**Course SYLLABUS form**

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| **Basic data of the subject** |
| **Academic Unit:**  | **Faculty of Mathematics & Natural Sciences – Department of Chemistry** |
| **Course title:** | Introduction to Environmental Engineering |
| **Level:** | **Bachelor (Bsc)** |
| **Course status:** | **Elective** |
| **Study year/Semester:** | **Second Year/Third Semester** |
| **Number of hours per week:** | **2 + 1** |
| **Credit value – ECTS:** | **3** |
| **Time / location:** |  |
| **Lecturer:** | **Prof. Asoc. Dr. BardhaKorça** |
| **Contact details:**  | **bardhakorca@gmail.com** |
| **Course description** | This course will focus on the field of basic concepts of environmental engineering including historical development causes and effects of environmental problems and engineering methods to control them., Major themes covered include the effect of human population growth and increased urbanization on the environment, energy consumption and production, water supply and treatment, air pollution and global climate change. Also will include the biochemical processes and their effects in environment. However the general focus will be control pollution. |
| **Course objectives:** | Course “Introduction to Environmental Engineering” is an assembled theoretical and practical material which will teach the studentsAbout the basic concepts relevant to environmental engineering and why this field has been developed as a special scientific discipline.  |
|  **Learning outcomes:** | **Upon finishing this course, the students will:**1. Understand the biosphere and ecosystem better.2. Recognize waste management.3. Understand the role of sustainable development4. To learn about the objectives of toxicology5. Recognize the importance of microbiological processes in the environment6. Learn about the various sources of pollution and pollution control. |
| **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 | 15 | 15 |
| Field exercises | / | / | / |
| Mid-terms, seminars | 1 | 5 | 5 |
| Homework | 1 | 5 | 5 |
| Individual time spent studying (at the library or home) | 2 | 10 | 20 |
| Final preparation for the exam | 1 | 30 | 30 |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 5 | 10 |
| Projects, presentations, etc. | 2 | 1 | 2 |
| **Total** |  |  | **132** |
| **Teaching methods**  | Teaching methodology is based on: Lectures, discussions, laboratory exercises and seminars. |
| **Evaluation methods** | First midterm evaluation*: 25%* Second midterm evaluation*: 25%* *Case studies and seminars: 10%* *Regular attendance: 5%* *Final exam: 35%* *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:**  | Introduction to Environmental Engineering and Science, 3rd Edition, by G.M. Masters and W.P. Ela, Pearson Prentice Hall, 2008, ISBN 0-13-148193-2  |
| **Additional Literature**  | Lectures material |

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| **Designed study plan - Lecture:**  |
| **Week** | **Lectures which will be held** |
| ***First week:*** | Introduction to Environmental Engineering. The main concepts of Environmental Engineering. The aim of environmental engineering. |
| ***Second week:*** | Biosphere. Technosphere. Ecosystem. Human impact on the environment. The causes and consequences of environmental pollution. Natural resources  |
| ***Third week:*** | Methods for solving problems caused by environmental pollution. Environmental management. Basic principles of waste management. The types of waste. Waste disposal. The basic principles of environmental protection.  |
| ***Fourth week:*** | Sustainable Development.Courses in the study program of environmental engineering. The role of ecology. The objectives of toxicology. Ecotoxicological research. Toxic effect. Environmental chemistry. The principles of green chemistry |
| ***Fifth week:*** | The role of organic chemistry in environmental engineering. Microbiology in technological processes for wastewater treatment and disposal. The importance of the mass and energy balances computation in environmental engineering.  |
| ***Sixth week:*** | Ecotechnology. The importance of industrial biotechnology in ecotechnology development. The application of industrial biotechnology.  |
| ***Seventh week:*** | First midterm |
| ***Eighth week:*** | Pollution control regarding the type, origin, media and transformation.  |
| ***Ninth week:*** | Sources and problems of water pollution by nutrients, organic substances and pathogens. |
| ***Tenth week:*** | Sources and problems of water pollution by toxic organic compounds, heavy metals and suspended solids.  |
| ***Eleventh week:*** | Air pollution. Tropospheric and stratospheric ozone. Chapman’s ozone cycle. Montreal protocol. Substances that deplete ozone layer.  |
| ***Twelfth week:*** | Sources and effects of greenhouse gas emissions. Global warming potential. Sources and problems of air pollution by CO2, SO2, NOx, and particulate matter.  |
| ***Thirteenth week:*** | Soil composition and its role in ecosystem functions. Main sources of soil pollution. Mechanisms of transport and transformation of pollutants in soil |
| ***Fourteenth week:*** | Soil remediation methods. Basic principles and tools in preventive approach to environmental protection and management.  |
| ***Fifteenth week:*** | Second midterm exam |
| **Designed study plan – Lab exercise:**  |
| **Nr.** | **Lab exercises** |
| ***1.*** | Practice in environmental engineering laboratory |
| ***2.*** | Individual initiative for writing a case study for environmental sustainable development |
| ***3.*** | Gas analyses, Laboratory determination of CO2, with Orsate method |
| ***4.*** | Gas analyses, Laboratory determination of NOx and Sulphur oxides |
| ***5.*** | Water analyses, Determination of (DO, COD and BOD) |
| ***6.*** | Determination of water parameters (acidity, alkalinity, water hardness) |
| ***7.*** | Determination of cations and anions in water  |
| ***8.*** | Test I |
| ***9.*** | Determination of residual chlorine in water |
| ***10.*** | Determination of organic substances in water (Demand of KMnO4) |
| ***11.*** | Writing case studies related to waste management  |
| ***12.*** | Soil analyses, Determenation of physical and chemical parametres (humidity, pH value, organic matter-humus)  |
| ***13*** | Determination of CaCO3 in soils with calcimetre |
| ***14*** | Determination of toxic metals in enviromental polluted samples |
| ***15*** | Test II |

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| **Academic policies and rules of conduct:** |
| * Regular attendance of classes and exercises.
* Compliance with the rules set forth by the university
* Compliance with the lesson schedule and consultation hours.
* Respecting the laboratory and lesson specifics.
* Respecting the code and Statute of the University.
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