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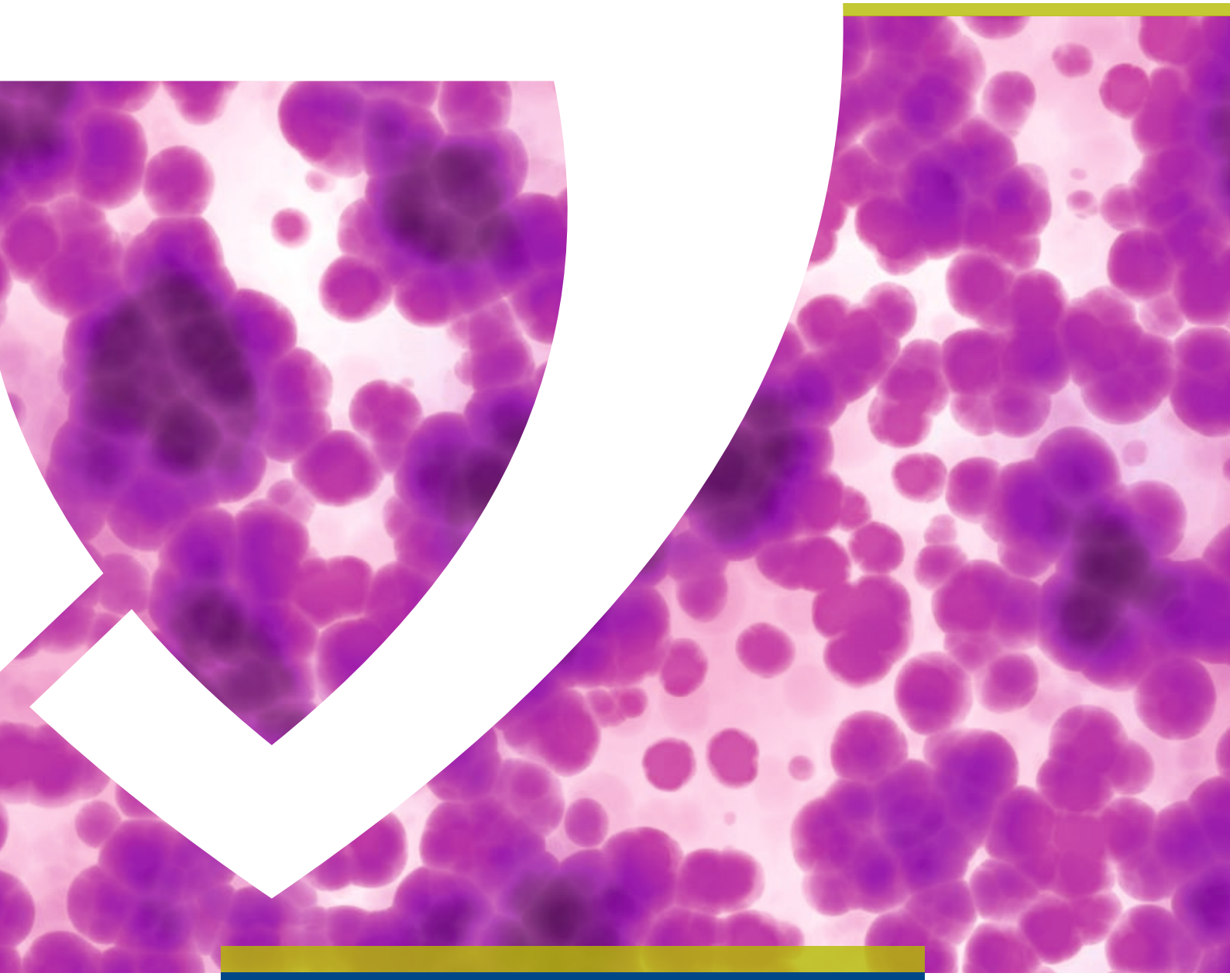

School of Engineering and Science

Molecular Life Science

Graduate Program

Contents

1 Preamble

This is the MoLife graduate handbook. The handbook will be revised regularly. Please check on the Jacobs University Web page at
http://ses.jacobs-university.de/ses/molife/ for the latest version.

The procedural rules in this handbook are labeled as Jacobs University rules, SES (School of Engineering and Science) rules, or MoLife rules.

In case of conflict, Jacobs University rules (which are taken from the Graduate Policies at **http://www.jacobs-university.de/policies-graduate**) always take precedence.

2 The Molecular Life Science Graduate Program

"Living organisms normally contain no functionless compounds, although there are some biomolecules whose functions are not yet understood."
(Albert L. Lehninger, 1970)

Research in Molecular Life Science plays a central role in all disciplines of the Life Sciences. Currently, Molecular Life Science Research is at an exciting point of development, since for the first time a mechanistic understanding of the phenomenon of Life in all its facets is within reach. Molecular Life Science Research has a wide impact on modern life in different areas such as Medicine, Plant and Animal Biology, Biotechnology and even Ethics. The Jacobs University Molecular Life Science graduate program (MoLife) invites students to participate and take an active role in the development of this fascinating field. Faculty from the Molecular Life Sciences and neighboring fields at Jacobs University Bremen have combined their expertise in a graduate program which provides students with the benefits of cooperation and synergy in research and teaching.
The Molecular Life Science program (MoLife) is the graduate program for all molecular life sciences at the Jacobs University Bremen (Jacobs University). Its main aim is to comprehensively train students who join with a BSc (or generally after three years of study) for independent research work. MoLife graduates are qualified to work towards a PhD by research.

2.1 General Structure of the Program

The MoLife program takes two years to the MSc, and another three (altogether five) years to the PhD. The first stage, up to the MSc or the qualifying examination, may be funded by a graduate stipend from Jacobs University. Additional non-funded spaces may be offered to applicants.
The first academic year is dedicated to course work and three laboratory rotations (of about 60 days each), to be done in the laboratories of the MoLife faculty. The purpose of these laboratory rotations is for students to become acquainted with the research and methods in order to be able to choose a laboratory for the MSc and/or PhD thesis.
The second academic year is dedicated to the MSc thesis (which is usually done in one of the rotation laboratories), and additional course work. The MSc stage is concluded either by the submission of an MSc thesis and its defense with the acquisition of 120 credit points altogether, or by passing a qualifying examination, held after finishing all required course work and laboratory rotations except the MSc thesis work. The qualifying examination constitutes no degree but it allows the student to immediately continue working towards the PhD at any MoLife research group without having to submit or defend an MSc thesis. After completion of the MSc thesis or the qualifying exam, students may (upon consent of a MoLife faculty member) continue their studies towards the PhD. Funding for this stage comes from the respective laboratory.
For Jacobs University graduates (those students who concluded undergraduate studies at Jacobs University with a BSc degree) and who have very good grades, MoLife offers the possibility of a "Fast Track" that allows them to begin with their PhD research work after only one year.

Table 1: Assigment of ECTS Credits to Academic Years in MoLife

	Courses	Number	Credits	Sum of credits in year
Year 1	Obligatory Lectures	4x2,5	10	
	Fundamental Lectures	2	10	
	MoLife Lectures	2	10	
	Lab Rotations	3	45	75
Year 2	MoLife Lectures	3	15	
	Master Thesis	1	30	45

2.2 Specialization Areas

The MoLife program offers different specialization areas (SA). The SAs currently implemented are:

- Cellular and Molecular Biology
- Computational Biology
- Molecular Biophysics
- Molecular Biotechnology
- Molecular Genetics

Each student must select two SAs, and depending on this choice, there will be different combinations of allowed lectures and laboratory rotations. One of these SAs will be later selected for Master thesis. The SAs define certain undergraduate courses (”fundamental lectures”) as eligible, one of which has to be taken by each student. In addition each student takes two MoLife lectures from each SA and performs in total three laboratory rotations.

