Functional Genetics and Bioinformatics: **Bioinformatics**

(2-year Master's program, 120 credits; recommended study plan)

1st Winter Semester

Introduction to Omics & Biotechnology
(KMB/921)
Practicals in Omics & Biotechnology
(KMB/933)
Seminars in Omics & Biotechnology
(KMB/926)
Practical Computing for Biologists
(KMB/925)
Bioinformatics for Biologists
(KMB/613)
The New Statistics for Exp. Biologists
(KMB/929)
Bioethics
(KMB/913)
Masters Thesis Assignment
(KMB/885)
Master's English Examination – TOEFL
(OJZ/930) *

*can be passed anytime during the studies

Python I
(UAI/735I) G1

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function
(KMB/914)
Essays in Omics & Biotechnology
(KMB/918)

BASH Programming
(KMB/934)
Introduction to R
(KMB/922)
Genomics
(KMB/919)

Databases
(UAI/697E) G1

Molecular Physiology and Metabolism
(KMB/924)
Structural Bioinformatics
(KMB/927) G3

2nd Winter Semester

Master thesis, Practical part
(KMB/881)

Transcriptomics and Epigenomics
(KMB/930)

Data Analysis in Natural Sciences
(UAI/330E)
Python in Data Sciences
(UAI/331) G2

Molecular Phylogenetics
(KPA/604)
Molecular Ecology
(KZO/412I) G3

2nd Summer Semester

Master thesis, Practical part
KMB/881
Genetics – Colloquia
(KMB/180)

Microbial Ecology and Genomics
(KPA/172) G3

Core courses (common to all): 75 credits

Obligatory courses: 19 credits

Obligatory elective courses: ≥ 4 credits of G1, ≥ 4 credits of G2, ≥ 9 credits of G3

Functional Genetics and Bioinformatics: **Human Molecular Genetics**

(2-year Master's program, 120 credits; recommended study plan)

1st Winter Semester

Introduction to Omics & Biotechnology
(KMB/921)
Practicals in Omics & Biotechnology
(KMB/933)
Seminars in Omics & Biotechnology
(KMB/926)
Practical Computing for Biologists
(KMB/925)
Bioinformatics for Biologists
(KMB/613)
The New Statistics for Exp. Biologists
(KMB/929)
Bioethics
(KMB/913)
Masters Thesis Assignment
(KMB/885)
Master's English Examination – TOEFL
(OJZ/930) *

*can be passed anytime during the studies

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function
(KMB/914)
Essays in Omics & Biotechnology
(KMB/918)

Fundamental Human Genetics
(KMB/932)
Molecular Mechanisms of Disease
(KMB/923)

Epigenetics & Regulation of Gene Expr.
(KMB/618)
Molecular Immunology
(KME/087E)
Molecular Physiology and Metabolism
(KMB/924)
Structural Bioinformatics
(KMB/927)
Advanced Methods of Mol. Biology 2
(KMB/602E)

2nd Winter Semester

Master thesis, Practical part
(KMB/881)

Clinical Genetics & Genomics
(KMB/915)
Diagnosis of Human Disease
(KMB/917)

Developmental Biol. - Mol. Perspective
(KMB/916)
Cytogenomics
(KMB/935)

2nd Summer Semester

Master thesis, Practical part
KMB/881
Genetics – Colloquia
(KMB/180)

Trends in Biomedicine
(KME/744E)

Core courses (common to all): 75 credits
Obligatory courses: 22 credits
Obligatory elective courses: ≥ 10 credits

Functional Genetics and Bioinformatics

Recommended courses for students enrolled in summer semester

Bioinformatics

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function *(5 ECTS)*
(KMB/914)
Essays in Omics & Biotechnology
(2 ECTS)
(KMB/918)
Practical Computing for Biologists II
(3 ECTS)
(KMB/939)

BASH Programming *(4 ECTS)*
(KMB/934)
Introduction to R *(4 ECTS)*
(KMB/922)
Genomics *(6 ECTS)*
(KMB/919)

Human Molecular Genetics

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function *(5 ECTS)*
(KMB/914)
Essays in Omics & Biotechnology
(2 ECTS)
(KMB/918)
Practical Computing for Biologists II
(3 ECTS)
(KMB/939)

Fundamental Human Genetics *(5 ECTS)*
(KMB/932)
Molecular Mechanisms of Disease
(6 ETCS)
(KMB/923)

a) Epigenetics & Regulation of Gene Expr. *(5 ECTS)*
(KMB/618)
OR
b) Molecular Physiology and Metabolism *(3 ECTS)* (KMB/924) and Advanced Methods of Mol. Biology 2 *(2 ECTS)* (KMB/602E)

Molecular Cell Biology and Genetics

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function *(5 ECTS)*
(KMB/914)
Essays in Omics & Biotechnology
(2 ECTS)
(KMB/918)
Practical Computing for Biologists II
(3 ECTS)
(KMB/939)

Molecular Mechanisms of Disease *(6 ETCS)*
(KMB/923)
Epigenetics & Regulation of Gene Expr.
(5 ECTS)
(KMB/618)
Advanced Methods of Mol. Biology 2
(2 ECTS) (KMB/602E)
Molecular Physiology and Metabolism
(3 ECTS) (KMB/924)

Biotechnology

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function *(5 ECTS)*
(KMB/914)
Essays in Omics & Biotechnology
(2 ECTS)
(KMB/918)
Practical Computing for Biologists II
(3 ECTS)
(KMB/939)

