Please note that this document is a non-binding convenience translation. Only the German version of the document entitled "Prüfungs- und Studienordnung der Universität Heidelberg für den Bachelor-Studiengang Molekulare Biotechnologie" [published in the President's bulletin (Mitteilungsblatt des Rektors) of 29 February 2012, p. 215] has legal validity.

Heidelberg University examination and degree programme rules and regulations for the Bachelor's degree programme in Molecular Biotechnology

09 February 2012

I. General information

II. Bachelor's examination

III. Final provisions

Preamble

All titles in this document, be they official, job, status or functions, are used in masculine form, however they refer to men and women equally and may also be used in the corresponding feminine form.

I. General information

§ 1 Purpose of the academic programme and examination

(1) The Bachelor's examination is the first degree for the Bachelor's degree programme in Molecular Biotechnology, qualifying graduates to enter a profession. The degree programme in Molecular Biotechnology conveys the academic basis and methods required for entering a profession in research, development and administration in the field of molecular biotechnology.

(2) The purpose of the Bachelor's examination is to assess whether students have an overview of the interconnections between the individual disciplines, are able to apply academic methods and knowledge, and have acquired the specialist knowledge required for entering a profession.

(3) Admission to the academic programme is subject to separate admission regulations.

§ 2 Bachelor's degree

Heidelberg University, represented by the Faculty of Biosciences, awards the academic degree of "Bachelor of Science" (abbreviated to "B.Sc.") to those who have passed the Bachelor's examination.

§ 3 Standard period of study, programme structure and range of courses offered

(1) The standard period of study is six semesters, including the Bachelor's thesis.

(2) Major subjects for the degree programme are drug design research, bioinformatics and biophysical chemistry. One major and two minor subjects are chosen from those subjects in the third year. Lectures and courses offered include basic modules (listed in annex 1) and specialisation modules (listed in annex 2). Successful completion of the Bachelor's degree programme requires a total of 180 credit points (ECTS points) in examination prerequisites and results for compulsory and elective courses.

(3) Examination prerequisites are graded with credit points in accordance with the European Credit Transfer System. One credit point corresponds to around 30 hours' workload. Credits are only awarded for successfully completed modules. Successful completion of graded modules requires the grade "sufficient" (4.0) or higher.

(4) An orientation examination must be taken no later than at the end of the second semester. It is an integral part of the course and, in accordance with annex 1 part 1, consists of successful participation in "Cell and Molecular Biotechnology", which is part of the module "Basics of Biology for Molecular Biotechnologists".

(5) If the orientation examination is not passed or is considered not to have been passed, it may be retaken once during the following semester. If the orientation examination has not been passed by the end of the third semester, the student is not entitled to take the final examinations, unless the student is not responsible for the deadline being exceeded.

(6) The orientation examination is an early part of the Bachelor's examination.

(7) The degree programme is completed with the Bachelor's examination in accordance with § 16 paragraph 1.

(8) Lectures and courses in the degree programme and the corresponding examination components are mainly held in German; however, some are also held in English. In general, examination components have to be taken in the language of instruction.

(9) A transcript of records will be issued at the end of each semester, listing all module and sub-module examinations students have passed, including the corresponding credits and grades.

§ 4 Examinations board

(1) An examinations board is formed for organising examinations and tasks defined in these examination rules and regulations. It consists of four members of the academic staff who are primarily employed by the Faculty of Biosciences. Three members must be professors, one member must be a research associate representative and one member must be a student as an advisory member.

(2) The chairperson of the examinations board, deputy chairperson, other members and deputies are appointed by the faculty council based on a proposal by the academic commission. The chairperson and the deputy must be professors. The examinations board student member is appointed by the faculty council based on a proposal from the departmental student committee.

(3) The members are appointed for four years; the student member is appointed for one year. Each term starts on January, 1st. Members may be re-elected.

(4) The examinations board ensures that the examination rules and regulations are upheld. On a regular basis, the committee reports to the faculty regarding changes to examinations, study periods and grading. This report is published in a suitable form.

(5) The chairperson manages the business of the examinations board, prepares and chairs meetings and, in the event of a tie vote, has the deciding vote. The examinations board can confer further responsibility on its chairperson. Such a decision may be revoked at any time.

(6) Examinations board members have the right to attend examinations.

(7) Members of the examinations board and their deputies are subject to official

secrecy. Those who are not civil servants are sworn to secrecy by the chairperson.

(8) All requests to the examinations board must be submitted via the Institute of Pharmacy and Molecular Biotechnology's admissions and examination office.

§ 5 Examiners and observers

(1) The chairperson, having consulted the examinations board, appoints the examiners for examination components. Examiners must be lecturers in the Bachelor's degree programme in Molecular Biotechnology. The examinations board prepares a list of all authorised examiners.

(2) In general, examination components which are not completed during the course of study may only be examined by professors, associate professors, lecturers or research associates who have been granted the right to examine.

(3) In general, the lecturer for the respective lecture or course is responsible for examination components completed during the course of study.

