



University of  
Zagreb



University of Zagreb  
FACULTY OF MINING,  
GEOLOGY AND PETROLEUM  
ENGINEERING



1. GENERAL INFORMATION			
1.1. Course teacher	Assistant professor Luka Perković, PhD		1.6. Year of the study
1.2. Name of the course	Process Dynamics and Regulation		1.7. ECTS credits
1.3. Associate teachers	Teaching assistant Amalia Lekić Brettschneider, MSc		1.8. Type of instruction (number of hours L + E + S + e-learning)
1.4. Study programme (undergraduate, graduate, integrated)	graduate		1.9. Expected enrolment in the course
1.5. Status of the course	<input type="checkbox"/> mandatory	<input checked="" type="checkbox"/> elective	1.10. Level of application of e-learning (level 1, 2, 3), percentage of online instruction (max. 20%)
II.			
2. COUSE DESCRIPTION			
2.1. Course objectives	The course Process Dynamics and Regulation is set in graduate study as a part of an elective module, and it's goal is to introduce students with basics of simplified system dynamics and provide basic regulation strategies. Students are simulating their case studies from the geoenergy system engineering with the use of numerical analysis.		
2.2. Enrolment requirements and/or entry competences required for the course			
2.3. Learning outcomes at the level of the programme to which the course contributes	Independently solve complex engineering problems in petroleum engineering and geoenergy engineering; Assess the environmental impact of petroleum engineering and geoenergy engineering; Plan the methods and procedures for avoiding or minimizing environmental impact of petroleum engineering and geoenergy engineering activities.		
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	Explain the role and importance of dynamics and process regulation in technology; Create a mathematical model of heat transfer, matter and momentum for an example in the field of petroleum engineering; Devise the regulation of the system for conducting some simple processes in the field of petroleum engineering; Analyse the dynamics of fluid flow in a two-phase flow through a well; Analyse the results of the system's response to external stimulation.		
2.5. Course content (syllabus)	Provide basic and applied knowledge in the field of dynamics and process regulation, with special reference to examples from petroleum engineering; Give the basics of numerical modelling and solving linear and nonlinear systems of equations; Give the basics of mathematical modelling of systems through Laplace transformations; Acquire knowledge in the field of modelling of complex dynamic systems that include heat, matter and impulse transfer in the flow of two-phase fluid; Show the importance of system thermal inertia; Provide basic knowledge of PID control with special reference to the control of electric submersible pump and geothermal heat pump systems.		
2.6. Format of instruction:	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent assignments	2.7. Comments:

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	<input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> exercises <input type="checkbox"/> online in entirety <input checked="" type="checkbox"/> partial e-learning <input type="checkbox"/> field work		<input checked="" type="checkbox"/> multimedia and the internet <input type="checkbox"/> laboratory <input type="checkbox"/> work with mentor <input type="checkbox"/> (other)						
2.8. Student responsibilities	Regular class attendance and active participation in lectures and exercises, seminar paper.								
2.9. Monitoring student work	Class attendance	YES		Research	YES		Oral exam		NO
	Experimental work		NO	Report		NO			
	Essay		NO	Seminar paper	YES				
	Preliminary		NO	Practical work		NO			
	Project		NO	Written exam		NO	ECTS credits (total)		4
2.10. Required literature (available in the library and/or via other media)	<b>Title</b>						<b>Number of copies in the library</b>	<b>Availability via other media</b>	
	Banks, D. (2008.): <i>An Introduction to Thermogeology: Ground Source Heating and Cooling</i> , Wiley-Blackwell.						NO	YES	
2.11. Optional literature									
2.12. Other (as the proposer wishes to add)									

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