**Incoming student mobility**

**Name of UNIOS University Unit: Department of Biology**

**COURSES OFFERED IN FOREIGN LANGUAGE**

**FOR ERASMUS+ INDIVIDUAL INCOMING STUDENTS**

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| **Department or Chair within the UNIOS Unit** | **Department of Biology** |

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| **Study program** | **Graduate University Study Programme in Biology** |

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| **Study level** | **Graduate (master)** |

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| **Course title** | **Molecular ecotoxicology** |
| **Course code (if any)** | **BM864** |
| **Language of instruction** | **English** |
| **Brief course description** | This course provides the knowledge about the prediction of impact of pollutants on ecological systems based on the results of different biomonitoring models. Monitoring the impact of xenobiotics on the lower levels of biological systems also means faster performance and the possibility of predicting effects and outcomes at higher levels.  Environmental risk assessment, monitoring and management of environmental and biological changes at the population levels or other higher levels of the ecosystem is not possible without knowledge of elementary principles of molecular ecotoxicology.  Lecture topics include: Pollution and contamination. Xenobiotics. Mechanisms of xenobiotics penetration in biological systems. First pass effect. Defense mechanisms. Biotransformation reactions. Phase I biotransformation of xenobiotics. Phase II biotransformation of xenobiotics. Phase III biotransformation of xenobiotics. Elimination of xenobiotics. Xenobiotics induction and inhibition. Hormone disruptors. Xenoandrogens. Xenoestrogens. Vitellogenin. Oxidative stress as a result of physical factors and exposure to xenobiotics. Effect of xenobiotics on metabolic pathways. Molecular biomarkers. P-glycoprotein and MXR. Biomarkers of exposure and effect. Influence of xenobiotics on markers of metabolic activity and health.  Laboratory exercises include the following: Methodsof exposure to xenobiotics. Tests in vivo. Tests on primary cell culture. Preparation of posmitochondrial and microsomal fraction. Cholinesterase inhibition as an indicator of exposure to organophosphates, carbamates and detergents. The total amount of cytochrome P450 and induction of ethoxyresorufin-o-deethylase as indicators of exposure to polycyclic aromatic hydrocarbons. The concentration of glutatione. Catalase and glutatione peroxidase activity as indicators of oxidative stress. Metabolic markers. Methallothionein concentration as indicator of metal exposure. |
| **Form of teaching** | **Lectures, laboratory exercises.** |
| **Form of assessment** | **Written and oral examination.** |
| **Number of ECTS** | **4** |
| **Class hours per week** | **2 hours of lectures + 1 hour of laboratory exercises** |
| **Minimum number of students** | **-** |
| **Period of realization** | **summer semester** |
| **Lecturer** | **Branimir K. Hackenberger, PhD, Full Professor** |