(4) Observers, if required, must have sat the Bachelor's examination or at least an equivalent final examination. They are appointed by the examiners.

(5) For examiners and observers, § 4 paragraph 7 (official secrecy) shall apply accordingly.

§ 6 Recognition of study periods, examination prerequisites and examination results

(1) Study periods, examination prerequisites completed and results obtained in degree programmes at German universities or at a comparable institution of higher education will be recognised, provided there is equivalence. There is equivalence if the majority of the periods of study, examination prerequisites completed and results obtained correspond to the Bachelor's programme in Molecular Biotechnology at Heidelberg University in relation to their content, scope and requirements. Programmes are not compared schematically, but rather considered and assessed as a whole. Failed examinations will also be considered.

(2) When recognising periods of study, as well as examination prerequisites completed and results obtained outside the Federal Republic of Germany, Equivalency Agreements and agreements between partner universities approved by the Conference of German Ministers of Education (Kultusministerkonferenz, KMK) and German Rectors' Conference (Hochschulrektorenkonferenz, HRK) must be taken into account. For equivalency matters, the Central Office for Foreign Education (Zentralstelle für ausländisches Bildungswesen) can be consulted.

(3) For study periods, examination prerequisites completed and results obtained at

state-recognised distance learning institutions and other institutes of education, in particular universities of cooperative education (state or state-recognised), paragraph 1 applies accordingly.

(4) If examination prerequisites and results are recognised, grades - if grading systems are similar - must be transferred and used when calculating the overall grade in accordance with these examination rules and regulations. If grading systems are not comparable, examination prerequisites and results are graded as a "pass". This recognition can be stated in the diploma. If more than 50 % of the examination components to be recognised are ungraded examination components completed during the course of study or examination components completed during the course of study from grading systems that are not comparable, the examinations board makes a decision.

(5) Parts of the Bachelor's examination might not be recognised if they make up more than 50% of all examination components completed during the course of study. The Bachelor’s thesis will not be recognised.

(6) Decisions on this matter are made by the examinations board in accordance with paragraphs 1 to 5, following departmental representative's advice. Students must present the documents necessary for recognition.

§ 7 Unexcused absence, withdrawal, deception and breaches of regulations

(1) An examination is graded as "failed" (5.0) if candidates fail to appear without being able to state a valid reason for their absence, or if they withdraw after the examination has started. A written examination that was not produced within the allocated time is also graded as "failed", unless the candidate is not responsible for the time being exceeded.

(2) Reasons for withdrawal or absence must be stated plausibly and immediately to the examinations board in writing. If the candidate, or a child for whom the candidate is generally the sole carer, is ill, a medical certificate must be provided three working days after the examination at the latest. For the second medical certificate for the same examination date, or in case of doubt, a medical certificate from a designated doctor can be requested. If the reasons are accepted, a new appointment will be scheduled. In this case, examination results that are already available will be taken into account.

(3) When deciding whether the candidate is responsible for exceeding a deadline for registration or taking an examination, the examinations board must respect the provisions stated in the Maternity Protection Act and the legal regulations concerning parental leave. The candidate must be granted use of these provisions.

(4) If the candidate tries to influence the examination results through deception, plagiarism or by using unauthorised aids, the examination component in question will be graded as "failed" (5.0). If candidates disrupt the proper course of the examination, they may be excluded from taking further part in the examination by the examiner or examination supervisor. In this case, the examination result

will be graded as "failed" (5.0). In severe cases, the examinations board may exclude the candidate from all further examinations.

(5) Within a period of fourteen days, the candidate may request that the decision be validated by the examinations board in accordance with paragraph 4 sentences 1 and 2. The candidate must be informed of negative decisions immediately and in writing, stating the reasons and providing information on the procedure for appeal.

§ 8 Types of examination components

(1) The examination components are:

1. oral examinations,
2. written examination components,
3. the Bachelor's thesis.

(2) If candidates provide a medical certificate which plausibly proves that they are not able to take examination components in the form prescribed, completely or partially, due to permanent or sustained health problems, the examinations board may allow them to take an equivalent examination. This also applies to examination prerequisites.

§ 9 Oral examination components

(1) In oral examination components, candidates should show that they are able to identify interconnections within the examination matter and relate special problems to these interconnections.

(2) Generally, oral examination components are carried out by an examiner and a qualified observer.

(3) An oral examination lasts between 15 and 45 minutes.

(4) Important content and the results of the oral examination must be written in the minutes. Candidates must be notified of examination results following the oral examination.

§ 10 Written examination components

(1) In written examination components, candidates should show that they are able to recognise problems relating to their subject and find solutions for them, using subject-specific methods with limited time and resources.

(2) A written examination lasts between 30 and 180 minutes. Multiple choice questions are permitted.

(3) If a written examination component is taken as a term paper, it must be taken

under examination conditions. Furthermore, candidates must assure that they are the author of their work and have used no sources or aids other than those indicated.

