

DESCRIPTION OF THE COURSE OF STUDY

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| Course code | 0511-2BIO-BC14-G | |
| Name of the course in | Polish | Genetyka |
| | English | Genetics |

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

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| 1.1. Field of study | Biology |
| 1.2. Mode of study | full-time studies |
| 1.3. Level of study | First-degree studies |
| 1.4. Profile of study* | general-academic |
| 1.5. Person/s preparing the course description | dr hab Artur Kowalik, dr Ernest Skowron |
| 1.6. Contact | artur.kowalik@ujk.edu.pl, ernest.skowron@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 genetics, biochemistry and organic chemistry |

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

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|-------------------------|--|---|
| 3.1. Form of classes | lectures, laboratory, (including e-learning) | |
| 3.2. Place of classes | Classes in the teaching facilities of UJK | |
| 3.3. Form of assessment | Examination, graded credit | |
| 3.4. Teaching methods | Lecture and discussions, laboratory courses | |
| 3.5. Bibliography | Required reading | 1. Brown T.A., Genomy, PWN, Warszawa, 2019. (Genomes 4 4th Edition English) 2. Fletcher H.L., I. Hickey G.I., Winter P.C., Genetyka - krótkie wykłady, PWN, Warszawa, 2010 i późniejsze (BIOS Instant Notes in Genetics 4th Edition English) 3. Bal J., Genetyka Medyczna i Molekularna, PWN, Warszawa, 2019. |
| | Further reading | 1. Connor M., Ferguson-Smith. M., Podstawy genetyki medycznej, PZWL, Warszawa 2014. (Essential Medical Genetics, Includes Desktop Edition, 6th Edition English) 2. Alberts B., Bray D., Johnson A., Lewis J., Raff M., Roberts K., Walter P., Podstawy biologii komórki. Wprowadzenie do biologii molekularnej, PWN, Warszawa, 1999. (Molecular Biology of the Cell 5th ed.) 3. Drewa G., Ferenc T. (red.), Podstawy genetyki dla studentów i lekarzy, Elsevier Urban & Partner, Wrocław, 2003. 4. Read A., Donnai D., New Clinical Genetics, third edition 3rd Edition 2015 |

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

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| <p>4.1. Course objectives (including form of classes)</p> <p>C1. Knowledge- Acquire theoretical knowledge of classical genetics (Mendel's and Morgan's rules), population genetics (population structure, heredity and consanguinity) and molecular genetics (transcription and translation process, selected issues in biotechnology) (lectures).</p> <p>C2. Learning about breeding methods and the type of <i>Drosophila melanogaster</i> mutants (laboratory exercises).</p> <p>C3. Developing the ability to use theoretical knowledge in practice (analysis of the results of <i>Drosophila melanogaster</i> breeding crosses, chi-square test, back and test cross, <i>Pisum</i> and <i>Zea</i> inheritance) and solving genetic tasks (laboratory exercises)</p> |
| <p>4.2. Detailed syllabus (including form of classes)</p> <p>Lecture: Divisions of genetics. Basic genetic concepts. Mendel's laws. Additions and modifications to the rules of inheritance established by Mendel. Localization of genes in chromosomes. Inheritance of sex-linked traits. Genetic analysis of haploid eukaryotic organisms. Genetic analysis of prokaryotic organisms and viruses. Structure of the genome in eukaryotic organisms. Mutagenesis, molecular mechanisms of mutation. The action of mutagenic agents. Reperation and recom-</p> |

bination of DNA. Human genetic diseases and their treatment options. Causes of cancer. The genetic code, transcription and its role in gene expression, translation. Regulation of gene expression in prokaryotes. Mechanisms of regulation of gene expression in eukaryotes. Transposons and other mobile genetic elements. Genetic engineering. Selected issues in biotechnology. Genetic basis of cell and tissue differentiation. Genetics of development of multicellular organisms. Extranuclear inheritance. Genetic structure of populations. Changes in the genetic structure of populations. Heredity. Consanguinity.

Laboratory;

Breeding methodology and review of *Drosophila melanogaster* mutants. Genetic concepts, chi-square test, Pisum and Zea type inheritance, test and backcross. Types of gene interaction. Inheritance of sex in *Drosophila melanogaster*, humans and birds. Dependent inheritance of partial linkage and complete linkage traits and gene mapping. Characteristics of variation in living organisms. Genetic balance of populations, factors that violate this balance.

