<table>
<tr><td>COURSE TITLE</td><td colspan="5">Cryptocurrency Technologies</td></tr>
<tr><td>Course code</td><td>DPR013</td><td>Year of study</td><td colspan="3">2</td></tr>
<tr><td>Lecturer(s)</td><td>Nikola Grgić, senior lecturer</td><td>ECTS</td><td colspan="3">6</td></tr>
<tr><td rowspan="2">Associates</td><td rowspan="2"></td><td rowspan="2">Total lesson hours per semester</td><td>Lecture</td><td>Seminar</td><td>Laboratory</td></tr>
<tr><td>24</td><td>16</td><td>20</td></tr>
<tr><td>Course status</td><td></td><td>Percentage share of e-learning</td><td colspan="3">25%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• Adopt a theoretical knowledge of cryptocurrency technologies and blockchain
• Develop a blockchain and cryptocurrency-based software
• Read, process and analyze blockchain data</td></tr>
<tr><td>Course enrolment requirements and entry competencies required for the course</td><td colspan="5">• programming skills (Python, Java, C# or other)</td></tr>
<tr><td>Learning outcomes

On successful completion of this course, student should be able to:</td><td colspan="5">1. Compare the most common cryptocurrencies
2. Describe a basic concepts related to blockchain-based cryptocurrencies
3. Apply a theoretical knowledge to interpret Bitcoin network events and to develop cryptocurrency-based software
4. Analyze different events at Bitcoin blockchain and interpret its correlation
5. Analyze blockchain data and present results
6. Develop a software using Bitcoin Core API in order to access a blockchain and network events</td></tr>
<tr><td>Course content</td><td colspan="5">Introduction. History of money. Cryptocurrency development. Bitcoin whitepaper. Basic terms. Wallets. Standard and deterministic wallet. Generating a private key. Bitcoin standard implementation. Full node. Bitcoin Core. Bitcoin Core datadir. Bitcoin Core API. Bitcoin Core Server mode. Testnet. RPC interface. Transactions, inputs and outputs. Mempool and fees. UTXO. Transaction scripts. Keys, addresses. Base 58 encoding. Bitcoin network. SPV clients. Blockchain. Block header and structure. Merkle tree. Mining. Proof of work. Consensus. Difficulty adjustment. Forks. BIPs. Bitcoin security model. Alternative cryptocurrencies (altcoins).</td></tr>
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<tr><td>Types of teaching:</td><td colspan="3">☒ lecture
☒ seminars and workshop
☒ practical
☐ combined e-learning
☐ field research</td><td colspan="3">☒ self-study
☐ multimedia
☒ laboratory
☒ mentoring work
☐ (others)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Attending classes, solving all tasks in laboratory, make seminar and project.</td></tr>
<tr><td rowspan="5">Monitoring student work (enter the share in ECTS credits for each activity so that the total number of ECTS credits corresponds to the credit value of the course):</td><td>Class attendance</td><td>2</td><td>Research</td><td>0,4</td><td></td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar</td><td>0,4</td><td></td><td></td></tr>
<tr><td>Self-study</td><td>1,6</td><td>Workshop</td><td></td><td></td><td></td></tr>
<tr><td>Project</td><td>1,4</td><td>Office hours, mid-term exams and final exam</td><td>0,2</td><td></td><td></td></tr>
<tr><td>Assessment and evaluation of student work during classes and at the final exam</td><td colspan="6">
<table>
<tr><th colspan="3">CONTINUOUS ASSESSMENT</th></tr>
<tr><th>Continuous testing indicators</th><th>Performance A_i (%)</th><th>Grade ratio k_i (%)</th></tr>
<tr><td>Seminar</td><td>10 - 100</td><td>100</td></tr>
<tr><td>Laboratory tasks attendance</td><td>100</td><td>0</td></tr>
<tr><td>Laboratory tasks final exam</td><td>50</td><td>0</td></tr>
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<tr><th colspan="3">FINAL ASSESSMENT</th></tr>
<tr><th>Indicators checks</th><th>Performance A_i (%)</th><th>Grade ratio k_i (%)</th></tr>
<tr><td>Project</td><td>10 – 100</td><td>40</td></tr>
<tr><td>Exam (written)</td><td>40 – 100</td><td>40</td></tr>
<tr><td>Exam (oral)</td><td>40 – 100</td><td>10</td></tr>
<tr><td>Previous activities</td><td>10 – 100</td><td>10</td></tr>
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Indicators checks	Performance A_i (%)	Grade ratio k_i (%)
Project	*10 – 100*	*40*
Exam (written)	*40 – 100*	*40*
Exam (oral)	*40 – 100*	*10*
Previous activities	*10 – 100*	*10*

The grade (in percentages) is formed on the basis of all indicators that describe the level of student activities according to the relation:

$$Grade\,(\%) = \sum_{i=1}^{N} k_i A_i$$

k_i - weighting factor for each activity,
A_i - success in percentage achieved for a particular activity,
N - total number of activities.

PERFORMANCE AND GRADE		
Percentage	Criteria	Grade
50% - 60%	basic criteria met	sufficient (2)
61% - 74%	average performance with some errors	good (3)
75% - 89%	above average performance with minor errors	very good (4)
90% - 100%	outstanding performance	outstanding (5)

Required reading	Antonopoulos, A. M., *„Mastering Bitcoin: Programming the Open Blockchain“*, O'Reilly Media, 2017.	Creative Commons Attribution-ShareAlike 4.0 *(CC BY-SA 4.0) licence*
	Nakamoto, S.: *„A Peer-to-Peer Electronic Cash System*“, 2008.	*www.bitcoin.org*