



JACOBS
UNIVERSITY



Study Program Handbook
Medical Natural Sciences

Bachelor of Science

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1 The Medical Natural Sciences (MedNat) Study Program

1.1 Concept

Medicine is the field of applied science related to diagnosis, treatment, and prevention of disease. It encompasses a variety of health care practices evolved to maintain and restore health by the prevention and treatment of illness in human beings. At German State Universities, a considerable fraction of students are chosen from Non-EU applicants. The Medical Natural Sciences (MedNat) Major program at Jacobs University prepares students from Non-EU countries to become medical students at a German Medical School. Importantly, the program starts with teaching in English while at the time of Graduation, all MedNat Students shall be prepared for continuing studies in German, preferably at a Medical School.

1.2 Specific Advantages of the MedNat Program at Jacobs University

- The MedNat program at Jacobs University combines modules in the Natural Sciences and Medicine with intensive German classes. In the Natural sciences, modules in Organic Chemistry, Physics or Cellular Biology are taught. These are accompanied by three dedicated modules Foundations in Medicine, in which MedNat students get to know essential concepts in Biology/Physiology and Anatomy, Biochemistry, Immunology or Microbiology. The MedNat program has a strong practical component, with excellent lab courses, tutorials and seminars.
- In the first year, all MedNat courses are taught in the English language. In the second year, most lectures are still taught in English, while exercises, lab courses or tutorials are instructed in German. Since MedNat students will have further advanced their German language skills by the third year, the German language will be the medium of instruction for all classes in the third year of study.
- As future Medical Doctors trained in Germany, MedNat students will get the essential background information on Germany and its region, as well as the different stake holders in the country in a dedicated lecture towards the end of the first year. Similarly, the German healthcare system and its stakeholders are going to be introduced in another dedicated lecture in the second year. To prepare MedNat students for the entrance exams at Medical Schools, an exercise is going to be offered, which will provide hands-on experience in medical tests and interviews.
- MedNat students will perform an intensive one-term internship at a Medical School or a hospital to get inside views on the real life as a Medical Doctor. There are intensive contacts established with leading Medical Schools that will foster a smooth transition from Jacobs University to the chosen Medical School in Germany.

1.3 Program-Specific Qualification Aims

- In their studies MedNat students acquire the necessary skills and knowledge to pursue a study of Medicine afterwards.
- Throughout their studies, MedNat student acquire solid theoretical knowledge in the key natural science subjects, as well as medical fields.
- The theoretical education is complemented by practical training through exercises and comprehensive laboratory courses, which already start in the first semester. In these

courses students will not only acquire excellent technical skills, but also learn how to accurately document and analyze scientific data through the writing of lab reports and the bachelor's thesis.

- Next to intensive German language classes, special training in several modules will enable MedNat graduates to get a clear picture of how Germany and its healthcare system function. This essential information will enable MedNat graduates to smoothly start at a Medical School of their choice.

1.4 The Jacobs University Employability and Personal Development Concept

Jacobs University's educational concept aims at fostering employability which refers to skills, capacities, and competencies which transcend disciplinary knowledge and allow graduates to quickly adapt to professional contexts. Jacobs University defines employability as encompassing not just technical skills and understanding but also personal attributes, competencies and qualities enabling students to become responsible members of their professional and academic fields as well as of the societies they live in. Graduates of JU will be equipped with the ability to find employment and to pursue a successful professional career, which means that graduates will be able to:

- acquire knowledge rapidly, gather, evaluate and interpret relevant information and evaluate new concepts critically to derive scientifically founded judgements;
- apply their knowledge, understanding and methodological competences to their activity or profession to solve problems;
- present themselves and their ideas effectively and to negotiate successfully;
- demonstrate understanding and knowledge of business principles and processes and to manage projects efficiently and independently;
- take responsibility for their and their team's learning and development.

Graduates of JU will also be equipped with a foundation to become globally responsible citizens, which includes the following attributes and qualities:

- graduates have gained intercultural competence; they are aware of intercultural differences and possess skills to deal with intercultural challenges; they are familiar with the concept of tolerance;
- graduates can apply problem-solving skills to negotiate and mediate between different points of view and to manage conflicts;
- graduates can rely on basic civic knowledge; they are able to analyse global issues of economic, political, scientific, social or technological nature; they are able to evaluate situations and take decisions based on ethical considerations;
- graduates are able and prepared to take on responsibility for their professional community and society.

1.5 Career Options

The Bachelor of Science (BSc) in Medical Natural Sciences received after three successful years of study at Jacobs University Bremen is the key to a world of numerous possibilities in the life sciences but primarily forms the basis for a successful study of Medicine at a German University for students from Non-EU countries. Intensive contacts to renowned Medical Schools in Germany exist, who are interested in successful MedNat graduates for a future study of Medicine.

1.6 More Information and Contact

For more information please contact the study program coordinator:

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Professor of Biochemistry

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or visit our program website: www.jacobs-university.de/MedNat

2 The Curricular Structure

2.1 General

The undergraduate education at Jacobs University equips students with the key qualifications necessary for a successful academic, as well as professional career. By combining disciplinary depth and transdisciplinary breadth, supplemented by skills education and extracurricular elements, students are prepared to be responsible and successful citizens within the societies they work and live in.

The curricular structure provides multiple elements enhancing employability, transdisciplinarity, and internationality. The unique Jacobs Track, offered across all study programs, provides a broad range of tailor-made courses designed to foster career competencies. These include courses which promote communication, technology, business, language, and management skills. The World Track, included in the third year of study, provides extended company internships or study abroad options, and for MedNat students an internship in a Medical school. Thus students gain training on the job and intercultural experiences.

All undergraduate programs at Jacobs University are based on a coherently modularized structure, which provides students with a broad and flexible choice of study plans.

The policies and procedures regulating undergraduate study programs at Jacobs University in general can be found on the website.

