**Course SYLLABUS form**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Basic data of the subject** | | | | |
| **Academic Unit:** | | **Faculty of Mathematics & Natural Sciences** | | |
| **Course title:** | | **Physical chemistry of macromolecule** | | |
| **Level:** | | **Master** | | |
| **Course status:** | | **Mandatory** | | |
| **Study year:** | | **II** | | |
| **Number of hours per week:** | | **2+2** | | |
| **Credit value – ECTS:** | | **6** | | |
| **Time / location:** | | **Tuesday 10:30, class no: 1** | | |
| **Lecturer:** | | **Prof.Asoc.Dr. Bashkim Thaçi** | | |
| **Contact details:** | | [**bthaqi75@gmail.com**](mailto:bthaqi75@gmail.com) | | |
|  | | | | |
| **Course description** | | This course will help students to gain basic knowledge of physical and chemical properties of macromolecules. | | |
| **Course objectives:** | | The aim of this course is to enable students to modern concepts of physical and chemical properties of macromolecules, its synthesis, types of reactions to synthesize, their kinetics. Methods for determining the molecular weight of macromolecules and their morphology; thermodynamics of macromolecular substances; liquid crystals; viscosity and viscoelasticity (rheological properties); osmotic pressure. | | |
| **Learning outcomes:** | | After completing this course students will be able to:  • Gain sufficient skills and experience to synthesize macromolecular products.  • To recognize the structure of various compounds and their forms and so improves the idea of ​​obtaining other new products.  • To know the procedures of determining the structure of macromolecules.  • To be prepared with enough knowledge that will successfully use either in research laboratories or in industrial ones. | | |
|  | | | | |
| **Contribution on student load (must correspond with learning outcomes)** | | | | |
| **Activity** | | **Hours** | **week** | **Total /hours** |
| Lectures | | 2 | 15 | 30 |
| Exercise theoretical/laboratory | | 2 | 15 | 30 |
| Practice work | |  |  |  |
| Contact with lecturer/consultations | | 1 | 15 | 15 |
| Field exercises | |  |  |  |
| Mid-terms, seminars | | 1 | 5 | 5 |
| Homework | | 1 | 10 | 10 |
| Individual time spent studying (at the library or home) | | 2 | 15 | 30 |
| Final preparation for the exam | | 2 | 5 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | | 2 | 5 | 10 |
| Projects, presentations, etc. | | 2 | 5 | 10 |
| **Total** | |  |  | **150** |
|  | | | | |
| **Teaching methods** | | Lectures, discussions, exercises, consultations, homework, colloquies and exams. | | |
|  | |  | | |
| **Evaluation methods** | | The first test is 20%,  second test is 20%,  attendance 5%,  engagements in practical exercises 15% and  final exam 40%. | | |
| **Literature** | | | | |
| **Basic Literature:** | 1. S. F. SUN, PHYSICAL CHEMISTRY OF MACROMOLECULES, Basic Principles and Issues  Second Edition, St. John’s University Jamaica, Neë York 2004. | | | |
| **Additional Literature** | 2. Chin Han Chan, Chin Hua Chia, Sabu Thomas, Physical Chemistry of Macromolecules: Macro to Nanoscales, CRC Press Taylor & Francis Group 2014.  3. P. W. Atkins and J. de Paula: Atkins' Physical Chemistry, 7th ed., Oxford Univ. Press, Oxford, 2002. | | | |

|  |  |
| --- | --- |
| **Designed study plan:** | |
| **Week** | **Lectures which will be held** |
| ***First week:*** | Colloid and macromolecule |
| ***Second week:*** | Synthesis of macromolecule compounds |
| ***Third week:*** | Kinetic and synthesis of polymers. |
| ***Fourth week:*** | Determination of molecular weight. |
| ***Fifth week:*** | Thermodynamic of macromolecule. |
| ***Sixth week:*** | Chemical transformation of polymers |
| ***Seventh week:*** | First test |
| ***Eighth week:*** | Liquids crystal. |
| ***Ninth week:*** | Liquid-crystal phases |
| ***Tenth week:*** | Elasticity of rubber |
| ***Eleventh week:*** | Viscosity and viscoelasticity, biologic polymer. |
| ***Twelfth week:*** | Osmotic pressure. |
| ***Thirteenth week:*** | Diffusion. |
| ***Fourteenth week:*** | Sedimentation |
| ***Fifteenth week:*** | Second test |
|  |  |
| **Designed study plan:** |  |
|  | **Exercises which will be held** |

|  |
| --- |
| Influence of additives on the thermal stability of polymeric materials. |
| Influence of additives on the oxidative stability of polymeric materials. |
| Coal preparation |
| Coal used as membrane material |
| Acetate cellulose used as membrane material |
| Membrane tested with reverse osmosis apparature |
| First colloquia |
| Determination of thermodynamic properties |
| Determination of polystyren vizkosity |
| Determination of moleculare wight of polystyrene. |
| Determination of osmotic pressure |
| Determination of diffusion coefficient |
| Determination of sedimentation coefficient |
| Second colloquia |
| **Academic policies and rules of conduct:** |
| Attendance at lectures and exercises should be regular and scheduled time. Students must be in commensurate to the general rules of the university. For specific rules and specifics of organizing lectures and exercises, students are notified by the professor of the course. |