MILITARY UNIVERSITY OF TECHNOLOGY, WARSAW, POLAND (MUT)
FACULTY OF MECHANICAL ENGINEERING (FME)

COURSE CARD

Course	***Strength of Materials 2***
Erasmus Code	
Academic year	2017/2018
Language	English
Profile of education	general-academic | ~~practical~~
Form of study	full-time study
Type of study	undergraduate (B.Sc.) | ~~postgraduate (M.Sc.)~~
Type of course	obligatory | ~~elective~~
Forms of teaching, number of hours /rigor, total number of hours, ECTS credits	Lectures: 20 / exam Problem-solving: 16 / pass Laboratory: 6 / pass Project: – / – Seminar: – / – **Total: 42 ECTS credits: 4.5**
Prerequisites	*Mathematics 1, Engineering Mechanics 1, Strength of Materials 1*
Programme	semester: winter | spring field of study: mechanics and machinery design specialization: all | ~~specify *specialization*~~
Author(s)	**Roman GIELETA, Ph.D., Eng.** Department of Mechanics and Applied Computer Science
Course contents	Spatial and plane states of stress. Spatial and plane states of strain. Hooke's law for an isotropic material. Failure theories for an isotropic material. Combined loadings. Displacements in simple beams and plane frames using the method of virtual work (the Maxwell-Mohr method). Statically indeterminate beams and plane frames – force method. Buckling of straight slender bars.
Course contents (extended description)	<u>Lectures:</u> 1. Spatial and plane states of stress | 2 hrs 2. Spatial and plane states of strain | 2 hrs 3. Hooke's law for an isotropic material | 1 hr 4. Failure theories for an isotropic material | 2 hrs 5. Combined loadings | 3 hrs 6. Displacements in simple beams and plane frames using the method of virtual work (the Maxwell-Mohr's method) | 4 hrs 7. Statically indeterminate beams and plane frames – the force method | 4 hrs 8. Buckling of straight slender bars | 2 hrs <u>Problem-solving:</u> 1. Spatial and plane states of stress and strain | 2 hrs 2. Hooke's law for an isotropic material | 1 hrs 3. Failure theories for an isotropic material | 1 hrs 4. Combined loadings | 2 hrs – Test #1 | 1 hrs 5. Displacements in simple beams and plane frames using the method of virtual work | 3 hrs – Test #2 | 1 hrs 6. Statically indeterminate beams and plane frames – force method | 3 hrs - Test #3 | 1 hrs 7. Buckling of straight slender bars | 1 hrs <u>Laboratory:</u> 1. Tension and compression tests of ductile and brittle materials | 2 hrs

	2. Creep | 2 hrs 3. Fatique | 1 hr 4. Impact test | 1 hr
Recommended reading	Gieleta R., *Strength of Materials 2* – lectures, pre-manual, Warsaw, 2017. Gieleta R., *Strength of Materials 2* – classes, pre-manual, Warsaw, 2017.
Learning outcomes and competences	State of stress and strain analysis of a deformable body. Strength analysis of machine elements in combined loadings with respect to internal forces, stresses and strains. Determination of displacements in simple beams and plane frames using the Maxwell-Mohr method. Determination of internal forces in statically indeterminate beams and plane frames. Determination of critical loads in the compression of straight slender bars.
Learning methods	Lectures are conducted using multimedia presentations. Problem-solving based on multimedia presentations. Homeworks.
Assessment criteria	To pass the course Student must satisfy all two of the criteria listed below: – pass the theory final test (at least 60% of total points), – pass all three tests on problem-solving (each test at least 60% of total points). Final grade of the course is calculated based on the theory final test (50%) and the average grade obtained from test #1, #2 and #3 (50%).
ECTS calculation	Student's workload (hours) 1. Participation in lectures / **20** 2. Participation in problem-solving / **16** 3. Participation in laboratory / **6** 4. Participation in project / **—** 5. Participation in seminar / **—** 6. Student's own work regarding lectures / 2x20 = **40** 7. Student's own work regarding problem-solving / 2x16 = **32** 8. Student's own work regarding laboratory / 3x6 = **18** 9. Student's own work regarding project / 3x... = **—** 10. Student's own work regarding seminar / 2x... = **—** Total student's workload: **132 hours** | 132:30 | **4.5 ECTS credits**