1. GENERAL INFORMATION				
1.1. Course teacher	Associate Professor Domagoj Vulin, PhD		1.6. Year of the study	II.
1.2. Name of the course	Laboratory Analysis of Petrophysical Properties		1.7. ECTS credits	4
1.3. Associate teachers	-		1.8. Type of instruction (number of hours L + E + S + e-learning)	30L+15E+15S+0e-learning
1.4. Study programme (undergraduate, graduate, integrated)	graduate		1.9. Expected enrolment in the course	10
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%)	-
2. COUSE DESCRIPTION				
2.1. Course objectives	After passing the exam, the student will understand laboratory procedures for determining rock properties (permeability, capillary pressure, wettability, porosity), including practical work (routine analysis of rock samples), practical introduction to equipment in a petrophysical laboratory and preparation of reports measuring individual rock properties.			
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	Analyse reservoir rock and reservoir fluids properties.			
2.4. Expected learning outcomes at the level of the course (3 to 10 learning outcomes)	Observe the outliers - samples of the measured data; Analyse and correct the measured data of petrophysical properties of rocks; Identify individual elements of apparatus for specific measurement of petrophysical properties of rocks; Carry out procedures for processing and interpretation of measured data; Make a model of a digital core; Design a system for receiving and processing data during measurements in the laboratory for special analyses of rocks and fluids; Match the results of laboratory flow measurements with reservoir data.			
2.5. Course content (syllabus)	Description of methods for obtaining samples from the well; Planning the core sampling; The method of retaining the original saturation; Sample sorting and preservation, preparation for analysis, core extraction; Description, imaging, gamma radiation			

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<table>
<tr><td></td><td colspan="10">measurements; Methods for determining the saturation in the core (Dean-Stark, Soxhlet extractor, etc.); Helium porosimetry; Calibration curve, description of method and apparatus, interpretation of results; Measurement of absolute permeability; Description of methods and apparatus, Klinkenberg correction; Measurement of relative permeability by steady state and unsteady state methods; Cases of immiscible fluids and miscible fluids flow; Measurement of minimum miscibility pressure; Determination of wettability (Amott test, Rise in Core); Measurement of contact angle and capillary pressure; Suction method, Purcell method, porous-plate method, centrifuge method; Application to reservoir, aquifer rocks, architectural-building stone etc;; Review of other methods of routine (RCAL) and special (SCAL) rock analyses; Preparation of core-analysis measurement reports; Correlations of relative permeability and capillary pressure; Preparation of data for reservoir simulation and analytical calculations - methods of reducing the measured relative permeability curves and capillary pressure curves to the analytical form; Curve normalization; Calculation of saturation in the core based on laboratory tests; Laboratory exercises; Conversion of measured capillary pressure data to reservoir pressure and temperature conditions and reservoir fluid system; Determination of pore size distribution; Analytical description of the distribution of pore sizes based on the assumption of different pore geometries; Seminar - Preparation of reports in the form of interpretation of measured data; Matching of laboratory data and analytical models - normalization and organization of data; Confirmation of measured values from SCAL analysis by coreflood model; Sensors, transducers and transducers in laboratory petrophysical measurements; Creating your own data acquisition system.</td></tr>
<tr><td>2.6. Format of instruction:</td><td colspan="4">☒ lectures
☒ seminars and workshops
☒ exercises
☐ online in entirety
☒ partial e-learning
☐ field work</td><td colspan="4">☒ independent assignments
☒ multimedia and the internet
☒ laboratory
☒ work with mentor
☐ (other)</td><td>2.7. Comments:
-</td></tr>
<tr><td>2.8. Student responsibilities</td><td colspan="10">The student should attend the laboratory exercises regularly and submit the prepared measurement results and calculations in the prescribed form. Before the practical exercises, it is compulsory to take a short test related to the respective exercise.</td></tr>
<tr><td rowspan="6">2.9. Monitoring student work</td><td>Class attendance</td><td>YES</td><td></td><td>Research</td><td>YES</td><td></td><td>Oral exam</td><td>YES</td><td></td></tr>
<tr><td>Experimental work</td><td>YES</td><td></td><td>Report</td><td>YES</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>NO</td><td>Seminar paper</td><td></td><td>NO</td><td></td><td></td><td></td></tr>
<tr><td>Preliminary exam</td><td>YES</td><td></td><td>Practical work</td><td>YES</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Project</td><td></td><td>NO</td><td>Written exam</td><td></td><td>NO</td><td>ECTS credits (total)</td><td colspan="2">4</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">2.10. Required literature (available in the library and/or via other media)</td><td colspan="6">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="6">Vulin, D (2017.): Practicum instructions, RGN faculty</td><td>NO</td><td>YES</td></tr>
<tr><td>2.11. Optional literature</td><td colspan="10">McPhee, C., Reed, J., Zubizarreta, I. (2015.): Core analysis: a best practice guide. Elsevier.</td></tr>
</table>

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	Bowen, D.G. (2003.): *Formation evaluation and petrophysics*, Core Laboratories, Jakarta, Indonesia 194.
	Torsæter, O., Abtahi, M. (2003.): *Experimental reservoir engineering laboratory workbook*, Norwegian University of Science and Technology.
2.12. Other (as the proposer wishes to add)	-

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