4.3 Intended learning outcomes

| Code | A student, who passed the course | Relation to learning outcomes |
|---|--|---|
| within the scope of KNOWLEDGE: | | |
| W01 | Knows and understands the concepts and rules of genetics as well as statistical methods in the interpretation of biological phenomena (chi-square test) | BIO1A_W01 BIO1A_W02 BIO1A_W04 BIO1A_W06 |
| W02 | Describes the course of experiments (genetic crosses) | BIO1A_W01 BIO1A_W03 |
| W03 | Explains the differences between genetic regularities | BIO1A_W01 BIO1A_W02 BIO1A_W03 BIO1A_W06 BIO1A_W11 |
| W04 | Knows and understands the relationships between genetic processes (meiosis and dependent and independent inheritance of traits) and has knowledge of the flow of genetic information and inheritance | BIO1A_W01 BIO1A_W02 BIO1A_W03 BIO1A_W06 BIO1A_W11 |
| within the scope of ABILITIES: | | |
| U01 | Distinguishes between different types of mutants of <i>Drosophila melanogaster</i> | BIO1A_U01 BIO1A_U02 |
| U02 | is able to use theoretical knowledge in practice and interpret their results and draw conclusions | BIO1A_U01 BIO1A_U02 BIO1A_U03 |
| U03 | Constructs a genetic crossword (test crossword, complementation test) | BIO1A_U01 BIO1A_U02 BIO1A_U03 |
| U04 | Can carry out basic tests using genetic material - isolation of nucleic acids and PCR reactions and explain the obtained results based on literature data | BIO1A_U02 BIO1A_U03 BIO1A_U06 BIO1A_U07 BIO1A_U08 |
| within the scope of SOCIAL COMPETENCE: | | |
| K01 | Works both individually and as part of a team | BIO1A_K01 BIO1A_K02 BIO1A_K03 |
| K02 | Takes care to conduct experiments safely | BIO1A_K01 BIO1A_K02 |
| K03 | Observes the conditions for working with living material and genetic material | BIO1A_K02 BIO1A_K03 |

| 4.4. Methods of assessment of the intended learning outcomes | | | | | | | | | | | | | | | | | | | | | |
|--|----------------------------|---|-----|-----------------|---|-----|-----------------|---|-----|------------------|---|-----|-----------------|---|-----|-----------------|---|-----|---|---|-----|
| Teaching outcomes (code) | Method of assessment (+/-) | | | | | | | | | | | | | | | | | | | | |
| | Exam oral/written* | | | Test* | | | Project* | | | Effort in class* | | | Self-study* | | | Group work* | | | Others* e.g. standardized test used in e-learning | | |
| | 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 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| W02 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| W03 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| W04 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| U01 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| U02 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| U03 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| U04 | + | - | | - | + | | | | - | + | | - | + | | - | + | | | | | |
| K01 | - | - | | - | - | | | | - | + | | - | + | | - | + | | | | | |
| K02 | - | - | | - | - | | | | - | + | | - | + | | - | + | | | | | |
| K03 | - | - | | - | - | | | | - | + | | - | + | | - | + | | | | | |

*delete as appropriate

| 4.5. Criteria of assessment of the intended learning outcomes | | |
|---|-------|--|
| Form of classes | Grade | Criterion of assessment |
| lecture (L) (including e-learning) | 3 | Obtaining 51-65% of the total number of points possible to obtain |
| | 3,5 | Obtaining 66-75% of the total number of points possible to obtain |
| | 4 | Obtaining 76-85% of the total number of points possible to obtain |
| | 4,5 | Obtaining 86-95% of the total number of points possible to obtain |
| | 5 | Obtaining 96-100% of the total number of points possible to obtain |
| laboratory (C)* (including e-learning) | 3 | Obtaining 51-65% of the total number of points possible to obtain |
| | 3,5 | Obtaining 66-75% of the total number of points possible to obtain |
| | 4 | Obtaining 76-85% of the total number of points possible to obtain |
| | 4,5 | Obtaining 86-95% of the total number of points possible to obtain |
| | 5 | Obtaining 96-100% of the total number of points possible to obtain |

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/ | 67 | |
| Participation in lectures* | 30 | |
| Participation in laboratories* | 30 | |
| Preparation in the exam/ final test* | 7 | |
| Others (please specify e.g. e-learning)* | | |
| INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/ | 58 | |
| Preparation for the lecture* | 25 | |
| Preparation for the laboratories* | 25 | |
| Preparation for the exam/test* | 8 | |
| Gathering materials for the project/Internet query* | | |
| Preparation of multimedia presentation | | |
| Others * | | |
| TOTAL NUMBER OF HOURS | 125 | |
| ECTS credits for the course of study | 5 | |

*delete as appropriate

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

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