2.2 The MedNat Program Structure

2.2.1 YEAR 1

The first study year of MedNat lays the foundation for future studies at a Medical School in Germany. Dedicated modules are offered in Intensive German I, Foundations in Natural Sciences and Foundation in Medicine I. MedNat Students additionally are trained in a variety of topics within the Jacobs track, with skills and methods courses.

2.2.2 YEAR 2

In the second year, MedNat students continue with Modules in Intensive German II, Cellular Biology and Foundations in Medicine II. Again, courses offered in the Jacobs track (see below) allow MedNat students to gain transdisciplinary approaches and extra skills from a wide variety of different areas.

2.2.3 YEAR 3

During their third year, students must decide on their career after graduation. In order to facilitate this decision, the fifth semester introduces two separate tracks. By default students are registered for the World Track.

1. **The World Track**

This track provides students with an extended internship and is the regular track for MedNat students. The internship program is a core element of Jacobs University's employability approach. The curriculum includes the option for a semester-long internship at the University Clinic Hamburg-Eppendorf, our premium partner. in a Medical School, which provides experiential learning as well as practical work experience.

For more information, please contact the Career Services Center (<http://www.jacobs-university.de/career-services/contact>).

2. **The Campus Track**

Alternatively, MedNat students who decide for a career in the Life Sciences may also opt to follow the Campus Track by continuing their undergraduate education at Jacobs, namely by selecting an additional Year 2 module in the Life Sciences during their third year.

In the sixth semester, MedNat students are offered the two modules Foundation of Medicine III and Intensive German III, which includes a preparation for the entry exams at Medical Schools. Additionally they will concentrate on their Bachelor thesis in the context of a Project/Thesis Module.

Students may also attend a set of career skills courses and events throughout their studies. These equip them with necessary skills for their 5th semester and their future career.

2.3 **The Jacobs Track**

The Jacobs Track, another stand-alone feature of Jacobs University, runs parallel to the MedNat modules across the first two study years and is an integral part of all study programs. It reflects our commitment to an in-depth methodological education, it fosters our transdisciplinary approach, it enhances employability, and equips students with extra skills desirable in your field of study. Additionally, it integrates essential language courses.

Mathematics, statistics, and other methods courses are offered to all students within a comprehensive Methods Module. This module provides students with general foundations and transferable techniques which are invaluable to follow the study content not only in the study program itself but also in related fields.

The Skills Module equips students with general academic skills which are indispensable for their chosen area of study. These could be, for example, programming, data handling, presentation skills, and academic writing, scientific and experimental skills.

The transdisciplinary Triangle Module offers courses with a focus on at least one of the areas of business, technology and innovation, and societal context. The offerings comprise essential knowledge of these fields for students from other majors as well as problem-based courses that tackle global challenges from different disciplinary backgrounds. Working together with students from different disciplines and cultural backgrounds in these courses broadens the students' horizon by crossing the boundaries of traditional disciplines.

Foreign languages are integrated within the Language Module. Communicative skills and foreign language competence foster students' intercultural awareness and enhance their employability in a globalized and interconnected world. Jacobs University supports its students in acquiring and improving these skills by offering a variety of language courses at all proficiency levels.

2.4 Modularization of the Medical Natural Sciences Program

Year 1

There are three mandatory modules in the MedNat program as listed below.

Intensive German I (CH17-IntGermI)

Intensive German courses are offered according to the language competency of the individual student. The first of these courses is already offered a month before the official start of the term. MedNat students who are not yet in Germany in August have the chance to take this course in the intersession between the first and the second semester. These two courses will be complemented by a lecture series on Germany and its regions which will introduce the new home country away from home. Students will not only get a introduction to Germany's geography, but also historic perspective, and an introduction to the different stakeholders and organizations in Germany. Many aspects of everyday life in Germany will also be discussed.

Foundation in Natural Sciences (CH18-FoundNat)

In this module, an introduction is provided to the principles, ideas and basics in the Natural Sciences, with emphasis on Organic Chemistry and Physics. For each of these topics, a 5 ECTS lecture will be held in the first and second semester, respectively which will feature tutorials as integral parts of the lectures. These courses are complemented by 2.5 ECTS lab courses offering practical training in key techniques applied in Organic Chemistry and Physics, respectively.

Foundation in Medicine I (CH19-FoundMedI)

Two lectures will introduce students to Biology/Physiology and Anatomy by giving a comprehensive overview about these topics. Topics will include the design and built in Medicine, covering cellular architectures, communication in multicellular organisms, organ morphology and anatomic features of the human body. Two 2.5 ECTS lab courses will complement these lectures by training students in key techniques in Molecular and Cellular Biology, and Anatomy, featuring amongst others dissection principles and techniques.

Year 2

Three mandatory modules are offered within the MedNat program.

Intensive German II (CO43-IntGermII)

As a continuation of Intensive German I, the language courses are offered according to the language competency of the individual student. These courses will be complemented by a 5 ECTS lecture series introducing the German Healthcare System (Das deutsche Gesundheitssystem). This will be a course completely taught in the German language. The different organizations and stakeholders in the medical sector in Germany will be introduced by experts from the relevant fields. This seminar will thus provide a concise overview of how healthcare is organized in Germany and provide MedNat students with all the required information to later work as medical doctors.

Cellular Biology (CO44-CelluBio)

Cell Biology is an introductory module giving a comprehensive overview about cellular structure and physiology. It will explain cellular architecture and organization and how cells need to interact and communicate in multicellular organisms. This module will thus provide insight into both, the organismal organization and specialization of cells as well as the underlying molecular processes, e.g., gene expression and intracellular transport. Two lectures are complemented by a 5 ECTS combined seminar and lab course in Histology (Histologie), offering practical training in key techniques applied in modern Histology. This German language based lab course is planned for the intersession between the 3rd and 4th semester.