§ 11 Written examination components as multiple choice examination

Generally, multiple choice questions are set by the lecturer responsible for a lecture or course. The questions must be tailored for examining the knowledge conveyed in the lecture or course and provide reliable results. Before assessing the examination results, the examiner must make sure that the questions for the examination apply to this principle. If the examiner finds individual examination questions incorrect, these questions must not be considered when assessing the examination results. In such a case, the total amount of questions is reduced and the assessment is based on the reduced number of questions. Reducing the number of examination questions must not have negative consequences for the candidates.

An examination carried out as a multiple choice examination is considered as passed, when at least 50 % of the questions were answered correctly, or when, based on the maximum amount of points, a candidate's number of correctly answered questions is not lower than 22 % of the average examination results of all candidates (non-referenced grading).

If a candidate answered the required number of questions for passing correctly, the multiple choice examination must be assessed as follows: In case of non-referenced grading, the scale for assessment is moved lineally by the difference between absolute and relative threshold for passing. Other grading scales may be used for other written examination components that are not multiple choice examinations.

%	Grade
≥ 50 – 55	4.0
> 55 – 60	3.7
> 60 – 65	3.3
> 65 – 70	3.0
> 70 – 75	2.7
> 75 – 80	2.3
> 80 – 85	2.0
> 85 – 90	1.7
> 90 – 95	1.3
> 95 – 100	1.0

§ 12 Assessment of examination components

(1) Grades for the individual examination components are determined by the respective examiners. The following grades must be used for assessment of examinations:

1 = very good	=	an outstanding performance;
2 = good	=	performance which lies substantially above average requirements;
3 = satisfactory	=	a performance which corresponds to average requirements;
4 = sufficient	=	a performance which, despite deficiencies, still meets the requirements
5 = failed	=	a performance which does not meet the requirements due to considerable deficiencies.

For more detailed assessment of examination results, interim grades may be given by increasing or decreasing the individual grades by 0.3; the grades 0.7, 4.3, 4.7 and 5.3 may not be used.

(2) In general, the evaluation period for examination components should not exceed two weeks after completion of the examination.

(3) An examination component is passed when it has been graded as "sufficient" (4.0) or higher. A module is successfully completed when all individual sub-module examinations have been passed.

(4) The overall grade of the Bachelor's examination is calculated using the grades of the module examinations weighted according to the respective credits. The lowest module grade after weighting one of the four basic modules from the first academic year (Inorganic Chemistry, Mathematics, Physics or Organic Chemistry) is not taken into account when calculating the overall grade, unless the grade is not improved by omitting this grade.

The overall grade is as follows:

for an average up to and including 1.5	very good
for an average between 1.6 and up to/including 2.5	good
for an average between 2.6 and up to/including 3.5	satisfactory
for an average between 3.6 and up to/including 4.0	sufficient

(5) When calculating final module grades and the overall examination grade, only the first decimal after the point is taken into account. The other decimals are dropped without rounding.

(6) If grades are awarded in accordance with the European Credit Transfer System ECTS, the assessment stated in annex 4 is used.

§ 13 Retaking an examination component integrated in the course of study

(1) If examination components are not passed or considered not to have been passed, they may be retaken twice. A second retake is not possible for the module “Bachelor’s thesis”. The orientation examination may only be retaken once.

(2) It is not possible to retake an examination component if it has been graded as passed.

(3) If an examination component has been failed, it must be retaken at the next examination date, at the latest. If candidates miss this deadline, they may not retake the examination component, unless they are not responsible for the deadline being exceeded.

(4) If finally a module is failed, the candidate loses the entitlement to take examinations. In accordance with Landeshochschulgesetz (Act on Higher Education of the Land of Baden-Württemberg) § 62 paragraph 2 no. 2, losing the entitlement to take examinations results in ex-matriculation at the end of the semester in which the entitlement was lost, ex officio.

§ 14 Participation in lectures or courses

Participation in a lecture or course may require previous successful participation in another lecture or course. Such regulations result from the individual module descriptions.

II. Bachelor’s examination

§ 15 Admission requirements and procedure

(1) Admission to the individual examination components for the Bachelor's examination is only authorised for those who:
1. are enrolled in the Bachelor’s degree programme in Molecular Biotechnology at Heidelberg University;
2. have not lost their entitlement to take examinations in this degree programme;
3. have not lost their entitlement to take examinations in the Bachelor’s degree programme at Heidelberg University's Faculty of Biosciences, related degree programmes, or the state examination degree programme in Pharmacy, and is currently not undergoing an examination procedure in such a programme. This includes failed examinations in one of the degree programmes mentioned above.

(2) Before an examination component is taken, students have to submit a declaration to the lecturer, stating that they have not lost the entitlement to take the final examinations.

(3) The decision on admission of the candidate is made by the chairperson of the examinations board or the respective lecturer.

(4) The application for admission to the examination may only be rejected if

1. conditions are not fulfilled in accordance with paragraph 1, or
2. documents are not compete, or
3. the candidate has lost their entitlement to take examinations in the Bachelor's degree programme at Heidelberg University's Faculty of Biosciences, related degree programmes, or the state examination degree programme in Pharmacy, and is currently not undergoing an examination procedure in such a programme, or
4. candidates have lost the entitlement to take examinations due to other reasons.

