**Course SYLLABUS form**

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| **Basic data of the subject** |
| **Academic Unit:**  | **Faculty of Mathematics & Natural Sciences****Department of Chemistry** |
| **Course title:** | Basics of Chemometry |
| **Level:** | **Bachelor** |
| **Course status:** | **Elective** |
| **Study year:** | **Second year/ III semester (II/3)** |
| **Number of hours per week:** | **2+1** |
| **Credit value – ECTS:** | **3** |
| **Time / location:** |  |
| **Lecturer:** |  |
| **Contact details:**  |  |
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| **Course description** | Object of the study of Chemometry. Insecurity in Measurement, Analytical Information Theory, Specificity and Selection of Analytical Methods, Probing Theory, Instrumental Calibration Theory, Analytical Signal Processing, Statistical and Mathematical Processing of Signal and Output, PCA and Cluster Methods. Planning the experiment. |
| **Course objectives:** | The acquired knowledge is intended to elevate the ability to conceptualize and address phenomena and experimental results to a greater extent, another way of tackling problems to enable them to engage in scientific work. Statistical processing and mathematical treatment of analytical results is another objective of this scientific discipline. |
|  **Learning outcomes:** | * The student is able to obtain useful information.
* The student is capable of designing experiments and chemical measurements.
* The student is able to handle and analyze analytical data in order to optimize and validate chemical analysis methods.
* The student is able to perform statistical processing and mathematical treatment of analytical results.
* The student is able to make the interpretation of experimental results, especially in the field of environment, which realizes an accurate assessment of environmental quality, levels of pollution, factors and causes that have influenced such an assessment.
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| **Contribution on student load (must correspond with learning outcomes)** |
| **Activity**  | **Hours** | **week** | **Total /hours**  |
| Lectures | 2 | 15 |  30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 1 | 6 | 6 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework |  |  |  |
| Individual time spent studying (at the library or home) | 5 | 1 | 5 |
| Final preparation for the exam | 5 | 2 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. |  |  |  |
| **Total** |  |  | **75** |
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| **Teaching methods**  | Lectures, discussions, exercises, seminars. |
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| **Evaluation methods** | The first evaluation: 20%, The second evaluation: 20%, Homework: 5%, Regular attendance 5%, Final exam (written and oral): 50%, Total: 100%.The final grade will be calculated as follows:51%- 60% = 6 61% -70% = 771% - 80% = 8 81% - 90% = 991%-100% =10 |
| **Literature** |
| **Basic Literature:**  | Pranvera Lazo, Njohuri bazë në kemometri, 2008. |
| **Additional Literature**  | James N. Miller, Jane C. Miller, Statistics and Chemometrics for Analytical Chemistry, 2010.Kristin J. Harman, The Art for Data Analysis, 2013.Otto, M., Chemometrics: Statistics and Computer Application in Analytical Chemistry, 2007. |

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| **Designed study plan:**  |
| **Week** | **Lectures which will be held** |
| ***First week:*** | The object of the study of chemometry and the history of its development, Chemometry basics and methods of chemical measurements. |
| ***Second week:*** | Systematic approach to chemical analysis, Analytical data evaluation, Quantitative analytical chemistry errors, Certain errors, Mistakes deriving from apparatus and reagents. |
| ***Third week:*** | Work Mistakes, Personal Mistakes, Method Errors, Errors of Indefinite Origin, Residual Outcome, Accuracy Required in Quantitative Analysis, Calibration and Standardization, Blind Test. |
| ***Fourth week:*** | The Significant Difference, Exempt of Outliers, Some Usable Terms in Chemometry, Key Statistic Parameters, Correlation, Simple Linear Correlation (Pearson). |
| ***Fifth week:*** | Values Outliers, Quantitative Approach to Values Outliers, Statistics, Variance, Covariance. |
| ***Sixth week:*** | Connection of chemometry with the chemical measurement process, Analytical information theory, Quantity of analytical information, Selective and specificity of a method, Quantitative selectivity of a method. |
| ***Seventh week:*** | Probation theory, Sample sampling theory, Heterogeneous Objects Solid Sampling Method, Sampling Quality Control, Statistical Control of Data for Evaluation of Sampling Quality. |
| ***Eighth week:*** | **First Intermediate Evaluation** |
| ***Ninth week:*** | Measurement theory and analytical signal processing, Knowledge on qualitative and quantitative analysis, Analytical signal and its appearance, Increased signal-noise ratio, Measurement apparatus optimization, Signal averaging, Analytical signal and its processing. |
| ***Tenth week:*** | Multivariable Methods and Statistical Designs, Identification of Chemical Models, Unfair Origination Method of Origin, Modeling Spatial Distance between Subgroups, Quantitative Assessment of Subgroup Similarity. |
| ***Eleventh week:*** | Subgroup Linear Computer Model, Nearest K-Method, SIMCA Method, Linear Difference Analysis. |
| ***Twelfth week:*** | Multivariable data and PCA methods. |
| ***Thirteenth week:*** | Summary of the results of an analysis of key components. |
| ***Fourteenth week:*** | Planning and optimizing the experiment. |
| ***Fifteenth week:*** | **Second Intermediate Evaluation.** |
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| **Academic policies and rules of conduct:** |
| Each student should comply with the policies outlined in the Statute of Uuniversity of Prishtina. The student is required to attend regular lectures, exercises and seminars. To behave in conformity with the code of conduct and to comply with the rules of work in research laboratories. |