Minor Biomolecular and Neurosciences track Biomolecular Sciences 2017-2018
Hier vind je de beschrijvingen van de vakken in de minor. Meer inhoudelijke informatie over de minor vind je op minor.vu.nl.
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Experimental Cell Biology I

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<td>Faculteit</td>
<td>Fac. der Aard- en Levenswetenschappen</td>
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<tr>
<td>Coördinator</td>
<td>dr. D. Bald</td>
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<td>Examinator</td>
<td>dr. D. Bald</td>
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<tr>
<td>Lesmethode(n)</td>
<td>Practicum, Werkgroep, Hoorcollege</td>
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**Doel vak**
The student has insight in biological processes fundamental in living cells. The student has an overview of techniques used in Cell Biology. The student can work with scientific literature.

**Inhoud vak**
We start with a brief repetition of basic Cell Biology and then go ahead with in-depth discussion of modern Cell Biology, with a particular focus on current and emerging experimental techniques. In Research Lectures, current topics in Cell Biology will be discussed.

Topics:
- General cell organization and function, protein, DNA and RNA function, cell cycle and (programmed) cell death
- Transcription factors, gene expression, and epigenetics
- Protein modification, sorting, and membrane transport
- Receptors and signal transduction
- Basic techniques in Cell Biology (PCR, Electrophoresis, ELISA, Current models organisms in Cell Biology (e.g. E. coli, yeast, C. elegans, drosophila, zebra fish, mammalian models)
- Visualization techniques in Cell Biology
Each student will also work on a literature assignment.

**Onderwijsvorm**
Lectures (26h), work discussions related to the literature assignment (6h), self-study in groups to repeat lecture material and for literature assignment.

**Toetsvorm**
Written exam (2/3), literature assignment (1/3)

**Literatuur**
No book mandatory. Useful books are:
Alberts et al. Molecular Biology of the Cell (more extensive, recommended for Biomolecular track) or
Aanbevolen voorkennis
Basic (first and second year level) courses in Cell Biology

Overige informatie
Compulsory portal course Minor Biomolecular Sciences and Neurosciences.
This minor course requires a minimum of 25 participants to take place.
This course is offered in week 1-4 of period 1 and is to be taken together with the accompanying course
Experimental Cell Biology II.
This course is based on first and second year level courses in Cell Biology.

Experimental Cell Biology II

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Doel vak
The student has an overview of advanced techniques in Cell Biology. The student is acquainted with current open questions and on-going developments in Cell Biology.
The student can use the gained knowledge in Cell Biology for the design of a research proposal.

Inhoud vak
In-depth discussion of modern Cell Biology, with a particular focus on current and emerging experimental techniques. In Research Lectures, current state-of-the-art topics in Cell Biology will be discussed.

Lecture topics include advanced -omic approaches, such as genomics, proteomics, metabolomics and interactomics.
Research lectures on
• Protein (GFP) labeling and visualization techniques
• (Confocal) Microscopy and Live Cell Imaging
• Proteomics and mass spectrometry
• Systems Biology
• Knock-out and RNAi techniques
• Interactomics techniques
The student will work out and submit a research proposal on a chosen topic in Cell Biology (group work).

Onderwijsvorm
Lectures (28 h), work discussions related to the research proposal (6h) self-study in groups to repeat lecture material and for research proposal.

Toetsvorm
Written exam (2/3), research proposal (1/3)

Literatuur
No book mandatory. Useful books are:
Alberts et al. Molecular Biology of the Cell (more extensive, recommended for Biomolecular track)
For the research proposal you will also work with scientific literature relevant for the chosen topic (search/discuss in small groups).

Vereiste voorkennis
This course is to be taken together with the accompanying course Experimental cell Biology I.

Aanbevolen voorkennis
Basic (first and second year level) courses in Cell Biology, participation in Experimental Cell Biology I.

Overige informatie
Compulsory portal course of the minor Biomolecular Sciences and Neurosciences.
This minor course requires a minimum of 25 participants to take place.
This course is offered in weeks 5-8 of period 1 and is to be taken together with the course Experimental cell Biology I (in week 1-4 of period 1).

Guestlecture:
Dr. J. van Buul (Sanquin). Basic (first and second year level) courses in Cell Biology, participation in Experimental Cell Biology I.

From Protein to Cell

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Doel vak
Final attainment:
The student knows:
- Principles and applications of protein over-expression, purification,
structure, function, and inhibition as well as the function of antibiotics as protein inhibitors.
The student can:
• Apply protein biochemistry methods (protein over-expression, affinity chromatography, spectro-photometry, fluorescence, protein labeling methods, gel electrophoresis, activity tests).

Inhoud vak
The course consists of a mixture of lectures, practicals, computer sessions and individual study. We will cover concepts/methods/techniques that you can use to study a broad range of relevant questions, e.g:
• How can I produce a protein using bacteria?
• How can I purify a protein?
• How can I investigate structure and function of a protein?
• How can I predict structure and function of a protein?
• How do antibiotics work as protein inhibitors?
• How can I design my experimental strategy?
• Which factors I have to think about to make my experiment successful?