Foundations in Medicine II (CO45-FoundMedII)

This addresses in two lectures Microbes and Infection, and Immunology respectively. It combines the fundamentals of microbiology with an overview about the human immune system. Students will learn how microbes act in the environment and on human health, and how scientists investigate and control microbial pathogens. The immune system will be explained and how it identifies and eliminates cancer cells, viruses, bacteria, and parasites. Immune evasion mechanisms of pathogens will be elucidated as well as therapeutic approaches. In a 2.5 ECTS lab course, students will learn to isolate, handle, characterize, and taxonomically identify microorganisms using classical and state-of-the-art technologies. This lab course in Microbiology (*Mikrobiologie*) will be taught in German, as will be the seminar Immunology (*Immunologie*), in which students train to address and solve immunological problems.

Year 3

There are two different options:

1. World Track

In the 3rd year students follow the World Track by default.

5th Semester

- Internship at a Medical School, particularly at the University Clinic Hamburg-Eppendorf.

6th Semester

- Intensive German III
- Foundations in Medicine III
- Bachelor thesis

2. Campus Track

Students who do not enter the World Track follow the Campus Track.

5th Semester

- Biomedicine
- Choose courses (5 ECTS) from the Jacobs Track

6th Semester

- Intensive German III
- Foundations in Medicine III
- Bachelor thesis

1. World Track Internship in a Medical School

This module will provide MedNat students with an in-depth insight into everyday work in a hospital. Students will be introduced to all aspects of the practical aspects of medicine and shadow medical doctors. This module takes place during the entire semester (September to December), with no additional courses during the normal class times in the MedNat curriculum.

Intensive German III

As in the modules Intensive German I and II, the language courses are offered according to the language competency of the individual student. These courses will be complemented by a 5 ECTS seminar in which MedNat students are introduced to and trained in all aspects concerning the entry tests at German Medical Schools (Übergang ins Medizinstudium). As all third year MedNat courses, also this seminar is taught in the German language. The internship in the 5th semester requires that the first German language course takes place before the 5th semester, and the seminar is planned for the intersession between the 5th and 6th semester.

Foundation in Medicine III

This module focuses on Biochemistry (*Biochemie*) and will address in the German language, how the structure of biological molecules (proteins, sugars, lipids, nucleic acids) defines their biochemical properties and function. Students will learn the basics of metabolism, and how small drug molecules can influence them, for example in gene expression or in infectious diseases and their treatment. A lecture is complemented by a 2.5 ECTS lab course offering practical training in key techniques applied in biochemistry and molecular biology and a seminar addressing methods and techniques in forensic medicine (*Forensik*).

2. Campus Track Biomedicine

Biomedicine is an advanced module that builds on the 2nd year module Cellular Biology. Biomedicine first expands knowledge on key cellular processes often affected in diseases, e.g. gene expression, cell proliferation, intracellular trafficking, signal transduction and general turnover of cellular compounds. The module will address how these processes become altered in different diseases, e.g., cancer and neurodegenerative diseases, and how diagnostic tools and therapies (ranging from chemical to cell-based approaches) can be developed according to a disease's molecular origin. Two lectures are complemented by a 5 ECTS lab course that introduces students to modern methodology in cell biological research and biomedicine.

Additionally, choose courses (5 ECTS) from the Jacobs Track.

See World Track for:

- **Intensive German III**
- **Foundation in Medicine III**
- **Bachelor Thesis / Project**

2.5 The Bachelor Thesis / Project

This module is a mandatory graduation requirement for all undergraduate students. It consists of two components in the major study program guided by a Jacobs Faculty member:

1. **A Research Project** (5 ECTS)
and
2. **The Bachelor Thesis** (10 ECTS)

The workload for the project component is about 125 hours and for the thesis component about 250 hours. The title of the thesis will be shown on the transcript.

2.5.1 Aims

Within this module, students apply knowledge they have acquired about their major discipline, skills, and methods to become acquainted with actual research topics, ranging from the identification of suitable (short-term) research projects, preparatory literature searches, the realization of discipline-specific research, and the documentation, discussion, and interpretation of the results. Research results obtained from the Research Project can be embedded in the Bachelor Thesis.

2.5.2 Intended Learning Outcomes

1. **Research Project**
This module component consists of a guided research project in the major study program. The well-defined research task must be completed and documented according to the scientific standards in the respective discipline. It involves a high degree of independence, supported by individualized instructor feedback and guidance.
2. **Bachelor Thesis**
With their Bachelor Thesis students should demonstrate mastery of the contents and methods of the major specific research field. Furthermore, students should show the ability to analyze and solve a well-defined problem with scientific approaches, a critical reflection of the status quo in scientific literature, and an original development of their own ideas.

Both, the Research Project and the Bachelor Thesis, can also have an inter- or transdisciplinary nature - with the explicit permission of the supervisor.

2.5.3 Supervision

Both module components can be performed with the same Jacobs faculty member, or different ones, the latter in order to allow a broader research experience. Students are required to choose a supervisor, at the latest, by the end of the drop-add period of the semester in which the module component is taken. **The MedNat study program coordinator must approve the Project topic and Bachelor Thesis topic before the student starts to work towards the module component.** The respective study program coordinators will assist in the search for prospective supervisor(s).

2.5.4 Registration

World Track students register for both components, at the earliest, in their 6th semester.

Campus Track students register for the Project component in the 5th and for the Bachelor Thesis component, at the earliest, in their 6th semester.

The registrations must be made before the end of the respective drop/add periods.

Later enrolment is possible for those students pursuing a second major or those who graduate late for other reasons. These students perform their (second) thesis earliest in the 7th semester of their studies. They have to contact the Student Records Office for individual registration.

