

**Regulations of the faculty Biosciences of the Johann Wolfgang Goethe  
University Frankfurt am Main  
for the Master's degree programme Physical Biology of Cells and Cell  
Interactions leading to award of the degree  
"Master of Science (M. Sc.)  
from July 28, 2015**

Based on §§ 20, 44 Paragraph 1 No. 1 of the Hessian Act on Higher Education in the version from 14 December 2009, last altered by the law passed on 27 May 2013, the faculty board of the faculty Biosciences of the Johann Wolfgang Goethe University Frankfurt am Main agreed on June 8 and July 13 upon the following set of regulations for the Master's degree programme Physical Biology of Cells and Cell Interactions. This set of regulations has been authorised by the presidium of the Johann Wolfgang Goethe University according to § 37 Paragraph 5 Hessian Act on Higher Education on July 28, 2015. It is hereby announced.

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### List of Abbreviations:

CP	<i>Credit Points</i>
Ex	Excursion
GVBl.	Gazette of laws and ordinances of the province of Hess
HHG	Hessian university law of 14 December 2009 (GVBl. I, page 666 ff).
HlmmaVO	Hessian regulations on enrolment at universities including for part-time study, Hessian regulations on study credits and the processing of personal data at Hessian universities of 29 December 2003 (GVBl. I, no. 1, page 12 ff.) in their currently valid version/s.
Ko	Colloquium
LN	Evidence/proof of academic achievement
MA	Master's degree thesis
M.Sc.	Master of Science
PM	Obligatory module
P	Practicum
RO	Framework regulations for tiered and modular degree programmes which are offered by Johann Wolfgang Goethe University Frankfurt am Main from 30 April 2014
S	Seminar
SWS	Semester weekly hours
T	Tutorial / tutorial management
TN	Proof of participation
Ü	Exercises
V	Lecture
WP	obligatory module choice



## Section I: General Points

### § 1 The area of validity of the regulations (RO: § 1)

This set of regulations contains the degree programme specific regulations for the Master's degree programme Physical Biology of Cells and Cell Interactions. It applies when used in combination with the framework regulations for tiered and modular degree programmes which are offered by Johann Wolfgang from 30 April 2014, UniReport statutes and regulations from July 11, 2014 in the respective currently valid version, hereinafter referred to as the framework regulations (RO).

### § 2 Purpose of the Master's examination (RO: § 2)

- 1) The Master's degree studies finish with the first qualification for entry into a profession. The Master's examination serves to determine whether the student has achieved the goal for taking the Master's degree programme. The examinations occur cumulatively, that is the sum of the module examinations taken during the Master's degree programme Physical Biology of Cells and Cell Interactions, including the Master's thesis, constitute the Master's examination.
- (2) The cumulative Master's examination is intended to establish whether the student has acquired sufficient specialist knowledge in the examination areas and also has the ability to use basic scientific methods and knowledge, self-sufficiently, as well as being prepared to enter into professional practice or a consecutive course of studies.

### § 3 Academic degree (RO: § 3)

Upon successful completion of the course of studies and upon passing of the examinations, the faculty Physical Biology of Cells and Cell Interactions awards the academic degree Master of Science, abbreviated as M.Sc..

### § 4 Standard period of study (RO: § 4)

- (1) The standard period of study for the Master's degree programme Physical Biology of Cells and Cell Interactions is 4 semesters. The Master's degree programme can be completed in a shorter period of time.
- (2) If additional requirements were imposed of more than 7 CP up to a maximum of 37 CP in order for working towards equivalence of completion of studies for access to the Master's degree programme according to § 8 Abs. 3, the standard period of study is extended by one semester, and for additional requirements of more than 37 CP up to a maximum of 60 CP, by two semesters.
- (3) The Master's degree programme Physical Biology of Cells and Cell Interactions is a consecutive

Master's degree programme. For consecutive degree programmes the total standard period of study for full-time study is five years (10 semesters).

(4) As part of the Master's degree programme Physical Biology of Cells and Cell Interactions it is necessary, according to § 13 to achieve 120 credit points – hereinafter referred to as CP.

(5) The faculty Physical Biology of Cells and Cell Interactions provides a course of study on the basis of these regulations and ensures that fixed suitable examination dates are set so the course can be completed within the standard period of study.

#### **§ 5 Studying abroad (RO: § 5)**

(1) During the period of studying on the Master's degree programme we recommend studying for at least one semester at a foreign university or planning in an appropriate period outside of Germany. Connections which exist between the Johann Wolfgang Goethe University and foreign universities can be used, over which information can be distributed in the Academic Advisory Service and in the International Office.

### **Section II: Objectives of the degree programme; beginning the degree programme and entrance requirements to take the course**

#### **§ 6 Objectives of the degree programme (RO: § 6)**

(1) The Master's degree programme aims to educate students in modern concepts and methods of cell biology and physical biology. Scientific questions in the fields of cell biology and physical biology will be combined with developmental biology, cellular structure biology, bioinformatics, biochemistry, immunology, neuro- and plant physiology. The Master's program provides students with an understanding of fundamental life processes from cell growth, cell-cell communication and differentiation to hormonal, inflammatory, angiogenic signaling and aging. These processes are studied in context of cells, individual tissues and model organisms. The experimental and conceptual approaches of the program include modern cell biological, molecular, biochemical, bioinformatical, immunological and genetic methods, combined with various microscopical techniques and applications, molecular imaging, data analysis as well as morphological and physiological technologies. The overall aim of the course is to teach advanced current cell biology and physical biology aspects. The intention is to equip students to carry out interdisciplinary research by teaching them a wide range of methodological and conceptual knowledge. The master's degree course is intended to teach students the knowledge and skills needed for independent scientific thought and responsible activity.

(2) The Master's degree programme Physical Biology of Cells and Cell Interactions is more research-oriented.

The Master's

(3) Successful completion of the degree programme qualifies the graduate for successful students for demanding careers in science, research and teaching. Successful students can take up careers in independent cell biology and research of physical biology, marketing, public relations and

management in the natural science, medicine and industrial fields.

The course is research oriented and is meant to equip students on completion of it to acquaint themselves quickly with new developments and new fields of knowledge and develop their scientific and technical knowledge themselves. The master's degree course over four semesters is intended to teach students the knowledge and skills needed for their professional careers.

### **§ 7 Beginning the degree programme (RO: § 7)**

The degree programme can only be started during the winter semester.

### **§ 8 Prerequisites for approval to take the Master's degree programme (RO: § 9)**

(1) Applications for admission to the Master's degree programme Physical Biology of Cells and Cell Interactions should be submitted to the examining board or to an office designated by the President of Johann Wolfgang Goethe University. The examining board regulates details of the application process and decides on admission of the applicant. Paragraph 10 Sentence 2 remains unaffected by this. In as far as the Master's degree programme is subject to an admission restriction, the provisions of the university selection statute in its currently valid version must be observed.

(2) A general eligibility requirement to take the Master's degree programme is

- a) verification of completion of a Bachelor degree programme in Physical Biology of Cells and Cell Interactions or in the same subject each with a standard period of study of 6 semesters or
- b) verification of at least an equivalent degree from a German university or a German polytechnic in a related subject with a standard period of study of at least six semesters or
- c) verification of at least an equivalent foreign degree in a related subject (e.g. Biosciences, Medicine, Psychology, Chemistry, Physics or Mathematics with a standard period of study of at least six semesters.

(3) In the cases of paragraphs 2 b) and c) the admission can occur subject to delivery of additional course performances and passing of module examinations until equivalence with the Bachelor degree programme Physical Biology of Cells and Cell Interactions at Johann Wolfgang Goethe University with a scope of a maximum of 30 CP is awarded.

The imposed additional requirements can completely or partially concern contents which are not part of the Bachelor degree programme, but whose general eligibility requirements are, for example, a command of foreign languages.

The additional performances are not a component part of the Master's examination. In a case of imposed additional requirements the studies can be extended appropriately. The examination committee, in a notification of admission, determines the time limit within which verification of fulfilment of the additional requirements must be delivered. Paragraph 7 Sentence 2 remains unaffected. If the additional requirements are not fulfilled as required the decision associated with them is to be revoked.

(4) Regulations for special entry requirements will be regulated in Appendix 1.

(5) One further eligibility requirement is demonstration of a command of English at the language level C 1 (z.B. TOEFL 100, IELTS 6,5), but at least B 2, of the "Common European Framework of Reference for Languages from the Council of Europe" from September 2000. The command of languages can be demonstrated by an in English written Bachelor thesis.

(6) If the final examination certificate for the Bachelor degree is not yet available at the point in time of applying for a Master's university place the application can be supported instead based on a certificate of admission to study and on a special certificate. This must be based to at least 80% on examination performances delivered for the CP needed for a Bachelor degree, must contain a provisional average grade which is calculated based on these examination performances according to the respective set of regulations, and which was issued by the office for creating certificates of the previous university. The provisional average grade is taken as the basis for the procedures to determine aptitude as long as the final grade is not verified before completion of the process. Admission on the basis of the special certificate occurs with the provision that the Bachelor certificate will be submitted by the end of the first semester. If this verification is not produced on time, the admission expires and the enrolment is to be retracted. .

(7) The examination committee will decide about existence or not of the eligibility requirements and, if necessary, the provisional admission according to Paragraph 9. The committee may also appoint an admissions committee to carry out this task. Further regulations can be found in Appendix 1: Paragraph 1 Sentence 4 remains unaffected.

(8) If the eligibility requirements have been met the student will be approved and admitted by the President of Johann Wolfgang Goethe University. In all other cases the examination or the admissions committee will issue a written notice of rejection with a section on legal remedies. Any additional requirement imposed according to Paragraph 3 can be issued either in the notification of admission or in a separate notification according to Paragraph 3 from the examination or the admissions committee.

(9) The requirements for obtaining approval to take the Master's examination are regulated in § 22. A declaration concerning whether the student had already finally failed an interim examination, an intermediate diploma examination, a Bachelor examination, a Masters examination, a diploma examination or an ecclesiastical university examination or a final state examination in the respective subject or in a comparable degree programme (a degree programme which was primarily focused on the subject) at a university or whether they are currently studying the respective subject or a comparable degree programme in an as yet not completed examination procedure at a university in or outside of Germany.

(10) For foreign applicants for a university place it is recommended to prove knowledge of the German language at B1 level - of the Common European Framework of Reference for Languages.

### Section III: Structure and organisation of the studies course

#### § 9 Structure of the studies course; modularisation (RO: § 11)

- (1) The Master's degree programme Physical Biology of Cells and Cell Interactions is a "single-subject degree programme".
- (2) The Master's degree programme Physical Biology of Cells and Cell Interactions consists of a number of modules. A module is a teaching and learning unit restricted in terms of time and scope. It comprises a set of courses whose contents relate to each other including practical training phases, project work as well as private study times and is oriented on a defined learning goal. Modules can extend over one or two semesters.
- (3) The Master's degree programme Physical Biology of Cells and Cell Interactions is subdivided into 6 compulsory modules: Introduction to the Master Programme and Basic Methods in Cell Biology, Advanced Cell Biology I+II, Current Concepts in Cell Biology, Advanced Methods in Cell Biology, Master Thesis and three elective modules.
- (4) Modules can be: Compulsory modules which are obligatory which include the Master's thesis or optional compulsory modules which can be selected from a given catalogue of modules.
- (5) The following programme structure is then obtained from assignment of the modules to the course phases, the degree of commitment the modules require and the workload on the student calculated according to § 13 in credit points (CP) for the Master's degree programme Physical Biology of Cells and Cell Interactions

**Example for the 120 CP degree programme:**

	Compulsory (PF)/ Optional compulsory (WP)	Credit (CP)	Points	Note
<b>1st Semester</b>		<b>31</b>		
Introduction to the Master Programme and Basic Methods in Cell Biology	PF	14		A
Advanced Cell Biology I	PF	6		B
Elective Module 1	WP	11		
<b>2nd Semester</b>		<b>29</b>		
Advanced Cell Biology II	PF	7		B
Elective Module 2	WP	11		
Elective Module 3	WP	11		
<b>3rd Semester</b>		<b>30</b>		
Current Concepts in Cell Biology	PF	15		
Advanced Methods in Cell Biology	PF	15		
<b>4th Semester</b>		<b>30</b>		
Master Thesis	PF	30		
<b>Sum</b>		<b>120</b>		

**Note:**

**A:** The introduction into the Master's Program and Basic Methods in Cell Biology will take place as block course the first part of winter semester.

**B:** The modules Advanced Cell Biology I and II will be lectured in parallel to the elective modules and do not interfere with the timeframes of the practical courses.

(6) The availability for selection of optional compulsory modules can be limited by a resolution of the faculty council due to a lack of capacity. The limitation should be announced to the students immediately by the Dean's Office. § 16 Paragraph 2 applies.

Further optional compulsory modules can also be approved by a resolution of the faculty council without making any changes to this regulation if they match in their scope and requirements the optional compulsory modules mentioned in this regulation. § 12 Paragraph 4 is relevant here. § 16 Paragraph 2 should be noted.

(7) The courses included in the modules differ in terms of their degree of commitment in compulsory and optional compulsory courses. Compulsory courses are clearly determined, as concerns the contents and form of the class, in the module description. Optional compulsory courses are courses which students should select within a module from a certain specialist field or concerning a certain subject area.

(8) In as far as individual courses are offered in English. These are regulated in the module description

(9) If the courses of a module cumulatively build on one another then the students are bound, in accordance with the module description, to the sequence given therein.

(10) The students have the option, within the Master's degree programme Physical Biology of



Cells and Cell Interactions to ask to be examined or their work to be checked, according to what free places are available, for more modules than those which are prescribed in this regulation (additional modules). The result of the examination will not be included when arriving at the final grade achieved in the Master's examination

#### **§ 10 Use of modules (RO: § 12)**

(1) If modules of the Master's degree programme Physical Biology of Cells and Cell Interactions are from other degree programmes being offered ("imported modules"), they are subject to the examination regulations of the exporting faculty (source regulation). They are listed in Appendix ... [specify] . Changes made by the examination committee will be included in good time in the module manual (see also § 12) and placed on the degree programme related website (see also § 16 Paragraph 2) at: [www.bio.uni-frankfurt.de/42272505/MSc-CBP](http://www.bio.uni-frankfurt.de/42272505/MSc-CBP)

(2) Apart from that the regulations contained in § 12 of the Framework Regulations apply.

#### **§ 11 Practical modules (RO: § 13 )**

An external practical module is provided as part of the Master's degree programme Physical Biology of Cells and Cell Interactions by the module 9 (External Practical Module Cell Biology). This is regulated in more detail in the module description.

#### **§ 12 Description of modules/the module manual (RO: § 14)**

(1) Appendix 5 contains a module description produced in accordance with § 14 Paragraph 2 RO for every compulsory and optional compulsory module. The module descriptions are an integral part of this set of regulations.

(2) The module descriptions are supplemented by a regularly updated module manual. This contains additional information in accordance with Paragraph 3 and, in particular, serves as a source of information for the students.

(3) In accordance with § 14 Paragraph 5 RO the module manual should contain at least the following contents:

- if necessary marking as an imported module
- the cycle according to which the module is offered (for example annually or every semester)
- the workload on the student differentiated according to the time they must be present or in regular contact and the private study time in hours and credit points (CP)
- the duration of the module
- recommended prerequisites
- the course/examination language

- Courses with teaching and learning methods as well as the semester periods per week and credit points
- the usability of the module
- the module officer
- if necessary, a time schedule for the module

(4) Changes in the module manual which do not affect the contents of the module descriptions made according to § 14 Paragraph 2 RO by a resolution of the faculty council, made in good time before beginning the courses of a semester, are possible and are to be announced up to this point in time on the degree programme related website. They must not lead to any significant change in the curriculum. The university computer centre should be consulted about the changes in good time before passing of a resolution in the faculty board.

(5) Changes in the imported modules can be made by the specialist area offering them without any need to change these regulations. They will be included in good time by the examination committee in the module manual and announced on the degree programme related website.

### **§ § 13 Scope of the degree programme and the modules; credit points (CP) (RO: § 15 )**

(1) Every module is awarded credit points (CP) in the module description on the basis of the European Credit Transfer Systems (ECTS) while taking account of resolutions and recommendations from the Conference of Ministers for Cultural Affairs and the German Rectors' Conference. The CP allow transfer of a student's performance to other degree programmes offered by Johann Wolfgang Goethe University or another university, or vice versa.

