

(faculty stamp)

**COURSE DESCRIPTION**

Z1-PU7

WYDANIE N1

<b>1. Course title:</b> COMPUTER AIDED MODERNIZATION		<b>2. Course code</b>		
<b>3. Validity of course description:</b> 2012/2013				
<b>4. Level of studies:</b> MSc programme				
<b>5. Mode of studies:</b> intramural studies				
<b>6. Field of study:</b> POWER ENGINEERING		(FACULTY SYMBOL) RIE		
<b>7. Profile of studies:</b> general				
<b>8. Programme:</b> Modernization of Power Installations				
<b>9. Semester:</b> first				
<b>10. Faculty teaching the course:</b> Institute of Power Engineering and Turbomachinery				
<b>11. Course instructor:</b> Dr inż. Grzegorz Nowak				
<b>12. Course classification:</b> professional				
<b>13. Course status:</b> compulsory				
<b>14. Language of instruction:</b> English				
<b>15. Pre-requisite qualifications:</b> basics of mechanics, basics of mechanics of materials				
<b>16. Course objectives:</b> provide knowledge of computer aided engineering mechanics of structural elements				
<b>17. Description of learning outcomes:</b>				
Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Student is aware of modernization requirements of machinery	Test	Lecture	K_W17
2.	Student has knowledge of the thermo-mechanical simulations with computer software	Test	Lecture	K_W07 K_W17
3.	Student has knowledge of the thermo-mechanical loads within simple structural elements	Test	Lecture	K_W07 K_W17
4.	Student can carry out a thermo-mechanical analysis with use of numerical software	Project	Project	K_U21 K_U28
5.	Student can numerically determine the thermo-mechanical stresses in the basic structural elements	Project	Project	K_U21 K_U28
6.				
7.				
8.				
<b>18. Teaching modes and hours</b>				
<b>Lecture</b> 15 <b>Project</b> 30				
<b>19. Syllabus description:</b>				
The concept of modernization, the need to modernize machinery, the approach to the task of modernization, the software used in the modernization, the basics of thermal FEM simulations, the basics of structural FEM simulations, the basis of FEM simulations of thermo-strength analyses, meshing principles and models construction, the thermo-mechanical simulations of simple elements: bars, beams, axissymmetrical shels and shafts, the thermo-mechanical simulations of rotating disks				
<b>20. Examination:</b> no				
<b>21. Primary sources:</b>				
J.L. Meriam, L.G. Kraige, Engineering Mechanics: Statics, Wiley, 2011 Hibbeler, Engineering Mechanics: Statics + Dynamics", Prentice Hall, 2013 Barron R., Barron. B., Design for Thermal Stresses, Willey, 2012 Zagrajek T., Krześciński G., Marek P., Metoda elementów skończonych w mechanice konstrukcji. Ćwiczenia z zastosowaniem systemu ANSYS				
<b>22. Secondary sources:</b>				
Orłoś Z. (red.), Naprężenia cieplne, Wydawnictwo Naukowe PWN, Warszawa 1991, Urugał A, Mechanics of Materials, Wiley, 2008				

**23. Total workload required to achieve learning outcomes**

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15 / 15
2	Classes	/
3	Laboratory	/
4	Project	30 / 30
5	BA/ MA Seminar	/
6	Other	/
	Total number of hours	45 / 45

**24. Total hours: 90****25. Number of ECTS credits: 3****26. Number of ECTS credits allocated for contact hours: 1.5****27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1****28. Comments:**

Approved:

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(date, Instructor's signature).....  
(date, the Director of the Faculty Unit signature)