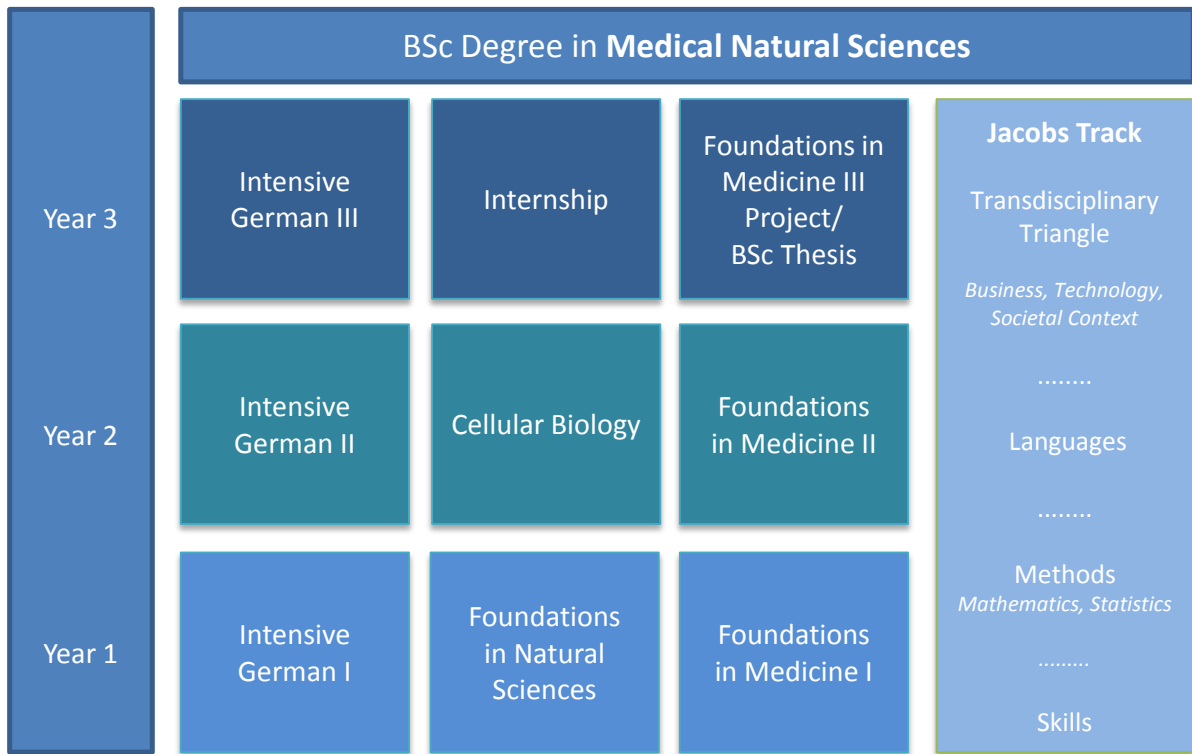
Students are allowed to extend their thesis related work into the intersession or summer break upon approval of the thesis supervisor and Student Records. Students are not allowed to register for different Bachelor Thesis courses in the same semester.

2.5.5 Formal Regulations for the Bachelor Thesis

- **Timing**
The Thesis work has to be generated within the semester of registration. The semester period has 14 weeks.
- **Extent**
The document must be between 15-25 pages in length, including references, but excluding appendices or supporting information. Deviations in length and format can be determined within individual study programs and should be communicated to all registered students by the study program coordinator.
- **Cover page**
The cover page must show the title of the Bachelor Thesis, the university's name, the month and year of submission, the name of the student and the name of the supervisor.
- **Statutory Declaration**
Each Bachelor Thesis must include a statutory declaration signed by the student confirming it is their own independent work and that it has not been submitted elsewhere. The respective form can be found on the Student Records Office website.
- **Submission**
The Bachelor Thesis must be submitted as a hard copy (pdf-file) to the supervisor and additionally to the Student Records Office via online form on the Student Records Office website.

Deadline for submission of the Bachelor Thesis is May 15 (unless specified otherwise by the Student Records Office).

2.6 Structure



YEAR 3

Alternative Campus Track option: instead of the module „Internship“ the module „Biomedicine“ and additional 5 ECTS from the Jacobs Track are required.

Figure 1: Medical Natural Sciences Module Structure

3 Requirements for a B.Sc. in Medical Natural Sciences

3.1 General Requirements

All undergraduate study programs at Jacobs University involve six semesters of study with a total of 180 ECTS (European Credit Transfer System) credits. The Bachelor's degree is designed to be achievable in three years.

The specific requirements for a degree in Medical Natural Sciences as stated below are, where applicable, complemented by the general requirements as stated in the Jacobs University Undergraduate Policy.

3.2 Requirements of the Study Program

The study program has two components: The first component includes program-specific modules. The second component provides general education modules (Jacobs Track). Detailed information on the required modules and courses is stated in the mandatory course plan.

3.2.1 Requirements for World Track

First Component:

Program-specific Requirements (150 ECTS credits in total):

- 45 ECTS credits in program-specific 1st year modules
- 45 ECTS credits in program-specific 2nd year modules
- 25 ECTS credits in program-specific 3rd year modules
- 20 ECTS credits in the Internship Module
- 15 ECTS credits in the program-specific project/research and Bachelor thesis module

Second Component:

Jacobs Track (General Education) Requirements (30 ECTS credits in total):

- 12.5 ECTS credits in the Triangle / Language Area Module
- 15 ECTS credits in the Methods / Mathematics Module
- 2.5 ECTS credits in the Skills Module

3.2.2 Requirements for Campus Track

First Component:

Program-specific Requirements (145 ECTS credits in total):

- 45 ECTS credits in program-specific 1st year modules
- 45 ECTS credits in program-specific 2nd year modules
- 25 ECTS credits in program-specific 3rd year modules
- 15 ECTS credits in the Biomedicine Module

- 15 ECTS credits in the program-specific project/research and Bachelor thesis module

Second Component:

Jacobs Track (General Education) Requirements (35 ECTS credits in total):

- 12.5 ECTS credits in the Triangle / Language Area Module
- 15 ECTS credits in the Methods / Mathematics Module
- 2.5 ECTS credits in the Skills Module
- 5 ECTS credits in any of the Jacobs Track areas (Triangle, Languages, Methods)

4 Appendix 1a/1b: Mandatory Module and Examination Plans for World Track and Campus Track

Jacobs University Bremen reserves the right to substitute courses by replacements and/or reduce the number of mandatory/mandatory elective courses offered.