(2) CP are a quantitative measure of the workload which the average student must fulfil to successfully complete the respective module for learning in class, participation on work placements outside the university or on excursions, preparation and post-processing of the lesson contents, preparation and development of one's own contributions as well as examination performances. A CP represents a workload of 30 hours. One can expect a maximum of 1800 working hours per academic year as a regular workload. 30 CP represents the average workload of a semester.

(3) For the Master's degree Physical Biology of Cells and Cell Interactions 300 CP in total are needed while taking account of the previous studies up to the first qualification for entry into a profession.

(4) The CP are only awarded for a fully and successfully completed module.

(5) A credit points account is set up in the examinations office for every student of the degree programme. In as far as this is possible from an organisational point of view, every student can obtain information about the status of his account at any time.

(6) The workload is checked as part of the evaluation according to § 12 Paragraph 1 and Paragraph 2 HHG as well as for re-accreditation for the degree programme and is adapted to the workload determined by the evaluation.



**§ 14 Teaching and learning methods; access to modules (RO: § 16)**

(1) Die Lehrveranstaltungen im Masterstudiengang Physical Biology of Cells and Cell Interactions werden in den folgenden Formen durchgeführt:

- a. Lecture: A logical presentation and communication of basic and specialist knowledge as well as methodological knowledge in the form of a talk, possibly also combined with demonstrations or experiments. The lecturers develop and communicate teaching contents through inclusion of the students;
- b. Exercises: Working with and deepening of understanding of subject matter as well as receiving training in the specialist methodology and communication of special skills through working through and discussing exemplary tasks;
- c. Undergraduate seminar/seminar: Development of scientific insights or working on current problem definitions through application of scientific methods, usually prepared by the students, contributions, mastering and practicing or obtaining deeper understanding of presentation and discussion techniques;
- d. Work placement: Guided performance of practical tasks in the experimental and apparatus area and/or computer simulations; providing training in use of scientific investigation and problem-solving methods; communication of technical skills and providing insight into functional sequences;
- e. Project: Development of concepts as well as realisation of solutions for complex, practical tasks; communication of social competence through primarily self-sufficient performing of a task while, at the same time, receiving subject-specific and work methodology guidance.
- f. Excursion: A prepared event taking place outside the university.
- g. Vocational work placement: Obtaining experience of practical professional work through active participation, usually outside the university (a provider of practical training) under local guidance and usually accompanied by subject-specific and methodological support from a teacher;
- h. Tutoring/mentoring: A course prepared according to § 75 Paragraph 1 HHG for running tutorials as well as running a tutorial; training in communication of subject-specific and didactic competences as well as mastering presentation and discussion techniques. The course is subject-specifically and methodologically lead by teachers.
- i. Private study:

(2) If, in accordance with the module description, access to the courses of a module is dependent upon successful completion of another module or from visiting the Academic Advisory Service, or if in the module description participation on an individual course requires a participation or certificate of achievement for another course, then the eligibility will be checked by proof of participation by the module responsible person.

(3) The module description can stipulate that a binding registration can be required to participate on the module or particular courses/events of the module. An announcement will be made in good time on the degree programme specific website as to whether and by which means binding registration should occur.

**§ 15 Study records (performance and attendance records) (RO: § 17)**

(1) During the degree programme study records (performance and attendance records) are foreseen and planned as verification of orderly study (pre-examination performances) or, together with the CP, for the passing of the module examination, as a prerequisite for awarding the CP to be produced and earned from the module. The following regulations apply:

(2) ) If there is a regulation in the module description which states that there is a duty to regularly attend courses then this will be documented on the basis of attendance records or absence lists. The course leadership decides on the form the documentation should take. Recording/certification of regular attendance is not taken as a course performance in accordance with Paragraph 6.

(3) Regular participation on a course is taken to be the case when the student was present at all individual courses scheduled by the course leadership throughout a given semester. It must still be confirmed if the student missed up to three individual courses for 15 scheduled dates or 20% of the course time in the case of less scheduled dates. If the permissible period of absence is exceeded for reasons which the student has no control over, such as illness, necessary support of a child living in one's own household or caring for a close relative (children, parents, grandparents, spouse, partner in a non-marital partnership) or involvement as a named or selected representative in the academic or student self-administration, the module officer will decide whether and in what way an equivalent performance is required and appropriate. The regulations concerning compensation for disadvantages contained in § 25 should be observed.

(4) In derogation of Paragraph 3 a regulation can also be integrated in the module description regarding issuing of an attendance record which states that the student must not only have regularly attended the course in accordance with Paragraph 3 but should also have actively participated in it. It can also just require active participation. According to that which has been established by the course leadership, active participation can include performance of a small amount of work such a writing reports, short presentations and group work. This work will neither be assessed nor evaluated as passed/not passed.

(5) Participation on a vocational work placement should be certified by the training place. The certification must contain the following details: Designation of the establishment, the first name, last name, date of birth, matriculation number of the apprentice as well as the type and duration of the activity. A work placement report should be produced by the apprentice about the work placement which is assessed in accordance with § 37 Paragraph 7.

In as far as the teachers require it, also regular participation on the course in accordance with Paragraph 3 is required for a performance record.

(6) Course performances can, in particular, include

- written examinations
- written papers or term papers
- presentations (with or without preparation)
- technical discussions
- work reports, reports

- working through practice exercises
- performance of tests and trials
- tests
- literature reports or documentation
- excursions

(7) The form and the time limit within which the course performance should be delivered is made known to the students by the teachers at the beginning of the course. The criteria for awarding the performance record should not be altered during the current semester in a way which is disadvantageous to the students. The teacher can allow the students to improve a written piece of work within a time limit.

(8) Written work which is not to be produced under supervision should be produced by the students according to the rules of good scientific practice. The student must be able, upon submission of the work, to state in writing that they produced the work themselves and that all sources and aids used to complete the work are cited. A declaration should also be made that the work was not yet – even in part – used in another degree programme as a course or examination performance. § 27 Paragraph 1 applies appropriately. In order to check observance of the rules of good scientific practice the teachers are entitled to require that the students also submit written work which is not to be produced under supervision in a suitable electronic form. The examination committee will decide upon more detailed regulations concerning this matter.

(9) Passed course performances cannot be repeated. Course performances which are not awarded a pass can be repeated as many times as necessary.

#### **§ 16 Course of study plan; information (RO: § 18)**

(1) The course of study plan included as Appendix 2 provides the student with some guidelines for target-oriented organisation of his studies. It takes account of content-related references between modules and organisational conditions of the degree programme being offered.

(2) The faculty sets up a website for the Master's degree programme Physical Biology of Cells and Cell Interactions on which general information and the regulations for the degree programme are presented in the respectively current form. One can also find [the module manual and] published there and the course of study plan there and, if modules are imported and/or exported, the list of the currently imported and exported courses for the degree programme.

(3) The faculty creates for the Master's degree programme Physical Biology of Cells and Cell Interactions on the basis of the module descriptions the course of study plan a directory of courses, with comments, with a description of the contents and organisation of degree programme being offered. This should be updated for every semester and should appear in the last lecture week of the previous semester.

#### **§ 17 Course guidance service; orientation event (RO: § 19)**

(1) The students have the option during the whole course of study to use the services of the

Academic Advisory Service for the Master's degree programme Physical Biology of Cells and Cell Interactions of the faculty of Biosciences.. The Academic Advisory Service is run by persons commissioned by the Dean of Studies. By making use of the Academic Advisory Service students receive support, in particular concerning questions about study organisation, studying techniques and selection of courses. The Academic Advisory Service should, in particular, be used:

- at the beginning of the first semester;
- when failing to pass examinations and when failing in attempts to obtain the required performance records;
- in case of difficulties experienced in individual courses;
- when changing degree programme or university.

(2) Apart from the course guidance service students also have access to the central course guidance provided by Johann Wolfgang Goethe University. It provides information, as a general course guidance centre, about course options, contents, the structure and requirements of a degree programme and gives advice in cases of course-related personal difficulties

(3) An orientation event takes place before beginning the lecture period of each semester in which the students can begin their studies to which first-year students are invited by displaying a notice or in some other way. Information is provided during this event about the structure and the overall design of the degree programme and about special features of the specific semester. The students are given the opportunity to ask relevant questions, particularly those concerning organisation of studies.

#### **§ 18 Academic management and the module officer (RO: § 20)**

(1) The task of academic management of the Master's degree programme Physical Biology of Cells and Cell Interactions is performed by the Dean of Studies of the faculty Biosciences in as far this is not transferred, based upon her or his suggestion, to a member of the professors group authorised to act as an examiner for the Master's degree programme for the period of 4 years. The academic leader is the advisory member in the study commission and particularly has the following tasks:

- Coordination of the courses and examinations involved in the degree programme in cooperation with the module officers, and possibly also with those from other faculties;
- Creation and updating of examiner lists;
- Evaluation of the degree programme and implementation of any required and developed quality assurance measures in cooperation with the study commission (see also § 6 Evaluation statutes for teaching and learning);
- if necessary, commissioning of module officers (Paragraph 2 remains unaffected)

(2) For every module the academic leadership for the degree programme nominates a module officer from the ranks of the teachers of the module. For interdisciplinary modules the module officer is nominated in cooperation with the Dean of Studies of the other faculty. The module officer must be a professor or a permanent scientific member of the teaching unit. She or he is responsible for all consultations concerning the contents of the module and organisational tasks assigned to her or him from this set of regulations, in particular for involvement in organisation of

the module examination. The module officer is represented by the academic leadership for the degree programme.

## Abschnitt IV: Organisation of Examinations

### § 19 Examination committee; examinations office (RO: § 21)

- (1) The faculty board forms an examination committee for the Master's degree programme Physical Biology of Cells and Cell Interactions.
- (2) There are seven members on the examination committee of which four are members of the group of the professorate, plus one scientific member and two students[on the Master's degree programme Physical Biology of Cells and Cell Interactions .
- (3) The members of the examination committee are selected along with a representative based on a suggestion from the respective group from the faculty board for the faculty Biosciences. The period of office of the students is one year while that of the other members is two years
- (4) If matters arise which concern a member of the examination committee, his membership will be suspended with reference to this matter and will be performed by his/her representative. This does not apply concerning purely organisational issues.
- (5) The examination committee selects a chairperson from the group of the professors on the committee.

The deputy chairperson is selected from the group of the professors on the committee or their representatives. The chairperson conducts the business of the examination committee. She or her sends out the invitations to the examination committee meetings and is the chairperson for all proceedings and making of resolutions. At least one meeting of the examination committee should normally take place in every semester. A meeting is to be called when at least two members of the examination committee ask for one.

- (6) The examination committee does not meet publically. It is empowered to make resolutions when at least one half of the members, including the chairperson or the chairperson, are present and a majority of the professors vote in favour of the resolution. Agreement on the part of a majority present is required to pass resolutions. In the case of an equal number of votes for and against the chairperson has the casting vote. Resolutions made by the examination committee must be minuted. In all other matters the procedure is according to the Rules of Procedure for the committee of Johann Wolfgang Goethe University.

- (7) The module officers in the Master's degree programme Physical Biology of Cells and Cell Interactions assist the examination committee in an advisory capacity.

- (8) The examination committee can delegate individual tasks to its superiors for sole performance and decision-taking. The members of the examination committee and the examinee in question have power of veto over their decisions. The chairperson of the examination committee can delegate performance of tasks to the examinations office. This is the business office of the examination committee. It handles the daily business arising under the direction of the examination committee and their superiors.



(9) The members of the examination committee and their representatives are required to observe official secrecy. In as far as they are not in public office the members are required by the chairperson to observe secrecy; they confirm their intention to do this with their signature which is placed on file.

(10) The members of the examination committee have the right to participate on oral examinations as a listener.

(11) The examination committee can announce decrees, establishment of fixed dates and other decisions, with legally binding effect, while taking account of data protection provisions, by displaying them on a board at the examinations office or by using other appropriate measures according to § 41 of the Hessian Administrative Procedures Act.

(12) Adverse decisions taken by the examination committee or the chairperson of the examination committee should be reported to student concerned without delay, in writing, should be justified and should also make reference to legal remedies. The student concerned should be given the opportunity to make a statement before the decision is finally reached .

#### **§ 20 Tasks of the examination committee (RO: § 22)**

(1) The examination committee and the examinations office responsible for the Master's degree programme Physical Biology of Cells and Cell Interaction are responsible for organisation and orderly running of the examinations in the Master's degree programme Physical Biology of Cells and Cell Interaction . The examination committee ensures that the provisions of this set of regulations are observed and, in cases of doubt, decides on questions of interpretation of this set of regulations. It decides on all examinations matters which are not taken from the set of regulations or statutes of another organ or committee or from the chairperson of the examination committee

(2) The examination committee is usually fully responsible to fulfil the following tasks:

- Decision concerning fulfillment of the prerequisites for access to the a Master's degree programme including imposing of some additional requirements concerning catching up on delivery of course performances and examination performances from the Bachelor degree programme and the decision concerning provisional admission;
- Establishment of time limits for examinations, time periods and time limits for registration and withdrawal for the examinations and their announcement;
- (if necessary) Appointment of examiners;
- Decisions concerning admission to examinations;
- the decision concerning allowing crediting of academic performances according to §§ 29, 30 as well as imposing of additional requirements regarding course or examination performances to be caught up on as part of the crediting of academic performances;
- calculation and announcement of the grades achieved in examinations as well as the overall grade for the Master's degree;
- the decisions concerning the Master's thesis;

- the decisions concerning passed and failed;
- the decisions concerning compensation for disadvantages and extension of examination or work deadlines;
- the decisions concerning violation of examination regulations;
- the decisions concerning the non-validity of a Master's degree;
- decisions concerning pleas and inconsistencies by students concerning decisions made in the examination procedure, in as far as these should take place;
- regular reporting in the study commission about the development of examination and study times including the work times required for the Master's thesis as well as about the demand from students for the various optional compulsory modules;
- disclosure of the distribution of subject and grades (overall);
- suggestions given to reform this set of regulations.

(3) For the purposes of checking observance of good scientific practice the examination committee is authorised to also check scientific work using suitable electronic means for deceptions and attempts to deceive. To do this it can demand that the work to be examined is submitted in an electronic form within a reasonable time limit. If the author of the work does not meet this requirement then the work will be awarded a fail grade.

#### **§ 21 Examiners; observer assessors (RO: § 23)**

(1) Members of the professors group, scientific workers who were commissioned with autonomous teaching in undergraduate programmes, as well as lecturers and teaching assistants for special tasks are authorised (§ 18 Paragraph 2 HHG) to check and assess university examination performances. Outside lecturers, unplanned professors, honorary professors who respectively teach in the subjects being examined as well as professors who have been relieved of their post and retired can be appointed by the examination committee with their agreement as examiners.

The examination committee can, in individual cases, appoint a person who is not at Johann Wolfgang Goethe University but who is authorised to act as an examiner according to Sentence 1 as a second expert assessor for the Master's thesis.

Examination performances may only be evaluated by persons who themselves hold at least the qualification (or an equivalent one) to be established by the examination.

(2) The examination which is associated with a module is usually administered, inspected and approved by the lecturers / teachers of the module without requiring any special appointment by the examination committee. If, for any reason, it is simply not possible for the teachers to administer, inspect and approve the examinations then the examination committee can appoint another examiner.

(3) Written examination performances which can no longer be repeated are to be assessed by two examiners. § 36 Paragraph 17 remains unaffected. Oral examinations are to be run by a number of examiners or by one examiner in the presence of an observer assessor.

(4) Only a member of Johann Wolfgang Goethe University or persons closely associated with it may be appointed as an observer assessor for oral examinations who themselves at least have a

Master's degree or have passed an equivalent examination. Appointment of the observer assessor is performed by the chairperson of the examination committee. She or he can delegate the appointment to the examiner.

(5) Examiners, observer assessors are required to observe official secrecy.

## Section V: Examination Requirements and Procedures

### § 22 First registration and approval to sit the Master's examinations (RO: § 24)

(1) At the latest at the time of registration for the first module examination in the minor subject Master's degree programme Physical Biology of Cells and Cell Interactions the student should submit a fully filled out registration form for approval to sit Master's examinations to the examinations office for the Master's degree programme Physical Biology of Cells and Cell Interactions. In as far as this did not take place in connection with the application for approval to take a degree programme, the application to sit examinations in particular should be attached.