§ 16 Scope, nature and organisation of Bachelor's examination

(1) The Bachelor's examination consists of:

1. examination components completed during the course of study for the basic and specialisation modules in accordance with annex 1 and 2,
2. the Bachelor's thesis.

(2) Examinations as referred to in paragraph 1 no. 1 are taken as an integrated part of the lecture or course. They can be in written or oral form. The lecturer responsible for a lecture or course, having consulted the examinations board, determines the nature and duration of the examination components in accordance with paragraph 1 no. 1 and announces this information by the beginning of the lecture or course at the latest.

(3) Module examinations may consist of several sub-module examinations.

(4) If several lectures or courses are allocated to a module (compulsory elective modules), examination components that have been completed first are used when calculating the module grade.

§ 17 Bachelor's thesis

(1) The Bachelor's thesis is an examination component that completes the academic programme. The purpose of the thesis is for candidates to show that they are able to work independently on a problem from the field of molecular biotechnology within a given period of time, using academic methods. The Bachelor's thesis must be taken in the major subject.

(2) The Bachelor's thesis may be assigned and supervised by any authorised examiner in accordance with § 5 paragraph 2.

(3) The Bachelor's thesis can be started in the sixth academic semester if all basic modules have been successfully completed, a minimum of 150 credit points have been acquired and an industry internship of six weeks was completed in the second or third academic year.

(4) The topic of the Bachelor's thesis will be determined by the thesis supervisor,

having consulted the candidate. If an application is made, the chairperson of the examinations board will ensure that the candidate receives a topic for their Bachelor's thesis in due time. The candidate is allowed to propose topics. However, this does not constitute a legal entitlement to a certain topic. The chairperson of the examinations board assigns the thesis topic; the date of assignment must be recorded.

(5) The deadline for submission of the thesis is 10 weeks after the topic was assigned. Exceptionally, the examinations board may extend this deadline by up to 2 weeks. If the deadline is exceeded, the Bachelor's thesis will be graded as "failed" (5.0), unless the candidate is not responsible for the deadline being exceeded.

(6) The topic, task and scope of the Bachelor's thesis must be limited in such a way that the candidate is able to complete the thesis within the given time frame.

§ 18 Submission and assessment of Bachelor's thesis

(1) The Bachelor's thesis must be submitted to the examinations board before the deadline; the submission date must be recorded.

(2) When submitting their Bachelor's thesis, candidates must assure in writing that they are the author of their work and have used no sources or aids other than those indicated.

(3) The Bachelor's thesis is assessed by one examiner. § 5 paragraphs 1 and 2 apply accordingly. The examiner should be the supervisor of the thesis. The evaluation period should not exceed two weeks.

(4) If the Bachelor's thesis is graded as "failed" (5.0), the candidate can apply for the thesis to be assessed by a second examiner. Such an application must be made to the examinations board. If both examiners' assessments differ, the examinations board will decide on the basis of the examiners' reviews.

(5) If the Bachelor's thesis is graded as "failed" (5.0), it may be retaken on a new topic; retaking the thesis with the previous topic is not possible. The retake must be started within four weeks after the candidate was notified of failing the first attempt.

§ 19 Passing the examination and overall grade

(1) The Bachelor's examination is passed when all examination components completed during the course of study and the Bachelor's thesis have been graded as "sufficient" (4.0) or higher.

(2) § 12 applies for assessment of all examination components and the overall grade.

(3) The overall grade of the Bachelor's examination is calculated using the grades

for the individual modules listed in annex 1 and 2, including the Bachelor's thesis. The module grades are weighted according to the credit points. The lowest module grade, after weighting one of the four basic modules from the first academic year (Inorganic Chemistry, Mathematics, Physics or Organic Chemistry) is not taken into account when calculating the overall grade, unless the grade is not improved by omitting this grade.

§ 20 Diploma

(1) After the Bachelor's examination has been passed, a diploma will be issued within four weeks. It states all individual modules with their respective grades and credit points, and the overall grade. The diploma is dated with the day of the last examination component. It must be signed by the chairperson of the examinations board.

(2) A Diploma Supplement in German and English is added, containing additional information about the course content and period of study. The content complies with the European Diploma Supplement Model.

§ 21 Bachelor's certificate

(1) A Bachelor's certificate is issued with the diploma, bearing the same date. It certifies the conferment of the academic degree.

(2) The Bachelor's certificate is signed by the dean of studies and the chairperson of the examinations board. It bears the faculty seal.

(3) If the candidate has failed the Bachelor's examination, a certificate will be issued on request and on presentation of relevant proof, listing passed examination components and the corresponding grades as well as the missing examination components. It is signed by the chairperson of the examinations board and includes a note about the Bachelor's examination not being passed. The same applies for the Bachelor's examination, failed on the final attempt.