Gene & Protein Engineering *(4 ECTS)*
(KMB/938)

a) Molecular Physiology and Metabolism *(3 ECTS)*
(KMB/924)

For an overall overview of the programme ***click here***

Core courses (common to all)

Obligatory courses

Obligatory elective courses

Functional Genetics and Bioinformatics: **Molecular Cell Biology and Genetics**

(2-year Master's program, 120 credits; recommended study plan)

1st Winter Semester

Introduction to Omics & Biotechnology
(KMB/921)
Practicals in Omics & Biotechnology
(KMB/933)
Seminars in Omics & Biotechnology
(KMB/926)
Practical Computing for Biologists
(KMB/925)
Bioinformatics for Biologists
(KMB/613)
The New Statistics for Exp. Biologists
(KMB/929)
Bioethics
(KMB/913)
Masters Thesis Assignment
(KMB/885)
Master's English Examination – TOEFL
(OJZ/930) *

*can be passed anytime during the studies

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function
(KMB/914)
Essays in Omics & Biotechnology
(KMB/918)

Epigenetics & Regulation of Gene Expr.n
(KMB/618E)
Advanced Methods of Mol. Biology 2
(KMB/602E)
Molecular Physiology and Metabolism
(KMB/924)

Thermodynamics of Biomolecular Sys.
(UCH/012E)
Structural Biochemistry
(UCH/014E)
Evolutionary Genetics
(KMB/221E)

2nd Winter Semester

Master thesis, Practical part
(KMB/881)

Developmental Biol. - Mol. Perspective
(KMB/916)

Bioenergetics
(KEBR/631)
Cytogenomics
(KMB/935)

2nd Summer Semester

Master thesis, Practical part
KMB/881
Genetics – Colloquia
(KMB/180)

Model Organisms in Biomedical Research
(KMB/931)

Introduction to Virology
(KMB/910)

Core courses (common to all): 75 credits
Obligatory courses: 21 credits
Obligatory elective courses: ≥ 10 credits

Functional Genetics and Bioinformatics: **Biotechnology**

(2-year Master's program, 120 credits; recommended study plan)

1st Winter Semester

Introduction to Omics & Biotechnology
(KMB/921)
Practicals in Omics & Biotechnology
(KMB/933)
Seminars in Omics & Biotechnology
(KMB/926)
Practical Computing for Biologists
(KMB/925)
Bioinformatics for Biologists
(KMB/613)
The New Statistics for Exp. Biologists
(KMB/929)
Bioethics
(KMB/913)
Masters Thesis Assignment
(KMB/885)
Master's English Examination – TOEFL
(OJZ/930) *

*can be passed anytime during the studies

1st Summer Semester

Master thesis, Practical part
(KMB/881)
Genetics – Colloquia
(KMB/180)
Cell Structure and Function
(KMB/914)
Essays in Omics & Biotechnology
(KMB/918)

Gene & Protein Engineering
(KMB/938)

Molecular Physiology and Metabolism
(KMB/924)

2nd Winter Semester

Master thesis, Practical part
(KMB/881)

Molecular Biology & Biotechnology of Cyanobacteria
(KMB/928)
Microbial Biotechnology
(KBE/262E)

Industrial Enzymology
(KMB/920)
Bioenergetics
(KEBR/631)

2nd Summer Semester

Master thesis, Practical part
KMB/881
Genetics – Colloquia
(KMB/180)

Plant Biotechnology
(KMB/937)
Animal Biotechnology
(VURH/xxx)

Algal Biotechnology
(KMB/912)
Biotechnological & Mol. Techniques in Crop Management
(KMB/936)

Core courses (common to all): 75 credits Obligatory courses: 21 credits Obligatory elective courses: ≥ 9 credits

Functional Genetics and Bioinformatics: **Core courses for all specializations**

1st Winter Semester

Introduction to Omics & Biotechnology
(KMB/921)
Practicals in Omics & Biotechnology
(KMB/933)
Seminars in Omics & Biotechnology
(KMB/926)
Practical Computing for Biologists
(KMB/925)
Bioinformatics for Biologists
(KMB/613)
The New Statistics for Exp. Biologists
(KMB/929)
Bioethics
(KMB/913)
Masters Thesis Assignment
(KMB/885)
Master's English Examination – TOEFL
(OJZ/930)*

*can be passed anytime during the studies

Prerequisites & Preconditions

Cell Structure and Function (KMB/914) – Molecular Biology (Molekulární biologie KMB/250) or equivalent course from former university; Basic Cell Biology (Základy buněčné biologie KMB/023) or equivalent from former university

BASH Programming (KMB/934) – Practical Computing For Biologists I (KMB/925) or II (KMB/xxx)

Introduction to R (KMB/922) – Practical Computing For Biologists I (KMB/925) or II (KMB/xxx)

Fundamental Human Genetics (KMB/932) – Genetics, Molecular Biology (KMB/250) or equivalent course from former university

Epigenetics & Regulation of Gene Expr. (KMB/618) – knowledge of basics of molecular biology (passing an introductory molecular biology course)

Advanced Methods of Molecular Biology 2 (KMB/602E) – students should understand principles of molecular biology techniques; the students should have basic knowledge from cell biology, molecular biology, developmental biology and genetics.

Gene & Protein Engineering (UCH/020) – basic knowledge of biochemistry, genetics and cell biology; a minimal laboratory practice – pippeting, preparation of biological buffers, calculation of solution concentrations.

Animal Biotechnology (VURH/ANBIF) – we expect basíc knowledge of animal reproduction and genetics.