- a) a declaration concerning whether the student had already finally failed a Bachelor examination, a Masters examination, a Master's degree examination, a diploma examination or an ecclesiastical university examination or a final state examination in the subject Biosciences or in a comparable degree programme (a degree programme which was primarily focused on the subject) at a university or whether they are currently studying the subject Biosciences or a comparable degree programme in an as yet not completed examination procedure at a university in or outside of Germany;
- b) a declaration concerning whether and, where relevant, how often the student has already failed module examinations in the Master's degree programme Physical Biology of Cells and Cell Interactions or in the same modules of another degree programme at a university in or outside of Germany;
- c) if necessary verifications of already achieved course or examination performances which should be included in the degree programme
- d) Verifications concerning language certificates, language proficiencies
- e) if necessary verification of payment of the examination fee to be charged according to § 49.

(2) The examination committee can, in exceptional cases, in particular in cases of a change in study location, a change of subject or resumption of studies, on request, release a student from the compulsory matriculation for registration for individual module examinations.

(3) The chairperson of the examination committee, and in cases of doubt the examination committee itself, decides on an approval question, possibly also after consulting a subject representative. Approval will be refused if

- a) the documentation is incomplete or



- b) the admission requirements stated in Paragraph 1 d) are not fulfilled or
  - c) the student has finally lost any right to examination for a module according to Paragraph 1 b) or for the respective degree programme or has finally failed one of the examinations mentioned in Paragraph 1 a).
- (4) The examination committee will decide on any exceptions to Paragraph 1 and Paragraph 3 in special cases on request by the student.
- (5) Refusal of approval is reported to the student in writing by the chairperson of the examination committee. It should be justified and also make reference to legal remedies.

### **§ 23 Point in time of the examination and the registration procedure (RO: § 25)**

- (1) Module examinations are rendered in temporal and subject-related connection with the respective modules. Module examinations for compulsory modules and for annually scheduled optional compulsory modules are usually to be offered at least twice a year.
- (2) The module-concluding oral examinations and written examinations should be performed within the examination periods set by the examination committee. The examination periods are usually the first two and the last two weeks of the lecture-free period.
- (3) The exact set examination dates for the module examinations are established by the examination committee in agreement with the examiners. The examinations office provides the students in good time, but at the latest four weeks before the set examination dates, with information in the form of an examination plan about the time and location of the examinations as well as the name of the examiners by displaying these on a board or by using other appropriate measures. If one must deviate from this examination plan for compelling reasons then new establishment of a set date is only possible with permission from the chairperson of the examination committee.
- Set dates for the oral concluding module examinations or for examinations which are temporally directed related with individual courses or which can be taken during courses (submodule examinations) are set by the examiners, if necessary in consultation with the students.
- (4) The student can only sit the module examination in as far as she or he is enrolled at der Johann Wolfgang Goethe University. § 22 Paragraph 2 remains unaffected. In order to register for [or sit] the respective module examination the student must be approved to sit the Master's examination and she or he must not yet have finally failed the respective module examination. She or he must also have delivered the required performance [and participation] records in accordance with the module description for the module. If approval to sit a module examination depends on submission of course performances and these have not yet been fully achieved then approval to sit a module examination [or a partial module examination] is possible conditionally. [The module is only then completed when all [course performances as well as] module examinations [or all submodule examinations of the module] have been passed / completed.] [The examination committee will decide about such exceptions.] Suspended students cannot sit any examinations or earn any performance records. It is, however, permitted to repeat failed examinations while being suspended. Students are also entitled to deliver course or examination performances while being suspended if the suspension was due to exercising of maternity rights

or due to exercising their right to parental leave or due, as attested by a medical certificate, to caring for family members in need of care or due to performance of official duties according to Art. 12 a of the German constitution (Basic Law) or due to involvement as the named or elected representative in the academic self-administration.

#### **§ 24 Absence and withdrawal from module examinations (RO: § 26)**

(1) A module examination performance is taken as “not sufficient” (5.0) according to § 39 Paragraph 3 if the student misses a set examination date which is binding for them without providing any important reason or breaks off participation during the examination before it finishes. The same applies if she or he has not submitted a written module examination performance within the prescribed work time or submitted an empty page as a module examination performance as a written piece of supervised work or remained silent at an oral examination.

(2) The asserted reason for not attending or breaking off an examination must immediately be submitted in writing to the chairperson of the examination committee after the reason becomes known and should be credible. Any inability to sit the examination arising during delivery of an examination performance must be communicated immediately to the examiner or to the proctor. The duty to immediately report and to give a credible explanation of grounds for certain actions to the examination committee remains unaffected. In a case of illness one must produce a doctor's attest immediately or at the latest within three working days from which it is very clear what health impairment (symptoms of the condition/type of performance impairment suffered) exists which is relevant to the set examination date in question. An additional attest from a medical officer can be required if any justified doubts remain.

(3) The illness of a child which the student has to take care of which has not yet reached the age of 14 or a near relative in need of care (children, parents, grandparents, spouse or partner in a non-marital partnership) are equivalent to one's own illness. Another important reason is exercising of maternity rights.)

(4) The chairperson of the examination committee will decide on the subject of recognition of the grounds for absence or withdrawal. If the grounds are accepted then a new date must be determined immediately.

(5) For a case of a recognised withdrawal or absence the examination results from already completed parts of the module will still be recognised.

#### **§ 25 Course and examination performances in cases of illness and a disability; special circumstances (RO: § 27)**

(1) In events, courses and examinations consideration must be given to the type and severity of a disability or a chronic illness of the student or concerning pressures on the student due to pregnancy or raising of children or caring for near relatives in need of care.

(2) The type and severity of the pressure should be demonstrated by the student in good time to the chairperson of the examination committee through submission of suitable documentation, in a case of illness through submission of a doctor's attest. An attest from a medical officer can be

required in cases of doubt.

(3) If the student can make a credible argument that she or he is not in a position to deliver the examination or course performance, fully or partially, in the form required, due to a disability, a chronic illness, caring for a near relative in need of care, a pregnancy or raising of a child which has not yet reached the age of 14 then this disadvantage must be compensated for by taking appropriate measures such as extending the work time given or using another type of examination procedure. Exercising of legally specified maternity rights periods and the time limits provided for the parental leave should be enabled through submission of the respective evidence.

(4) Decisions concerning compensation for disadvantages for delivery of examination performances are made by the chairperson of the examination committee, while those for course performances are made by the chairperson of the examination committee in agreement with the persons responsible for the course.

#### **§ 26 Mandatory course guidance; time frame for sitting examinations (RO: § 28)**

(1) The student must participate on a mandatory counselling interview in as far as his course of study is delayed in comparison with the study plan by more than two semesters.

After the mandatory counselling interview the examination committee will impose the additional requirement on the person involved to sit the still unsat module examinations, as seen in a comparison with the study plan, at the point in time of issuing of the requirements, within a time limit to be set by the examination committee (at least two semesters). Non-fulfilment of the additional requirement will lead to loss of the right to examination during the Master's degree programme Physical Biology of Cells and Cell Interactions. Reference should be made to this when imposing additional requirements. In as far as the person affected can give a credible explanation according to Paragraph 2, in good time, of important reasons why fulfillment of the additional requirement was prevented, the examination committee will extend the time limit for fulfillment of the requirement by at least one further semester. If the student does not turn up for the first counseling interview then an invitation will be issued soon after to attend a counseling interview. If the student still does not turn up on a second date for the counseling interview then sentences 2 to 5 will apply without any further invitation to a counseling interview being issued.

(2) The requirements for

- fulfillment of the additional requirements
- successful completion of the section of the course
- achieving the required number of CP
- successful passing of the Master's examination

According to Paragraph 1 the time limit can be extended on request by a student if the delay was caused by Johann Wolfgang Goethe University or the student was not able to meet the time limit due to serious circumstances. When meeting a time limit, extensions of and interruption of study times are not taken into account in as far as they were caused

1. by an authorised leave of absence semester;
2. involvement as the named or elected representative in the academic or student self-administration.
3. by illness, a disability or a chronic illness or for another reason which was outside the students area of control;
4. due to exercising of maternity rights or parental leave;
5. due to necessary care for a child which has not yet reached the age of 14 Or due to caring for a near relative in need of care (parents, grandparents, spouse or partner in a non-marital partnership) with assignment to a care level according to § 15 Paragraph 1 of the Eleventh Code of Social Law;
6. due to membership of an A, B, C or D/C squad of high-performance sports associations.

In the case of number 4, at least exercising of time limits according to § 3 Paragraph 2 and § 6 Paragraph 1 of the Protection of Mothers Law (MuSchG) and the regulations concerning parental leave in §§ 15 and 16 of the legislation on parental allowances and parental leave (BEEG) should be taken into account appropriately. Also an orderly overseas study period of up to two semesters remains unaccounted for. The application should be made at the point in time at which the student recognises that an extension of time limit is necessary. The application should always be made before expiry of the time limit. The duty for delivery of evidence lies with the student; it should be submitted together with the application. In the case of illness a doctor's attest should be submitted. § 24 Paragraph 2 Sentence 4 RO. An attest from a medical officer can be required in cases of doubt. The examination committee decides on the application for extension of the time limit.

#### **§ 27 Deception and a breach of regulations (RO: § 29)**

- (1) If a student seeks to influence the result of her or his examination or course performance through deception or through use of non-permitted aids, the examination or course performance is evaluated as "not sufficient (5.0). The attempt at deception is, in particular, recognized when a student brings non-permitted aids into the examination room or he had submitted a false declaration according to §§ 15 Paragraph 8, 31 Paragraph 8, 34 Paragraph 6, 36 Paragraph 16 or if she or he submitted one and same work (or parts thereof) more than once as an examination or course performance.
- (2) A student which is actively involved in an attempt to deceive can be excluded by the respective examiner or by the supervisory person from continuation of the respective examination; in this case the associated examination or course performance is evaluated as "not sufficient"(5.0).
- (3) In case of a specially severe deception, in particularly for repeated deception or a deception with addition of a written declaration from the student about autonomous production of his work without non-permitted aids, the examination committee can decide upon exclusion from repeating the examination and delivery of further course performances so that the right to examination during the Master's degree programme Physical Biology of Cells and Cell Interactions] expires. The severity of the deception is to be evaluated on the basis of the

deception energy used by the student such as organised cooperation or use of technical aids such as radios and mobile telephones and by the impairment of equal opportunities caused by the deception.

(4) A student who disturbs orderly running of the examination can be excluded by the respective examiner or by the supervisory person from continuation of the respective examination; in this case the associated examination or course performance is evaluated as “not sufficient” (5.0). Paragraph 3 Sentence 1 is applied appropriately.

(5) If a student wrongly achieves participation on an examination through culpable behaviour, the examination committee can decide that the associated examination performance is evaluated as “not sufficient” (5.0)).

(6) The student can require in writing within a time limit of four weeks that decisions taken according to paragraphs 1 to 5 are checked by the examination committee.

(7) Adverse decisions taken by the examination committee should be reported to the student concerned without delay, in writing, should be justified and should also make reference to legal remedies.

(8) The subject-specific established citation rules for producing scientific work apply for term work, written talks and the Master’s thesis. In a case of non-observance one should check for an attempt to deceive.

(9) In order to be able to check on a suspicion of wrong scientific behaviour the examination committee can decide that written examination and/or course performances which are not to be produced under supervision must also be submitted in an electronic form.

#### **§ 28 Deficits in the examination procedure (RO: § 30)**

(1) (1) If it turns out that the procedure for obtaining an oral or a written examination performance was deficient in a way which could have influenced the test results then, on request from a student or from the office as ordered by the examination committee, a particular student will be allowed to repeat the examination performance. For a written examination performance the deficit must be complained about during the examination situation to the supervisory team and in the case of oral examinations immediately after the examination to the chairperson of the examination committee or to the examiner. If a student participating on a written examination performance considers the support measures taken by the supervisory team to be inadequate then she or he should make their complaint immediately after the examination to the chairperson of the examination committee.

(2) No further directives may be made ex officio according to Paragraph 1 six months after completion of the examination performance.



**§ 29 Recognition and allowing credits/accreditation for academic performances (RO: § 31)**

- (1) Study times, course performances and examination performances are credited to the student without any assessment of equivalence when they were delivered at another university in Germany on the same degree programme, the degree programme is accredited and no significant differences exist between the modules concerning the qualification goals achieved. If the examination committee cannot demonstrate that there is any significant difference then the study times, course performances and examination performances should be credited.
- (2) Study times, course performances and examination performances from other degree programmes are credited in as far as there are no significant differences as regarded the acquired competences. There is no schematic comparison made for this crediting but simply an overall view and overall assessment of the contents, scope and requirements of the course performances and examination performances with particular consideration given to the qualification goals achieved. The burden of proof to demonstrate a lack of equal value lies with the examination committee. Paragraph 1 Sentence 2 applies appropriately.
- (3) Paragraph 2 is appropriately applicable for recognition of study times, course performances and examination performances delivered in state-approved distance learning studies, at other educational institutions, in particular at state or state-approved vocational academies, for multimedia supported course performances and examination performances as well as for course performances and examination performances delivered by students on the basis of § 54 Paragraph 5 HHG..
- (4) Paragraph 2 also applies appropriately for crediting of performances which were delivered at foreign universities. During the crediting process the equivalence agreements approved by the Conference of Ministers for Cultural Affairs and the Conference of University Rectors as well as agreements made in relation to university partnership agreements should be observed. The examination committee will decide if there are no equivalence agreements to refer to. If there any doubts concerning equivalence the Central Office for Foreign Education should be consulted
- (5) In a case of obligatory or recommended study in a foreign country the student should meet with the chairperson of the examination committee or a person commissioned to do this about the eligibility of course performances and examination performances before beginning the studies in the foreign.
- (6) Relevant professional occupations can be recognised as practical education. More details are regulated in the module description.
- (7) Final work (for example Master's theses, diploma work, state examination work), which the student has already successfully delivered outside the Master's degree programme Physical biology of cells and cell Interactions... at Johann Wolfgang Goethe University, will not be credited. It is also not possible to have multiple crediting of the same performance in the Master's degree programme Physical Biology of Cells and Cell Interactions.
- (8) Course performances and examination performances from a Bachelor degree programme cannot usually be credited for the Master's degree programme.
- (9) If examination performances are credited, the grades should be adopted – in as far as the grading systems are equivalent– and included in calculating the grade (overall). The remark "passed" will be adopted if the grading systems are not comparable. Credited performances are

usually marked in the final degree document with details of the university at which they were acquired.

(10) The applicant submits all of the documentation required for crediting or recognition to the examination committee which is the basis for evaluation, the credit points (CP) and the points in time of all examination performances delivered in examinations which she or he previously sat in another degree programme or at other universities. The documentation should provide clear information about which examinations and course performances were not successful or had to be repeated. The examination committee can demand submission of further documentation such as the legally binding module descriptions of the modules to be recognised.

(11) Unsuccessful attempts in other degree programmes or in degree programmes taken at other universities will be credited in as far as they were credited when they were done successfully.

(12) Crediting and recognition of examination performances which were delivered more than five years previously can be refused in individual cases; the decision can be associated with imposing of some additional requirements. A legal entitlement to crediting exists in a case of meeting of the conditions of paragraphs 1 to 4 in combination with Paragraph 10. Sentence 1 and paragraphs 7 and 11 remain unaffected.

(13) Decisions which have general validity concerning questions about crediting are taken by the examination committee; crediting in an individual case takes place by its chairperson, where necessary in consultation with a subject examiner. They establish a subject-related semester while taking account of the crediting.

(14) If crediting of course performances and examination performances takes place which are not awarded credit points (CP) then the respective equivalents should be calculated and appropriately labelled on the student account.

(15) If credits are awarded then these can be associated with additional requirements regarding course performances and examination performances which must be caught up on. Additional requirements and possible time limits for fulfilling the additional requirements should be communicated to the applicant in writing. The announcement should make reference to legal remedies.

### **§ 30 Crediting of competences acquired outside of a university (RO: § 32)**

The CP of the respective module can be credited to the modules of the degree programme on request for knowledge and abilities which have been acquired before beginning the degree programme or during the degree programme, outside a university, and which are equivalent in level and the results of learning. This particularly applies for the modules 2, 9-32. The crediting takes place individually by the examination committee based on a suggestion from the persons responsible for the module. The prerequisite is written evidence (for example attestations, certificates) concerning the scope, contents and the performances delivered. No more than a total of 50% of the CP required in a degree programme may be replaced by credited points. Crediting of the CP takes place without a grade. This is shown appropriately in the certificate.

## Section VI: Performing the Module Examinations

### § 31 Module examinations (RO: § 33 )

(1) Module examinations are held during the course. This finalises the respective module. They are examination events which can be repeated a limited number of times and which are [usually] awarded a grade.

(2) Modules finish off [usually] with a single module examination which can also be sat temporally directed related with one of the courses of the module (a course-related module examination).

