<table>
<tr><td>COURSE NAME</td><td colspan="5">STATISTIC</td></tr>
<tr><td>Code</td><td>PMM230</td><td>Year of study</td><td colspan="3">2</td></tr>
<tr><td>Course teacher</td><td>Nikola Koceć Bilan</td><td>Credits (ECTS)</td><td colspan="3">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td></tr>
<tr><td>30</td><td></td><td>30</td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="3">30%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">The objectives will be to achieve a deep understanding of particular statistical methods and to learn to use some advanced tools for analyzing and developing statistical methods.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Successful completion of course „Probability I“</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">Upon successful completion of the requirements for this course, students should have the knowledge and skills to:
understand basic principles and concepts of mathematical statistics (sufficiency, efficiency, likelihood)
understand the basic principles of statistical inference and the issues they raise about how to do statistical inference.
be familiar with the common probability distributions that are used in statistical inference
understand and be able to carry out maximum likelihood estimation and inference in simple statistical models
understand and explain the different uses of randomization in statistics
be able to know what drawing a random sample from a population means and why it is important
be able to estimate the value of various population parameters from a sample of data
understand regression models
be able to apply linear regression and evaluate its efficiency</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Introduction. Examples of statistical problems. Statistical data types. Discrete statistical data types. Continuous statistical data types. CDF and density function. Graphical representation.
Introduction to Mathematical Statistics. Sufficient statistics. Factorization criterion. Equivalent statistics. Location Families. Examples.
Exponential family. Likelihood. Fisher information. Pivotal quantities. Examples.
Point estimators. Unbiased estimation. Uniform minimum variance unbiased (UMVU) estimator. Examples.
Efficient estimators. Maximum likelihood estimators. Examples.
Confidence set. Confidence interval. Construction of confidence intervals by pivot quantities. Asymptotic confidence intervals. Examples.
Hypothesis testing. Basic concepts (test, statistical test). Comparison of statistical test (errors, power, ...).
Constructing statistical tests. z-test. t-test. Likelihood ratio tests. Significance. Examples.
Regression analysis. Classical linear regression. Least squares. Multivariate linear regression. Matrix algebra.
Gauss – Markov theorem. Testing hypothesis about slope. Multicollinearity.
Model validation. Confidence intervals. Prediction intervals. Examples.
Rank based statistics. Mann-Whitney-Wilcoxon test. Wilcoxon signed-rank</td></tr>
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	test. 13. Resampling. Permutation tests. Bootstrap.
Format of instruction	Exercises section and lectures
Student responsibilities	Students are expected to be present for every lecture and exercise section.
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Attending lectures and exercises (2) Written final exam/mid-term exams (2) Oral exam (2)
Grading and evaluating student work in class and at the final exam	There are 2 mid-term exams during a semester. Passing both mid-term exams enables students to take an oral exam. Successfully passing the oral exam leads to successful completion of the course. Final grade is derived as the arithmetic mean of scores in mid-term exams (or a written exam) and the oral exam. In the case of failure in mid-term exams or the oral exam students must undergo a written exam before approaching oral exam again.
Required literature (available in the library and via other media)	Ivo Ugrina, Uvod u matematičku statistiku – Available on WWW.
Optional literature (at the time of submission of study programme proposal)	1. G. K. Bhattacharyya, R. A. Johnson, *Statistical Concepts and Methods*, John Wiley & Sons, 1977. 2. Ž. Pauše, *Uvod u matematičku statistiku*, Školska knjiga, Zagreb, 1993. 3. D. Freedman, R. Pisani, R. Purves, A. Adhikari, *Statistics*, 2nd edition, W. W. Norton & Co, 1991. 4. D. J. Savile, G. R. Wood, *Statistical Methods. A Geometric Primer*, Springer Verlag, 1996. 5. D. Williams, *Weighing the Odds*, Cambridge University Press, 2001.
Quality assurance methods that ensure the acquisition of exit competences	Detailed statistics of student results, gathering feedback from students through official questionnaires and lecturer's self-evaluation.
Other (as the proposer wishes to add)	