Onderwijsvorm
The course consists of a mixture of lectures (8h), practical’s (36h), computer sessions (3h) and individual study.

Toetsvorm
Reports (50 %), oral presentation (50 %).

Literatuur
Lecture slides and experimental protocols. Any biochemistry textbook can be used for repetition.

Aanbevolen voorkennis
Participation in the Portal Courses Experimental Cell Biology I and II.

Doelgroep
Students in the Minor Biomolecular Sciences & Neurosciences, Track Biomolecular Sciences.

Overige informatie
Part of the Minor Biomolecular Sciences & Neurosciences, Track Biomolecular Sciences.
This course is scheduled in the first half of period 2.
This minor course requires a minimum of 25 participants to take place.
A lab coat is mandatory for the lab practical lab work. Participation in the Portal Courses Experimental Cell Biology I and II.

Molecular Cell Biology

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**Doel vak**
To obtain a basic understanding of the functioning of living cells at the molecular level, and introduction to qualitative and quantitative methods applicable inside and outside the living cell. To learn to design and execute studies where these methods are applied, and to interpretate the results.

Specifically, the students will be trained in:
- The use and interpretation of information about cellular processes such as energy metabolism, regulation of gene expression, oxygen damage, apoptosis and signal transduction.
- The design and execution of simple experiments concerning gene expression, signal transduction, growth and metabolic processes.
- Application of Metabolic Control Analysis to quantify distribution of control and regulation of cellular processes by individual cellular reactions.
- The use of existing computer models of molecular systems in the cell to explore the behaviour of these systems.

**Inhoud vak**
- Introduction to Metabolic Control Analysis and its basis in enzyme kinetics.
- Laws and practical applications of Metabolic Control Analysis, and extension of this method to include gene expression.
- Modular kinetic analysis of cellular networks.
- Structure and function of respiratory networks, with Paracoccus denitrificans as example.
- Regulation of gene expression during nitrification and denitrification in microorganisms.
- Use of a depository of mathematical models to explore reaction systems in the cell.
- Control Analysis of signal transduction as a key in the understanding of cancer.
- Application of the presented methods to a case study: fighting the parasite that causes sleeping sickness.

**Onderwijsvorm**
Lectures (16.5 contact hours); workgroups (3 contact hours, obligatory); computer practical (1.5 contact hours, obligatory); practical project in the department of Molecular Cell Physiology (depending on the project ca. 20 contact hours, obligatory)

**Toetsvorm**
Written exam (70%)
Presentation (30%)

**Literatuur**
A syllabus is available on the Canvas site.

**Vereiste voorkennis**
Participation in the course “From Protein to Cell” (1st half of period 2)
Doelgroep
Part of the minor Biomolecular Science and Neuroscience, track Biomolecular Science.

Overige informatie
For the practical a laboratory coat will be supplied. After the course, the coat will be sterilised. Participation in the course "From Protein to Cell" (1st half of period 2) is compulsory.

Molecular Microbiology

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Doel vak
To learn how theory and experimental approaches are combined to answer research questions. For that purpose, the complex molecular processes in the bacterial cell serve as central theme. The emphasis is on structure and function of the cell envelope, its role in bacterial pathogenesis and vaccine development. At the end, the students are able to understand and know:
- Fundamental molecular processes that are important for growth, functioning and pathogenicity of micro-organisms.
- Practical and experimental approaches in molecular microbiology, immunology, bacterial DNA technology, protein techniques.

Inhoud vak
A series of 12 lectures (24h contact)

A laboratory project of 3 weeks:
- writing a Research Proposal (week 1; 3h contact)
- performing Laboratory Research (week 2 and 3; 70h contact [full-time days])
- preparing a presentation and participating in a symposium (3h contact)

Onderwijsvorm
Theory; Lectures series
Research project: in a small group with a supervisor planning and conducting a research project in the laboratory of that supervisor. The full participation in the laboratory project is obligatory.
Toetsvorm
Deliverables for the course are:
- A written Research proposal (25%)
- A presentation at a symposium (25%)
- A written exam on the lectures series (50%; the mark should be > 5.0 to pass the course)

Literatuur
Background:

Each Lecture will be supported by a concise review on the topic, but also includes data and insights of the lecturer. For the Lectures a list of reviews is provided. These are updated yearly to keep the course up-to-date. The list will be published on the Canvas site prior to the start of the course.

Doelgroep
Students of Minor Biomolecular Sciences and of other Minors with biomolecular or biomedical background that can use this course as optional course.

Intekenprocedure
Maximum number of participants: 44

Overige informatie
Guest Lecturer: Dr. P. van der Ley; Laboratory of Vaccine Research, National Institute of Health and the Environment, Bilthoven.

Course with a lot of direct contact with the professors, associate and assistant professors, PhD's and postdocs.