Table 2: Assigment of ECTS Credits to Specialization Areas in MoLife

Category	Courses	Credits	Sum
General Courses	MoLife Research Seminar I and II *	5	
	MoLife Presentation Course I and II **	5	10
Spec. Area I	Fundamental Lecture	5	
	MoLife Lecture	5	
	MoLife Lecture	5	
	Lab Rotation I or II	15	
	Lab Rotation III	15	
	Master Thesis	30	75
Spec. Area II	Fundamental Lecture	5	
	MoLife Lecture	5	
	MoLife Lecture	5	
	Lab Rotation I or II	15	30
Miscellaneous	additional MoLife Lecture	5	5
Total Sum of Credits			**120**

* Course numbers: Fall= 530451 and Spring= 530482

** Course numbers: Fall= 530431 and Spring= 530432

The study program for students in MoLife comprises four phases:

1. Students must select the first SA during their initial application to the MoLife program. The initial laboratory rotation will be conducted in one of the laboratories of the selected first SA.
2. After the first semester, all students select the second SA. The second laboratory rotation takes place in one of the laboratories of the second SA.
3. During the second semester, the students decide on one of the two SAs as their major focus and perform a third laboratory rotation in a second laboratory of the main SA.
4. At the end of the first academic year students select one of the laboratories of their main SA for master thesis. Alternatively, students may decide to take the qualifying examination and conduct a PhD project (provided that funding is ensured). During the third and fourth semester, all students attend MoLife graduate lectures and work towards their MSc thesis.

The research groups open for laboratory rotations in each SA are shown in the following table. More detailed descriptions of the faculty members' research interests can be found on the MoLife website, or on their individual faculty pages. MoLife students are advised to study the research interest of all MoLife faculty members carefully in order to identify potential research groups for laboratory rotations and their research areas of interest.

Table 3: Assigment of faculty to SAs (R= representative of the SA)

	Cellular and Molecular Biology	Computational Biology	Molecular Biotechnology	Molecular Biophysics	Molecular Genetics
Benz			x		
Brix	R				
Fritz				x	
Gabel	x		x	x	
Hammann	x				x
Hütt		R			
Kleinekathöfer		x		x	
Kuhnert				x	
Lahore			R		
Lerchl				x	
Muskhelishvili					R
Nau				x	
Nevoigt			x		
Preusser		x			
Roccatano		x			
Springer	x				
Ullrich	x				x
Weingart			x	x	
Winterhalter			x	R	

For questions regarding courses and laboratory rotations students should approach the representative of the specialization area (labeled by "R").

2.3 Specific Training Aims

Studying life sciences at molecular level requires, on one hand, specialization and in depth theoretical and practical education at very diverse fields of science knowledge and, on the other hand, an interdisciplinary understanding essential for successful research. MoLife integrates these goals by offering different specialization areas, from which each student must select two. This organization ensures that each student receives a well structured practical and theoretical

education in two modern fields of molecular life science. Furthermore, the balance between necessary specialization and inter-disciplinarity of the education is ensured.
The aim of MoLife is to train students to reach subject knowledge in their area of interest, and in the molecular life sciences in general, so they can understand the current state of the field, current problems and directions, and modern methods. MoLife teaches students

- to understand that scientific knowledge is constantly evolving, and to be able to independently obtain and update their subject knowledge as above;
- to design, understand, and critique experimental approaches;
- to carry out research work in a precise, diligent, and reproducible manner;
- to understand the value and challenges and practice of interdisciplinary approaches;
- to develop their own career perspective.

2.4 Career Perspectives for MoLife Graduates

Students who graduate from MoLife with an MSc (or qualifying examination) are fully prepared and qualified to pursue research work towards a PhD. While a PhD is usually the condition for a high-level scientific position, MSc graduates can find employment worldwide in industry or government institutions, or proceed to an additional higher degree.
MoLife offers students excellent opportunities for research as documented in several publications co-authored by students from MoLife (see the MoLife Web page for details). Examples of future careers of MoLife students are also available on the MoLife Web page.

3 Study plan for MoLife

3.1 Arrival at Jacobs University, and beginning of your first semester

- Meet with academic advisor
- Meet with student advisor
- Select courses for the first semester (***Deadline: first week of semester, see academic calender***). Course selection is done via Campusnet. Typical course plan:
  - MoLife Research Seminar I (Course 530451)
  - MoLife Presentation Course I (Course 530431)
  - one ore two MoLife lectures (if two: one from the first Specialization Area, one from the second)
  - one ore two Fundamental lectures (if two: one from the first Specialization Area, one from the second)
  - First Lab Rotation (530401)
- Select a lab (from your first Specialization Area) for the first lab rotation. Selection is done on a special form (website) and submitted to Sabine Meier, Team Assistant Res. II (***Deadline: Sept. 15th***).

3.2 During your first semester:

- Decide about the second Specialization Area. (Selection is done on a special form (Website) and submitted to Sabine Meier, Team Assistant Research II (***Deadline: Jan. 10th***).
- Select a lab (from your second Specialization Area) for the second lab rotation. Selection is done on a spezial form (Website) and submitted to Sabine Meier, Team Assistant Research II (***Deadline: Jan. 10th***).

3.3 Beginning of your second semester:

- Select courses for the second semester. Typical course plan:
  - MoLife Research Seminar II (Course 530482)
  - MoLife Presentation Course II (Course 530432)
  - one ore two MoLife lectures (if two: one from the first Specialization Area, one from the second)
  - one Fundamental lecture
  - Second Lab Rotation (530402)
  - Third Lab Rotation (530403)

3.4 During your second semester:

- Decide about your main Specialization Area (for the third rotation and your MSc thesis) and on your third lab rotation. Selection is done on a special form (Website) and submitted to Sabine Meier, Team Assistant Research II (***Deadline: Apr. 10th***).

3.5 During the intersession (June, July, August) after your second semester:

- Select lab for the MSc thesis. Selection is done on a special form (Website) and submitted to Sabine Meier, Team Assistant Research II (***Deadline: July 10th***).
- August is free.

3.6 Beginning of your third semster:

- Select courses for the third semester. Typical course plan:
  - two ore three MoLife Lectures
  - MSc thesis

3.7 During your third semester:

- Decide whether you will go for an MSc examination, or for a qualifying exam and the PhD. (Talk to your advisor and/or the coordinator.)

3.8 Beginning of your fourth semester:

- Select courses for the fourth semester (if any).

3.9 During your fourth semester:

- Complete course selection summary form (website) and submit to Registrar.
- Select courses for the fourth semester (if any).
- Submission of MSc thesis and MSc examination (***Deadlines: see Section 12.2***).

4 List of Courses

4.1 Courses in Specialization areas:

Cellular and Molecular Biology

Representative: Prof. Brix

Research groups for laboratory rotations: Prof. Brix, Prof. Springer
Prof. Ullrich, Prof. Hammann

MoLife courses:

Number	Title	Instructor	Type	Prerequisites
530581	Cellular Biochemistry	Springer	Lecture, 2.5 credits	
530541	Physiology of Eucaryotic Cells	Brix	Lecture, 2.5 credits	520311
530591	Microbial Pathogenicity	Ullrich	Lecture, 2.5 credits	520251
530641	Literature Course Molecular Immunology I	Springer, Hein	Lecture, 2.5 credits	only by appointment with instructor
530642	Literature Course Molecular Immunology II	Springer, Hein	Lecture, 2.5 credits	only by appointment with instructor
530481	Models of Metabolism	Hütt	Seminar, 2.5 credits	
530611	Advanced Studies in Cellular & Molecular Biology	Brix, Springer, Ullrich	Lecture, 5 Credits	530431, 530451

Courses are offered according to the scheduling (Section 4.2)

Fundamental Lectures:

520311:	Biomedicine and Infection Biology	(Brix, Illenberger, Ullrich)
520251:	Microbiology	(Ullrich)
520322:	Immunology	(Springer)
5203XX:	Ribogenetics	(Hammann)

Computational Biology

Representatives:	Prof. Hütt
Research groups for laboratory rotations:	Prof. Hütt Prof. Kleinekathöfer Prof. Preusser Prof. Roccatano

MoLife courses:

Number	Title	Instructor	Type	Prerequisites
530462	Computational Challenges in Biology and Biophysics	Hütt, Kleinekathöfer	Lecture, 5 Credits	500321 and (560301 or 400301)
530461	Techniques for the Analysis and Structure Determination of Biomolecules I	Nau, Fritz	Lecture, 2.5 Credits	
530561	Techniques for the Analysis and Structure Determination of Biomolecules II	Kuhnert, Fritz, Nau	Lecture, 2.5 Credits	
530481	Models of Metabolism	Hütt	Seminar, 2.5 credits	500321 or 550331
530681	Models of Gene Regulation	Hütt	Seminar, 2.5 credits	
530532	Advanced Studies in Computational Biology	Hütt, Kleine-kathöfer, Preusser, Roccatano	Seminar, 5 Credits	530471, 530451