5 Appendix 2: Course Data for Program-Specific CHOICE and CORE Courses

All course data stated in the appendix is based on the previous study year and subject to change.

Version	Valid as of	Decision	Details
Fall 2017 - V1	01.09.17	AB July 17	Masterversion

Appendix 1a - Mandatory Module and Examination Plan

Medical Natural Sciences – World Track																			
Matriculation Fall 2017																			
Program-Specific Modules					Jacobs Track Modules (General Education)														
Type	Status ¹	Semester	Credits	Type	Status ¹	Semester	Credits	Type	Status ¹										
Year 1				45				15											
CH17-IntGermI Module: Intensive German I					JT-ME-MethodsMath Module: Methods / Mathematics					m 7,5									
CH17-010101	German I	Seminar	m	1	5	JTME-120106	Applied Calculus I	Lecture	m	1	2,5								
CH17-010102	German II	Seminar	m	2	5	JTME-120107	Applied Calculus II	Lecture	m	1	2,5								
CH17-010103	Germany and its regions	Lecture	m	2	5	JTME-120101	Mathematical Concepts in the Sciences	Lecture	m	2	2,5								
CH18-FoundNat Module: Foundations in Natural Sciences					JT-SK-SkillsMN Module: Skills MEDNAT					m 2,5									
CH18-540101	Foundations in Organic Chemistry	Lecture	m	1	5	JT-SK-990103	Scientific and Experimental Skills	Lecture	m	1	2,5								
CH18-540111	Foundations in Organic Chemistry Lab	Lab	m	1	2,5														
CH18-540102	Foundations in Physics	Lecture	m	2	5														
CH18-540112	Foundations in Physics Lab	Lab	m	2	2,5														
CH19-FoundMedI Module: Foundations in Medicine I					JT-TA-TriLangArea Module: Triangle / Language Area					m 5									
CH19-540103	Biology/Physiology	Lecture	m	1	5	Take two courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area. Each counts 2,5 ECTS					me	1/2	5						
CH19-540113	MedNat Lab	Lab	m	1	2,5														
CH19-540123	Anatomy	Lecture	m	2	5														
CH19-540133	Anatomy/Physiology Lab	Lab	m	2	2,5														
Year 2				45				15											
CO43-IntGermII Module: Intensive German II					JT-ME-MethodsMath Module: Methods / Mathematics					m 7,5									
CO43-010104	German III	Seminar	m	3	5	Take three methods (mandatory) elective courses. Each counts 2,5 ECTS.					me	3/4	7,5						
CO43-010105	German IV	Seminar	m	4	5														
CO43-010106	Das deutsche Gesundheitssystem	Lecture	m	4	5														
CO44-CelluBio Module: Cellular Biology					JT-TA-TriLangArea Module: Triangle / Language Area					m 7,5									
CH01-520122	From cells to tissue and body functions	Lecture	m	3	5	Take three courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area. Each counts 2,5 ECTS.					me	3/4	7,5						
CO44-540201	Histologie Labor	Lab	m	3	5														
CH01-520102	General Molecular Cell Biology	Lecture	m	4	5														
CO45-FoundMedII Module: Foundations in Medicine II					JT-TA-TriLangArea Module: Triangle / Language Area					m 7,5									
CO02-520233	Microbes and Infection	Lecture	m	3	5	Take three courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area. Each counts 2,5 ECTS.					me	3/4	7,5						
CO45-540211	Mikrobiologie Labor	Lab	m	3	2,5														
CO02-520322	Immunology	Lecture	m	4	5														
CO45-540202	Immunologie	Seminar	m	4	2,5														
Year 3				60				180											
CA19-IntGermIII Module: Intensive German III					JT-TA-TriLangArea Module: Triangle / Language Area					m 7,5									
CA19-010107	German V (between 4th and 5th Semester)	Seminar	m	5	5	Take three courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area. Each counts 2,5 ECTS.					me	3/4	7,5						
CA19-010108	Übergang ins Medizinstudium (Intersession)	Seminar	m	5	5														
CA19-010109	German VI	Seminar	m	6	5														
CA02-Internship Module: Internship					JT-TA-TriLangArea Module: Triangle / Language Area					m 7,5									
Internship at Medical School		Internship	m	5	20	Take three courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area. Each counts 2,5 ECTS.					me	3/4	7,5						
CA20-FoundMedIII Module: Foundations in Medicine III					JT-TA-TriLangArea Module: Triangle / Language Area						m 7,5								
CA20-540301	Biochemie	Lecture	m	6	5						Take three courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area. Each counts 2,5 ECTS.					me	3/4	7,5	
CA20-540311	Biochemie Labor	Lab	m	6	2,5														
CA20-540302	Forensik	Seminar	m	6	2,5														
CA21-MedNat Module: Project/Thesis MEDNAT					JT-TA-TriLangArea Module: Triangle / Language Area					m 7,5									
CA21-540303	Project MEDNAT	Project	m	6	5	Take three courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area. Each counts 2,5 ECTS.					me	3/4	7,5						
CA21-540304	Thesis MEDNAT	Thesis	m	6	10														
Total ECTS										180									

¹ Status (m = mandatory, e = elective, me = mandatory elective)