III. Final provisions

§ 22 Invalidity of examinations

(1) If a candidate has deceived in an examination and this is only discovered after the diploma has been issued, the examinations board may correct the examination results affected by the deception accordingly and may declare the examination partially or completely failed.

(2) If the requirements for admission to the examination were not fulfilled without any intent to deceive on the candidate's part, and this is only discovered after the diploma has been issued, the passed examination is considered to compensate for this shortcoming. If the candidate intentionally gained admission to the examination through deceit, the examinations board will make a decision on the

matter.

(3) Before the decision is made, candidates are given the right to explain themselves.

(4) The fraudulent examination diploma will be confiscated and, if necessary, a new diploma will be issued. The Bachelor's certificate will be confiscated along with the fraudulent examination diploma if the examination was graded as "failed" due to deception. In accordance with paragraph 1 and paragraph 2 sentence 2, a decision may not be made more than five years after the date on the examination diploma.

§ 23 Access to examination documents

Within a year after the examination procedure has been completed, the candidate can request access to written examination documents, examiners reviews and the examination minutes. The chairperson of the examinations board decides when and where access will be given.

§ 24 Coming into force

(1) These examination and degree programme rules and regulations will come into force on the first day of the month following publication in the President's bulletin (Mitteilungsblatt des Rektors). At the same time, the examination rules and regulations for the Bachelor's and Master's programme in Molecular Biotechnology from 22 July 2010 (President's bulletin from 30 August 2010, p. 1329) will expire.

(2) Students who are enrolled in the Bachelor's degree programme in Molecular Biotechnology at Heidelberg University while these examination rules and regulations are coming into effect may apply for the former regulations to be applied for them for up to three years. Such an application must be addressed to the examinations board and made within one month after the beginning of the lecture period of the semester in which these rules and regulations came into effect. If this deadline cannot be met, it may be applied for in the following semester.

ANNEX 1: Basic modules and modules completed during the course of study Compulsory (elective) modules[1], incl. certification of successful participation and grading:

Basic modules (1st and 2nd academic year)			
Part 1 (1st academic year)		**WCH**	**CP**

[1] Based on the European Credit Transfer System (ECTS), the modules correspond to a certain number of credit points (CP).

Basics of General and Inorganic Chemistry for Molecular Biotechnologists			**11 CP**
- General Chemistry	L	2.5	3
- Inorganic Chemistry	L	2.5	3
- Inorganic Chemistry	Lab	5	5
Basics of Biology for Molecular Biotechnologists			**7 CP**
- Basics of Biology	L	5	7
Mathematics for Molecular Biotechnologists			**12 CP**
- Mathematics / Computer Science A	L	4	6
- Mathematics / Computer Science A	P	2	
- Mathematics / Computer Science B	L	4	6
- Mathematics / Computer Science B	P	2	
Basics of Organic Chemistry for Molecular Biotechnologists 12 CP			
- Organic Chemistry	L + S	4	6
- Organic Chemistry	Lab	5	6
Physics for Molecular Biotechnologists			**10 CP**
- Basics of Physics A	L / P	6	3
- Basics of Physics B	L / P	6	3
- Laboratory Course Physics	Lab	3	4
Industry Internship			**7 CP**
Six weeks work experience in the biotechnology industry or related industries	I	14	
Total 1st Academic Year			**59 CP**
Part 2 (2nd academic year)		**WCH**	**CP**
Introduction to Bioinformatics			**8 CP**
- Methods of Bioinformatics	L / P	4	4
- Seminar: Applying Systems of Bioinformatics	S	2	4
Practical Biology for Molecular Biotechnologists			**16 CP**
- Biochemistry	Lab	3	4
- Molecular Biology	Lab	3	4
- Microbiology	Lab	3	4
- Pharmacology	S	3	4

Specialised Biology for Molecular Biotechnologists			**14 CP**
- Lecture series: Regulation of Systems in Biology	L	5	7
- Lecture series: Human Biology	L	5	7
Process Engineering in Biotechnology			**6 CP**
- Modelling of Biotechnological Processes	L / P	2	2
- Bioprocess Engineering - Fermentation	L +	2+4	4
Specialised Chemistry for Molecular Biotechnologists			**6 CP**
- Chemistry of Biomolecules and Metabolic Pathways	L	2	3
- Biocatalysis	L	2	3
Physical Chemistry			**6 CP**
- Thermodynamics and Kinetics	L	3	6
	P	2	

Crossdisciplinary Skills (1st and 2nd academic year)			**5 CP**
- Presentation Skills and Scientific English	S / P	4	5
- Ethic, Legal and Economic Aspects of molecular biotechnology (compulsory elective)	S	2	

Total 2nd Academic Year			**61 CP**

ANNEX 2: Specialisation modules (3rd academic year)

Modules Every lecture or course = 6	as Major subject	as Minor subject	CP Major	CP Minor
Bioinformatics	2 laboratory courses, 1 lecture, 1 seminar	1 laboratory course, 1 lecture	24	12
Biophysical Chemistry	2 laboratory courses, 1 lecture, 1 seminar	1 laboratory course, 1 lecture	24	12
Drug design	2 laboratory courses, 1 lecture, 1 seminar	1 laboratory course, 1 lecture	24	12
Total	4 laboratory courses	3 lectures, 1 seminar	48	