Courses are offered according to the scheduling (Section 4.2)

Fundamental Lectures:

550321:	Computational Systems Biology	(Hütt
400301:	Computational Chemistry & Biochemistry	(Roccatano)
550331:	Basic Concepts of Modeling Dynamics in Biology	(Hütt)

Molecular Biophysics

Representative:	Prof. Winterhalter
Research groups for laboratory rotations:	Prof. Benz, Prof. Fritz Prof. Kleinekathöfer, Prof. Kuhnert Prof. Nau, Prof. Gabel, Prof. Winterhalter

MoLife courses:

Number	Title	Instructor	Type	Prerequisites
530421	Biological Thermodynamics, Kinetics, and Seperation	Winterhalter, Fritz, Gabel	Lecture, 5 Credits	
530443	Biomembranes and Materials Science	Winterhalter	Lecture, 5 Credits	
530461	Techniques for the Analysis and Structure Determination of Biomolecules I	Nau, Fritz	Lecture, 2.5 Credits	
530561	Techniques for the Analysis and Structure Determination of Biomolecules II	Kuhnert, Fritz, Nau	Lecture, 2.5 Credits	
530462	Computational Challenges in Biology and Biophysics	Hütt, Kleinekathöfer	Lecture, 5 Credits	500321 and (560301 or 400301)
530621	Advanced Studies in Molecular Biophysics	Fritz, Kleinekathöfer, Benz, Gabel, Kuhnert, Nau, Winterhalter	Lecture, 5 Credits	530431, 530451
530463	Enzyme Kinetics and Membrane Transport	Benz, Winterhalter	Lecture, 2.5 Credits	

Courses are offered according to the scheduling (Section 4.2)

Fundamental Lectures:

560351:	Biophysical Chemistry I	(Winterhalter)
201321:	Biophysics	(Fritz)
400301:	Computational Chemistry & Biochemistry	(Roccatano)
500321:	Neuroendocrinology/Biorythms	(Lerchl)

Molecular Biotechnology

Representative:	Prof. Fernandez-Lahore
Research groups for laboratory rotations:	Prof. Benz Prof. Fernandez-Lahore Prof. Nevoigt Prof. Winterhalter Prof. Gabel

MoLife courses:

Number	Title	Instructor	Type	Prerequisites
530671	Microbial Engineering I	Nevoigt	Lecture, 2.5 Credits	520251, 560101
530672	Microbial Engineering II	Nevoigt	Lecture, 2.5 Credits	560102. 530671
530421	Biological Thermodynamics, Kinetics and Separation	Winterhalter, Gabel, Fritz	Lecture, 5 Credits	560201
530651	Biotechnology: Science, Business and Culture	Fernandez-Lahore	Lecture, 5 Credits	
530631	Advanced Studies in Molecular Biotechnology	Fernandez-Lahore, Winterhalter, Benz	Lecture, 5 Credits	530431, 530451
530463	Enzyme Kinetics & Membrane Transport	Benz, Winterhalter	Lecture, 2.5 Credits	

Courses are offered according to the scheduling (Section 4.2)

Fundamental Lectures:

520252:	Plant Biochemistry & Biotechnology	(Ullrich)
400301:	Computational Chemistry & Biochemistry	(Roccatano)
560332:	Industrial Biotechnology	(Nevoigt)

Molecular Genetics

Representative:	Prof. Muskhelishvili
Research groups for laboratory rotations:	Prof. Muskhelishvili Prof. Ullrich Prof. Hammann

MoLife courses:

Number	Title	Instructor	Type	Prerequisites
530551	Molecular Genetics	Muskhelishvili, Ullrich	Lecture, 5 Credits	520342
530681	Models of Gene Regulation	Hütt	Seminar, 2.5 Credits	520251, 520201
530601	Advanced Studies in Molecular Genetics	Muskhelishvili, Ullrich	Lecture, 5 Credits	530431, 530451
530***	Literature Course in RNA Biochemistry I	Hamman	Seminar, 2.5 Credits	planned for Fall 2014
530***	Literature Course in RNA Biochemistry II	Hamman	Seminar, 2.5 Credits	planned for Spring 2015

Courses are offered according to the scheduling (Section 4.2)

Fundamental Lectures:

520251:	Microbiology	(Ullrich)
520342:	Molecular Biology & Genomics	(Muskhelishvili)
520201:	Advanced Biochemistry & Molecular Biology	(Illenberger)
5203XX:	Ribogenetics	(Hammann)

General Courses

General Lectures:

Number	Title	Instructor	Type
530431	MoLife Presentation Course I	Weingart	Seminar, 2.5 credits
530451	MoLife Research Seminar I	Winterhalter	Lecture, 2.5 Credits
530432	MoLife Presentation Course II	Weingart	Seminar, 2.5 credits
530482	MoLife Research Seminar II	Winterhalter	Lecture, 2.5 Credits

Courses are offered according to the scheduling (Section 4.2)

General Laboratory Courses: Instructor of Record, Prof. Winterhalter

Number	Title	Instructor	Type
530401	Lab Rotation I	All	Laboratory Rotation
530402	Lab Rotation II	All	Laboratory Rotation
530403	Lab Rotation II	All	Laboratory Rotation

Courses are offered according to the scheduling (Section 4.2)

4.2 Scheduling:

Table 4: Course scheduling and credit points

Course number	Course name	SA	Instructor	Type	2013 Fall	2014 Spring	2014 Fall	2015 Spring
530581	Cell Biochem	CMB	Springer	Lecture		2,5		2,5
530541	Physio Cell	CMB	Brix	Lecture	2,5		2,5	
530591	Mic Path	CMB	Ullrich	Lecture		2,5		2,5
530641	LitMollmm I	CMB	Springer, Hein	Lecture	2,5		2,5	
530642	LitMollmm II	CMB	Springer, Hein	Lecture		2,5		2,5
530462	CompBiol	CompBio Biophys	Hütt, Kleinekathöfer	Lecture		5		
530461	AnalStrucDet Biomol I	CompBio Biophys	Fritz, Nau	Lecture			2,5	
530561	AnalStrucDet Biomol II	CompBio Biophys	Fritz, Nau, Kuhnert	Lecture	2,5			
530481	ModMetab	CompBio CMB	Hütt	Seminar	2,5			
530681	Mod Gene Reg	CompBio MolGen	Hütt	Seminar			2,5	
530421	BioTherm (KinSep)	Biophys BioTech	Winterhalter, Gabel, Fritz	Lecture				5
530443	BiomembMatSci	Biophys	Winterhalter	Lecture	5		5	
530463	Membrane Physics	Biophys BioTech	Benz, Winterhalter	Lecture	2,5		2,5	
530671	MicroEng I	BioTech	Nevoigt	Lecture			2,5	
530672	MicroEng II	BioTech	Nevoigt	Lecture				2,5
530651	BioBiz	BioTech	Fernandez-Lahore	Lecture			5	
530551	MolGen	MolGen	Muskhelishvili, Ullrich	Lecture	5		5	
530601	AdvStudMolGen	MoLGen	MolGen faculty	Lecture	5	5	5	5
tbd	LCRB I	CMB	Hamman	Seminar	2,5		2,5	
tbd	LCRB II	CMB	Hamman	Seminar		2,5		2,5
530611	AdvStudCell-MolBio	CMB	CMB faculty	Lecture	5	5	5	5
530621	AdvStudMol Biophys	Biophys	Biophys faculty	Lecture	5	5	5	5
530631	AdvStudMol Biotech	BioTech	BioTech faculty	Lecture	5	5	5	5
530532	AdvCompBio	CompBio	CompBio faculty	Seminar	5	5	5	5
530431	MoLifePres I	All	Weingart	Seminar	2,5		2,5	
530432	MoLifePres II	All	Weingart	Seminar		2,5		2,5
530451	MoLifeRes I	All	Winterhalter	Lecture	2,5		2,5	
530482	MoLifeRes II	All	Winterhalter	Lecture		2,5		2,5
530401	LabRot I	All	All	Lab Work	X	X	X	X
530402	LabRot II	All	All	Lab Work	X	X	X	X
530403	LabRot III	All	All	Lab Work	X	X	X	X

Courses for Fall 2014 and Spring 2015 are still subject to change.