Appendix 1b - Mandatory Module and Examination Plan

Medical Natural Sciences – Campus Track											
Matriculation Fall 2017											
Program-Specific Modules	Type	Status ¹	Semester	Credits	Jacobs Track Modules (General Education)	Type	Status ¹	Semester	Credits		
Year 1					45						15
CH17-IntGermI	Module: Intensive German I			m	15	JT-ME-MethodsMath	Module: Methods / Mathematics			m	7,5
CH17-010101	German I	Seminar	m	1	5	JTME-120106	Applied Calculus I	Lecture	m	1	2,5
CH17-010102	German II	Seminar	m	2	5	JTME-120107	Applied Calculus II	Lecture	m	1	2,5
CH17-010103	Germany and its regions	Lecture	m	2	5	JTME-120101	Mathematical Concepts in the Sciences	Lecture	m	2	2,5
CH18-FoundNat	Module: Foundations in Natural Sciences			m	15	JT-SK-SkillsMN	Module: Skills MEDNAT			m	2,5
CH18-540101	Foundations in Organic Chemistry	Lecture	m	1	5	JT-SK-990103	Scientific and Experimental Skills	Lecture	m	1	2,5
CH18-540111	Foundations in Organic Chemistry Lab	Lab	m	1	2,5						
CH18-540102	Foundations in Physics	Lecture	m	2	5						
CH18-540112	Foundations in Physics Lab	Lab	m	2	2,5						
CH19-FoundMedI	Module: Foundations in Medicine I			m	15	JT-TA-TriLangArea	Module: Triangle / Language Area			m	5
CH19-540103	Biology/Physiology	Lecture	m	1	5		Take two courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area.	me	1/2	5	
CH19-540113	MedNat Lab	Lab	m	1	2,5						
CH19-540123	Anatomy	Lecture	m	2	5						
CH19-540133	Anatomy/Physiology Lab	Lab	m	2	2,5						
Year 2					45						15
CO43-IntGermII	Module: Intensive German II			m	15	JT-ME-MethodsMath	Module: Methods / Mathematics			m	7,5
CO43-010104	German III	Seminar	m	3	5		Take three methods (mandatory) elective courses.	me	3/4	7,5	
CO43-010105	German IV	Seminar	m	4	5						
CO43-010106	Das deutsche Gesundheitssystem	Lecture	m	4	5						
CO44-CelluBio	Module: Cellular Biology			m	15	JT-TA-TriLangArea	Module: Triangle / Language Area			m	7,5
CH01-520122	From cells to tissue and body functions	Lecture	m	3	5		Take three courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area.	me	3/4	7,5	
CO44-540201	Histologie Labor	Lab	m	3	5						
CH01-520102	General Molecular Cell Biology	Lecture	m	4	5						
CO45-FoundMedII	Module: Foundations in Medicine II			m	15						
CO02-520233	Microbes and Infection	Lecture	m	3	5						
CO45-540211	Mikrobiologie Labor	Lab	m	3	2,5						
CO02-520322	Immunology	Lecture	m	4	5						
CO45-540202	Immunologie	Seminar	m	4	2,5						
Year 3					55						5
CA19-IntGermIII	Module: Intensive German III			m	15	JT-MedNatCT	Module: Jacobs Track (MedNat CT)			m	5
CA19-010107	German V (between 4th and 5th Semester)	Seminar	m	5	5		Take any two courses from the triangle (BUSINESS, TECHNOLOGY and INNOVATION, SOCIETAL CONTEXT) or language area or methods area.	me	3/4	5	
CA19-010108	Übergang ins Medizinstudium (Intersession)	Seminar	m	5	5						
CA19-010109	German VI	Seminar	m	6	5						
CO01-Biomed	Module: Biomedicine			me	15						
CO01-520234	Advanced Molecular Cell Biology	Lecture	m	5	5						
CO01-520241	Advanced Molecular Cell Biology Lab (Intersession)	Lab	m	5	5						
CO01-520235	Molecular Mechanisms of Disease, Diagnostics and Therapy	Lecture	m	6	5						
CA20-FoundMedIII	Module: Foundations in Medicine III			m	10						
CA20-540301	Biochemie	Lecture	m	6	5						
CA20-540311	Biochemie Labor	Lab	m	6	2,5						
CA20-540302	Forensik	Seminar	m	6	2,5						
CA21-MedNat	Module: Project/Thesis MEDNAT			m	15						
CA21-540303	Project MEDNAT	Project	m	5	5						
CA21-540304	Thesis MEDNAT	Thesis	m	6	10						
Total ECTS										180	

¹ Status (m = mandatory, e = elective, me = mandatory elective)

Appendix 2 - Course Data

Course Name German I	Course No CH17-010101	ECTS 5
Module Affiliation CH17-IntGerml Intensive German I	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims MedNat students will be individually assigned in this course to two consecutive language classes depending on their level. The levels start with A 1.1 for student with no prior knowledge of German. One course is scheduled during the term, and the second one during summer or the intersession. For all German language courses holds: The teaching language is German – right from the very first lesson.		
Course Name German II	Course No CH17-010102	ECTS 5
Module Affiliation CH17-IntGerml Intensive German I	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims MedNat students will be individually assigned in this course to two consecutive language classes depending on their level. One course is scheduled during the term, and the second one during summer or the intersession. For all German language courses holds: The teaching language is German – right from the very first lesson.		

Appendix 2 - Course Data

Course Name Germany and its regions	Course No CH17-010103	ECTS 5
Module Affiliation CH17-IntGerml Intensive German I	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This course aims at familiarizing first-year MedNat students with the German political system, society and culture. It starts with a look into history highlighting developments that have been crucial for today's Germany. This is followed by a more thorough overview of contemporary society and politics. Aspects of culture will be discussed in the third part of the course. Excursions are planned to embed the course topics into a local context. Aims and Objectives: Getting familiar with the contemporary German political system, society and culture. Learning how to analyze and interpret societal developments in Germany and put them into a broader context.		
Course Name Foundations in Organic Chemistry	Course No CH18-540101	ECTS 5
Module Affiliation CH18-FoundNat Foundations in Natural Sciences	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This course provides students with a clear foundation to the structure of organic molecules and their relevance to drugs and drug targets. Assuming little prior knowledge of the subject the course describes and explains the terminology and principles that determine bonding and the geometry between atoms within organic molecules. Relevant compound classes are introduced with an emphasis on organic molecules. Importantly, we will delve into the basics of drug-drug target interactions from the perspective of proteins, enzymes, receptors, and signal transduction from a chemical perspective. Those discussions will be framed in the chemical principles underlying how drug discovery programs obtain drug candidates and ultimately marketable drugs. The lectures will include regular tutorials allowing the students to enhance their problem based learning skills.		