(3) By passing the module examination the student should demonstrate that she or he has mastered the contents and method of the module in their fundamental contexts and can use the knowledge and abilities acquired. The object of the module examinations is basically the contents established in the module descriptions of the courses of the respective module. In the case of course-related module examinations the overriding higher qualification goals of the module are also tested.

(4) In as far as, for cumulative module examinations, only a minority of the submodule examinations of the module have to be passed to successfully complete the module, the module description provides more detailed regulation, in particular concerning calculating the grade of the modules.

(5) The module description provides clear regulation of whether and what failed submodule examinations can be compensated for by passing another part of the module, so that the module as a whole can be completed successfully. In this case repeating the failed but compensated for submodule examinations is not permitted. It is also not permissible to compensate for submodule examinations which have been evaluated as “not sufficient” (5.0) according to §§ 24 or 27.

(6) The respective form of the examination for the module examination [or partial module examination] can be taken from the module description. Written examinations occur in the form of:

- written examinations;
- term work;
- written papers (for example essays, written talks);
- reports;
- thesis papers;
- reports;
- portfolios;
- project work;
- drawings;



- descriptions.

Oral examinations occur in the form of:

- individual examinations;
- group examinations;
- technical discussions;
- colloquia

Additional forms of examination are:

- seminar lectures;
- talks;
- presentations;
- subject-related practical examinations

(7) The form and duration of module examinations [and if necessary the submodule examinations] are regulated in the module descriptions. If there is a variety of forms of examination planned in the module description, the form of examination for the respective examination date is established by the examiners and the students are informed at the beginning of the courses of the module but at the latest upon announcement of the examination date.

(8) The examination language is English. Individual written or oral examinations can be taken in foreign language by agreement of all persons participating on the examination. This is regulated in more detail in the module description.

(9) Written work which is not to be produced under supervision (for example term work) should be produced by the students according to the rules of good scientific practice. The student must be able, upon submission of the work, to state in writing that they produced the work themselves and that all sources and aids used to complete the work are cited. A declaration should also be made that the work was not yet – even in part – used in another degree course as a course or examination performance.

(10) Participants on module examinations must identify themselves through submission of an official identity document with a photograph.

(11) The examiners decide whether and what aids may be used for a module examination. The permitted aids are to be announced in good time before the examination.

### **§ 32 Oral examination performances (RO: § 34)**

(1) Oral examinations are to be held by the examiner in the presence of an observer assessor as an individual examination. Group examinations involving up to five students are possible.

(2) The duration of oral examinations lies between at least 15 minutes and at the most 60 minutes per student to be examined. The duration of the respective module examination can be taken from the module description.

(3) The primary objects and results of the oral examination are to be recorded by the observer assessor in a report. The examination report should be signed by the examiner and the observer assessor. The observer assessor should be consulted in the absence of the examinee and not in

public before awarding the grade. The report should be sent to the examinations office immediately.

(4) The result of the oral examination should be announced to the student at the end of the oral examination and explained and justified in more detail if the student fails it or makes an explicit request for this; the reasons given are to be recorded in the report..

(5) Oral examinations are public within the university for students who should sit the same examination. The student to be examined can contradict approval for his results to be made public. The public may not be present when the examination results are disclosed to the student to be examined. It can also be limited on capacity grounds. The chairperson of the examination committee can demand appropriate evidence to check the grounds mentioned in Sentence 1.

### **§ 33 Written examinations [and other written work done under supervision] (RO: § 35)**

(1) Written examinations include answering a task or problem or a number of tasks, problems or questions. In a written examination [or other written work done under supervision] the student should demonstrate that she or he can solve tasks on his own within a limited period of time under supervision using limited aids and can use the required basic knowledge or commonly used methods in the field of study to both recognise a problem and find ways to solve it.

(2) "Multiple choice" questions in written examinations should only contribute to up to 25% of the overall points achievable.

(3) For written examinations at which the "multiple choice" questions can earn more than 25% of the overall points achievable, the following regulations must be observed for creation of the questionnaire and evaluation of the written examinations:

-The examination questions must ensure reliable examination results. The examination questions must be unequivocally clearly understandable, clearly answerable and suitable for clearly establishing the level of knowledge and skills of the student. It is particularly important that there is no other possible solution presentable other than the solution which was prescribed for evaluation as the correct one. The examination committee should ensure this is the case by using a suitable procedure;

-If the tasks turn out to be unsuitable from this point of view then they must be excluded from the evaluation. Respective answers which are not the prescribed approved solution but which are nevertheless arguable and tenable will be recognized in favour of the student. Malus points for wrong answers are impermissible;

-The question and answer catalogue should be drafted by at least two persons authorized to act as an examiner whereby one of them must belong to the group of professors;

-The students should be informed about the prerequisites for passing and the evaluation scheme for the written examination at the latest when the tasks or problems are made known.

A written examination which consists of more than 25% multiple choice questions is passed if the student has answered at least 50% (the pass limit) of the examination questions correctly or if the number of the questions answered correctly by the student is no more than 22% less than the average examination performance of all examinees who took part in the examination for the first time.

(4) If a student arrives late to a written examination, she or he cannot make up the lost time.

(5) The supervisory person for a written examination should produce a short report for every written examination. In this he should record all incidents which may be of relevance for establishing the test results, in particular incidents according to §§ 24 and 27.

(6) The working time for the written examination work [and for the other written work done under supervision] should be oriented on the scope of the module to be examined [or in the case of submodule examinations on the scope of the part of the module to be examined]. For written examination work this is at least 45 minutes and a maximum of 90 minutes. The concrete period should be established in the respective module descriptions.

(7) The written examination work [and the other written work done under supervision] are usually assessed by an examiner. In the case of failure of a student's last permitted repeat attempt, it is to be assessed by a second examiner. The evaluation must be justified in writing. If there is some deviation in the grades calculated then the grade awarded for the written examination work [and the other written work done under supervision] is the average of the two grades. The assessment process for written examinations should not exceed four weeks.

8) Multimedia supported practice exams ("e-written examinations") are permissible in as far as they are suitable to fulfil the examination purpose. They may only be delivered using computer systems present in the administration offices of the university or from the examinations office released for this purpose by agreement of the HRZ. Unique identifiability of the electronic data must be possible. The data must be unmistakable and capable of being permanently assigned to the examinees. The examination must take place in the presence of a subject-specific competent keeper of the minutes. A written record is to be produced about the course of the examination in which the name of the keeper of the minutes as well as the examinees, beginning and end of the examination as well as any special incidents are to be recorded. § 47 applies for inspection of the multimedia supported examination as well as of the examination results. The task or problem set including a model solution, the evaluation scheme, the individual examination results as well as the written record should be archived according to legal provisions.

#### **§ 34 Term work [and other written papers] (RO: § 36)**

(1) By completing written term work the student should demonstrate that she or he is capable of solving a problem from a specialist field autonomously through application of scientific methods. It must be a component part of a module.

(2) Protocols and written elaborations can be performed in parallel to a practical course.

(3) A piece of term work can be approved as group work if the contribution made by individuals can be evaluated as an examination performance, recognizable on the basis of objective criteria.

(4) The student can be given the opportunity to suggest a topic. Issuing of the topic is performed by the examiner who documents the processing period of the term work.

(5) A written protocol should comprise 10-30 pages. Term work should involve a working time of at least two and at the most four weeks (full time, that is workload of 2 to 5 CP). The respective processing period is regulated in the module description. The task time limits for the term work are established and documented by the examiner.

(6) The term work must be submitted within the established processing time limit as a single copy with a declaration according to § 31 Paragraph 8 to the examiner; the date stamp is decisive if it is sent by post. Submission of the term work should be recorded in the files by the examiner.

(7) Assessment of the term work by the examiner should be completed within six weeks after

submission; the evaluation must be justified in writing. § 33 Paragraph 7 applies appropriately for all other matters.

(8) A student who had his term work evaluated as “not sufficient (5.0)” can apply to the examiner for an opportunity to improve the term work. This does not apply if an evaluation with “not sufficient”(5.0) is based on § 24 or on § 27. The examiner establishes a time limit for improving the term work. When deciding on the improved term work the decision is simply made as to whether the term work is evaluated with the grade 4.0 or worse. If the time limit for submission of the improved term work is not observed then the term work will receive the final grade “not sufficient” (5.0).

### **§ 35 Project work (RO: § 38)**

(1) Through submitting project work the student should demonstrate his/her ability to develop, implement and present concepts. The student should demonstrate that she or he can define goals for a large task as well as develop methods of resolution and concepts.

(2) The duration of the project work is regulated in the module description.

(3) If project work is undertaken in the form of team work the contribution made by individual student should be clearly recognisable and evaluable and should fulfil the requirements according to Paragraph 1.

### **§ 36 Master's thesis (RO: §§ 3, 40, 41)**

(1) The Master's thesis is an obligatory component of the Master's degree programme. It forms its own autonomous [final] module.

(2) The Master's thesis should demonstrate that she or he is capable, within a given time limit in accordance with the goals according to §§ 2, 6, to work on a topic in a comprehensive and deeper way. The topic must be conceived in such a way that it can be processed within the prescribed time limit.

(3) The processing scope of the Master's thesis is 30 CP; this represents a processing time of 6 months / 25 weeks.

(4) In order to apply for approval to submit a Master's thesis, the modules 1,2,3,4,5 as well as the three elective modules must be completed.

(5) Supervision of the Master's thesis is undertaken by a person amongst the circle of persons authorised to act as an examiner according to § 21. These have the duty to guide the student in delivering the Master's thesis and to inform regularly about the progress of the work. The supervisor must ensure that the person is supplied with the instrumental equipment required, if necessary, to produce the Master's thesis. The supervisor is usually the primary reviewer of the Master's thesis.

(6) In consultation with and by agreement with the chairperson of the examination committee, the Master's thesis can also be produced in an establishment outside Johann Wolfgang Goethe

University, for example the Max Planck Institute. In this case the topic must be set in consultation with a member of the professors groups of the faculty of Biosciences.

(7) The topic of the Master's thesis should be agreed upon with the supervisor and communicated to the chairperson of the examination committee to register the Master's thesis. If the student does not find a supervisor then the chairperson of the examination committee will ensure, on request from the student, that they obtain a topic for the Master's thesis and a supervisor in good time.

(8) The chairperson of the examination committee will decide on approval to submit a Master's thesis.

(9) Issuing of the topic is performed by the chairperson of the examination committee. The point in time of issuing and the topic should be recorded in the files at the examinations office. The Master's thesis must not be worked on before the officially recorded issue of the topic.

(10) The Master's thesis can also be approved in the form of a group work if the contribution made by individual students can be evaluated as an examination performance on the basis of indication of sections, page numbers, or other objective criteria enabling clear delineation of ownership of the work which is definable and evaluable and the requirements according to Paragraph 2 are fulfilled.

(11) The Master's thesis should be produced in German. In consultation with the chairperson of the examination committee it can also be produced in another foreign language. Production of the Master's thesis in a foreign language should be applied for at the latest together with the registration to submit a bachelor thesis to the examination committee. Permission to allow production of the Master's thesis in the selected foreign language is awarded as part of issuing the topic in as far as the written declaration of consent from the supervisor is available at the time of registration to submit a bachelor thesis and the option is available to appoint a second expert assessor with an adequate language qualification in the selected foreign language. For the case that Master's thesis is produced in a foreign language in consultation with the chairperson of the examination committee, an abstract of the thesis should be attached in the German language.

(12) The set topic can only be given back once and then only within the first third of the processing time. The contents of the newly set topic must differ from the given back topic. If, as a result of the withdrawal according to Paragraph 13 Sentence 3, a new topic is issued for the Master's thesis then giving back of this topic is complete.

(13) If the return date cannot be observed by the student for understandable reasons (for example illness of the student himself/herself or of one of the children she/he has to take care of) then the chairperson of the examination committee will extend the processing time if the student has applied for this before the deadline. The maximum extension which can be allowed is 50% of the processing time. If the situation preventing the student from fulfilling the task continues longer then the student can withdraw from the examination performance.

(14) The Master's thesis should be submitted to the examinations office on time. The point in time of its arrival should be recorded in the files. The date stamp is decisive if it is sent by post. If the Master's thesis is not submitted on time it will be given the grade "not sufficient" (5.0).

(15) The Master's thesis is to be submitted as 4 written (bound) copies and in the form of word/pdf-file. If the Master's thesis is not submitted on time in the prescribed form, it will be given the grade "not sufficient" (5.0).



(16) The Master's thesis should be composed according to the rules of good scientific practice. In particular all places in the text, pictures and drawings which have been taken verbatim or as a representation of the general meaning intended from publications or other external texts should be marked as such. The Master's thesis is to be accompanied by a declaration made by the student that she or he composed the work – or in the case of a group work marks the section of the work he/she contributed – himself and without use of any other than the cited sources and aids. A declaration should also be made that the Master's thesis was not – even in part – used for another examination or as a course performance.

(17) The examination committee passes on the Master's thesis to the supervisor as the primary reviewer for evaluation according to § 39 Paragraph 3. At the same time it appoints one further examiner from the circle of persons authorised to act as an examiner according to § 21 for a second evaluation and also passes on the work to him/her for evaluation. At least one of the examiners should belong to the group of professors from the faculty of Biosciences. The second examiner can, after consultation, limit the evaluation to adding his signature to the expert assessor's evaluation produced by the primary examiner. The evaluation should be performed by the examiner without delay; it should be submitted at the latest six weeks after submission of the work. In a case of different evaluations of the Master's thesis by the two examiners the grade will be awarded by the chairperson of the examination committee for the Master's thesis according to § 37 Paragraph 6.

(18) The Master's thesis should be evaluated within a further two weeks by one further appointed person from the circle of persons authorized to act as an examiner according to § 21 if the assessments of the two examiners differ from each other by more than 2.0 or one of the two examiners has evaluated the Master's thesis as "not sufficient" (5.0). The grade in this case is arrived at from the grades of the primary examiner, the second examiner and the third examiner according to § 37 Paragraph 6. If the conditions of § 24 or § 27 have been met then Sentence 1 does not apply.

## **Section VII: Evaluation of the Course Performances and Examination Performances;**

### **Calculating the grades and the overall grade; Failing the comprehensive examination**

#### **§ 37 Evaluation/assessment of the course performances and examination performances; Calculating the grades and the overall grade (RO: § 42)**

- (1) Course performances are evaluated by the respective teacher as "passed" or "failed".
- (2) Examination performances are [usually] graded and, exceptionally, evaluated in accordance with the module description with "passed" or "failed". The assessment or evaluation of examination performances is undertaken by the respective examiners. Here it is always the individual performance of the student which is the basis.
- (3) The following assessment levels should be used to grade the individual examination performances:

1	very good	an excellent performance;
2	good	a performance which lies significantly above the average requirements;
3	satisfactory	a performance which meets the average requirements;
4	sufficient	a performance which, despite deficiencies, is still sufficient to meet the requirements;
5	fail	a performance which does not meet the requirements due to its major deficits.

To obtain a differentiated evaluation of the examination performances the grades can be raised or lowered by 0.3 to produce intermediate values; thus it is permissible to award the grades 1.0; 1.3; 1.7; 2.0; 2.3; 2.7; 3.0; 3.3; 3.7; 4.0 and 5.0.

(4) If the module examination consists of a number of submodule examinations, the grade for the module will be calculated as the arithmetic average of the grades for the individual examination performances (submodule examinations). In this process only the first decimal points behind the comma will be taken into account.

(5) If the module examination is evaluated differently by two or more persons authorised to act as an examiner, the module grade will be taken as the arithmetic average of the grades from the examiners evaluations. When calculating the grade only the first decimal points behind the comma will be taken into account.

(6) The examiners can deviate from the system of computing the grade of a module examination if this better matches the performance level of the student based on the overall impression he/she gives and the deviation will not influence passing or not passing (the bonus regulation). In this process one in particular takes account of the course performances delivered during the semester in exercises or other courses which do, however, only make up a maximum value of up to 25 in 100 of the overall evaluation of the respective module examination. This is regulated in more detail in the module description [module manual]. The course performances leading to awarding of bonus points should be made public at the latest at the beginning of a semester in a suitable manner. Earned bonus points expire after completion of the semester which follows the semester in which the bonus was awarded.

(7) For the Master's examination an overall grade will be assigned in which all of the results of the module examinations of the degree programme are included.

(8) If more CP are earned in an optional compulsory area as were conceived of then those modules are included in determination of the grade (overall) which were first completed. If a number of modules were completed in the same semester the ones with the better grades count.

