
Course title: GENETICS AND BASICS OF GENOMICS

ECTS credit allocation (and other scores): 5.5

Semester: autumn

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Natural sciences

Language: English

Number of hours per semester: 60

Course coordinator/ Department and e-mail: dr Piotr Androsiuk/Dept. Plant Physiology, Genetics and Biotechnology/piotr.androsiuk@uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES: Mendel's Laws. Selection of pure lines as cross-breeding components. The issue of dominance, recessiveness, codominance. The rules governing the frequency of gamete formation and their random mating. The morphological and molecular phenotype. Interaction of non-allelic genes. Sex determination and genes linked with sex. Genetic linkage. Inheritance of quantitative traits. Genetic mapping and application of genetic maps. Elements of population genetics. Nucleic acid extraction methods. Polymerase chain reaction. Techniques for the analysis of genomic variability. Application of organellar genomes in genetic studies. Repetitive elements of the genome and their use in genetic analyses

LECTURES: Mendelian genetics. Chromosomal theory of inheritance. Multiple alleles. Sex determination, and sex-linked traits. Structure of genetic material. Structure of the Procarota and Eucaryota genome. Replication, transcription, translation, genetic code. Regulation of gene expression in Procaryota and Eucaryota. Non-heredity and hereditary variability of organisms. Qualitative and quantitative traits. Elements of population genetics. Point mutations and chromosomal aberrations. DNA repair mechanisms. Induced mutagenesis. Genetic mapping. Organellar genome. New technologies in genomics. The use of molecular markers in plant and animal breeding. Repetitive elements of the genome

Learning purpose: Obtaining knowledge concerning classical and molecular genetics, incl. cutting-edge methods of genome analysis

On completion of the study programme the graduate will gain:

Knowledge: classical (Mendelian) and molecular genetics, modern technologies in Genomic studies

Skills: to plan and perform genetic experiment, to apply selected molecular techniques in the field of genetics and genomics

Social Competencies: ability to self-education and creativity, ability to work in a group

Basic literature: 1) Brown T.A, Genomes, wyd. Oxford: Wiley-Liss, 2014 ; 2) Snustad P.D., Simmons M.J., Principles of genetics, wyd. John Wiley @ Sons, Inc., 2006

Supplementary literature: 1) Turner P.C., McLennan A.G., Bates A.D., White M.H.R., Krótkie wykłady – Biologia molekularna, wyd. PWN, 2011 ; 2) Węgleński P., Genetyka molekularna, wyd. PWN, 2006

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 62

Student's independent work: 75.