**description of the course of study**

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| **Course code** | **0912-7LEK-F-11-GG** |
| **Name of the course in** | Polish | **Inżynieriagenetyczna** |
| English | **Genetic engineering** |

1. **LOCATION OF THE course OF STUDY within the system of studies**

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| **1.1. Field of study** | Medicine |
| **1.2. Mode of study** | Full-time |
| **1.3. Level of study** | Uniform Master’s studies |
| **1.4. Profile of study\*** | General academic |
| **1.5. Person preparing the course description** | dr n. biol. Michał Majchrzak |
| **1.6. Contact** | zaklad.mikrobiologii@wszzkielce.pl |

1. **General characteristicS of the course of study**

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| **2.1. Language of instruction** | English |
| **2.2. Prerequisites\*** | BiochemistryGeneticsMolecular Biology |

1. **DETAILED CHARACTERISTICS OF THE COURSE OF STUDY**

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| * 1. **Form of classes**
 | Lectures- 15h (including 5 of e-learning) |
| * 1. **Place of classes**
 | Courses in the teaching rooms of the UJK |
| * 1. **Form of assessment**
 | Credit with grade |
| * 1. **Teaching methods**
 | Problem-based lecture |
| * 1. **Bibliography**
 | **Required reading** | 1. Strachan T, Goodship J., Chinnery P., Genetics and Genomics in Medicine, Garland Science 2014.2. Natural Genetic Engineering and Natural Genome Editing, ISBN: 9781573317658. |
|  **Further reading** | 1. Nicholl D. Introduction to Genetic Engineering, Cambridge University Press, Cambridge 2008.
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1. **Objectives, syllabus CONTENT and intended LEARNING outcomes**

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| * 1. **Course objectives *(lecture)***

C1 Familiarize students with the basic methods of genetic engineering.C2 Application of genetic engineering for the production of therapeutic proteins.C3 Acquaintance with the subject of induced stem cells.C4 Overview of the foundations of gene therapy and its applications. |
| * 1. **Detailed syllabus *(lecture)***

Gene transfer to animal cells. Vectors for cloning in animals. Selectable markers for the isolation of transformants following the introduction of the foreign gene(s) into animal cells. Genetic manipulation in animals - production of transgenic animals. Reprogramming somatic cells and somatic cloning of animals.Gene transfer into plant cells.Advanced transgenic technologies: induced expression of the transgene and CRISPR-Cas technique. Application of recombinant DNA technology for the production of therapeutic proteins and metabolic engineering. Prevention of the spread of the modified genes in the environment. Medical application of induced stem cells and tissue engineering. Basic techniques used in gene therapy and the examples of their use to correct genetic dysfunction. |

**4.3 Intended learning outcomes**

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| **Code** | **A student, who passed the course** | **Relation to learning****outcomes** |
| within the scope of **knowledge**, the graduate knows and understands: |
| W01 | benefits and risks arising from the presence in the ecosystem of genetically modified organisms (GMOs); | C.W10. |
| W02 | the principles of combination therapies in oncology, algorithms for diagnostic and therapeutic procedures in most common human cancers; | E.W26. |
| W03 | the causes, symptoms, principles of diagnosis and therapeutic management of the most common hereditary diseases; | E.W37. |
| W04 | legal regulations and basic methods concerning medical experiments and conducting other medical research with the consideration of the basic method of data analysis; | G.W8. |
| within the scope of **ABILITIES**, the graduate knows how to: |
| U01 | analyze genetic crossing over, pedigree qualities and human diseases as well as the estimated risk of having a child with chromosomal aberrations; | C.U1. |
| U02 | identify indications for prenatal diagnosis;  | C.U2. |
| U03 | make a decision on the need to perform cytogenetic and molecular tests; | C.U3. |
| U04 | asses the risk of disclosure of a particular disease in the offspring based on family predisposition and the influence of environmental factors; | C.U5. |

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|  | within the scope of **SOCIAL COMPETENCE**, the graduateisable to: |  |
| K01 | establish and maintaindeep and respectfulcontact with the patient and show understandingtowardsideological and culturaldifferences;  | H.S1 |
| K02 | do whatisright for the patient; | H.S2 |
| K03 | respectmedicalconfidentiality and patient’srights; | H.S3 |
| K04 | takeactionsconcerning the patient on the basis of ethicalprinciples, beingaware of socialconditions and restrictionsresulting from illness; | H.S4 |
| K05 | recognizehis/herownlimitations and self-evaluateeducationaldeficiencies and needs; | H.S5 |
| K06 | promotehealthylifestyle; | H.S6 |
| K07 | usereliableinformationsources; | H.S7 |
| K08 | conclude on the basis of ownsurveys and observations; | H.S8 |
| K09 | introducerules of socialconduct and teamwork to the group of specialists, includingspecialists form othermedicalprofessionsalso in the multicultural and multinational environment; | H.S9 |
| K10 | giveopinionsconcerningvariousaspects of professionalactivity; | H.S10 |
| K11 | takeresponsibility for owndecisionsmadeduringprofessionalactivitiesincludingownsafety and safety of otherpeople; | H.S11 |

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| * 1. **Methods of assessment of the intended learning outcomes**
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| **Teaching** **outcomes*****(code)*** | **Method of assessment (+/-)** |
| **Exam /written\*** | **Test\*** | **Project\*** | **Effort** **in class\*** | **Self-study\*** | **Group work\***  | **Others\*****Observation** |
| ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** | ***Form of classes*** |
| *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* | *L* | *C* | *...* |
| W01 – W04; U01 – U04 | **x** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K101-K11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ***+*** |  |  |

***\*delete as appropriate***

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| * 1. **Criteria of assessment of the intended learning outcomes**
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| **Form of classes** | **Grade** | **Criterion of assessment** |
|  **lecture (L)** | **3** | LectureAchievement 61-68% of the total number of points |
| **3,5** | LectureAchievement 69-76% of the total number of points |
| **4** | LectureAchievement 77-84% of the total number of points |
| **4,5** | LectureAchievement 85-92% of the total number of points |
| **5** | LectureAchievement 93-100% and more of the total number of points |

* [**Thresholds**](https://pl.bab.la/slownik/angielski-polski/thresholds) **are valid from 2018/ 2019 academic year**
1. **BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT**

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| **Category** | **Student's workload** |
| **Full-time****studies** |
| *NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/* | **15** |
| *Participation in lectures\** | **10** |
| *Participation in classes, seminars, laboratories\** |  |
| *Preparation in the exam/ final test\** |  |
| *Others\** | **51** |
| *INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/* | **10** |
| *Preparation for the lecture\** | **10** |
| *Preparation for the classes, seminars, laboratories\** |  |
| *Preparation for the exam/test\** |  |
| *Gathering materials for the project/Internet query\** |  |
| *Preparation of multimedia presentation* |  |
| *Others\** |  |
| *TOTAL NUMBER OF HOURS* | **25** |
| ECTS credits for the course of study | **1** |

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

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1 e-learning (withoutparticipation of the lecturer)