(9) When forming the overall grade the grades for the modules 1-5 and the 3 elective modules

are included with the weighting 1. The grade for the final module is included in the overall grade with the weighting twice.

(10) The overall grade for the passed Master's examination arises from the following figure whereby only the first decimal place is taken into account; all further places are removed without rounding up or down:

1.0 up to and including 1.5	very good
1.6 up to and including 2.5	good
2.6 up to and including 3.5	satisfactory
3.6 up to and including 4.0	sufficient
4.0	fail

(11) If an English language translation of the certificate is produced, the grades for the individual examination performances as well as the grade (overall) are shown according to the following grading scale:

1.0 up to and including 1.5	very good
1.6 up to and including 2.5	good
2.6 up to and including 3.5	satisfactory
3.6 up to and including 4.0	sufficient
4.0	fail

(12) For an overall Master's grade of up to and including 1,2 and a Master's thesis evaluated with the grade 1,0 the overall grade is "excellent (passed with distinction)". The English language translation of "mit Auszeichnung bestanden" is "excellent".

(13) For transparency of the overall grade an ECTS grading table is adopted in the Diploma Supplement according to § 45.



**§ 38 Passing and failing examinations; announcement of grades (RO: § 43)**

- (1) A module examination consisting of a single examination performance is passed if it was evaluated with the grade "sufficient" (4.0) or better. An examination performance evaluated using points is a pass when at least 5 points were achieved.
- (2) A module examination consisting of a number of submodule examinations (a cumulative module examination) is only passed if all submodule examinations were evaluated as at least "sufficient"(4.0).
- (3) The Master's examination is passed if all modules prescribed in this set of regulations were performed successfully, that is the required study records are available and the prescribed module examinations including the Master's thesis were evaluated with at least "sufficient" (4.0).
- (4) The results of all examinations are announced without delay. The examination committee decides on whether the announcement of grades should be public within the university in an anonymised form in the form of a notice on a display board and/or takes place using the electronic exam administration system, whereby the legitimate interest of those involved are to be protected. If the module examination was finally evaluated as "not sufficient" (5.0) or if the Master's thesis was evaluated with a grade worse than "sufficient" (4.0) then the student will receive a written notification from the chairperson of the examination committee, with a section on legal remedies, which should contain guidance concerning whether and in within which time limit the module examination or the Master's thesis can be repeated.

**§ 39 Collation of the examination results (Transcript of Records) (RO: § 44)**

The student will, on request, be presented with a certificate concerning passed examinations in the form of a Transcript of Records; issued in German and English, which at least contains the module title, the date of the individual examinations and the grades.

**Section VIII: Changing Compulsory and Optional Compulsory Modules/Major Fields of Study; repeating examinations; loss of the right to examination and final failing**

**§ 40 Changing compulsory and optional compulsory modules/major fields of study (RO: § 45)**

If an optional compulsory module is finally failed, one can change to a new optional compulsory module.

**§ 41 Repeating examinations; free attempt; improving grades (RO: § 46)**

- (1) Passed course examinations cannot be repeated.
- (2) Failed module examinations and submodule examinations may only be repeated twice at the most. It is possible to arrange for the failed examination performances in one module at the most to be repeated a third time.
- (3) A failed Master's thesis can be repeated once. A different topic is given. Giving back of the topic of the Master's thesis is only permissible as part of a repeat examination if the student did not take advantage of this option when producing the first master thesis. Repeated handing back of the topic is not permissible.
- (4) Failed attempts on the same or a comparable module examination of another degree programme taken at Johann Wolfgang Goethe University or another German university should be added to the permissible number of repeat examinations. The examination committee can, in special cases, decide not to credit these attempts, particularly in the case of a change of degree programme.
- (5) The examination committee can require an oral examination for repeating of failed written examination performances, with the exception of the Master's thesis.
- (6) The examination committee can impose additional requirements on students before repeating a module examination.
- (7) The examination committee determines the exact dates for repeating and announces these in good time. The right to examination expires if the time limit for repeating is not observed, except in cases where the student had no control over the circumstances causing that. De-registration in the meantime does not extend the time limit for repeating.
- (8) Repeat examinations are always to be sat according to the set of regulations according to which the first examination was sat.

**§ 42 Loss of the right to examination and final failing (RO: § 47)**

- (1) The Master's examination is finally failed and the right to examination finally lost if
  1. a module examination is not passed after exhausting all possibilities to repeat it
  2. a time limit set for delivery of certain performances according to § 26 was not observed
  3. a time limit set for repeating a module examination according to § 43 was not observed
  4. a serious case of deception or a serious case of disorderly conduct according to § 27 has been recorded.
- (2) An announcement will be issued with a section on legal remedies about final failing of the Master's examination and the associated loss of the right to examination.
- (3) If the student has finally failed the Master's examination in the degree course and therefore lost the associated right to examination, she or he should de-register. On request the student can receive, upon submission of the de-registration certificate, a certificate from the examinations office in which all passed module examinations, their grades and the earned credit points are

listed and which states that the Master's examination was finally not passed.

## **Section IX: The Examination Certificate; Degree Certificate and Diploma Supplement**

### **§ 43 Examination Certificate (RO: § 48)**

(1) A certificate in German, by application from the student with a translation in English, is to be issued concerning a successfully passed Master's examination, where possible within four weeks after arrival of the evaluation of the last examination performance, respectively according to the sample from the framework regulations. The certificate contains details of the modules with the module grades (also modules will be marked which did not go into the overall grade for the passed Master's examination), the topic and the grade for the Master's thesis, the standard period of study and the overall grade.

In the certificate there are also [possibly the fields of study/the major fields of study/the result of examinations in additional modules/the course performances delivered].

(2) The certificate is to be signed by the chairperson of the examination committee and to be awarded the seal of Johann Wolfgang Goethe University. The certificate carries the date on which the last examination performance was evaluated.

(3) The examination committee will, on request, also issue a certificate that the Master's degree earned corresponds in its contents with the respective diploma or the respective Master's degree.

### **§ 44 The Master's certificate (RO: § 49)**

(1) At the same time as receiving the certificate for the Master's examination the student also receives a Master's degree certificate with the date of the certificate according to the sample from the framework regulations (Appendix 9 RO). This represents certification of awarding of the academic grade. The degree certificate can also be issued in English on request.

(2) The degree certificate is signed by the Dean of Studies of the faculty of Biosciences and the chairperson of the examination committee and awarded the seal of Johann Wolfgang Goethe University.

(3) The academic degree may only be used after handing over of the degree certificate.

### **§ 45 Diploma Supplement (RO: § 50)**

A Diploma Supplement is issued according to international requirements along with the degree certificate and the certificate; this is a text which was agreed upon between the Conference of University Rectors and the Conference of Ministers for Cultural Affairs in which the respectively

valid version should be used (sample in Appendix 10 RO).

(2) The Diploma Supplement contains an ECTS grading table. The overall grades which are awarded in the respective degree course in a comparable cohort should be recorded and their numerical and percentage-wise distribution of the grade stages are to be determined according to § 39 Paragraph 11 and presented in a table as follows:

Overall grades	Total number within the reference group	Percentage of graduates within the reference group
up to 1.5 (very good)		
from 1.6 to 2.5 (good)		
from 2.6 to 3.5 (satisfactory)		
from 3.6 to 4.0 (sufficient)		

The reference group arises from the number of graduates of the respective degree programme in a period of three study years. The calculation only occurs if the reference group consists of at least 50 graduates. If there have been less than 50 graduates within the comparative cohorts who completed the degree programme then, according to a resolution of the examination committee, further study years can be included in the calculation.

## Section X: Invalidity of the Master's examination; examination files;

### Appeals and objections; checking fees

#### § 46 Invalidity of examinations (RO: § 51)

(1) If the student practiced deception for a course or examination performance and this fact only came to light after handing over the degree certificate then the examination committee can retrospectively appropriately correct the grades for those course or examination performances for which the student had practiced deception and can declare the examination or course performance as totally or partially failed. The examiner should be consulted beforehand. The student concerned should be given the opportunity to make a statement before the decision is finally reached.

(2) ) If the conditions for approval to sit an examination are not fulfilled, without the student wishing to be deceptive about this, and if this fact only came to light after handing over the

degree certificate, then this deficit is remedied by maintaining the status of the examination. If the student gained admission to an examination by intentionally deceitful means then the examination committee will decide upon legal action against him while observing the Hessian state administration procedural law in its currently valid version. Paragraph 1 Sentence 3 applies appropriately.

(3) The incorrect certificate should be confiscated and possibly replaced with a new one. The incorrect certificate should be confiscated together with the Diploma Supplement and possibly also the respective degree programme records and possibly replaced with new ones. The Master's degree certificate is also to be confiscated with these documents if the examination was declared "failed" due to deceptive behaviour. A decision according to Paragraph 1 and Paragraph 2 Sentence 2 is excluded after a time limit of five years from the date on the examination certificate.

#### **§ 47 Gaining access to the examination files; retention periods (RO: § 52)**

(1) Within one year after completion of a module and completion of all of the examination procedures, the student can, on request, be allowed access to his/her examination files (examination reports, work to be examined as well as expert assessor reports).

(2) The examination files are to be kept by the examination officials. Pertinent for the retention periods for examination documents is § 20 of the Hessian Enrolment Regulations (HImmaVO) in their currently valid version.

#### **§ 48 Appeals and objections (RO: § 53)**

(1) It is possible to submit an appeal against decisions taken by the chairperson of the examination committee. It should be submitted within one month of announcement of the decision to the chairperson of the examination committee. The examination committee will decide on the objection and appeal. If the appeal does help to see any need to remedy the situation the chairperson of the examination committee will issue a justified notice of rejection with a section on legal remedies.

(2) The person in question can, in as far as a legal remedies section was included, raise a written objection within a month, otherwise within a year after announcement with the chairperson of the examination committee (examinations office) against adverse decisions taken by the examination committee and against the examiner evaluations. If the examination committee does not see any need to remedy the situation, if necessary after receiving statements from the examiners involved, the President will issue the notice of rejection. The notice of rejection should be justified and make reference to legal remedies.

#### **§ 49 Examination fees (RO: § 54)**

(1) If the presidium of the Johann Wolfgang Goethe University does not require levying of examination fees then paragraphs 2 and 3 are not needed.

(2) The examination fees are to be exclusively levied for administration costs of the examination officials. They are a total for the Master's examination including the Master's thesis of 100 Euro.

(3) The examination fees are due in two instalments, the first instalment upon applying for approval to sit a Master's examination, the second instalment upon approval to submit a Master's thesis. Payment of the examination fees should be accredited by the examinations office.

## Section XI: : Final Provisions

### § 50 Coming unto force [and transitional regulations] (RO: § 56)

(1) The set of regulations for the Master's degree programme Physical Biology of Cells and Cell Interactions from 18.10.2015 published in UniReport/statutes and the sets of regulations of 28.09.2012 ceased to be in force at the same time.

(2) This set of regulations applies for all students who begin their studies from the winter semester 2015-2016 in the Master's degree programme Physical Biology of Cells and Cell Interactions.

(3) Students who were enrolled in the Master's degree programme Physical Biology of Cells and Cell Interactions before coming into force of this set of regulations can, on request to the examination committee, complete their studies and sit the Master's examination according to this set of regulations. Already delivered course and examination performances will be credited according to § 29. The application is irrevocable.

Frankfurt, 14.08.2015

**Prof. Dr. Meike Piepenbring**

Dean of the faculty Biosciences



## Appendix 1: Regulation for special entry requirements

(1) Apart from the first professional qualification, admission requires

Proof of English language skills: If you are not a native speaker have to provide a proof of sufficient knowledge of the English language on C1 level- at least B2 level - of the Common European Framework of Reference for Languages.

-Letter of motivation in English language

-A statement that you did not finally fail in another Master/Diploma degree program in the same or related discipline or that the decision on such a procedure is not pending.

(2) The application needs to be accompanied by:

- CV including information of special interests, skills and talents that qualify you for the program.

- A letter of motivation explaining why you have applied for this program and that also covers your previous experience in the field of neuroscience (maximum two pages).

- Language Certificate

- Letter of recommendation

-Transcript of records, a detailed certificate of the present status of your studies and the anticipated date of completion of the Bachelor's programme.

- Certificate of qualification for university matriculation

(3) The examination committee for the Master's degree programme checks that all requirements have been met in compliance with Articles 1 and 2 and then continues with further proceedings. The committee may appoint one or several admissions committees to carry out this task. An admissions committee consists of at least two professors authorised as examiners of the Master's degree programme, an scientific employee authorised to act as an examiner as well as a student enrolled on the Master's degree programme who participates in an advisory role. The professorial majority must be maintained. If the examining board appoints several admissions committees for the same Master's degree programme, a common vote regarding the criteria for assessment, usually under the chairmanship of the chair of the examination committee, takes place at the beginning of the selection procedure. The examination or admission committee can also call on other members of staff for support.

(4) The committee awards the *motivational letter* with aptitude points in compliance with § 37 paragraphs 3, according to the apparent level of motivation and aptitude for the Master's degree programme. An overall grade is formed consisting of 49% of said number of points and 51% of the number of points achieved with the first degree. The Admission requires a total point count of at least 3.0 .

## Appendix 2: An exemplary course of study plan

Semester	Title, Module	Form	Timeframe and SWS	(CP)	Module No.
1.	Compulsory Module I: Introduction into the Master Program and Basic Methods in Cell Biology	P, S, V, Ü	1. st part of semester: 4 day per week, daily (14 SWS)	14	1
	Compulsory Module II Advanced Cell Biology I	V, S, Ko	1. and 2. part of winter semester, 2 days per week (6 SWS)	6	2
	Elective Module 1	P, S	5 weeks, daily (11 SWS)	11	aus: 9-32
	<b>Sum SWS / CP</b>		<b>31 SWS</b>	<b>31</b>	
2.	Compulsory Module III Advanced Cell Biology II	V, S, Ko	1. and 2. part of summer semester, 2 days per week (7 SWS)	7	3
	Elective Module 2	P, S	5 weeks, daily (11 SWS)	11	aus: 9-32
	Elective Module 3	P, S	5 weeks daily (11 SWS)	11	aus: 9-32
	<b>Sum SWS / CP</b>		<b>29 SWS</b>	<b>29</b>	
3.	Compulsory Module IV: Current Concepts in Cell Biology	P, S	5 week daily (12 SWS)	15	4
	Compulsory Module V: Advanced Methods in Cell Biology	P, S	6 weeks, daily (15 SWS)	15	5
	<b>Sum SWS / CP</b>		<b>27 SWS</b>	<b>30</b>	
4.	Compulsory Module VI: Master Thesis	MA	6 months	30	6
	<b>Sum SWS / CP</b>			<b>30</b>	
	<b>Sum: 1.- 4. Semester</b>			<b>120</b>	

Abbreviations: V: Lecture P: Practical, S: Seminar, Ko: Colloquium, MA: Master Thesis, Ü: Exercise, SWS: Semester Weekly Hours, CP: Credit Points

### Appendix 3: Module list for export modules

Services for the degree programme	Module (title, number)	FB [Number]	Summer semester /Winter semester	CP
Interdisciplinary Neuroscience Molecular Biosciences Molecular Biotechnology Ecology and Evolution	Module for Students from other Masters (Module 7)	15	Summer and Winter Semester	15
Biophysics		13		15
Biochemistry		14		15

## Appendix 4: Modules of the Master Course

### **Obligatory Module (PM)**

- 1 Introduction to the Master Program and Basic Methods in Cell Biology
- 2 Advanced Cell Biology I
- 3 Advanced Cell Biology I
- 4 Current Concepts in Cell Biology
- 5 Advanced Methods in Cell Biology
- 6 Master thesis

### **Export module (EM)**

- 7 Module for students from other Masters

### **Module „free Studies“**

- 8 Module „Free studies“ for Students from the Master PBioC

### **Obligatory Module Choice (WP)**

- 9 External Practical Module Cell Biology
- 10 Cell Biology and Physiology of Signal Transfer
- 11 How to make a Neuron: From Stem Cells to Stable Cell Lines
- 12 Neurophysiology of Sensory Systems
- 13 Auditory Function and Dysfunction: Behavior and Physiology
- 14 Information Processing in the Central Auditory System
- 15 Developmental Neurobiology
- 16 Physiology and Behaviour
- 17 Three-Dim. Cell Cultures and Three-Dim. Microscopy
- 18 Three-Dim. Developmental Biology and Three-Dim. Microscopy
- 19 Three-Dim. Plant Cell Biology and Three-Dim. Microscopy
- 20 Cell Communication, Cell Adhesion and Cell Motility
- 21 Plant Cell Biology
- 22 Fungal Cell Biology
- 23 Function and Evolution of Metabolic Pathways
- 24 Special aspects in Immunology
- 25 Developmental Genetics
- 26 Cell Biology and Gene Expression Control
- 27 Endothelial Cells and Tumor Cell Biology
- 28 Principles of Tube Morphogenesis
- 29 Developmental Cell Biology
- 30 Basics and Application of Image and Data Analysis in Biology
- 31 Biology of Extracellular Vesicles
- 32 Special Aspects in Tumor Cell Biology
- 33 Cellular RNA Biology
- 34 Neuronal Basis of Acoustic Communication in Mammals