4.3 Course descriptions:

530401 - 530403 - Laboratory Rotations I - III:

Instructors:	Prof. Dr. Mathias Winterhalter
Type:	Lab
Course Name Abbreviation:	Lab Rot I - III
Credits:	15.00
Partial Grades:	Final Grade

Course 530401 - Lab Rotation I
Course 530402 - Lab Rotation II
Course 530403 - Lab Rotation III

Students carry out three research laboratory rotations each during their first year. Each rotation lasts three months. During a rotation, students spend at least three full days per week working in the laboratory of their choice.

530421 - Biological Thermodynamics, Kinetics, and Separation:

Instructors:	Prof. Dr. Jürgen Fritz, Prof. Dr. Mathias Winterhalter, Prof. Dr. Detlef Gabel
Type:	Lecture
Course Name Abbreviation:	BioTherm(KinSep)
Credits:	5.00
Partial Grades:	Final Exam (50 percent), Midterm Exam (30 percent), Home Work (20 percent)

This course focuses on the thermodynamics and kinetics of structure formation and association of biomolecules, a theme of central importance for biological recognition. It includes a discussion of theoretical methods to describe thermodynamic driving forces for association and structure formation and how to analyze cooperative effects. The course is also intended to give a comprehensive overview on experimental methods to measure thermodynamic contributions and how to investigate the kinetics of biological processes at various time scales. In addition, separation methods that are based on differences in the physical properties of proteins and other biomolecules will be discussed in detail.

Additional Information: This semester (S2012) the course focus a bit more on the experimental methods and theoretical background to understand the biophysics of cellular membranes. The framework is still an introduction to systems, experimental and theoretical methods in biophysics. The course should address biophysics interested MSc students from MoLife or NanoMol, but also motivated 3rd year BSc students. For some topics, a basic mathematical background is certainly needed.

530431 and 530432 - MoLife Presentation Course I and II:

Instructors:	Dr. Helge Weingart
Type:	Seminar
Course Name Abbreviation:	MoLifePres I and II
Credits:	2.50
Partial Grades:	Final Grade

Course 530431 - MoLife Presentation Course I
Course 530432 - MoLife Presentation Course II

In this course MoLife students train to present their own research results and publications of other groups, discuss and interpret data and design experiments. In addition, the course will inform the students about the research taking place in MoLife groups.

530443 - Biomembranes and Materials Science:

Instructors:	Prof. Dr. Mathias Winterhalter
Type:	Lecture
Course Name Abbreviation:	BiomembMatSci
Credits:	5.00
Partial Grades:	Final Grade

The lecture ”Biomembranes and Materials Science” will cover aspects of membrane biosynthesis and functions as well as respective methods, research fields, and applications. Biological membranes are essential components of bacterial and eukaryotic organisms and fulfill diverse functions. The first part of the lecture will give insight into biosynthesis and functionality of biological membranes: lipid biosynthesis, the membrane as permeation barrier, compartmentalization of cells, membrane proteins and their functions. Transmembrane proteins play an essential role in the exchange of substrates between the surrounding environment and the cell interior. Different proteins, as porins and ion channels, allow the permeation of small molecules through biological membranes. A deeper insight in this group of proteins and the electrophysiology techniques used to study them will be pursued. The second part of the lecture will give introduction into the rapid-growing field of ”Materials Science”, focusing on the design and processing of advanced materials, manipulation of their physicochemical properties, various analytical techniques for characterization, and areas of application. Four main material classes - metals, ceramics, polymeric structures and composites - will be discussed within the course highlighting the relationship between the structure of materials at a nanoscale and their macroscopic properties. Briefly, metal and semiconductor nanoparticles, carbon-based materials, nanostructured coatings, thin films, polymeric microcontainers, and multicompartment particles will be introduced to elucidate the latest research developments in the field of materials nanotechnology and nanofabrication.

530451 and 530482 - MoLife Research Seminar I and II:

Instructors:	Dr. Mathias Winterhalter
Type:	Lecture
Course Name Abbreviation:	MoLifeRes I and II
Credits:	2.50
Partial Grades:	Participation Mandatory, Final Grade

Course 530451 - MoLife Research Seminar I
Course 530482 - MoLife Research Seminar II

The course will inform the students about the research taking place in MoLife groups and work in the different laboratories.

530461 - Techniques for the Analysis and Structure Determination of Biomolecules I:

Instructors:	Prof. Dr. Jürgen Fritz, Prof. Dr. Werner Nau
Type:	Lecture
Course Name Abbreviation:	AnalStrucDetBiomol I
Credits:	2.50
Partial Grades:	Exam 1 (50 percent), Exam 2 (50 percent)

Modern experimental methods to investigate the structure and dynamics of bio-molecules are of increasing importance to study the function of bio-molecules. The course gives an overview on the physical foundations of modern crystallographic and microscopic methods to study the structure of bio-molecules. A first part introduces to X-ray crystallographic methods to determine atomic resolution structures of proteins and nucleic acids. The second part focuses on optical, electron and atomic force microscopy techniques to investigate the structure and dynamics of single bio-molecules and complexes.

Additional Information:
All participants are strongly encouraged to fill in the teaching evaluation.

530462 - Computational Challenges in Biology and Biophysics:

Instructors:	Prof. Dr. Marc-Thorsten Hütt, Prof. Dr. Ulrich Kleinekathöfer
Type	Lecture
Course Name Abbreviation:	CompBiol
Credits:	5.00
Partial Grades:	Final Exam (40 percent), Midterm Exam (30 percent), Quizz(es) and Attendance (30 percent)

Computational approaches to analyzing, understanding and predicting biological processes have developed rapidly in the last decade and have by now an important role in virtually every fields of biological research. With these lectures we aim at highlighting the current computational achievements in different areas of biology, their limits and possible future developments. Topics include: predicting protein structure from sequences, understanding genome evolution, simulating cells, simulating membrane transport with atomic resolution, predicting epidemic

spreading of diseases and analyzing patterns of brain activity.

530463 - Enzyme Kinetic and Membrane Transport:

Instructors:	Prof. Dr. Roland Benz, Prof. Dr. Mathias Winterhalter
Type:	Lecture
Course Name Abbreviation:	MembranePhysics
Credits:	2.50
Partial Grades:	Final Exam

Physio-chemical background of chemical reactions, limitations of various models.

530481 - Models of Metabolism:

Instructors:	Prof. Dr. Marc-Thorsten Hütt
Type:	Seminar
Course Name Abbreviation:	ModMetab
Credits:	2.50
Partial Grades:	Final Grade

From the single biochemical reaction to the distribution of control in metabolic pathways and, finally, to large-scale metabolic networks, within the seminar we will discuss various attempts to model metabolism.

Additional Information:
The material will mostly be recent scientific literature and recent systems biology software (e.g. CelLDesigner or the MatLab/Mathematica flex balance analysis toolbox). Beyond systems biology, the concepts and models from this course have direct application to biochemical engineering.

Further Grading Information:
Grading will be based on seminar presentations and on active participation in the discussions. The forms of presentation are possible in this course: 1) Reviews of research articles; 2) Results from numerical simulations obtained with the software packages discussed here.

530532 - Advanced Studies in Computational Biology:

Instructors:	Prof. Dr. Marc-Thorsten Hütt, Prof. Dr. Ulrich Kleinekathöfer, Prof. Dr. Tobias Preusser, Prof. Dr. Danilo Roccatano
Type:	Seminar
Course Name Abbreviation:	AdvCompBio
Credits:	5.00
Partial Grades:	Final Exam (40 percent), Midterm Exam (30 percent), Quizz(es) and Attendance (30 percent)

This course comprises small computer projects and the discussion of recent literature in computational biology; special emphasis is on various aspects of network biology, in particular on the network organization of metabolic luxes and on the distribution of gene expression levels

on transcriptional regulatory networks.