Bachelor's thesis in major subject	12
Total credit points in 3rd academic year	**60**

ANNEX 3: Integrated cross-disciplinary skills (key skills)

Skill	Module / Module element	CP
Presentation skills	Presentation skills and scientific English	2
Ability to work in a team	All laboratory courses, seminars and industry internship	2
Time management		3
Integrative and creative thinking	all modules	4
Scientific writing	Presentation skills and scientific English; all laboratory courses, specialisation modules; Bachelor's thesis	2
Total of integrated credit points		13

ANNEX 4: Grading in accordance with ECTS

In addition to the German-style grades, students who have passed the examination components will also be awarded a relative grade according to the following scale:

A	top 10 %
B	the following 25 %
C	the following 30 %
D	the following 25 %
E	the following 10 %

The relative grades are calculated based on the results of the graduation year group as well as two or more previous years, depending on the number of students in the year group. For degree grades, the ECTS grade must be added. For individual modules, the ECTS grade can be stated, where possible and necessary.

ANNEX 5: Modules

Module: Basics of General and Inorganic Chemistry for Molecular Biotechnologists

a) *Module content and qualification objectives*
This module conveys basic knowledge and skills in general and inorganic chemistry, using experimental and theoretical methods.
After completing the module, the student has acquired basic, comprehensive, practical and theoretical knowledge in general and inorganic chemistry. Students are able to use the methods learned for finding solutions to simple questions in chemistry, conduct experiments safely, deal with hazardous substances in accordance with health and safety regulations, and record the results in a scientific manner.

The module consists of a lecture in general chemistry, a lecture in inorganic chemistry and a laboratory course.

b) *Teaching methods*
Lecture, laboratory course

c) *Requirements for participation*
Participation in the laboratory course is only allowed for students who have passed one of the lecture examinations. In order to take the final examination, which takes place at the end of the laboratory course, the laboratory course has to be successfully completed.

d) *Applicability of module*
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
11 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) *Course offered*
annually, beginning of winter semester

h) *Workload*
The workload is 330 hours.

i) *Duration*
two semesters

Basics of Biology for Molecular Biotechnologists

a) Module content and qualification objectives
This module conveys basics in general biology, physiology, anatomy and medical microbiology.

b) Teaching methods
Lectures

c) Requirements for participation
none

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes. Cell and molecular biotechnology is the orientation examination.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
7 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, winter semester

h) Workload
The workload is 210 hours.

i) Duration
one semester

Mathematics for Molecular Biotechnologists

a) Module content and qualification objectives
Basic knowledge of mathematical methods, from the application of maths to mathematical data analysis and in particular concerning the theoretical chemistry of biophysics and bioinformatics, are gained.

Conceptual and analytical thinking will be trained through the use of knowledge gained while finding solutions to scientific problems.

The module consists of lectures and associated practice classes.

b) Teaching methods
Lecture, practice classes

c) Requirements for participation
none

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
12 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 360 hours.

i) Duration
two semesters

Module: Organic Chemistry for Molecular Biotechnologists

a) *Module content and qualification objectives*
This module conveys and extends on basic knowledge and skills in organic chemistry, using experimental and theoretical methods.
After completing the module, the student has acquired basic, comprehensive, practical and theoretical knowledge in organic chemistry. Students are able to use the methods learned for finding solutions to simple questions in chemistry, conduct experiments safely, deal with hazardous substances in accordance with health and safety regulations, and record the results in a scientific manner.

The module consists of a lecture as well as the laboratory course "Organic chemistry" and its corresponding seminar.

b) *Teaching methods*
Lecture, laboratory course, seminar

c) *Requirements for participation*
Participation in the laboratory course is only allowed for students who have passed the lecture examination.

d) *Applicability of module*
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
12 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) *Course offered*
annually, beginning of summer semester

h) *Workload*
The workload is 360 hours.

i) *Duration*
two semesters

Module: Physics for Molecular Biotechnologists

a) *Module content and qualification objectives*
The module provides basic education in physics and gives an introduction to the basics of dynamics, mechanics, thermodynamics, electrodynamics, electromagnetic waves, optics, atom physics, many body physics (solid state) and nuclear physics.

b) *Teaching methods*
Lecture, practice class, laboratory course

c) *Requirements for participation*
Attending the offered pre-course in mathematics is highly recommended; however it is not mandatory.

d) *Applicability of module*
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
10 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) *Course offered*
annually, beginning of winter semester

h) *Workload*
The workload is 300 hours.

i) Duration
two semesters

Module: Industry internship

a) *Module content and qualification objectives*
The students are given an insight into the workings of a private company in the field of biotechnology, the pharmaceutical industry and similar technological companies and service providers. The cooperation in industrial research, product development, production, quality control, application and marketing strengthens knowledge of the economy.

