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|---|---|---|
| **1.** | **Field of study** | **Biomedical Engineering** |
| 2. | Faculty | Faculty of Science and Technology |
| 3. | Academic year of entry | 2024/2025 (winter term) |
| 4. | Level of qualifications/degree | first-cycle studies (in engineering) |
| 5. | Degree profile | general academic |
| 6. | Mode of study | full-time |

| **7.** | **General information about the module** |
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| **Module name** | **Basics of biomaterial modelling using the molecular dynamics method** |
| Module code | 08-IBIB-S1-17-5-PMBM |
| Number of the ECTS credits | 4 |
| Language of instruction | Polish |
| Purpose and description of the content of education | Moduł "Podstawy modelowania biomateriałów metodą dynamiki molekularnej" ma umożliwić studentowi/studentce poznanie zagadnień praktycznego wykorzystania klasycznej dynamiki molekularnej do symulacji zjawisk i procesów w materiałach do zastosowań biomedycznych. Dzięki temu student/studentka powinna rozumieć znaczenie eksperymentu komputerowego nie tylko w opisie właściwości fizyko-chemicznych biomateriałów, ale również w projektowaniu nowych biomateriałów inżynierskich do zastosowań technicznych i medycznych. Realizacja powyższych celów będzie wymagała poznania podstaw matematyczno-fizycznych metody dynamiki molekularnej oraz oraz jej ograniczeń. Moduł umożliwi również nabycie praktycznych umiejętności w zakresie projektowanie algorytmów oraz tworzenia programów w środowisku wybranego pakietu programowego dedykowanego do symulacji metodą klasycznej dynamiki molekularnej. |
| List of modules that must be completed before starting this module (if necessary) | not applicable |

**8. Learning outcomes of the module**

| Code | Description | Learning outcomes of the programme | Level of competenc (scale 1-5) |
|---|---|---|---|
| K_1 | Wiedza z zakresu podstaw matematycznych i fizycznych metody klasycznej dynamiki molekularnej | W01<br>W03<br>W06 | 3<br>2<br>1 |
| K_2 | Znajomość zasad projektowania algorytmów symulacji komputerowych metodą klasycznej dynamiki molekularnej | W13 | 2 |
| K_3 | Umiejętność analizy zagadnienia inżynierskiego, doboru właściwego algorytmu oraz projektowania programów do symulacji wybranych zjawisk i procesów fizykochemicznych oraz właściwości biomateriałów metodą dynamiki molekularnej | U01<br>U10 | 3<br>2 |
| K_4 | Umiejętność opracowania dokumentacji dotyczącej realizacji symulacji oraz zawierającej omówienie jej wyników | U03 | 3 |
| K_5 | Odpowiedzialność za pracę własną oraz umiejętność określania priorytetów i podziału zadania w pracy zespołowej | K03 | 3 |

| 9. | Methods of conducting classes | |
|---|---|---|
| **Code** | **Category** | **Name (description)** |
| a01 | Lecture methods / expository methods | Formal lecture/ course-related lecture<br>*a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided* |
| a05 | Lecture methods / expository methods | Explanation/clarification<br>*explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course* |
| c06 | Demonstration methods | Demonstration-imitation<br>*a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours* |
| d01 | Programmed learning methods | Working with a computer<br>*e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline* |

| 10. | Forms of teaching | | | | |
|---|---|---|---|---|---|
| **Code** | **Name** | **Number of hours** | **Assessment of the learning outcomes of the module** | **Learning outcomes of the module** | **Methods of conducting classes** |
| k_fs_1 | lecture | 15 | exam | K_1, K_2, K_3, K_4, K_5 | a01 |
| k_fs_2 | laboratory classes | 30 | course work | K_1, K_2, K_3, K_4, K_5 | a05, c06, d01 |

| 11. | The student's work, apart from participation in classes, includes in particular: | | |
|---|---|---|---|
| **Code** | **Category** | **Name (description)** | **Is it part of the BUNA?** |
| a01 | Preparation for classes | Search for materials and review activities necessary for class participation<br>*reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes* | No |
| a02 | Preparation for classes | Literature reading / analysis of source materials<br>*reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class* | No |
| a03 | Preparation for classes | Developing practical skills<br>*activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)* | No |
| a05 | Preparation for classes | Production/preparation of tools, materials or documentation necessary for class participation<br>*developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes* | No |
| b01 | Consulting the curriculum and the organization of classes | Getting acquainted with the syllabus content<br>*reading through the syllabus and getting acquainted with its content* | Yes |

| | | | |
|---|---|---|---|
| c02 | Preparation for verification of learning outcomes | Studying the literature used in and the materials produced in class<br>*exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class* | No |
| d01 | Consulting the results of the verification of learning outcomes | Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes<br>*reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes* | Yes |
| d02 | Consulting the results of the verification of learning outcomes | Development of a corrective action plan as well as supplementary/corrective tasks<br>*reviewing and selecting tasks and activities enabling the elimination of errors indicated by the academic teacher, their verification or correction resulting in completing the task with at least the minimum passing grade* | Yes |

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: https://usosweb.us.edu.pl.