530541 - Physiology of Eukaryotic Cells:

Instructors:	Prof. Dr. Klaudia Brix
Type:	Lecture
Course Name Abbreviation:	Physio Cell
Credits:	2.50
Partial Grades:	Final Exam, Presentation, Active Participation

The aim of cell biology is to explain life from molecules through cells to tissues and organisms. Millions of cells and numerous cell types are necessary to maintain the physiology of complex organisms such as a mouse or a human being. Hence eukaryotic cells are diverse in structure and function. This course tends to reach a better understanding on how eukaryotic cells interact with each other in order to form tissues that make up organs such as e.g. the heart, intestine, kidney, liver or the thyroid gland. The focus of the course will be on cellular differentiation to distinct types of cells and their integration into certain organs thereby enabling and maintaining life of an organism. As the course deals with physiology of eukaryotic cells, we will also have to include pathophysiology by discussing common and rare diseases afflicting our body's organs and cells. The course will be held in an interactive lecture style with active participation of the Students. The course material will comprise a selection of textbooks, review articles and original research papers dealing with cells and their function in tissues and organs. Students will contribute by presenting research papers of their own choice or following the suggestions of the Instructor. Student presentations will be included into the respective lecture topics as talks or posters. In depth discussions of specific topics is expected from this as well as related courses in this specialization area (see Handbook for a comprehensive list of our offers). Therefore, the course invites participation of Students who already gained knowledge in the fields of Molecular Cell Biology and/or Molecular Medicine. The course will be conducted in 14 sessions. Grading is based on active participation (20 percent), student presentation (40 percent) and the results of a final exam conducted in the last session (40 percent).

530551 - Molecular Genetics:

Instructors:	Prof. Dr. Georgi Muskhelishvili, Prof. Dr. Matthias Ullrich
Type:	Lecture
Course Name Abbreviation:	MolGen
Credits:	5.00
Partial Grades:	Final Exam (40 percent), Midterm Exam (40 percent), Active Participation (20 percent)

This is a unique course focused on acute problems of molecular genetics and considering both prokaryotes and eukaryotes. The course presents the topical issues as featured in recent scientific papers and review articles. The problems addressed - from theory of networks to functional genomics to contemporary achievements in our understanding of genetic mechanisms of regulation in health and disease - cover a broad range of topics and introduce the student not only to the power of the molecular genetics approach but also to the recent developments in the field. In addition, for those interested in applied research this course offers a survey of current

methods of molecular genetics and their application in medicine and biotechnology.

530* - Literature Course in RNA Biochemistry I/II:**

Instructors:	Prof. Dr. Christian Hamman
Type:	Seminar - planned for 2014/2015
Course Name Abbreviation:	LCRB I/II
Credits:	2.50
Partial Grades:	tbd

PRELIMINARY: In this course, the most recent literature from RNA biochemistry is studied through detailed presentation and discussion. Emphasis is on the evaluation of the quality and novelty of the data, the stringency of the conclusions, and the contributions of the findings to the knowledge in the field. New avenues for research are discussed. Presentations of research from the Hammann group may be added as appropriate. The course is suitable for graduate students in MoLife who have a strong background in biochemistry and/or molecular genetics (e.g. those in the specialization area Molecular Genetics) but also for undergraduates from the BCCB major.The students who attend the course present papers, possibly several times during the semester, upon which grading is based. Individual presentation training is provided. The two courses take place in alternating semesters. No course is a prerequisite for the other, though, since the literature sources discussed in the two courses are independent of each other.

530561 - Techniques for the Analysis and Structure Determination of Biomolecules II:

Instructors:	Prof. Dr. Nikolai Kuhnert, Prof. Dr. Werner Nau
Type:	Lecture
Course Name Abbreviation:	AnalStruDetBiomol II
Credits:	2.50
Partial Grades:	Exam 1 (50 percent), Exam 2 (50 percent)

Modern experimental methods to investigate the structure and dynamics of bio-molecules are of increasing importance to study the function of bio-molecules. The course gives an overview on the physical foundations of modern spectroscopic methods to study the structure of bio-molecules. The first part introduces optical spectroscopy to determine structures and functions of proteins and nucleic acids. The second part focuses on determining the solution structure of proteins and nucleic acids at atomic resolution by NMR spectroscopy.

530581 - Cellular Biochemistry:

Instructors:	Prof. Dr. Sebastian Springer
Type:	Lecture
Course Name Abbreviation:	Cell Biochem
Credits:	2.50
Partial Grades:	Quizzes

Cellular Biochemistry is an elective course for MoLife that is also accessible to third-year undergraduate students. It has fourteen sessions. The course builds on the understanding of biological systems established in the undergraduate courses, Advanced Cell Biology I+II and

Advanced Biochemistry and Molecular Biology I+II, or equivalent. Although a brief introduction will be given, graduate or undergraduate students who have no foundation in cell biology should consider attending Advanced Cell Biology prior to this course. This is an intensive course, based on advanced textbooks, scholarly reviews, and recent research articles, that will take students to the cutting edge of a few select fields. The topics are a selection of complex and integrated systems from all areas of biochemistry and cell biology that change from year to year, and that are typically analyzed on all levels from their molecular mechanism to their cellular manifestations. They may include intracellular trafficking of proteins and lipids, synthesis and turnover of cellular components, regulation and signal transduction, and development and cooperation of cells in tissues. The course will also provide and train skills that are needed to understand and critique published data.

Each subject is typically covered by:

- a lecture-style initial introductory overview by the instructor;
- a thorough discussion of selected topics that requires prior reading of review articles;
- student presentations of research papers including a detailed analysis.

Prior reading of the provided literature is essential, required, and relevant for the grade.

530591 - Microbial Pathogenicity:

Instructors:	Prof. Dr. Matthias Ullrich
Type	Lecture
Course Name Abbreviation:	Mic Path
Credits:	2.50
Partial Grades:	Final Exam (40 percent, Mandatory), Midterm Exam (30 percent), Active Participation (20 percent), two Quizzes (10 percent)

Infectious diseases have always been and still are a major thread to our civilization. Knowledge of the molecular basis and mode of action of many pathogen-mediated diseases has skyrocketed in the past decades. This half-semester course is meant to familiarize the student with a selection of infectious diseases, the microbial pathogens causing them, and potential ways to heal infected persons. Although this selection of diseases can by no way be comprehensive due to time constraints, some of the most important diseases will be dealt with. For advanced participants (i.e. those who previously took the 3rd-year undergraduate Biomed and Infection Biology course) particular problem tasks for some diseases will be given. Diseases and pathogens to be dealt with include: HIV, TB, candidiosis, Salmonella, toxoplasmosis, malaria, bacterial toxins, plant pathogens, and sexually transmitted diseases. A total of 13 lectures will be followed by a final examination in the 14th time slot. Additionally, a short mid term quiz will be held.

530601 - Advanced Studies in Molecular Genetics:

Instructors:	Prof. Dr. Georgi Muskhelishvili, Prof. Dr. Matthias Ullrich
Type	Lecture
Course Name Abbreviation:	AdvStudMolGen
Credits:	5.00
Partial Grades:	Final Grade

This course offers an intensive theoretical training in Molecular Genetics for advanced students. In this course they directly interact with one of the instructors and work on a theoretical subject. The course is finished with a written report that is the basis for grading. Students who visited ALL Molife courses of the respective Specialization Area are allowed to select up to one Advanced studies course per Specialization Area in their 2nd and 3rd semester of studies. For this they select one of the instructors of that course and request admission. Acceptance of students for an Advanced Studies course is by approval of the respective instructor.

530611 - Advanced Studies in Cellular and Molecular Biology:

Instructors:	Prof. Dr. Klaudia Brix, Prof. Dr. Sebastian Springer, Prof. Dr. Matthias Ullrich
Type:	Lecture
Course Name Abbreviation:	AdvStudCellMolBio
Credits:	5.00
Partial Grades:	Final Grade

This course offers an intensive theoretical training in Cellular and Molecular Biology for advanced students. In this course they directly interact with one of the instructors and work on a theoretical subject. The course is finished with a written report that is the basis for grading. Students who visited ALL Molife courses of the respective Specialization Area are allowed to select up to one Advanced studies course per Specialization Area in their 2nd and 3rd semester of studies. For this they select one of the instructors of that course and request admission. Acceptance of students for an Advanced Studies course is by approval of the respective instructor.

