Classes of materials for optic application			
VII week lectures	Bio-materials, classes of materials for medical application			
VII week exercises	I Colloquium			
VIII week lectures	Bio-materials in medicine and stomatology			
VIII week exercises	Case study: Biomaterials in medicine			
IX week lectures	Bio materials in medicine: coatings, implants			
IX week exercises	Case study: materials for the application in prosthetic implantology			
X week lectures	Ultra-light materials, metallic foams, classes and application			
X week exercises	Case study. ultra-light materials			
XI week lectures	Metallic foams, application			
XI week exercises	Case study: metallic foams			
XII week lectures	Materials for coatings			
XII week exercises	Case study: Materials for coatings			
XIII week lectures	Coatings and refractory materials			

XIII week exercises	Case study: Refractory materials					
XIV week lectures	Nano materials, "smart" materials , characteristics, application					
XIV week exercises	Case study: nano materials					
XV week lectures	Smart materials, characteristics					
XV week exercises	II colloquium					
Student workload						
Per week			Per semester			
6 credits x 40/30=8 hours and 0 minuts 2 sat(a) theoretical classes 1 sat(a) practical classes 1 excercises 4 hour(s) i 0 minuts of independent work, including consultations			Classes and final exam: 8 hour(s) i 0 minuts x 16 =128 hour(s) i 0 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 8 hour(s) i 0 minuts x 2 =16 hour(s) i 0 minuts Total workload for the subject: 6 x 30=180 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 36 hour(s) i 0 minuts Workload structure: 128 hour(s) i 0 minuts (cources), 16 hour(s) i 0 minuts (preparation), 36 hour(s) i 0 minuts (additional work)			
Student obligations			Active participation in lectures and exercises, two colloquoia, final exam			
Consultations			Any day up to 10 a.m			
Literature			Cellular Solids, Structure and Properties, 2nd Edition, L.J. Gibson, and M.F. Ashby, Cambridge University Press, 1999. • Ashby, M. F., Evans, A., Fleck, N. A., Gibson, L. J., Hutchinson, J. W., & Wadley, H. N. G., Metal Foams: A Design Guide, Butterworth-Heinemann, Massachusetts; 2000 • Cobalt-Base Alloys for Biomedical Applications, Disegi, Kennedy, and Pilliar, ASTM _STP1365. • Advanced Ceramics, Vol.1- Bioceramics, J. F. Shackelford, Gordon and Breach Science Publishers, 1999. • Skeletal Tissue Mechanics, R. B. Martine, D. B. Burr, and N. A. Sharkey, Springer, 1998 • Materials Science of Thin Films, 2nd Edisiotn, Milton Ohring, Academic Press, 2002. • Mechanics of Fibrous Composites, C.T. Herakovich, John Wiley & Sons, Inc., New York, 1998. • Materials Science and Engineering, An Introduction, 5th Edition, William D. Callister, Jr., John Wiley & Sons, Inc., New York, 1999, with CD-ROM. • Bolton W.2002 Technology of Engineering Materials Butterworth Heinemann • Fundamentals of Modern Manufacturing, Materials, Processing, and Systems, 2nd edition, Mikell P. Groover, John Wiley & Sons, inc., • Fundamentals of meta matrix composites, S. Suresh, A. Mortensen and A Needleman, Butterworth Heinemann, 1993 • Structure and properties of engineering materials, fifth edition, Henkel and Pense, McGraw Hill, 2002 • .R. Aleksić, Funkcionalni kompozitni materijali Kompozitni materijali, skripta u izdanju TMF Beograd (2013) • D.D.I Chung , Applied materials science-Application of Engineering materials in structural electronics, Thermal and other industries, CRC Press (2001) ISBN 0-8493-1073-3			
Examination methods			Activity on lectures and exercises (0-10 poena) -I colloquium: (0-20 poena), - II colloquium (0-20 poena), - Final exam (0-50 poena) Prelazna ocjena se dobija ako se kumulatino skupi najmanje 50 poena			
Special remarks			-			
Comment			-			
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points