1. GENERAL INFORMATION				
1.1. Course teacher	Associate Professor Lidia Hrnčević, PhD		1.6. Year of the study	I.
1.2. Name of the course	Environmental Protection in Petroleum Engineering		1.7. ECTS credits	4
1.3. Associate teachers	-		1.8. Type of instruction (number of hours L + E + S + e-learning)	45L+0E+10S+5e-learning
1.4. Study programme (undergraduate, graduate, integrated)	graduate		1.9. Expected enrolment in the course	30
1.5. Status of the course	☒ mandatory	☐ elective	1.10. Level of application of e-learning (level 1, 2, 3), percentage of online instruction (max. 20%)	level 2, 8,3% online
2. COUSE DESCRIPTION				
2.1. Course objectives	Analysis of the global climate change issues and greenhouse gas emissions with special focus on petroleum industry. Analysis of the global climate change initiatives and activities. Analysis of contingency planning and acting in case of hydrocarbon spill. Review of legislation in field of environmental protection in petroleum industry.			
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; Compare specific procedures and processes in petroleum engineering and geoenergy engineering; Assess the risk of accidental situations during various operations 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)	Distinguish the methods of assessment, monitoring and reporting of greenhouse gas emissions in petroleum industry; Compare the methods of greenhouse gas emissions reductions in petroleum industry; Elaborate and distinguish the methods of oil spill detection; Plan oil spill remediation activities based on contemporary contingency planning protocols, and compare and evaluate the conducted remediation activities; Design of remediation methods (activities) for specific case of oil spill; Modelling oil slick movement and spreading (predict of oil spill trajectory by using computer programmes); Elaborate the processes that impact the concentration and movement of polluters in groundwater systems; Interpret legal acts related to petroleum industry in field of environmental protection of marine environment.			

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2.5. Course content (syllabus)	Global climate change mitigation activities; Greenhouse gas emissions issues with special focus on petroleum industry (sources and sinks of greenhouse gases, greenhouse gas emissions trends, sources of greenhouse gases in petroleum industry, methods of assessment, monitoring and reporting of greenhouse gas emissions in petroleum industry, methods of greenhouse gas emissions reductions in petroleum industry); Oil spill detection methods; Oil spill behaviour in different environments; Oil spill trajectory modelling; Oil spill contingency planning; large oil spills - case studies; Waste water treatment; Legislation in field of environmental protection in petroleum industry.								
2.6. Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ online in entirety ☐ partial e-learning ☒ field work			☒ independent assignments ☐ multimedia and the internet ☐ laboratory ☐ work with mentor ☐ (other)			2.7. Comments: -		
2.8. Student responsibilities	Class attendance (lectures, seminars, field class), preparation and presentation of seminar paper.								
2.9. Monitoring student work	Class attendance	YES		Research		NO	Oral exam	YES	
	Experimental work		NO	Report		NO			
	Essay		NO	Seminar paper	YES				
	Preliminary exam		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)	**Title**	**Number of copies in the library**	**Availability via other media**
	Cheremisinoff, N.P., Rosenfeld, P. (2009.): *Handbook of Pollution Prevention and Clever Production, Best Practices in the Petroleum Industry*, Vol. 1, Elsevier Inc. - selected chapters	NO	YES
	Boubel, R.W., Fox, D.L., Turner, D.B., Stern, A.C. (1994.): *Fundamentals of Air Pollution*, Third Edition, Academic Press, San Diego, California, USA. - selected chapters	NO	YES
	API (2009.): *API Compendium of Greenhouse Gas Emission Methodologies for the Oil and Gas Industry*, API, SAD - selected chapters	NO	YES
	Clifton, A. Ed. (2014.): *Oil Spills:Environmental Issues, Prevention and Ecological Impacts*, Nova publishers. - selected chapters	NO	YES
	IPIECA, API & OGP (2011). *Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions*, 2nd Ed. - selected chapters	NO	YES

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2.11. Optional literature	Wang, L.K., Pereira, N.C., Hung, Y.T. Ed. (2004.): *Air Pollution Control Engineering*, Humana Press Inc.
	Orszulik, S.T. Ed. (2008.): *Environmental Technology in the Oil Industry*, Springer
	Konig, L.F., Weiss, J.L.Ed. (2009.): *Groundwater: Modelling, Management and Contamination*, Nova Science Publishers, Inc.
	Cheremisinoff, N.P. (2002.): *Handbook of Water and Wastewater Treatment Technologies*, Butterworth-Heinemann
2.12. Other (as the proposer wishes to add)	-

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