## Appendix 5: Module Descriptions

<b>Module [1]: Introduction to the Master Program and Basic Methods in Cell Biology (Obligatory Module), CP 14</b>	
1st	<p><b>Contents:</b></p> <p>The module focuses on 3 parts:</p> <p>1. Introduction to the master's degree program: In a seminar the fields of cell biology and physical biology and the Institute of Cell Biology and Neuroscience will be presented. There are presentations of the master's degree program and research projects within it as well as objectives, participating groups, the curriculum and an overview of elective and compulsory modules. The contents of elective modules will be presented by their module leaders.</p> <p>The intention is to teach students the form and content of the program and enable them to get to know fellow students and university teaching staff.</p> <p>2. Basic Methods in Cell Biology: In a practical course of 8-9 weeks basic and standard molecular biological, protein biochemical, immunological, histological, cellular, biotechnical and microscopic work methods and techniques are taught. In the field of bioinformatics an introduction of mining public databases and knowledge of relational database systems will be given. The handling of genome and proteome data-base systems will be learned.</p> <p>The participants work out the theoretical background to different working methods and carry same out after familiarisation under scientific guidance and monitoring. They will be taught how to select suitable methods for use in defined scientific problems and fields of application and to critically evaluate them. The students will present and discuss their experimental results in the seminar.</p> <p>3. The third part of the module focuses on the mediation and education of legal and ethical aspects in biosciences.</p> <p>The topics are: animal welfare law, the German embryo protection law, gene technology law, safety and operating instructions for S1 laboratories, gene technology safety regulation (GenTSV), (§12Abs.2GenTSV), bio-substances regulation (BioStoffV), biological safety, rules of good scientific practice, basics in patent law.</p> <p>Animal welfare law: The theoretical and professional contents of this module part will be lectured on three days and correspond to the legal requirements of animal protection. The participation is obligatory. For the students it is obligatory to participate in safety instructions for S1 safety laboratories after § 12 Abs. 2 GenTSV.</p> <p>Lectures and Seminars to the aspects: Legal and ethical aspects in Biosciences are obligatory for the students, the participation has to be proved.</p>
2nd	<p><b>Study results/competency goals:</b></p> <p>The intention is to teach students the form and content of the program and enable them to get to know fellow students and university teaching staff.</p> <p>Students are taught knowledge of various experimental scientific work techniques, their theoretical bases and their evaluation. On completion of their practical course they will have some knowledge of basic molecular biological, protein biochemical, immunological, cell biology and microscopic work methods and the ability to apply same with the aid of work instructions. They will be taught how to select suitable methods for use in defined scientific problems and fields of application and to critically evaluate them.</p> <p>The get knowledge of legal and ethical aspects in biosciences. They will get the competence to plan their scientific experiments on consideration of the guidelines and rules of animal welfare law, the German embryo protection law, gene technology law, safety and operating instructions for S1 laboratories, gene technology safety regulation and biological safety as well as rules of good scientific practice.</p>
3rd	<p><b>Prerequisites for participation:</b></p>

	None. Module starts in the first part of winter term.	
4th	[Possible] Mode of teaching and learning:	
	Practicum, Seminar, Lecture, Exercises	
5th	Degree programme records:	
	Attendance records:	<p>1. Proof of participation: Introduction into the Master's degree programme.</p> <p>2. Proof of participation in lectures and seminars to the aspects: animal welfare law, the German embryo protection law, gene technology law, biological safety, rules of good scientific practice, basics in patent law</p> <p>3. Proof of participation in safety and operating instructions for S1 laboratories, gene technology safety regulation (GenTSV), (§12Abs.2GenTSV), bio-substances regulation (BioStoffV)</p>
	Performance records:	<p>Presentation an experimental method in the seminar (20-40min)</p> <p>Protocol (10-15) pages</p>
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Examination, 60 min
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	



Module [2]: Advanced Cell Biology I (Obligatory Module), CP 6		
1st	Contents:	
	<p>Lecture series: Selected chapters to physical biology of cells and cell interactions, cell biology, physiology, neurophysiology, cell types and their functions, developmental as well as molecular and biochemical principles of the function of various animal and plant cells, mechanisms of signal transmission and development of nerve cells and nerve systems will be lectured.</p> <p>Seminar on the lecture on selected chapters of physical biology of cells and cell biology: Students will draft papers on original publications relevant to the lecture.</p> <p>Colloquium: Students must participate in 7 cell biology / physical biology oriented colloquia at the Institute.</p>	
2nd	Study results/competency goals:	
	<p>Students are taught a wide interdisciplinary basic knowledge in the fields of physical biology, cell biology, developmental biology, physiology as well as neurophysiology and the uses of same. They learn scientific research concepts, are enabled to link differing cell biology parts and paradigms with one another and to lecture on original publications.</p>	
3rd	Prerequisites for participation:	
	None	
4th	[Possible] Mode of teaching and learning:	
	Lecture, Seminar, Colloquium Self Studies	
5th	Degree programme records:	
	Attendance records:	Participation in Seminar, Lectures and Colloquia
	Performance records:	20-30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination: Form/duration	
	Module examination consisting of:	Examination / 45 min / Content: Topics of Lecture and Seminar
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [3]: Advanced Cell Biology II (Obligatory Module), CP 7		
1st	Contents:	
	<p>Lecture series: selected chapters of cell biology of higher eukaryotes</p> <p>Contents: Cellular, molecular and physiological principles of development and function of higher eukaryote cells including plants; mechanisms of cell-cell and cell-matrix detection, receptor systems and their ligands, signal transmission, apoptosis, vesicular transport of cells, stem cell concepts and cellular plasticity, tumour biology and plant cell biology.</p> <p>Seminar on the lectures: Selected higher eukaryote cell biology chapter. Students will draft papers and lectures on original publications relevant to the lecture/s.</p> <p>Lecture and seminar: Molecular principles of vertebrate genetics</p> <p>Contents: Specific and current concepts of genetic analysis of eukaryotic genes and their products will be discussed here; targeted suppression of genes by homological recombination; functional suppression of genes, phenotype analyses.</p> <p>Students will draft papers and lectures on original publications relevant to the lecture.</p> <p>Colloquium: Participation in 7 Institute colloquiums of cell biological orientation.</p>	
2nd	Study results/competency goals:	
	<p>Students will be taught a wide knowledge of cell biology principles and their uses. They will learn cell biology research concepts employing various model organisms and are enabled to link differing cell biology parts and paradigms with one another. They will be enabled to lecture on original publications and discuss same.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	Lecture, Seminar, Colloquia, Self-Studies	
5th	Degree programme records:	
	Attendance records:	Participation in Seminar, Lectures and Colloquia
	Performance records:	20-30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Examination / 90 min / Content: Topics of Lecture and Seminars: Selected chapter's higher eukaryote cell biology and molecular principles of vertebrate genetics.
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [4]: Current Concepts in Cell Biology (Obligatory Module), CP 15		
1st	Contents:	
	The module includes a project and a seminar with the aim of teaching students the major theoretical principles of research concept development in cell biology. After familiarisation with current literature critical open questions are to be identified and research strategies for solving same developed. The research concept is to be drafted in the form of an application for third party subsidy.	
2nd	Study results/competency goals:	
	Students will be familiarized with developing scientific research concepts and integrating them in requests for subsidies from third parties when they have completed this module.	
3rd	Prerequisites for participation:	
	<p>Passing the introductory module: Introduction into the Master's Program and Basic Methods in Cell Biology (module 1), Advanced Cell Biology I (module 2), Advanced Cell Biology II (module 3) and 2 of the 3 obligatory choice modules.</p> <p>This project work can be generated in any cell biology working group in the master's degree course of the faculty of biosciences, FB 15, Goethe University and is not necessarily linked with the master's degree thesis.</p>	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	Proof of having held a lecture in the seminar (20-30 min) and presentation the research concept.
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Written research concept of 5-20 pages
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [5]: Advanced Methods in Cell Biology (Obligatory Module), CP 15		
1st	Contents:	
	The module has the aim of so intensively teaching students the major experimental techniques in the subject in which they hope to gain a master's degree that they are able to pass that degree in the time allowed.	
2nd	Study results/competency goals:	
	Students will be familiarised with the practical principles directly related to their master's degree thesis in the subject chosen when they complete the module. They will then be able to efficiently obtain methodological information from publications and the Internet and evaluate the feasibility of methodological approaches. They will also be able to criticise methods and evaluate artefacts.	
3rd	Prerequisites for participation:	
	Successfully passing the introductory module: Introduction into the Master's Programme and Basic Methods in Cell Biology (module 1), Advanced Cell Biology I (module 2), Advanced Cell Biology II (module 3), current concets in cell biology (module 4) and the 3 obligatory choice modules.	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	Presentation of 20-30 minutes, progress report in the working group
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Oral Examination 30 min Duration
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [6]: Master Thesis (Obligatory Module), CP 30	
1st	Contents:
	In their master's degree theses students deal within a time limit of six months with a problem set therein comprehensively and in depth applying scientific methods. Theses may involve experimental, empirical or analytical work. The results must be summarised in a written master's degree thesis in the style of scientific publications. The quality of the performance rendered will be marked based on evaluation of the written work by the mentor and a second examiner.
2nd	Study results/competency goals:
	Teaching the ability to comprehensively deal with scientific problems in depth and classify the knowledge gained in extant literature. Teaching the drafting of written papers in the style of scientific publications. Teaching the practical application and evaluation of modern research methods.
3rd	Prerequisites for participation:
	Proof of having gained at least 90 CPs and having passed Methods in Cell Biology (module 5). The master's degree thesis is usually mentored by a university teacher regularly rendering obligatory or obligatory choice module teaching events in the master's degree course.
4th	[Possible] Mode of teaching and learning:
	seminar, self-studies
5th	Degree programme records:
	Attendance records:
	Performance records: 30 min Presentation of the Master Thesis
	Pre-examination performances: Modules 1-5
6th	Module examination: Form/duration
	Module examination consisting of: Written in master's degree thesis form (the mark will be doubly weighted compared to that/those gained in all other modules).
	Cumulative module examination consisting of:
7th	Module grade:
	Forming the module grade in cumulative module examinations

Module [7]:		Module for students from other Masters		(Export Module)	CP 15
1st	Contents:				
	<p>The module is an export module and includes an obligatory choice module (Appendix 4) and completion of a project on current concepts in the specific subject module chosen. This is intended to ensure applicability to other FB 15 master's degree courses of study.</p> <p>This module specifies the performance required of students from other master's degree courses. Students must elaborate controversial key questions in the subject chosen using important original works and overview articles. Project work is to be written in the form of an overview or summary article the scope of which is agreed beforehand with the academic responsible for the module.</p>				
2nd	Study results/competency goals:				
	Students will be familiarized with the theory and practice relevant to the specific module subject chosen and be able to prioritize current developments and controversies in the same field after completing the module.				
3rd	Prerequisites for participation:				
	None				
	This module only applies to students of other master's degree courses needing a module lasting half a semester for which 15 CPs are awarded.				
4th	[Possible] Mode of teaching and learning:				
	Seminar, self-studies				
5th	Degree programme records:				
	Attendance records:				
	Performance records:		Unmarked proof of academic performance/achievement for written project work		
	Pre-examination performances:		none		
6th	Module examination:		Form/duration		
	Module examination consisting of:				
	Cumulative module examination consisting of:				
7th	Module grade:				
	Forming the module grade in cumulative module examinations				



Module [8]: Module “free studies” for students from the Master PBioC		CP 11
1st	Contents:	
	The students get the possibility to choose an obligatory module choice from the Master Courses other faculties of the Goethe University.	
2nd	Study results/competency goals:	
	Students will be familiarized with the theory and practice relevant to the specific module subject chosen and be able to prioritize current developments and controversies in the same field after completing the module	
3rd	Prerequisites for participation:	
	Performance of the module needs the approval and agreement of the academic head of the Master Physical Biology of Cells and Cell Interactions.	
4th	[Possible] Mode of teaching and learning:	
	Practicum, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	
	Performance records:	The regulations of the provider, module leader will be applied.
	Pre-examination performances:	
6th	Module examination:	Form/duration
	Module examination consisting of:	The regulations of the provider, module leader will be applied.
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [9]: External Practical Module Cell Biology		(Obligatory Module Choice)	CP 11
1st	Contents:		
	The obligatory choice practicum teaches the basic methods and techniques in basic cell biological and physical biology science. Students work on some current projects under supervision and present the results in the form of a seminar lecture. They learn how to draft scientific papers by writing a protocol of their results. The module can be offered by the faculties of the Goethe University, of other universities in Germany and elsewhere and by research facilities that are not part of any university.		
2nd	Study results/competency goals:		
	Knowledge of how to perform cell biological or physiological experiments in the basic sciences field. Working out scientific problems against the background of relevant literature.		
3rd	Prerequisites for participation:		
	Lectures and protocol in English. The module is an external one which can replace an obligatory choice module in Appendix 4 and requires the agreement of the PA or academic management of the master's degree course concerned. It is an extension of the modules in the Physical Biology of Cells and Cell Interactions master's degree course and is co-supervised by a university teacher of Physical Biology of Cells and Cell Interactions master's degree course. The form of test performance required will be advised at the beginning of the respective semester. Aside from ERASMUS studies, there is no claim to perform the External Practical Module Cell Biology as long as practical courses from the Master Physical Biology of Cells and Cell Interactions can be offered.		
4th	[Possible] Mode of teaching and learning:		
	Practicum, seminar, self-studies		
5th	Degree programme records:		
	Attendance records:		
	Performance records:	The regulations of the provider, module leader will be applied	
	Pre-examination performances:		
6th	Module examination:	Form/duration	
	Module examination consisting of:	The regulations of the provider, module leader will be applied	
	Cumulative module examination consisting of:		
7th	Module grade:		
	Forming the module grade in cumulative module examinations		