530621 - Advanced Studies in Molecular Biophysics:

Instructors:	Prof. Dr. Roland Benz, Prof. Dr. Jürgen Fritz, Prof. Dr. Detlef Gabel, Prof. Dr. Ulrich Kleinekathöfer, Prof. Dr. Nikolai Kuhnert, Prof. Dr. Werner Nau, Prof. Dr. Mathias Winterhalter
Type:	Lecture
Course Name Abbreviation:	AdvStudMolBiophys
Credits:	5.00
Partial Grades:	Final Grade

This course offers an intensive theoretical training in Molecular Biophysics for advanced students. In this course they directly interact with one of the instructors and work on a theoretical subject. The course is finished with a written report that is the basis for grading. Students who visited ALL Molife courses of the respective Specialization Area are allowed to select up to

one Advanced studies course per Specialization Area in their 2nd and 3rd semester of studies. For this they select one of the instructors of that course and request admission. Acceptance of students for an Advanced Studies course is by approval of the respective instructor.

530631 - Advanced Studies in Molecular Biotechnology:

Instructors:	Prof. Dr. Roland Benz, Prof. Dr. Hector Marcelo Fernandez Lahore, Prof. Dr. Elke Nevoigt, Prof. Dr. Mathias Winterhalter
Type:	Lecture
Course Name Abbreviation:	AdvStudMolBiotech
Credits:	5.00
Partial Grades:	Final Report

This course offers an intensive theoretical training in Molecular Biotechnology for advanced students. In this course they directly interact with one of the instructors and work on a theoretical subject. The course is finished with a written report that is the basis for grading. Students who visited ALL Molife courses of the respective Specialization Area are allowed to select up to one Advanced studies course per Specialization Area in their 2nd and 3rd semester of studies. For this they select one of the instructors of that course and request admission. Acceptance of students for an Advanced Studies course is by approval of the respective instructor.

530641 - Literature Course Molecular Immunology I:

Instructors:	Prof. Dr. Sebastian Springer, Ph.D. Zeynep Hein
Type:	Lecture
Course Name Abbreviation:	LitMollmm I
Credits:	2.50
Partial Grades:	Presentation (70 percent, Mandatory), Active Participation (30 percent)

In this course, the most recent literature from molecular immunology and related fields is studied through detailed presentation and discussion. Emphasis is on the evaluation of the quality and novelty of the data, the stringency of the conclusions, and the contributions of the findings to the knowledge in the field. New avenues for research are discussed. Presentations of research from the Springer Group may be added as appropriate.
The course is suitable for graduate students in MoLife who have a strong background in biochemistry and/or cell biology (i.e. those in the specialization area Cellular and Molecular Biology) but also for undergraduates from the BCCB major. In addition to lectures by the instructor, the students who attend the course present papers, possibly several times during the semester, upon which grading is based. Individual presentation training is provided.

For registration please meet Prof. Springer. (Registration will be done manually by the Registrar's Office).

530642 - Literature Course Molecular Immunology II:

Instructors:	Prof. Dr. Sebastian Springer, Ph.D. Zeynep Hein
Type:	Lecture
Course Name Abbreviation:	LitMollmm II
Credits:	2.50
Partial Grades:	Presentation (70 percent, Mandatory), Active Participation (30 percent)

In this course, the most recent literature from molecular immunology and related fields is studied through detailed presentation and discussion. Emphasis is on the evaluation of the quality and novelty of the data, the stringency of the conclusions, and the contributions of the findings to the knowledge in the field. New avenues for research are discussed. Presentations of research from the Springer group may be added as appropriate.
The course is suitable for graduate students in MoLife who have a strong background in biochemistry and/or cell biology (e.g. those in the specialization area Cellular and Molecular Biology) but also for undergraduates from the BCCB major. In addition to lectures by the intructor, the students who attend the course present papers, possibly several times during the semester, upon which grading is based. Individual presentation training is provided.

This course is the continuation of the Literature Course Immunology I (course number 530641). That course is not a prerequisite, though, since the literature sources discussed in the two courses are independent of each other.

Additional Information: Prerequisites for undergarduate students only: Advanced Cell Biology I, II. Prerequisites for graduate students: none.

For registration please meet Prof. Springer. (Registration will be done manually by the Registrar's Office).

530651 - Biotechnology: Science, Business and Culture:

Instructors:	Prof. Dr. Hector Marcelo Fernandez Lahore
Type	Lecture
Course Name Abbreviation:	BioBiz
Credits:	5.00
Partial Grades:	Final Grade

The course will emphazise a global approach to biotechnology-based business, their technical and administrative management issues, and their impact on modern societies. BioBiz will provide:

1. A detailed exploration of the business of biotechnology, its structure and operation, and the science upon which this industry sector is founded. Focus is on methods and economics of bioprocessing, project planning and evaluation, business alliances, and global models.

2. An overview of the theory and practice of managing projects in the Biotech sector. Emphasis is on leadership skills, team development, internal/external communication, con-

flict resolution. The goal is to gain a solid understanding of how to successfully manage each phase of the project life cycle, work within organizational constraints, set goals linked directly to stakeholder needs and utilize proven project management tools.

3. An examination of current societal issues in biotechnology from several perspectives. Topics include the commercialization of biotechnology; biohazards; managerial views of legal issues and bioethics; the need for public scrutiny; environmental and cultural issues; and the role of governmental regulatory agencies in researching, developing, and commercializing biotechnology.

Additional Information:
All participants are strongly encouraged to fill in the teaching evaluation.

530671 - Microbial Engineering I:

Instructors:	Prof. Dr. Elke Nevoigt, Dr. Mathias Klein
Type:	Lecture
Course Name Abbreviation:	MicroEng1
Credits:	2.50
Partial Grades:	Final Exam (40 percent, Mandatory), Presentation (40 percent), Midterm Exam (20 percent)

This course is designed to meet the comprehensive requirements for master students in microbial engineering. You will learn how to design microbes in order to exploit them for human life. The course is divided into 2 parts: in part I (MicroEng1) an overview about the principles of microbial engineering, i. e. the integration of engineering methods, analysis approaches and metabolic modeling will be given. The course will introduce you to genetic engineering methods for manipulating bacteria, yeast and fungi. Examples of those techniques will be given to show how we can apply them to develop microbes for practical application (formation of a product of interest, utilization of available feedstock, stress tolerance etc.) Students also learn to study scientific literature and give presentations about related topics.

Additional Information:
All participants are strongly encouraged to fill in the teaching evaluation.

530672 - Microbial Engineering II:

Instructors:	Prof. Dr. Elke Nevoigt, Dr. Mathias Klein
Type:	Lecture
Course Name Abbreviation:	MicroEngII
Credits:	2.50
Partial Grades:	Final Exam (40 percent, Mandatory), Presentation (40 percent), Midterm Exam (20 percent)

This course is designed to meet the comprehensive requirements for master students in microbial engineering. You will learn how to design microbes in order to exploit them for human life. The course is divided into 2 parts: part II (MicroEng2) provides knowledge concern-

ing approaches for global analysis (omics technologies: genomics transcriptomics, proteomics, metabolomics, fluxomics). Topics such as evolutionary engineering and selection of microorganisms, next generation sequencing, genomic mapping, and metagenomics will also be included. A major focus will be put on metabolic engineering examples for the production of biofuels due to their importance in today's biotechnology. Discussions and literature seminars will be organized during the course.

530681 - Models of Gene Regulation:

Instructors:	Prof. Dr. Marc-Thorsten Hütt
Type:	Seminar
Course Name Abbreviation:	ModGeneReg
Credits:	2.50
Partial Grades:	Final Grade

The expression of a gene is a highly complex process with regulation on many spatial and temporal scales. Starting from the level of a single operon (i.e. a sequence of genes under joint regulation) and ending with large-scale transcriptional regulatory networks we will discuss (and describe with mathematical models) how genes regulate other genes. Using the mathematical models, we will try to connect different levels of dynamical behavior in gene regulation with laboratory data. Topics include: recent models of the lac operon; noise in gene expression; statistical properties, evolution and interference of gene regulatory networks; role of DNA topology; robustness of gene regulation; modeling of RNA interference. The material will mostly be recent scientific literature. Grading will be based on seminar presentations and on active participation in the discussions.

Additional Information:
All participants are strongly encouraged to fill in the teaching evaluation.

All course descriptions are published on **http://campusnet.jacobs-university.de**. For course descriptions of prerequisite courses and/or Fundamental Lectures please visit the course catalogs for undergraduate majors.

