**DESCRIPTION OF THE COURSE OF STUDY**

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|---|---|---|
| **Course code** | | |
| **Name of the course in** | Polish | **Metody komputerowe modelowania układów złożonych** |
| | English | **Computer methods of modeling complex systems** |

## 1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

| | |
|---|---|
| **1.1. Field of study** | physics |
| **1.2. Mode of study** | full-time |
| **1.3. Level of study** | 2nd degree |
| **1.4. Profile of study** | general academic |
| **1.5. Person/s preparing the course description** | Prof. dr hab. Wojciech Broniowski |
| **1.6. Contact** | wojciech.broniowski@ujk.edu.pl |

## 2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

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|---|---|
| **2.1. Language of instruction** | English |
| **2.2. Prerequisites** | knowledge of some elementary computer programming, pre-farably Mathematica |

## 3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

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|---|---|---|
| **3.1. Form of classes** | | 15 hrs of lectures |
| **3.2. Place of classes** | | Courses in the UJK teaching rooms of the Faculty of Exact and Natural Sciences |
| **3.3. Form of assessment** | | homework |
| **3.4. Teaching methods** | | lecture |
| **3.5. Bibliography** | **Required reading** | all materials provided during the course |
| | **Further reading** | |

## 4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

| **4.1. Course objectives (including form of classes)** |
|---|
| **Knowledge (lectures and laboratories)**<br>C1. Knowledge of modeling complex physical systems<br>**Abilities (laboratories and project)**<br>C2. Application of basic computer methods used in complex physical systems |

| **4.2. Detailed syllabus (including form of classes)** |
|---|
| **Lectures:**<br>Monte Carlo methods, Ising model, Metropolis algorithm, nonlinear dynamics, catastrophe theory, de-terministic chaos, quantum chaos. Mathematica is used as a basic tool. |

**4.3. Education outcomes in the discipline**

| **Code** | **A student, who passed the course** | **Relation to learning outcomes** |
|---|---|---|
| within the scope of **KNOWLEDGE:** | | |
| W01 | has knowledge of modeling complex physical systems | SD_W01<br>SD_W02<br>SD_W07 |
| within the scope of **ABILITIES:** | | |
| U01 | has skills to apply basic computer methods used in complex physical systems | SD_U01<br>SD_U03<br>SD_U07 |

| 4.4. Methods of assessment of the intended learning outcomes | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Teaching outcomes** *(code)* | **Method of assessment (+/-)** | | | | | | | | | | | | | | | | | | | | |
| | **Oral answer** | | | **Project** | | | **Self-study** | | | **Group work** | | | **Homework** | | | | | | | | |
| | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | | ***Form of classes*** | | |
| | *L* | *C* | *P* | *L* | *C* | *P* | *L* | *C* | *P* | *L* | *C* | *P* | *L* | *C* | *P* | *L* | *C* | *P* | *L* | *C* | *P* |
| W01 | ***x*** | | | | | | ***x*** | | | | | | ***x*** | | | | | | | | |
| U01 | ***x*** | | | | | | ***x*** | | | | | | ***x*** | | | | | | | | |

| 4.5. Criteria of assessment of the intended learning outcomes | | |
|---|---|---|
| **Form of classes** | **Grade** | **Criterion of assessment** |
| **lecture (L)** | **3** | at least 50% and not more than 60% of the total number of available points |
| | **3,5** | more than 60% and not more than 70% of the total number of available points |
| | **4** | more than 70% and not more than 80% of the total number of available points |
| | **4,5** | more than 80% and not more than 90% of the total number of available points |
| | **5** | more than 90% of the total number of available points |

**5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT**

| **Category** | **Student's workload** | |
|---|---|---|
| | **Full-time studies** | **Extramural studies** |
| *NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/* | | |
| *Participation in lectures* | 15 | |
| *Participation in laboratories/project* | | |
| *Preparation for the exam* | | |
| *Others* | | |
| *INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/* | | |
| *Preparation for the lecture, doing homework* | 15 | |
| *Preparation for the laboratories* | | |
| *Preparation for the exam* | | |
| *Gathering materials for the project* | | |
| *Preparation of multimedia presentation* | | |
| *Others** | | |
| *TOTAL NUMBER OF HOURS* | **30** | |
| ECTS credits for the course of study | **2** | |

***Accepted for execution*** *(date and signatures of the teachers running the course in the given academic year)*

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