Module [10]: Cell Biology and Physiology of Signal Transfer (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical course teaches basic cellular and molecular techniques of cell- and neurobiology. The students will be supervised during the work on their own projects, quantitative and qualitative data analysis and will document their results in a written protocol. At the end of the individual experiments results will be presented in an oral communication. Moreover, the students will present an original paper in the framework of cellular and molecular neurobiology in a seminar talk. By the appropriate creation of a results protocol they will learn the configuration of scientific work.</p> <p>Focuses are: proteinbiochemical methods to study the function of neurons including subcellular fractionation and immunodetection, basis of neuronal cell cultures work, immunocytology of cultured cells including digital image processing, cell culture, proliferation and differentiation of cell lines, fluorescence microscopy.</p>	
2nd	Study results/competency goals:	
	<p>Cellular and molecular techniques in cell biology and neurobiology (detailed above), skills for the isolation of neuronal cell organelles, self-dependent characterization of organellar proteins, sterile work and culturing of cells, self-dependent work at the fluorescence microscope and computer-based evaluation of experimental data and image processing (CS Photoshop, Illustrator), self-dependent processing of data, written standard report and presentation of scientific questions in relation to the relevant literature.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	seminar lecture (20-30 min) on the results of own scientific studies with current literature
	Pre-examination performances:	none
6th	Module examination: Form/duration	
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted.
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [11]: How to make a Neuron: From Stem Cells to Stable Cell Lines (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical course teaches cellular and molecular techniques of cell- and neurobiology with a focus on the proliferation and differentiation behavior of neural stem cells derived from neurogenic niches of adult mouse. The students will be supervised during the work on their own projects, quantitative and qualitative data analysis and will document their results in a written protocol. At the end of the individual experiments results will be presented in an oral communication. Moreover, the students will present an original paper in the framework of cellular neurobiology in a seminar talk.</p> <p>Focuses: cell culture of stable stable transfected cell lines, knockdown by RNA interference, cell transfection (lipofection, electroporation), cultivation, proliferation and differentiation primary neural stem cells, making of cryosections, immunocyto- und enzyme histochemical methods, genotyping of transgenic mice, fluorescence microscopy</p>	
2nd	Study results/competency goals:	
	Cellular and molecular techniques in cell biology and neurobiology (detailed above), computer-based evaluation of experimental data and image processing (CS Photoshop, Illustrator), knowledge about laboratory animals (mouse), self-dependent processing of data, written standard report and presentation of scientific questions in relation to the relevant literature.	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	seminar lecture (20-30 min) on the results of own scientific studies with current literature
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [12]: Neurophysiology of Sensory Systems (Obligatory Module Choice) CP 11		
1st	Contents:	
	The practical teaches basic electrophysiological conductance techniques and bio-acoustic measuring techniques to investigate the auditory system in laboratory mammals and insects in vivo. The students work on their own projects with supervision, and present their results in the form of a seminar talk. In a further seminar talk they present an original piece of research from the field of auditory neurobiology. They learn how to present scientific work through writing up an appropriate result protocol. The main topics are: physiological properties of nerves in the midbrain and cortex, investigating active sensory amplification mechanisms in the inner ear, psychoacoustic analyses in humans, use of computer/software in evaluating data and generating stimuli.	
2nd	Study results/competency goals:	
	Competence: Familiarity with carrying out electrophysiological experiments, measuring optoacoustic emissions, familiarity with anaesthetising and surgical procedures in animal experiments, application of neuroanatomical techniques, learning how to work on scientific questions based on relevant publications.	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	Written practical protocol, 1 seminar talk on the results of one's own experiments, 1 seminar talk on recent scientific papers.
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [13]: Auditory Function and Dysfunction: Behavior and Physiology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical teaches techniques to determine auditory function and dysfunction in rodents. These techniques can be used to determine effects of pharmacological or behavioral treatments of sensory disorders such as tinnitus or hearing loss. The focus is on behavioral techniques suitable to characterize the disorder rather precisely in comparison to normal functions. All steps that are necessary for a project in the field are taught in this practical: study design, animal handling, control of experimental parameters, pharmacological treatment of animals, and data analysis. The behavioral analysis is paralleled by basic electrophysiological measurements necessary to determine the effects of dysfunction and treatments at the physiological level. The students work on their own projects under supervision and present their results in the form of a seminar talk. The main focuses are: measuring and analyzing behavioral data, performing efficient physiological experiments to determine auditory function, and statistical evaluation methods. Preparation of a potential publication will be the final part of the project. After completion, the individual projects will be presented and discussed in the form of a seminar talk. In a further seminar talk the students will present an original piece of research from the area of cognition and hearing.</p>	
2nd	Study results/competency goals:	
	<p>Familiarity with carrying out well controlled behavioral experiments (animal handling, measuring and analyzing behavioral data, statistical analysis). Performing physiological measurements including electrophysiological recording in minimally invasive preparations. Additional aspects are: introduction to software for data handling, signal processing, and graphical display. Deriving scientific questions from the current literature. Knowledge about the usage and limitations of animal models for neurological diseases.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	Written practical protocol, 1 seminar talk on the results of one's own experiments, 1 seminar talk on recent scientific papers.
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	



Module [14]: Information Processing in the Central Auditory System (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical covers the whole range of techniques to investigate brain activity underlying the processing of sensory information in the auditory domain. The focus is on electrophysiological single cell techniques in rodents in the awake and anesthetized preparations. Brain activity is acquired and analyzed with the goal to understand behavioral responses following auditory stimulation. Cognitive aspects (e.g. context-dependence) are taken into account. The students work on their own projects under supervision and present their results in the form of a seminar talk. The main focuses are measuring and analyzing neuronal activity in different configurations of in-vivo recording techniques. The following analysis includes modern techniques of signal processing, efficient handling of larger data sets and statistical evaluation methods. Preparation of a potential publication will be the final part of the project. After completion, the individual projects will be presented and discussed in the form of a seminar talk. In a further seminar talk the students will present an original piece of research from the area of cognition and hearing.</p>	
2nd	Study results/competency goals:	
	<p>Familiarity with carrying out physiological experiments (animal handling, surgery, measuring and analyzing electrical activity at the single neuron level. Combining physiology with neuroanatomical and histological staining techniques. Basic introduction to behavioral control. Introduction to software for data handling, signal processing, statistical analysis and graphical display. Understanding cognitive influences on sensory information processing as an important aspect of context-dependent behavior. Deriving scientific questions from the current literature.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [15]: Developmental Neurobiology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical course offers basic theoretical and experimental knowledge in the area of developmental neurobiology. Principal areas of research are the development and plasticity of the synapse as well as migration of neurons during cortex development. The students take part on ongoing experiments in the laboratory to elucidate the molecular mechanisms of these processes. Their work includes: basic mouse genetics techniques and the handling of a mouse colony, processing of brain tissue for in situ hybridization and immunohistochemistry, isolation of primary hippocampal and cortical neurons from mice, transfection of primary neurons, immunofluorescence microscopy, confocal microscopy, biochemical techniques including protein gel electrophoresis, western blot and immunoprecipitation.</p> <p>The results of the practical course are presented by every student on the form of a written protocol and a talk at the end of the course. The students also take part on the weekly lab meetings where they learn about the ongoing research of all the members of the group. In a Journal Club every student presents a recent publication on the field of their own projects.</p>	
2nd	Study results/competency goals:	
	Students learn the basic techniques to study cellular and molecular Neurobiology (as detailed above). By the end of the course they have been in direct contact with mice and learn how to handle a mouse colony. The students are in an international environment and learn how to write and communicate their results in English.	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [16]: Pysiology and Behaviour (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The module teaches physiological bases of behaviour control. Students will work on individual projects that are jointly designed. The techniques taught may comprise cell physiology (patch clamp, calcium imaging, extracellular recording), Neuroanatomy, behavioural experiments (behavioural pharmacology, learning and memory). Model organisms are insects, mainly the honey-bee. Conceptual focusses are: function of ion channels and transmitter receptors, neuromodulation, learning behaviour, olfaction, social behaviour of honeybees.</p> <p>The students will give oral presentations of their results and will create a scientific poster summarizing their experiments. In a second seminar talk they learn to critically present physiological and behavioural articles. Presentations, seminars and posters will be given in English and the students receive detailed feedback on their presentation style as well as on the scientific contents. By writing a protocol in a manuscript style the students get acquainted with preparing a manuscript draft for submission to a science journal.</p> <p>The students will be responsible – under supervision – for the study design, protocolling and analysing the original data. Each step will be developed during the course rather than working after a pre-defined protocol.</p>	
2nd	Study results/competency goals:	
	Planning, conducting and analyzing of behavioral physiological experiments; measuring of ionic currents; behavioural observations and quantifications; neuroanatomical methods. Approaching scientific topics; literature work. Preparing of scientific texts, posters and talks.	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	20-30 min presentation in the seminar to the experimental results of the scientific studies, and poster presentation
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [17]: Three-Dimensional Cell Cultures and Three-Dimensional Microscopy (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>This internship teaches the basic concepts of three-dimensional cell biology and modern three-dimensional microscopy. The observation of live biological specimens under physiologically relevant conditions becomes increasingly important in the Life Sciences. Healthy as well as tumor cell lines, primary cells as well as stem cells, are cultivated and analyzed under physiological conditions. These conditions are achieved with organ slices and three-dimensional cellular spheroids by growing them in collagen and many other hydrogels that mimic the extracellular matrix (e.g. Matrigel). Quantitative analyses of living three-dimensional structures requires fast optical sectioning. Confocal microscopy is only useful for relatively thin specimens, because of its slow scanning speed, high photo-bleaching rate and low efficiency in collecting light from thick specimens. Light sheet-based fluorescence microscopy in conjunction with three-dimensional specimen preparation techniques provides a suitable alternative. Students will participate in current research projects of the Stelzer group and are supervised by experienced members. They present their results in an oral presentation and in a written internship report.</p>	
2nd	Study results/competency goals:	
	<p>The student learns the basic concepts of classical two-dimensional as well as three-dimensional cell culture. She or he is aware of several applications of three-dimensional cell cultures and knows, which cell types are used in the Life Sciences. He or she understands the principles of optics in classical microscopy (characteristics of light, resolution, aperture) as well as photometry (energy, power). The student knows the differences between confocal and light sheet-based fluorescence microscopy and is able to estimate the limits of classical light microscopy in dense tissues. She or he masters the formation, isolation and staining of spheroids, cysts, organoids and three-dimensional tissue slices. The student has experience in the preparation of the specimens for different microscopes as well as the acquisition and processing of the images and the analysis of the data. At the end of the module the student presents the results in a written report and a talk.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	presentation in the seminar to the experimental results of the scientific studies, 5 min presentation to introduce the project, 15 min (+5 min discussion) talk
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Internship report of 15-30 pages
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [18]: Three-Dimensional Developmental Biology and Three-Dimensional Microscopy (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>This internship teaches state-of-the-art three-dimensional fluorescence microscopy and respective non-invasive sample mounting techniques. All steps are shown exemplarily in the investigation of insect embryogenesis. For more than a century, insect research has contributed significantly to genetics and developmental biology. The most prominent model organism is the common fruit fly/vinegar fly <i>Drosophila melanogaster</i>. However, over the last years it became apparent that focusing on a few established model organisms is not sufficient to understand the basic principles of insect development in detail. New insect species (emerging model organisms) are established in many laboratories to gain new insights into neglected or even unknown processes. For example, the red flour beetle <i>Tribolium castaneum</i> is used since its embryogenesis deviates substantially from that of <i>Drosophila</i> in many different aspects. Instead of wide field or confocal fluorescence microscopy, we use light sheet-based fluorescence microscopy, which allows us to image individuals for one week. Moreover, the imaged individual survives the procedure. Students will work on current research projects and are supervised by experienced members of the Stelzer group. They present their results in an oral presentation and a written internship report.</p>	
2nd	Study results/competency goals:	
	<p>The student learns the principles of insect model organisms, such as <i>Tribolium castaneum</i>, in developmental biology. He or she is aware of current scientific questions in developmental biology and knows how to handle transgenic organisms. He or she understands the principles of optics in classical microscopy (characteristics of light, resolution, numerical aperture) as well as photometry (energy, power). The student knows the differences between confocal and light sheet-based fluorescence microscopy and is able to estimate the limits of classical light microscopy in dense tissues. He or she understands laboratory cultivation of <i>Tribolium</i> as well as preparation methods for confocal and light sheet-based fluorescence microscopes, in the context of long-term live imaging of <i>Tribolium</i> embryos in toto. The student analyzes the data and understands the basics of scientific image processing and the embryonic development of <i>Tribolium</i>.</p> <p>The interns work under guidance on their own individual project based on the actual research topics of the Stelzer group. At the end of the course, they summarize their results and findings in a protocol and prepare a seminar under the guidance of their advisor.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	presentation in the seminar to the experimental results of the scientific studies, 5 min presentation to introduce the project, 15 min (+5 min discussion) talk
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Internship report of 15-30 pages
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [19]: Three-dimensional Cell Biology of Plants and Three-Dimensional Microscopy (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>This internship teaches the principles of plant cell biology. A focus is the application of advanced three-dimensional fluorescence microscopy as a function of time. Developmental processes of biological specimens are performed under close-to-physiological conditions. The plants are oriented upwards during long-term observations. Their roots are perfused with ideal media while the leaves remain in the air. Additionally, we have full control over light, temperature and the nutrient supply in our light sheet-based fluorescence microscopes (LSFM). The intrinsic properties of LSFM are high tempo-spatial resolution and low photo toxicity, which enable the observation of plant development on a cellular level in a three-dimensional, almost physiological environment over days without destroying the plant nor leading towards artificial stress responses. Besides LSFM, further microscopic techniques such as confocal and super resolution microscopy are applied based on the experimental question. Another focus is basic scientific image processing and advanced image analysis to handle the large amount of data, which results from LSFM. The interns work under guidance on their own individual project based on current research topics of the Stelzer group. At the end of the course, they summarize their results and findings in a protocol and prepare a seminar talk under the guidance of their advisor.</p>	
2nd	Study results/competency goals:	
	<p>The student learns the principles and basic terms of plant cell biology. He or she knows current questions in developmental biology of plants and understands the handling of transgenic organisms. He or she understands the principles of optics in classical microscopy (characteristics of light, resolution, numerical aperture) as well as photometry (energy, power). The student knows the differences between confocal and light sheet-based fluorescence microscopy and is able to estimate the limits of classical light microscopy in dense tissues. He or she knows the laboratory cultivation of plants as well as the preparation methods of plant specimens for long-term observations with a LSFM. Therefore, she or he has practical experience in the recording of dynamic processes at the cellular or subcellular level at high temporal resolution on a long-term scale. The student analyzes the data and applies basic scientific image processing for developmental aspects of <i>A. thaliana</i> (lateral root development). The interns work under guidance on their own individual project based on current research topics of the Stelzer group. At the end of the course, they summarize their results and findings in a protocol and prepare a seminar talk under the guidance of their advisor.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	presentation in the seminar to the experimental results of the scientific studies, 5 min presentation to introduce the project, 15 min (+5 min discussion) talk
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Internship report of 15-30 pages
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [20]: Cell Communication, Cell Adhesion and Cell Motility (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical course offers basic theoretical and experimental knowledge in the area of molecular cell biology and specific questions to cell communication, cell adhesion and motility of cells in culture and organisms. The students will work under supervision on their own scientific project which is leaned on the scientific work and ongoing experiments of the working group.</p> <p>Educational objectives are the handling and work with eukaryotic cell cultures e.g. passaging of cells, cell transfection for ectopic expression and knockdown of proteins. The analysis comprises a broad spectrum of molecular biological and immunocytochemical techniques e.g. PCR, plasmid cloning, SDS-polyacrylamide gel electrophoresis, western blotting, immunofluorescence staining and microscopy of tissue sections and cells as well as performing tis-sue sections for histological analysis.</p> <p>Experimental data will be digital recorded and analyzed. Mining of public literature databases (PubMed) and the handling of genome and proteome data-base systems will be learned. The results of the practical course are presented by every student on the form of a written protocol and a talk at the end of the course. The students also take part on the weekly lab meetings where they learn about the ongoing research of all the members of the group. In a Journal Club every student presents a recent publication on the field cell biology in context of their own projects.</p>	
2nd	Study results/competency goals:	
	<p>Students learn the basic techniques for cellular and molecular biology (as detailed above). They will get practical experience in sterile working with eukaryotic cells. At the end of the course they will be able to work with cell cultures for further analysis.</p> <p>Students will be familiarized with scientific literature and learn how to write, communicate and present their results in English.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	