5 Admission to MoLife

- Application to MoLife is through the Graduate Office of the School of Engineering and Science. Application procedures are as for all Jacobs University graduate programs as published on the Jacobs University web site. As a specialty, MoLife requires that applicants submit a statement of their practical research experience and to select the first SA. In case of acceptance, this selection is binding for the student. Selection of the second SA is made after one semester of study at Jacobs University.
- Admission to MoLife is valid up to the award of the MSc (for two years at most). It does not imply admission and acceptance to PhD studies after the award of an MSc. Students who wish to continue with a PhD after their MSc degree or after their qualifying examination should, 6-12 month ahead of the time, approach a MoLife faculty member and discuss the funding options. Funding for the PhD must come from the faculty members funds or from a external stipend.
- The Admissions Committee cannot admit students to PhD studies. Students from outside who seek direct admission to do a PhD by research must address individual investigators.

6 General Academic Information and Rules

6.1 Advising

- Upon admission the head of the MoLife admissions committee assigns an Academic Advisor to each beginning MoLife student. The assignment is made on the basis of the choice of the first SA that a student made at the time of application.
- The role of the Academic Advisor is similar to that of an Academic Advisor for a Jacobs University undergraduate. Especially, the Academic Advisor:
  - Advises the student on her/his choice of courses, and in the case of external students, helps to set up the mandatory plan of fundamental courses;
  - Agrees to the advisee's choice of courses in CampusWeb;
  - Serves as the first point of contact for the student in case of academic or other difficulties.
- Students can change their Academic Advisor using Jacobs University's standard Academic Advisor Change Form.
- For questions regarding courses and laboratory rotations students should approach the SA Representative.

6.2 Academic Integrity

- MoLife students are, like undergraduate students, bound by Jacobs University's Code of Academic Integrity (as published on Jacobs University's Website).
- Plagiarism (copying without attribution) in course work or reports carries an automatic grade of 5 (fail) in the respective course.
- In addition, when working in research, graduate students are subject to Jacobs University's "Guidelines to Ensure Good Academic Practice and for Handling Academic Misconduct in Teaching and Research" as published on Jacobs University's website.
- For violations, the sanctions outlined in the respective documents apply.

6.3 The Course Descriptions of MoLife Courses

All course descriptions are published on "**http://campusnet.jacobs-university.de**"

6.4 ECTS Credits (German Legislation)

In general, one ECTS credit corresponds to 30 hours of student workload. This includes classes themselves, studying, and preparation time for examinations.

6.5 Replacement of Fundamental lectures

Students can request that their fundamental lectures be replaced with additional MoLife lectures only with the approval of the Representative of the SA. The replacement of fundamental courses only applies to Jacobs University students who have already attended the same courses before and also to exceptionally qualified external students. The replacement MoLife lecture should be in the same SA. Only in the exceptional case where a student has attended all MoLife lectures of one SA, can the fundamental courses be replaced by MoLife courses taken from another

SA. A fundamental lecture cannot be replaced by a lecture taken form undergraduate programs which is not specified in the SA.

6.6 Replacement of MoLife courses

Replacement of MoLife courses with respect to the specific requirements of some students, the MoLife program coordinator can allow the replacement of individual MoLife courses by Fundamental lectures.

6.7 Advanced studies courses

The ”Advanced studies” courses offer an intensive theoretical training for advanced students. In this course, students directly interact with one of the instructors of the SA and work on a theoretical subject. The course is finished with a written report that is the basis for grading. The reports together with the grades are submitted to the representatives of the SA and the program coordinator for approval. Students who visited at least two MoLife courses in there respective SA are allowed to select ONE advanced studies course in their main SA in their 2nd or 3rd semester of studies. Acceptance of students for an advanced studies course is by approval of the respective instructor.

6.8 German Courses

It may be possible to take up to two German courses for credit in MoLife. See the program coordinator.

7 Laboratory Rotations (MoLife Rules)

Students select research groups for their laboratory rotations from the list offered by the specialization area. Students carry out three research laboratory rotations each during the first three semesters. The name ”laboratory rotations” includes, of course, research rotations in computational and theoretical groups which have no laboratories. The rotations take place in the following time slots.

1. First rotation: September 1 - January 31 (including a Christmas break of two weeks) (course No. 530401)
2. Second rotation: February 1 - Apr 30 (course No. 530402)
3. Third rotation: May 1 - July 31 (course No. 530403)
4. Master thesis work: Sept 1 - April 30 (including a Christmas break of two weeks)

- The minimum working time for a single laboratory rotation (15 ECTS credits) is 56 full working days (including preparations and writing the protocol). The students are expected to spend a minimum of 3 full days per week in the laboratory of the host Principal Investigator (PI). The normal working hours are 8 am to 6 pm. Depending on the research project, the working hours may be adjusted. However, both students and PIs have to take into account that no one is allowed to work alone in the laboratory.
- Each laboratory rotation consists of the practical work and writing the report. Therefore, about 10 days before the end of the rotation, students should stop practical work and start writing the laboratory report. The report is due to the PI on the first day of the next rotation.
- Laboratory decisions: About three weeks before the next rotation, students submit the lab rotation selection form (Deadlines are given in the study plan). To identify a host laboratory, they should contact possible PIs several weeks in advance. The next host PI signs the official form that confirms acceptance and states the name, laboratory rotation number, and a title as well as the deadline for the report. The form has to be submitted to the Instructor of Record (IoR) of the laboratory rotation course. On that form, the laboratory supervisor of the previous rotation has to sign that the rotation has been finished.
- Laboratory report: Each laboratory rotation has to be summarized in form of a report. The reports should have the format of a small publication. The specific contents and length are specified by the host PI. In addition, host PIs should have the student present their work in the group meeting and may ask for the laboratory book to be handed-in as well. The host PIs communicate the final grade to the IoR of the laboratory rotation as Jacobs University grades.
- Students who receive a stipend from Jacobs University must perform laboratory rotations in three different MoLife laboratories.
- Failing laboratory rotations: If a student is about to fail a laboratory rotation (grade 4.67 or worse), the responsible PI informs the representative of the SA, the academic advisor of the student and the student the latest 4 weeks before the end of the rotation about this prospect to allow for interference. When the attempt to avoid the failure is not successful, the student does NOT have the possibility to repeat the laboratory rotation. This will usually lead to expulsion from the program.
- Thesis laboratory: Before the end of the third rotation, students have to decide in which

laboratory they want to perform their Master's thesis work in.

- Internships: These are different from laboratory rotations. Internships are performed off campus, are not mandatory, not part of the MoLife program and do not earn credits. All MoLife students are allowed to perform internships during their vacation time (August).
- Vacation: If students want to leave Jacobs University for vacation or any other reason for more than 1 continuous week, the IoR of the laboratory rotation courses has to be informed in writing at least 2 weeks in advance. Any vacation in addition to the general summer vacation in August has to be applied for in written form with a) the host PI of the laboratory rotation and b) the representative of the SA.
- Laboratory rotations in other laboratories: Laboratory rotations in research groups not listed in the SA may be allowed but only by the approval of the Representative of the SA. Students must obtain permission BEFORE beginning the laboratory rotation. Please note that external laboratory rotations, i.e. rotations outside of Jacobs University, are not allowed in the MoLife Graduate Program by definition. Jacobs BSc graduates may apply for an exception to this role to the program coordinator.

8 The MoLife Fast Track

(MoLife Rules)

8.1 Admission to the Fast Track

- After admission to MoLife, Jacobs University graduates may apply to take the Fast Track. The Fast Track is accessible to Jacobs University graduates who:
  - have enough 'excess' undergraduate credits to transfer 15 credits in eligible courses into their graduate studies. Eligible credits are those from the courses specified in the respective SA the student will select.
  - can start their first laboratory rotation by June 1st of their year of admission (see below section 6.4.1).
- Admission to the Fast Track is decided upon by the Admissions Committee of MoLife. No later changes are possible. The coordinator of MoLife transmits this information to the Provost's Office.
- To students who hold a degree from another university, MoLife Fast Track is accessible only if they are available to start their first laboratory rotation on July 1st before their admission, and they pass an oral examination (to be held in orientation week at the latest) which demonstrates scientific standing in theory and practice equivalent to an Jacobs University graduate in BCE, BCCB, BICB, or Biology with a Grade Point Average ≤ 2.0 (where the scale is from 1.0 the highest to 5.0, failure is 4.6 and 5). Such students must contact the admission committee by their own initiative.
- Students are notified of their admission to the Fast Track by a letter from the Provost's Office.