Appendix 2 - Course Data

Course Name Foundations in Physics	Course No CH18-540102	ECTS 5
Module Affiliation CH18-FoundNat Foundations in Natural Sciences	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This lecture provides students with a short and general introduction to selected topics of classical physics that are relevant to medicine and the life sciences. Assuming little prior knowledge of the subject, the lecture describes and explains the terminology, concepts and phenomena in physics. The course starts with mechanics, especially with the description of motion, Newton's laws and different forces. Energy will be introduced as a fundamental concept in physics. A short discussion of fluid mechanics finishes the mechanics part. In the thermodynamics section heat, the ideal gas law, and the first law of thermodynamics will be discussed. The electromagnetism part includes basic concepts such as Coulomb's law, electric field and potential, current and magnetic fields. It finishes with electromagnetic waves and is followed by a short introduction to optics. The overview of classical physics will be completed by introducing harmonic oscillations and classical waves. Finally, an outlook of some topics in modern physics will be given such as the discussion of elementary particles, atoms and electrons, radioactivity, absorption and emission. The lecture includes regular exercises, allowing students to acquire not only a conceptual but also a quantitative understanding of physical phenomena and their underlying processes.		
Course Name Foundations in Organic Chemistry Lab	Course No CH18-540111	ECTS 2,5
Module Affiliation CH18-FoundNat Foundations in Natural Sciences	Workload (hrs / sem) Contact Time: 25,50 Private Study: 37,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This lab course accompanies the lecture "Foundations in Organic Chemistry". It introduces students to experimentation in an organic chemistry laboratory. Experiments will address separation and extraction techniques, re-crystallization and chromatography. You will also be introduced to basic synthetic principles and lab equipment in organic chemistry, and will isolate caffeine from tea during the lab course. In-lab seminars will discuss the theory behind the experiments and the expected outcomes. The students will document and discuss their experimental data in publication-style reports. Theoretical preparation will be tested for by quizzes and the preparation of material safety data sheets (MSDS).		

Appendix 2 - Course Data

Course Name Foundations in Physics Lab	Course No CH18-540112	ECTS 2,5
Module Affiliation CH18-FoundNat Foundations in Natural Sciences	Workload (hrs / sem) Contact Time: 25,50 Private Study: 37,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This lab course accompanies the lecture "Foundation in Physics". It introduces students into the experimental analysis and description of physical phenomena. Different experiments will address forces, oscillations, fluid mechanics, ideal gas, lens optics. A seminar will introduce students to the topics of the experiments, the necessary lab report layout and data analysis. The students will document and discuss their experimental data and results in short lab reports. Theoretical preparation will be tested for by quizzes (pass or fail) at the beginning of the experiments.		
Course Name Biology/Physiology	Course No CH19-540103	ECTS 5
Module Affiliation CH19-FoundMedI Foundations in Medicine I	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This lecture course will give a comprehensive overview of life at the organismal level with a strong focus on human biology and physiology. Basic principles of physiology as well as organ systems and metabolism will be introduced. Students will learn about general rules of molecular genetics and heredity. Finally, the contributions of cellular processes like cell division and differentiation will be discussed to elucidate how complex cellular interactions and communication (e.g., via hormones) generate body plans that are both, typical and characteristic for an organism. At the end of the lecture students will have acquired a sound understanding of biological principles underlying multicellular organization and function.		

Appendix 2 - Course Data

Course Name MedNat Lab	Course No CH19-540113	ECTS 2,5
Module Affiliation CH19-FoundMedI Foundations in Medicine I	Workload (hrs / sem) Contact Time: 25,50 Private Study: 37,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This laboratory course accompanies the lecture "Biology/Physiology". It aims at introducing students to the basic techniques (e.g., pipetting, spectrophotometry, microscopy) in experimental life sciences. Students will learn how to prepare buffers and determine concentrations spectrophotometrically. They will analyze different classes of biomolecules and investigate the importance of pH on molecular function and cellular behavior. In-lab seminars will discuss the theory behind the experiments and the expected outcomes. The students will document and discuss their experimental data in publication-style reports. Theoretical preparation will be tested for by quizzes and the preparation of material safety data sheets (MSDS).		
Course Name Anatomy	Course No CH19-540123	ECTS 5
Module Affiliation CH19-FoundMedI Foundations in Medicine I	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This course provides students with a general introduction to selected topics of human anatomy that are relevant to medicine and the life sciences. Assuming little prior knowledge of the subject, the lecture describes and explains the terminology, different concepts and phenomena in the fields of human anatomy as well as basics of histology and embryology. The lecture includes also some information concerning the physiology linked directly to the anatomy. Where possible, some topics will be presented by the students themselves in order to understand better how to study the complexity of human anatomy.		

Appendix 2 - Course Data

Course Name Anatomy/Physiology Lab	Course No CH19-540133	ECTS 2,5
Module Affiliation CH19-FoundMedI Foundations in Medicine I	Workload (hrs / sem) Contact Time: 25,50 Private Study: 37,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This laboratory course accompanies the lecture "Anatomy", and builds on the lecture "Biology/ Physiology". It aims at introducing students to basic concepts of animal anatomy, with an emphasis on the human body plan. Using anatomic models or skeletons, different aspects of anatomy will be studied. Next to these systemic approaches, we will use dissection to investigate the regional anatomy of various body parts. In-lab seminars will discuss the theory behind the investigations and the expected outcomes. The students will document and discuss their observations in publication-style reports. Theoretical preparation will be tested for by quizzes and the preparation of material safety data sheets (MSDS; where appropriate).		
Course Name German III	Course No CO43-010104	ECTS 5
Module Affiliation CO43-IntGermlI Intensive German II	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims MedNat students will be individually assigned in this course to two consecutive language classes depending on their level. One course is scheduled during the term, and the second one during summer or the intersession. For all German language courses holds: The teaching language is German – right from the very first lesson.		