b) *Teaching methods*
Internship

c) *Requirements for participation*
Industry internship taken before the starting the academic programme cannot be recognised.

d) *Applicability of module*
Molecular biotechnology (Bachelor)

e) *Requirements for awarding credits*
Certification provided for 6 weeks of full time work

f) *Credit points and grades*
7 ECTS points are awarded. The internship will not be graded.

g) *Course offered*
Any semester break

h) *Workload*
The workload is 210 hours.

i) *Duration*
six weeks

Introduction to Bioinformatics

a) Module content and qualification objectives
Theoretical and practical knowledge of computer methods in bioscience research and bioinformatics is gained. After completing the module, the students will have acquired basic knowledge of sequence analysis, data assessment and genetic analysis, the use of biological data banks, the assessment of biological pictographic data, and programming.

b) Teaching methods
Lecture, practice classes, seminar

c) Requirements for participation
Knowledge acquired in the module Mathematics for Molecular Biotechnologists is required.

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
8 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 240 hours.

i) Duration
two semesters

Practical Biology for Molecular Biotechnologists

a) Module content and qualification objectives
Knowledge of microbiology (cultivation and analysis; micro-organisms as a source for biotechnological products; genetic manufacturing of recombinant proteins) as well as molecular biology (molecular biological methods of DNA analysis and cloning, plasmids, phage, transformation, selection) will be conveyed. Furthermore, the biochemical production and analysis of recombinant proteins and enzymes as well as the basics of protein biochemistry, purification and determination of activity will be taught. Pharmacological knowledge, based on the effectiveness of pharmaceuticals, disease patterns and therapies, will be conveyed.

b) Teaching methods
Laboratory course, seminar

c) Requirements for participation
Module: Basics of Biology for Molecular Biotechnologists

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
16 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 480 hours.

i) Duration
two semesters

Specialised Biology for Molecular Biotechnologists

a) Module content and qualification objectives
Deeper knowledge in human biology and the regulation of biological systems, as well as the biology of evolution will be gained. Understanding the main interconnections and biotechnological applications, with focus on cell biology, genetics, developmental biology, immunology, oncology, biochemistry, molecular biology, biology of plants (especially nutrition and medicinal plants, and applications in green technologies), will be deepened.

b) Teaching methods
Lectures

c) Requirements for participation
Successful participation in the module Basics of Biology for Molecular Biotechnologists

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
14 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 420 hours.

i) Duration
two semesters

Process engineering in biotechnology

a) Module content and qualification objectives
Basics in simulating biotechnological processes, fermentation and industrial production of biological molecules will be gained.

b) Teaching methods
Lecture, laboratory course

c) Requirements for participation
Successful completion of the modules Basics of Biology for Molecular Biotechnologists and Mathematics for Biotechnologists

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
6 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of summer semester

h) Workload
The workload is 180 hours.

i) Duration
one semester

Specialised Chemistry for Molecular Biotechnologists

a) Module content and qualification objectives
Deeper understanding and skills of bio-organic chemistry as well as chemical biology will be gained.
At the end of the module students will have acquired a wide range of knowledge in the theoretical basics of bio-organic chemistry and chemical biology.

b) Teaching methods
Lecture, seminar

c) Requirements for participation
Completion of the module General and Inorganic Chemistry for Molecular Biotechnologists as well as proof of successful completion of the examination for the theoretical part of the module Organic Chemistry for Molecular Biotechnologists.

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
6 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 180 hours.

i) Duration
two semesters

Physical Chemistry for Molecular Biotechnologists

a) Module content and qualification objectives
This module provides basic knowledge of physical chemistry.
After completing the module, the student will understand the basics of the structure of matter, thermodynamics, reaction kinetics, electrochemistry. Conceptional and analytical thinking will be trained by applying the knowledge acquired.

b) Teaching methods
Lecture, practice classes

c) Requirements for participation
Knowledge of the modules Mathematics for Molecular Biotechnologists, Physics for Molecular Biotechnologists, and General and Inorganic Chemistry for Molecular Biotechnologists

d) Applicability of module
Molecular biotechnology (Bachelor)
Applicable as scientific basic education in module based scientific degree programmes.

e) *Requirements for awarding credits*
The lecturer determines the nature of the examination component, having consulted the examinations board.

f) *Credit points and grades*
6 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, summer semester

h) Workload
The workload is 180 hours.

i) Duration
one semester

Cross-disciplinary skills

a) Module content and qualification objectives
This module trains scientific English and presentation skills. Scientific writing is practised. Skills and abilities concerning ethical, legal and scientific aspects of molecular biotechnology focusing on bioethics, founding a company, and safety in gene technology will be gained.

b) Teaching methods
Lecture, seminar, practice classes

c) Requirements for participation
none

d) Applicability of module
Molecular biotechnology (Bachelor)

e) Requirements for awarding credits
Requirements for awarding credits are active participation in the practice classes and seminars, as well as passing the examination components.
Lectures or courses in the following fields have to be taken:

- Scientific English
- Presentation skills and scientific writing
- Ethic, legal and economic aspects of molecular biotechnology (compulsory elective)

