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<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">Colloidal systems in applied chemistry</td></tr>
<tr><td>Code</td><td>PPC216</td><td>Year of study</td><td colspan="4">1. year (1. Semester), Master study Biology and Chemistry</td></tr>
<tr><td>Course teacher</td><td>Assist. prof. Perica Boskovic PhD</td><td>Credits (ECTS)</td><td colspan="4">2</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><td>F</td></tr>
<tr><td>15</td><td>15</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>elective</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Emphasize students the importance of the field of application of colloidal systems in various industries such as food, pharmaceutical, cosmetic.
Acquire basic knowledge about the physico-chemical properties of classic emulsions, microemulsions and new microemulsion systems without the presence of surfactants based on "green chemistry".</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Entry competences required for this course are basic knowledge of physical chemistry.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">Students will succeed in successfully mastering a subject:
- to describe the structural composition of emulsions, microemulsions and microemulsion systems without the presence of surfactants, surfactant-free-microemulsions; define the differences between them
- Explain the role of surfactant and the importance of thermodynamic parameters in achieving a stable colloidal system
- Determine the size, shape and distribution of emulsion and microemulsion aggregates and explain the dynamics of their growth
- to describe the basic principles and possibilities of applying different methods (spectroscopy, conductometry, viscosimetry, surface tension measurement, AFM, TEM, SANS) in the research of the above mentioned systems
- recognize the principles on the basis of which "green chemistry" reduces negative impacts of chemical processes and technologies on the environment
- Apply appropriate computer programs for numerical processing of experimental data and graphic representation of the obtained results; discuss the results obtained and make a conclusion at the end of the work</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
Week 1: Introduction to colloidal systems.
Week 2: Properties and colloidal structure.
Week 3: Differences between microemulsions and emulsions.
Week 4: Phase diagrams.
Week 5: Surfactants and their characteristics.
Week 6: Rheology of microemulsion and emulsion systems.
Week 7: Methods and experimental techniques for microemulsion systems research.
Week 8: Microstructure of microemulsion aggregates.
Week 9: Microemulsions without the presence of surfactant.
Week 10: Application of emulsions and microemulsions. Examples.
Seminar:
The student will select a topic chosen from the content of the subject learned through the lectures, self-study the literature in writing through the seminar work and oral presentation</td></tr>
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<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☒ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attending classes, searching for literature, preparing and presenting seminar papers, written and oral exam.</td></tr>
<tr><td rowspan="5">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)</td><td>Class attendance</td><td>0.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1.0</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Activity during the lecture attendance. Preparing seminar paper in writing and presentation in the form of Power Point presentations. The subject is divided into two parts that students submit through partial written exams or by completing the exam at the end of the semester. The exam will be passed if the students achieve at least 60%. Scoring: <60% of students did not satisfy; 60-69% sufficient (2); 70-79% good (3); 80-89% very good (4); 90-100% excellent (5).</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">R. Najjar, Microemulsions - An Introduction to Properties and Applications, InTech, 2012.</td><td></td><td></td></tr>
<tr><td colspan="3">C. Sell, The Chemistry of Fragrances - From Perfumer to Consumer, RSC Publishing, Ashford, UK, 2006.</td><td></td><td></td></tr>
<tr><td colspan="3">P. K. Bidyut, S.P. Moulik, Uses and applications of Emulsions and Microemulsions, Curr. Sci. 80 (2001) 990.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">P. Bošković, V. Sokol, T. Zemb, D. Touraud, W. Kunz. Weak Micelle-Like Aggregation in Ternary Liquid Mixtures as Revealed by Conductivity, Surface Tension, and Light Scattering, J. Phys. Chem. B 119 (2015) 9933.
I. Kralova, J. Sjöblom Surfactants Used in Food Industry: A Review, J. Disper. Sci. Technol. 30 (2009) 1363.
J. Drapeau, M. Verdier, D. Touraud, U. Kröckel, M. Geier, A. Rose, W. Kunz, Effective Insect Repellent Formulation in both Surfactantless and Classical Microemulsions with a Long-Lasting Protection for Human Beings, Chem. Biodivers. 6 (2009) 934.
C. A. Katz, Z. J. Calzola, J. K. N. Mbindyo, Structure and Solvent Properties of Microemulsions, J. Chem. Educ. 85 (2008) 263.
K. Holmberg, B. Jönsson, B. Kronberg, B. Lindman, Surfactants and polymers in aqueous solutions, John Wiley and Sons, Chichester, 2003.
J.L. Salager, Surfactants: Types and Uses, Universidad de los Andes, 2002.</td></tr>
<tr><td>Quality assurance methods that ensure the</td><td colspan="6">Quality and performance monitoring will be performed at three levels: (1) university, (2) faculty, through the Quality Control Committee, (3) teaching level.</td></tr>
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acquisition of exit competences	
Other (as the proposer wishes to add)	