

| FACULTY CHEMISTRY | | | | | |
|---|---|----------------------|------------|---------|---------|
| SUBJECT CARD | | | | | |
| Name of subject in English: | Synthesis and Fabrication of Nano-engineering Systems | | | | |
| Main field of study (if applicable): | Chemical and Process Engineering | | | | |
| Specialization (if applicable): | Chemical nanoengineering | | | | |
| Profile: | academic | | | | |
| Level and form of studies: | 2nd level, full-time | | | | |
| Kind of subject: | obligatory | | | | |
| Subject code: | ICC025002 | | | | |
| Group of courses: | NO | | | | |
| | Lecture | Classes | Laboratory | Project | Seminar |
| Number of hours of organized classes in University (ZZU) | 30 | 15 | | | |
| Number of hours of total student workload (CNPS) | 60 | 30 | | | |
| Form of crediting | Exam | crediting with grade | | | |
| For group of courses mark (X) final course | X | X | | | |
| Number of ECTS points | 2 | 1 | | | |
| including number of ECTS points for practical (P) classes | | 1 | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1 | 0,5 | | | |
| PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES | | | | | |
| 1. Basic knowledge of organic and inorganic chemistry 2. Basic knowledge of spectroscopic methods | | | | | |
| SUBJECT OBJECTIVES | | | | | |
| C1. To provide students with the issues of organic chemistry in nano-engineering systems including bioorganic chemistry C2. To provide students with the issues of nano-engineering mimetic systems C3. To provide students with the molecular receptors issues C4. To provide students with the structure, properties and use of particular groups of compounds used in nano-engineering systems C6. To acquaint students with scientific literature and literature examples | | | | | |
| SUBJECT EDUCATIONAL EFFECTS | | | | | |
| related to knowledge: | | | | | |
| PEK_W01 – student knows what nano-engineering is and knows the scope of its applicability | | | | | |
| PEK_W02 – student knows the properties of particular groups of compounds used in nano-engineering | | | | | |
| PEK_W03 – student knows the methods of nanosystems synthesis | | | | | |

PEK_W04 – student knows the types of interactions between molecules and knows what compounds form individual interactions

related to skills:

PEK_U01 - student can find a suitable group of compounds that can be used in nano-engineering systems

PEK_U02 - student can construct complex questions in factographic databases and find and analyze professional literature

PEK_U03 - student can analyze the types of interactions responsible for the interaction of molecules

PEK_U04 - student can distinguish and describe the properties of particular groups of compounds applicable in nano-engineering systems

PEK_U05 - student is able to design a potential receptor or mimetic of a biologically active compound based on the acquired knowledge in nano-engineering systems

related to social competences:

PEK_K01 student is able to work in a group, performing various roles including group leader

PEK_K02 student is ready to critically evaluate his/her knowledge and received content

PROGRAMME CONTENT

| Lectures | | Number of hours |
|-----------------|---|------------------------|
| Lec 1 | Presentation of the general characteristics of the subject | 2 |
| Lec 2 | Organic chemistry reactions | 2 |
| Lec 3 | Click chemistry and nano-scaffolds | 2 |
| Lec 4 | Synthesis, structure, properties and application of rotaxanes and catenanes in nano-engineering systems | 2 |
| Lec 5 | Synthesis, properties and application of dendrimers in nano-engineering systems | 2 |
| Lec 6 | Peptide and protein mimetics in nano-engineering systems | 2 |
| Lec 7 | Cyclodextrins in nano-engineering systems | 2 |
| Lec 8 | Synthesis, structure, properties and application of cyclophanes in nano-engineering systems | 2 |
| Lec 9 | Designing, properties and application of calixarenes | 2 |
| Lec 10 | Mimetics of DNA and RNA nucleic acids in nano-engineering systems | 2 |
| Lec 11 | Enzyme mimetics - Molecular imprinting polymers | 2 |
| Lec 12 | Micellar catalysis, liposomes, fatty acid mimetics | 2 |
| Lec 13 | Construction, properties and application of porphyrins | 2 |
| Lec 14 | Carbohydrates and their derivatives in nano-engineering systems | 2 |
| Lec 15 | Receptors for compounds with diol moieties | 2 |
| | Total | 30 |
| Classes | | Number of hours |
| Cl1 | General characteristics of the subject nano-engineering systems | 1 |
| Cl2 | Organic chemistry reactions | 1 |
| Cl3 | Click chemistry and nano-scaffolds | 2 |
| Cl4 | Synthesis, structure, properties and application of rotaxanes and catenanes in nano-engineering systems | 1 |

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|---|---|--|
| CI5 | Synthesis, properties and application of dendrimers in nano-engineering systems | 1 |
| CI6 | Peptide and protein mimetics in nano-engineering systems | 1 |
| CI 7 | Cyclodextrins in nano-engineering systems | 1 |
| CI 8 | Synthesis, structure, properties and application of cyclophanes in nano-engineering systems | 1 |
| CI 9 | Designing, properties and application of calixarenes | 1 |
| CI 10 | Mimetics of DNA and RNA nucleic acids in nano-engineering systems | 1 |
| CI 11 | Enzyme mimetics - Molecular imprinting polymers | 1 |
| CI 12 | Micellar catalysis, liposomes, fatty acid mimetics | 1 |
| CI 13 | Construction, properties and application of porphyrins | 1 |
| CI 14 | Carbohydrates and their derivatives in nano-engineering systems | 1 |
| | Total | 15 |
| TEACHING TOOLS USED | | |
| Lecture N1 information lecture N2 problem lecture N3 multimedia presentation | | |
| Classes N8 multimedia presentation | | |
| EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT | | |
| Evaluation (F – forming (during semester), P – concluding (at semester end)) | Educational effect number | Way of evaluating educational effect achievement |
| F1 Classes | C11-C114 | Score from multimedia presentation |
| P Lecture | multimedia presentation | |
| PRIMARY AND SECONDARY LITERATURE | | |
| [1] Source literature - scientific publications | | |
| SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS) | | |
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