The lecturer determines the nature of the examination component, having consulted the examinations board.

f) Credit points and grades
5 ECTS points are awarded. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, currently every semester

h) Workload
The workload is 150 hours.

i) Duration
integrated in the course of studies

Specialisation module: Bioinformatics

a) Module content and qualification objectives
Deeper theoretical knowledge and practical skills in bioinformatics focusing on data processing, sequence analysis, analysing the gene expression, as well as data evaluation from graphical diagnostic processes and cellular biological analysis will be gained.
Alongside independent scientific work, scientific argument and discussion skills will be practised.

b) Teaching methods
Lectures, seminar, practice classes, laboratory courses

c) Requirements for participation
Basic modules

d) Applicability of module
Molecular biotechnology (Bachelor)

e) Requirements for awarding credits
Requirements for awarding credits are active participation in the lectures or courses, as well as passing the examination components.
As minor, a lecture amounting to 4 WCH and one compulsory elective laboratory course must be successfully completed. As major, a lecture amounting to 4 WCH, a seminar amounting to 2 WCH, and two compulsory elective laboratory courses must be successfully completed. The lecturer determines the nature of the examination component, having consulted the examinations board.

f) Credit points and grades
12 credit points are awarded in the minor, 24 credit points are awarded in the major subject. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 360 or 720 hours.

i) Duration
two semesters

Specialisation module: Biophysical chemistry

a) Module content and qualification objectives
Deeper theoretical knowledge and practical skills in biophysics focusing on surface chemistry, protein mechanics, structural biology, microscopic structural techniques and imaging will be gained.
Alongside independent experimental scientific work, reporting scientific results is practised, and scientific debating and discussion are trained.

b) Teaching methods
Lecture, seminar, laboratory course

c) Requirements for participation
Basic modules

d) Applicability of module
Molecular biotechnology (Bachelor)

e) Requirements for awarding credits
Requirements for awarding credits are active participation in the lectures or courses, writing reports as well as passing the examination components.
As minor, a lecture amounting to 4 WCH and one compulsory elective laboratory course must be successfully completed. As major, a lecture amounting to 4 WCH, a seminar amounting to 2 WCH, and two compulsory elective laboratory courses must be successfully completed. The lecturer determines the nature of the examination component, having consulted the examinations board.

f) Credit points and grades
12 credit points are awarded in the minor, 24 credit points are awarded in the major subject. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 360 hours in the minor, and 720 hours in the major subject.

i) Duration
two semesters

Specialisation module: Drug design

a) Module content and qualification objectives
Deeper theoretical knowledge and practical skills of drug design research will be gained. The focus is on molecular causes of disease, identifying molecular and biochemical drug targets, search for drugs, production of drugs (medicinal chemistry, biotechnology), testing the function of drugs, and formulating drugs for therapy. This will be complemented with specific topics of molecular cell biology, biological analysis, biotechnology and molecular biology, functional genome analysis, biopharmacy, pharmacology, and pharmaceutical chemistry.
Alongside independent experimental scientific work, reporting scientific results is practised, and scientific debating and discussion are trained.

b) Teaching methods
Lecture, seminar, laboratory course

c) Requirements for participation
Basic modules

d) Applicability of module
Molecular biotechnology (Bachelor)

e) Requirements for awarding credits
Requirements for awarding credits are active participation in the lectures or courses, writing reports as well as passing the examination components.
As minor, a lecture amounting to 4 WCH and one compulsory elective laboratory course must be successfully completed. As major, a lecture amounting to 4 WCH, a seminar amounting to 2 WCH, and two compulsory elective laboratory courses must be successfully completed. The lecturer determines the nature of the examination component, having consulted the examinations board.

f) Credit points and grades
12 credit points are awarded in the minor, 24 credit points are awarded in the major subject. The module grade is calculated using the grades from the examination components.

g) Course offered
annually, beginning of winter semester

h) Workload
The workload is 360 or 720 hours.

i) Duration
two semesters

Module: Bachelor's Thesis

a) *Module content and qualification objectives*
The academic thesis should cover a topic from the major subject, using academic methods and working independently.
The aim of the module is being able to solve scientific questions and record them in writing.
The topic should be chosen from the specialisation module in the selected major. The results will be presented in written form in the Bachelor's thesis.

b) *Teaching methods*
Guidance to scientific work

c) *Requirements for participation*
The Bachelor's thesis can be started in the sixth academic semester if a minimum of 150 credit points have been acquired, all basic modules and an industry internship of six weeks have been successfully completed.

d) *Applicability of module*
Molecular biotechnology (Bachelor)

e) *Requirements for awarding credits*
The thesis is assessed by an examiner.
The module must be started one week after the last examination component has been completed during the course of study, at the latest.

f) *Credit points and grades*
12 ECTS points are awarded.

g) *Course offered*
every semester

h) *Workload*
The workload is 360 hours.

i) *Duration*
10 weeks, however a 2 week extension can be applied for in exceptional cases

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