Module [21]: Plant Cell Biology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical course teaches basic techniques and experimental concepts of molecular cell biology and special questions of cellular and molecular aspects of plant physiology.</p> <p>Key features are: protein biochemical methods to study protein translocation and dynamics of chloroplasts, including subcellular fractionation, basics in plant cell culturing and transgenic (genetically modified) plants, in vivo and in situ measurement of protein activity and localization including digital image processing.</p> <p>The students will learn the handling of genetically modified plants, plant cell cultures and protoplasts e.g. culturing, passaging and transfection for ectopic expression or knockout of genes. The analysis comprises a broad spectrum of molecular biological and cell biological techniques like PCR, cloning, SDS-polyacrylamide gel electrophoresis, western blotting, immunofluorescence, measurement of protein activity and so on.</p> <p>The students work under supervision on their own scientific project which is leaned on the scientific work of the study group and present their experimental results in form of a seminar lecture. In another lab meeting the students present a recent publication on the field of cellular and molecular plant physiology. By performing a protocol with own scientific results, the students learn to write a scientific paper.</p>	
2nd	Study results/competency goals:	
	<p>Skills taught: Knowledge to isolate plant cell organelles, independent characterization of organelle proteins, sterile working, culturing and transfection of cells, working with the fluorescence microscope and computational evaluation of experimental data and image files, knowledge in the analysis of transgenic plants, independent handling of scientific questions in the context of relevant scientific literature.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar Poster presentation, a practicum protocol of 10-30 pages must be drafted
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	Examination of 45 min to the practical course, experimental results and current literature
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [22]: Fungal Cell Biology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>Das Praktikum vermittelt grundlegende Arbeitstechniken und Konzepte zur Bearbeitung ausgewählter Fragestellungen zur Zellbiologie der Pilze. Die Fragestellungen zielen dabei nicht ausschließlich auf speziell für diese Organismen relevante Prozesse ab, sondern werden sehr gezielt verfolgt, um auf höhere Systeme übertragbare Grundprinzipien (z.B. Mechanismen biologischer Alterungsprozesse) an einfachen, experimentell gut manipulierbaren Systemen effektiv erarbeiten zu können. Jeder Teilnehmer erhält ein eigenes Projekt zu einer aktuellen Fragestellung. Das Projekt wird mit verschiedenen Ansätzen aus dem Bereich der molekularen Zellbiologie bearbeitet. Zu den regelmäßig verfolgten Ansätzen gehören vergleichende Studien von Wildtyp-Stämmen mit gentechnisch manipulierten Stämmen („knock-out“ und Überexpressionsstämme). Dieser Ansatz erlaubt es, unter Einsatz verschiedener molekularer, biochemischer und zellbiologischer Techniken, gezielt einen vertieften Einblick in molekulare Regulationswege (z.B. Signalwandlungswege) zu erarbeiten. Schwerpunktmäßig werden folgende Arbeitstechniken eingesetzt: Herstellung und Transformation von Pilzprotoplasten, Isolation von Mitochondrien, Atmungsmessungen, „Blue-native“ Gelelektrophorese, Fluoreszenzmikroskopische Analysen der Mitochondriendynamik, Southern-, Northern-, Western Blot Untersuchungen, PCR Analysen, Proteinaktivitätsmessungen, OxyBlot Analysen, in-silico Datenanalysen. Jede Teilnehmerin/ jeder Teilnehmer stellt am Ende des Praktikums seine Arbeiten vor und legt ein schriftliches Ergebnisprotokoll vor. Darüber hinaus berichtet sie/er über eine aktuelle wissenschaftliche Publikation.</p>	
2nd	Study results/competency goals:	
	<p>Die oder der Studierende erhält theoretische Kenntnisse der Grundtechniken und Methoden molekularbiologischer, biochemischer und zellbiologischer Arbeiten. Erfahrungen im sterilen, mikrobiologischen Arbeiten sind erwünscht, werden aber im Verlaufe des Praktikums auch routinemäßig vermittelt. Im Praktikum wird der Umgang mit englischsprachiger Originalliteratur erlernt und praktiziert.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [23]: Function and Evolution of Metabolic Pathways (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>In this practicum we will provide an understanding of basic methods and algorithms for the bioinformatics analysis of large datasets. The students will work on problems circling around the functional characterization and evolution of metabolic pathways and functional protein complexes. We will integrate latest high throughput DNA sequencing data into the analysis whenever possible and appropriate.</p> <p>Emphasis will be put on the compilation of novel sequence data sets for analyses, on data mining for complementation of existing data sets, as well as on the bioinformatics methods for comparison and annotation of sequence data. The theoretical foundation of the analyses will be formed by self-reliant literature research in combination with the presentation of a publication from the area of applied bioinformatics. Towards the end of the practicum the students will exercise the correct way of presenting scientific results by summarizing their achievements in an oral presentation as well as in written form in a report.</p>	
2nd	Study results/competency goals:	
	Independent conduct of functional annotation of sequences, of bioinformatics annotation transfer and of prediction of functionally equivalent proteins under consideration of evolutionary relationships; Ability for management and bioinformatics analysis of large sequence sets; Mining of public databases; Knowledge of relational database systems; Generation and interpretation of phylogenetic profiles; Introduction into independent scientific research on the background of relevant literature.	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation of results in the seminar, poster presentation
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted or a poster
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [24]: Special Aspects of Immunology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>In the practical course the students work on current projects of the working group. Main topics are immunological experiments in the murine system and in primary murine cells as well as primary human cell cultures.</p> <p>In vitro experiments with murine organs and the isolation of murine primary cells will be learned and performed.</p> <p>The analysis comprises a broad spectrum of immunological and cell culture techniques like: FACS, ELISA, Plaque-Assay, viral Infections, (q)RT-PCR and the culturing of primary human cells and the isolation of different cell types from blood donors as well as the separation of cells with MACS and Cell-Sorter.</p>	
2nd	Study results/competency goals:	
	<p>The students will learn to plan and to perform complex immunological experiments.</p> <p>The results of the practical course are presented by every student on the form of a written protocol and a talk at the end of the course. The students also take part on the weekly lab meetings where they learn about the ongoing research of all the members of the group. In a Journal Club every student learns to presents a recent publication on the field of immunology and in context of their own projects</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [25]: Developmental Genetics (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>This practical course offers basic theoretical and experimental knowledge in the area of developmental genetics. Principal areas of research are the development, function and homeostasis of vertebrate organ systems including the cardiovascular system, lung and pancreas. The students take part on ongoing experiments in the laboratory to elucidate the cellular and molecular mechanisms underlying these processes. Their work includes: basic zebrafish or mouse genetics techniques and the handling of a zebrafish or mouse colony, live imaging of zebrafish embryos and larvae, processing of embryos or tissues for in situ hybridization and immunohistochemistry, immunofluorescence microscopy, confocal microscopy, molecular biology, embryological techniques (DNA and RNA injections into zebrafish embryos).</p> <p>The results of the practical course are presented by each student in the form of a written report as well as a talk at the end of the course. The students also take part in the weekly lab meetings where they learn about the ongoing research of all the members of the group. In a Journal Club each student presents a recent publication in the field of their own project</p>	
2nd	Study results/competency goals:	
	Students learn the basic techniques to study cellular and molecular aspects of developmental genetics (as detailed above). By the end of the course they have been in direct contact with zebrafish or mice and learn how to handle a zebrafish or mouse colony. The students are in an international environment and learn how to write and communicate their results in English	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [26]: Cell Biology and Gene Expression Control (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>This practical course offers basic theoretical and experimental techniques in the field of cell-and molecular biology with the focus of the control of gene expression via transcription factors and micro RNA's.</p> <p>The students work in the lab on their own project under scientific advice. Topics of interest are control of gene expression, epigenetics and tumor biology.</p> <p>The students will learn the handling and work with eukaryotic cell cultures e.g. passaging of cells, cell transfection for ectopic expression and knockdown of proteins. In addition basic molecular techniques e.g. PCR, molecular cloning, SDS-PAGE and Western Blotting will be performed.</p> <p>The students will learn to document their results in a lab book. The results of the practical course are presented by every student on the form of a written protocol and a talk at the end of the course. The students also take part on the weekly lab meetings where they learn about the ongoing research of all the members of the group. In a Journal Club every student presents a recent publication on the field cell biology in context of their own projects.</p>	
2nd	Study results/competency goals:	
	<p>Students learn the basic techniques for cellular and molecular biology (as detailed above). They will get practical experience in sterile working with eukaryotic cells. At the end of the course they will be able to work with cell cultures for further analysis. Students will be familiarized with scientific literature and learn how to write, communicate and present their results in English.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [27]: Endothelial Cells and Tumor Cell Biology Cell Biology (Obligatory Module Choice) CP 11		
1st	Contents:	
	This training aims at teaching theoretical knowledge and practical experience in the fields of cellular and molecular biology, more specifically in the fields of endothelial and tumor cell biology. The student(s) will participate in ongoing projects in the lab, including the possibility to work on mice as model organism (depending on the project and availability- under supervision). The student(s) will also participate in regular meetings, and the obtained data will be summarized in a written protocol. The lab-atmosphere is international.	
2nd	Study results/competency goals:	
	This training aims at learning different techniques from the above-mentioned fields, including cell culture of cell lines and primary cells, siRNA-mediated knock-down of genes, preparation of histological sections including staining, confocal microscopy and image analysis, PCR, Western blots, immunoprecipitation, etc.	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	20-30 min presentation in the seminar to the experimental results of the scientific studies
	Pre-examination performances:	none
6th	Module examination: Form/duration	
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	



Module [28]: Principles of Tube Morphogenesis (Obligatory Module Choice) CP 11		
1st	Contents:	
	In this course, we will offer you the opportunity to learn basics of the theory and experimental techniques in cell biology, biochemistry and physiology. The course is especially focusing on tube formation processes during vascular and kidney epithelial morphogenesis. The students will be involved in ongoing projects in the laboratory to address molecular mechanisms underlying these processes. The work includes: molecular cloning, basic protein purification, gel electrophoresis, western blot, cell culture of both primary cell and established cell line, immunohistochemistry using cultured cells and tissues, genotyping of transgenic mice, isolation of mouse tissue, immunofluorescence and confocal microscopy observation.	
2nd	Study results/competency goals:	
	In the journal club you will present a recent paper. In the end of the course, you will have an opportunity to present your progress during the course. You will work in a very international environment. All of the communication is in English	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [29]: Developmental Cell Biology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical course offers basic theoretical and experimental knowledge in the area of developmental cell biology. Principal areas of research are the mechanisms underlying cell migration and morphogenesis during organ formation using the zebrafish. Our main model system is the lateral line, a sensory system present in fish that derives from a group of cells that migrate in a collective manner. The students take part in ongoing experiments in the laboratory to elucidate, for example, the mechanisms underlying cell migration, cell differentiation, cell shape changes or cell proliferation in this system. The techniques used include basic genetics techniques, molecular biology, in situ hybridization and immunohistochemistry as well as handling zebrafish (crossing, injection, genotyping...) and confocal and live imaging.</p> <p>The results of the practical course are presented by every student on the form of a written protocol and a talk at the end of the course. The students also take part on the weekly lab meetings where they learn about the ongoing research of the members of the group. In a Journal Club every student presents a recent publication on the field of their own projects.</p>	
2nd	Study results/competency goals:	
	Students learn the basic techniques of molecular and developmental biology including zebrafish handling and modern live imaging techniques as detailed above. By the end of the course they have been in direct contact with mice and learn how to handle a mouse colony. The students are in an international environment and learn how to write and communicate their results in English.	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [30]: Basics and Appliance of Image and Data Analysis in Biology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The internship provides the basics of image and data analysis of light microscopy images. In the Life Sciences, two and three-dimensional, time-lapse light microscopy has been established as a fundamental tool. To extract objective measurements from the images as required e.g. for cell and developmental biology, a quantitative analysis of the images is essential. This requires the application of image filtering, image segmentation and feature extraction. The main challenge is to determine the measurements that are relevant for a given biological question. The results are visualised and analysed statistically by applying hypothesis testing, data smoothing or regression analysis. Standard software tools like ImageJ or Mathematica are used during the project. The students work under guidance on current research topics of the Stelzer group. They summarise their results in a report and present them as a talk.</p>	
2nd	Study results/competency goals:	
	<p>The student studies basic concepts of image and data analysis. She or he knows the common steps of an image processing pipeline. She or he understands the basic concepts of classical microscopy (resolution, aperture) as well as photometry (energy, power). The student learns the differences between confocal and light sheet-based fluorescence microscopy and is able to estimate the limits of classical light microscopy in dense tissues. She or he masters the application of existing image and data analysis tools as well as visualisation software (e.g. Arivis' 3DVision). Furthermore, the student has practical experience in programming image and data analysis applications. At the end of the module the student presents the results in a talk.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	15 min presentation in the seminar to the experimental results of the scientific studies and 5 min discussion
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 15 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [31]: Biology of Extracellular Vesicles (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>Extracellular vesicles are released membrane vesicles from all cells which contain functional proteins as well as nucleic acids. The communication between cells via extracellular vesicles is a relative new and complex field of research.</p> <p>In the practical course the students will get an introduction to extracellular vesicles.</p> <p>Main points are the aspects of purification, classification, analysis of RNA-Protein content as well as visualization and transfer analysis of functional molecules between cell populations in vitro and in vivo.</p> <p>The students will work with different cell culture techniques, immunofluorescence microscopy, flow cytometric analysis and other related techniques.</p>	
2nd	Study results/competency goals:	
	<p>The students will get knowledge and first experience in the field of Biology with extracellular vesicles and the communication via extracellular vesicles. They learn basic techniques to work with vesicles and they will learn to analyze the biological function. Students will be familiarized with scientific literature and learn how to write, communicate and present their results in English</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [32]: Special Aspects of Tumor Biology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The practical course gives a basic insight into experimental techniques and concepts of molecular tumor biology and to special scientific questions to cell cycle regulation and the function of protein kinases in tumor cells. The students will work under supervision on their own scientific project which is leaned on the scientific work and ongoing experiments of the working group.</p> <p>Experimental educational objectives of the internship are the handling of tumor cells, culturing, passaging and transfections of tumor cells with expression plasmids. A main focus of the working group is the generation, planning and implementation of knockdown (RNAi) - and knockout (CRISPR/Cas9-Genome Editing, Homologous Recombination)- in cells and model systems in tumor research. Ongoing experiments and analysis include techniques of molecular biology, PCR, DNA cloning, SDS-PAGE, Western Blotting, Co-Immunoprecipitation, Kinase Assays, and Time-lapse experiments with established cell lines in culture. In addition the interaction of tumor proteins in cell lysates and be characterized with Mass-Spectrometry.</p> <p>Animal models (Xenograft, transgene tumor models) will be used for in vivo-questions. The experimental results will be presented by each student in a seminar at the end of the internship.</p>	
2nd	Study results/competency goals:	
	<p>The results of the practical course are presented by every student on the form of a written protocol and a talk at the end of the course. The students also take part on the weekly lab meetings where they learn about the ongoing research of all the members of the group. In a Journal Club every student learns to presents a recent publication on the field of tumor biology and in context of their own projects</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [33]: Cellular RNA Biology (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>In the practical course basics in RNA Biology and animal cell culture will be learned. The students will learn and perform the analysis of RNA expression and RNA-protein-interactions in cells. The students will work under supervision on their own scientific project which is leaned on the scientific work and ongoing experiments of the working group of AK Müller-McNicoll. The experimental results will be presented in a seminar and in form of a graded protocol. During the practical course the students learn to work with different eukaryotic cell lines, the production and transfection of siRNAs to knockdown specific proteins of interest, the purification of RNA-binding proteins from cells and the identification and quantification of bound RNAs via quantitative RT-PCR or other methods.</p> <p>Other techniques comprise immunofluorescence microscopy, PCR, western Blotting, DNA-cloning, mutagenesis of proteins, subcellular fractionation and differentiating of cells.</p>	
2nd	Study results/competency goals:	
	<p>Students will be familiarized with scientific literature; will have additional knowledge in RNA biology and special methods of transcript analysis.</p> <p>They will get practical experience in sterile working with cells and their analysis. At the end of the course they will be able to work with cell cultures for further analysis. They learn how to write, communicate and present their results in English language.</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	30 min presentation in the seminar
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	

Module [34]: Neuronal Basis of Acoustic Communication in Mammals (Obligatory Module Choice) CP 11		
1st	Contents:	
	<p>The main goal of this course is to understand how mammals communicate using acoustic information (sounds). The course is designed from the perspective of the “broadcaster-receiver” approach, and therefore it is consequently subdivided into two parts. The first part is meant for understanding the sounds broadcasted by two mammalian species (Mongolian gerbils and bats) while they are communicating. Basically, using bioacoustics tools, the students will try to figure out the vocal alphabet of bats and gerbils. The second part of the course deals with the receiver. In this part, the students will learn how the gerbil’s voice is processed in the brain by neurons located in the auditory cortex. The main aim here is to assess what happens in the brain when an animal hears a behaviorally relevant sound. At the beginning of each course part, there will be introductory discussions that will provide the students with the necessary theoretical background for conducting and understanding the different experiments. An introduction to statistics and to MATLAB will also be offered. The final report will be written in the form of a scientific paper, and the results will be presented in the form of a short talk.</p>	
2nd	Study results/competency goals:	
	<p>By the end of the course, the students should be able to: (1) Understand basic concepts of bioacoustics such as the sound as a mechanical wave, sound transduction using microphones, analog-to-digital conversion using sound cards. (2) Measure basic parameters of a sound wave (frequency, duration, intensity). (3) Perform basic surgeries required for acquiring neuronal data. (4) Understand basic neuroscience concepts such as: action potential, local field potential, receptive field, brain topography, spike clustering, brain oscillations. (5) Testing hypothesis using basic statistical tests (normality tests, parametric and non-parametric t-tests and analyses of variance (ANOVA)).</p>	
3rd	Prerequisites for participation:	
	none	
4th	[Possible] Mode of teaching and learning:	
	practical course, seminar, self-studies	
5th	Degree programme records:	
	Attendance records:	none
	Performance records:	1 seminar presentation on the results of one’s own experiments, 1 seminar presentation on recent scientific papers, work report
	Pre-examination performances:	none
6th	Module examination:	Form/duration
	Module examination consisting of:	A practicum protocol of 10-30 pages must be drafted
	Cumulative module examination consisting of:	
7th	Module grade:	
	Forming the module grade in cumulative module examinations	