Academic course description

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| MASTER ‘S PROGRAMME**Molecular Genetics**1ST YEAR OF STUDY, 1ST SEMESTER |

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| **Course title** | **Genomics** |
| Course code | BGM6101 |
| Course type | full attendance |
| Course level | 2nd cycle (master’s degree) |
| Year of study, semester | 1st year of study, 1st semester |
| Number of ECTS credits | 6 |
| Number of hours per week | 4 (2 lecture hours + 2 seminar hours) |
| Name of lecture holder | Lucian Gorgan |
| Name of seminar holder | Lucian Gorgan |
| Prerequisites | Advanced level of English  |
| A | **General and course-specific competences** |
|  | **General competences**:* The usage of terms and in-depth concepts, working principles and methodologies characteristic for the field of study and specialization "Molecular genetics".
* Investigation and interpretation of the molecular basis of organization and functioning of living matter for the elaboration of studies / reports that can be published and / or applied in a professional level.
* The use of molecular analysis equipments and tools specific to different professional laboratories
* **Course-specific competences**:
* to understand the structures of different genome types and the differences between them
* to differentiate the influence of the main evolution factors on the individual status
* to use genomics-specific scientific language
* to understand the importance of knowing the mutational processes and the adaptability of the organisms
* to know the main methods and techniques for genomic analysis
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| B | **Learning outcomes** |
|  | * Initiation into the knowledge of molecular structures and mechanisms at the genomic level.
* Awareness of the influence of environmental factors on individual status.
* The development of the skills needed to analyze nucleic acids and to correlate structures with the spatial and temporal factors of evolution.
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| C | **Lecture content** |
|  | The concept of *Genome*The genome in prokaryotes and eukaryotesComparative genomicsMetagenomeEvolutionary changes in amino acid and DNA sequencesMolecular and adaptive variationsGenetic diversity. Diversity indicatorsMolecular phylogenetics and modeling. Molecular phylogeographyDNA-protein interactionsDatabases, sequences, annotationsFunctional and medical genomics |
| D | **Recommended reading for lectures** |
|  | 1. Avise J C., 2000 – Phylogeography: the history and formation of species, Harvard college.
2. Bertorelle G., Bruford M. W., Hauffe H. C., Rizzoli A. P., Vernesi C., 2009 - Population Genetics for Animal Conservation, Cambridge University Press.
3. Höglund J., 2009 - Evolutionary Conservation Genetics, Oxford University Press.
4. Lesk A., 2007 – Introduction to Genomics, Oxford University Press
5. Lewin B., 2008 – Genes, 10th ed., Oxford University Press
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| E | **Seminar content** |
|  | Molecular markersSampling and analysis techniquesMethods for identifying polymorphismsStatistical methods used in comparative genomicsDatabases - DNA sequences, complete genomesGene annotations. BLAST Algorithm Sequence alignmentPhylogeny and molecular phylogeography.Phylogenetic trees, trees calibration |
| F | **Recommended reading for seminars** |
|  | 1. Nei M., Kumar S., 2000 – Molecular evolution and phylogenetics, Oxford University Press.
2. Saccone C., Pesole C., 2003 - Handbook of comparative genomics - Principles and Methodology, John Wiley & Sons.
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| G | **Education style** |
| learning and teaching methods | systematic exposure; conversation; didactic demonstration |
| assessment methods | Exam |
| Language of instruction | English |