8.2 Stipends in the Fast Track

- Fast Track stipends are 17 months in total and start from the 1^{st} June, with the first laboratory rotation, and end at the 31^{st} October in the following year.

8.3 Credit Transfer to the Fast Track

- Jacobs University undergraduates can take up to three graduate courses. These courses can be awarded transfer credits (TC) in the MoLife Fast Track. These courses must come from the list specified in the specific SAs that the student has already selected. These courses must not have been used for graduating with the BSc otherwise they are "used up" and cannot be used for transfer credits.
- Since some of the graduate courses in the MoLife program are held in a two-year cycle it will be necessary for Fast Track students to take these courses already during their third undergraduate year.
- The courses that receive transfer credits appear on a student's BSc certificate. Students must then identify to the MoLife coordinator the courses which they want to transfer. The coordinator will then certify the transfer to the Registrar.

8.4 Studying in the Fast Track

8.4.1 Summer laboratory Rotation

- MoLife Fast Track students do their first laboratory rotation in the summer after their BSc graduation, starting June 1st, for 56 full working days. (course No. 531401)
- They register for the rotation until May 30th. The drop-add phase is the first week of June.
- Fast track students have, from their undergraduate time at Jacobs University, still a Jacobs University enrollment certificate which is valid until the end of August. After this, they receive a new one.

8.4.2 Further Coursework

- Fast Track students then perform two additional laboratory rotations (September to January and February to April).
- They must also take all courses necessary to graduate within two semesters of study. It is important to note that some MoLife courses might be offered only every other year. Hence Jacobs University students have access to them already in the last year of their undergraduate studies.
- After the spring semester, students do their Qualifying Exam or start with the MSc work, which would take from May to end of October.
- Students may always switch back to the regular track of studies. However, the stipends will not be adjusted.

9 Summary of the Different Options for Studying MoLife

Year of Studies	Months	Fast Track with QE	Fast Track	Normal Track with QE	Normal Track
	June				
	July				
	Aug				
1	Sept				
1	Oct				
1	Nov				
1	Dec				
1	Jan				
1	Feb				
1	March				
1	April				
1	May				
1	June	Start with PhD work (not funded by MoLIfe)			
1	July				
1	Aug				
2	Sept				
2	Oct				
2	Nov		Start with PhD work (not funded by MoLife)		
2	Dec				
2	Jan			Start with PhD work (not funded by MoLife)	
2	Feb				
2	March				
2	April				
2	May				
2	June				Start with PhD work (not funded by MoLife)
2	July				
2	Aug				
		continued	continued	continued	continued

Abbreviation QE: Qualifying Examination

Note that stipends are given for 17 month in the fast track and 24 month in the normal track

10 Progress Monitoring

10.1 Jacobs University Rules

- Students in graduate programs who receive a semester grade point average worse than 3.0 or who do not receive at least 20 ECTS credit points in any single semester will be placed on Academic Probation. The University Registrar will inform the student, Academic Advisor and the Provost. Thereafter, the student must achieve a semester grade point average 3.0 or better and at least 20 ECTS credit points in the subsequent semester in which the Student is enroled at Jacobs University in order to be restored to good academic standing. Failure to do so will result in suspension from the University.
- Any student whose Grade Point Average in any given semester is worse than 4.33 will automatically be suspended from the University.

10.2 MoLife Rules

- If a student does not conform to the rules of the program (for example, by not attending mandatory courses) the coordinator must, in cooperation with the student's academic advisor and the instructor of record of the respective course, and after consultation with the student, ask the Provost to have the student's stipend terminated, and the student excluded from the program. The final decision is made by the Provost.

11 The Qualifying Exam

11.1 MoLife Rules

- The Qualifying Exam is held in public. The student and three faculty members attend. Faculty members will be the laboratory rotation supervisors. The future PhD supervisor of the student acts as the Head of the Examination Committee.
- The duration of the Qualifying Examination is typically about 60 minutes (minimum 45 minutes).
- The Qualifying Examination deals with the laboratory rotation in the laboratory where the student plans to conduct his or her PhD work. The examination starts with the student explaining the outline of the work, and the results achieved. This presentation should take at least 15 and 30 minutes at most. Questions of the faculty follow.
- The Qualifying Examination is graded with ”pass” or ”fail”. In case of failure, the qualifying examination can be repeated once. The Head of the Examination Committee provides a written report of the contents of the exam and the evaluation to the Provost.

12 The Master of Science Thesis and Defense

12.1 Contents of the Thesis

12.1.1 Jacobs University Rules

- The cover page needs to show the title of the Master's Thesis, the name of the School or Center, the University's name, the month and year of submission, the name of the Student and the names of the two Reviewers. Furthermore, the Thesis needs to contain a declaration signed by the Student submitting the Master's Thesis that the Thesis is independent work that has not been submitted elsewhere.

12.1.2 MoLife Rules

- The MSc thesis reports on practical work done in a laboratory of the MoLife faculty for at least 5 months.
- The thesis should in general be about 30 pages (Arial or Times 11 point, 1.5 line spacing, 3 cm margins) including everything. The absolute maximum is 50 pages.
- The thesis should have the parts Introduction, Materials and Methods, Results, Discussion, and References.
- Methods should be reported if they are different from published methods. Published methods must be referred to.

12.2 Time and Circumstances of Submission

12.2.1 Jacobs University Rules

- By the end of the fourth semester, Students must submit a Master's Thesis to the Registrar's Office. The following number of copies must be submitted:
  - one hard copy per Examiner (in MoLife, there are two examiners),
  - one hard copy and a pdf version for the Registrar's Office,
  - one hard copy for the Provost's Office.

12.2.2 MoLife Rules

- The regular date for the submission of the MSc thesis is May 15th, for graduation at the Jacobs University's graduation ceremony in the first week of June. In exceptional cases the submission of the MSc thesis may be delayed until August 15th.
- The student's MSc thesis supervisor (not: Academic Advisor) is responsible for fixing the submission date and for sending a note about the submission date to the program organizer and the student's Academic Advisor.
- At the time of submission, students need to identify a second reader (see below).
- Students who do not meet the submission date on August 15th are excluded from the program by default unless they can show to the registrar a written exemption from the Provost.

12.3 Grading of the MSc Thesis

12.3.1 Jacobs University Rules

- Each Examiner must submit the completed ”Master’s Thesis Evaluation” form to the Registrar’s Office within four weeks after receiving the Thesis. The grades of all Examiners are averaged and rounded to the next Jacobs University grade.

12.3.2 MoLife Rules

- The MSc thesis is graded by two MoLife faculty members. One is the MSc thesis advisor. The other is picked by the student. The student is responsible for finding a second reader before the submission date.
- The MSc thesis is graded within one week after the submission. It is the responsibility of the student’s MSc thesis supervisor (not: Academic Advisor) to ensure this.
- The thesis is graded and appears on the transcript with 30 credits.

12.4 Master’s Thesis Defense

12.4.1 MoLife Rules

- The Master’s Thesis Defense is conducted within two weeks after submission of the MSc work.
- It is the responsibility of the student to identify and notify the examiners, to find a time at which the examination can be held, and to communicate this to the thesis supervisor.
- The Master’s Thesis Defense is a thesis-oriented examination which deals with the experimental contents of the thesis, and its theoretical background.
- The Defense is public. The Thesis Defense committee comprises three faculty members. Two are those who read and graded the thesis. The third is another faculty member whom the student must select at least one week in advance of the examination date. The supervisor of the MSc work is the Head of the Thesis Defense committee.
- The duration of the Defense is typically about 60 minutes (minimum 45 minutes).
- The Defense starts with the student explaining the outline of the work, and the results achieved. The student’s presentation should take between 15 and 30 minutes at most. Questions of the faculty follow.
- The head of the Thesis Defense committee decides on the approval of media for the student’s presentation.
- The grade of the Master thesis comprises of the grades for the written thesis (given by the two readers), the grade for the practical work (given by the Master thesis supervisor) and the grade for the Thesis Defense. The weight of each component is one third.
- The committee decides on the final grade of the thesis immediately after the Defense.
- The grade is communicated to the student by the committee immediately after decision.
- In case of failure, the Thesis Defense will be repeated after one week.
- It is the responsibility of the student’s MSc thesis advisor (not the academic advisor) to pass on, in writing, the results of the grading of the MSc thesis, and the results of the Thesis Defense, to the Registrar.