Appendix 2 - Course Data

Course Name German IV	Course No CO43-010105	ECTS 5
Module Affiliation CO43-IntGermlI Intensive German II	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims MedNat students will be individually assigned in this course to two consecutive language classes depending on their level. One course is scheduled during the term, and the second one during summer or the intersession. For all German language courses holds: The teaching language is German – right from the very first lesson.		
Course Name Das deutsche Gesundheitssystem	Course No CO43-010106	ECTS 5
Module Affiliation CO43-IntGermlI Intensive German II	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims MedNat students will receive concise information on the healthcare system in Germany and its key players. The course will be organized as a series of lectures from experts of rather disparate fields, which will introduce, in the German language, the following topics: The role of patients and the care providers (Medical doctors, pharmacists, nursing staff and further healthcare professionals); Financing healthcare (private and statutory health insurance; direct payment) and the role of the employer in the statutory health insurance; The paying authorities (direct payment vs. insurances (health insurances, accident insurance, nursing care insurance, pension insurance), the association of Statuary Health Insurance Physicians, state support for civil servants (Beihilfe); The state and the statutory organizations of the federal government, the federal states governments and the local authorities, regulatory and surveillance units, public health departments; Patient organizations and self-help organizations; The Marburger Bund, the professional association of physicians in Germany; Ethics and the legal situation at the end of life (Patient's provision etc.); Rules of professional conduct; Liabilities and professional liability insurance; At the end of the course, students will have a much clearer idea about the occasionally confusing organization of the healthcare system in Germany, and its peculiarities.		

Appendix 2 - Course Data



Course Name General Molecular Cell Biology	Course No CH01-520102	ECTS 5
Module Affiliation CH01-CellBio Cell Biology CO44-CelluBio Cellular Biology	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CORE
Course Description / Content / Aims This lecture course will focus on the molecular architecture of cells and will address more complex cell biological topics. Students will learn how genetic information is encoded and organized, how cellular compounds are synthesized, delivered and degraded within the cell and how these processes govern cellular physiology. A comprehensive overview about the field of molecular cell biology will be provided through a combination of historical outlines, information about experimental approaches in the molecular life sciences and the analysis of key cellular processes: DNA replication, protein synthesis, intracellular transport, cell division, cellular movements, signal transduction, cellular communication and the biology of neurons. Finally, students will learn how alterations in molecules, e.g. by mutation, may lead to diseases, such as cancer and neurodegenerative diseases. At the end of this lecture students will have acquired a thorough understanding of the general principles underlying cellular processes.		
Course Name From Cells to Tissues and Body Functions		
Course No CH01-520122		
ECTS 5		
Module Affiliation CH01-CellBio Cell Biology CO44-CelluBio Cellular Biology	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CORE
Course Description / Content / Aims This lecture course will focus on explaining life from molecules through cells to tissues and organisms. The diversity of eukaryotic cell types and the complexity of cellular differentiation programs will be introduced at the molecular, structural, and functional levels. Students will learn about stem cells and how various cell types are integrated into tissues thereby building the organs of the body that enable physiologic functionality. We will discuss junctional complexes between cells in tissues and will understand how cells communicate with their environment by signal transduction processes. Based on the complex differentiation programs, developmental and morphogenetic processes generate body plans that are both, typical and characteristic for each organisms. At the end of the lecture students will have acquired a thorough understanding on how the cells and tissues found in round worms, fish, flies, rodents and humans are strikingly similar although different species are coping with the diverse environments they live in. The course will emphasize the principles of cellular and developmental biology, thereby highlighting physiology and also covering pathophysiology leading to disorders and disease.		
Methods of Assessment		
Name		Weighting
4 Quizz(es)		20%
Final Exam		30%
Poster Preparation and Presentation		50%

Appendix 2 - Course Data

Course Name Histologie Labor	Course No CO44-540201	ECTS 5
Module Affiliation CO44-CelluBio Cellular Biology	Workload (hrs / sem) Contact Time: 51,00 Private Study: 74,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims This is the first lab course within the MedNat study program to be held in the German language. The focus is on biological tissues, with an emphasis on human tissues in healthy and pathological conditions. Topics will include preparation of histological specimen for investigation under a light or electron microscope. Tissue sections are prepared, fixed, processed, sectioned and stained. In-lab seminars will discuss the theory behind the experiments and the expected outcomes. Trouble-shooting sessions will solve problems on the spot. The students will document and discuss their experimental data in publication-style reports. Theoretical preparation will be tested for by quizzes and the preparation of material safety data sheets (MSDS).		
Course Name Microbes and Infection		
Course No CO02-520233		
ECTS 5		
Module Affiliation CO02-Inflmm Infection and Immunity CO45-FoundMedII Foundations in Medicine II CAS-CT-BCCB Specialization Area BCCB	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims There is no higher life form without microbes. But there are plenty of microbes without higher life forms. Microorganisms are present wherever life is possible – and their cell numbers outcompete the cell numbers of higher life forms by several orders of magnitude. This survey course introduces the principles of the world of microorganisms, their diversity, and how microbes act in the environment and on human health. Bacteria, archaea, fungi, protists, and viruses are covered with specific examples of high relevance in human health, environmental processes, or food manufacturing and preservation. The diverse biochemical life styles of microbes will be introduced, from photosynthesis via methanogenesis to pathogenicity. The course furthermore deals with the different ways on how to investigate and control microbial contaminations and pathogens, and how microbes impact our everyday life, political processes, history, and social behavior.		
Methods of Assessment		
Name		Weighting
2 Quizz(es)		10%
Active Participation		20%
Exam 1		30%
Exam 2		40%

Appendix 2 - Course Data

Course Name Immunology	Course No CO02-520322	ECTS 5
Module Affiliation CO02-InflImm Infection and Immunity CO45-FoundMedII Foundations in Medicine II CAS-CT-BCCB Specialization Area BCCB	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims This CORE course gives a thorough basic training in molecular, cellular, organismic, and clinical immunology, leading - in some aspects - up to the cutting edge of current research. We will use annotated slide files, textbooks, review articles, original literature, and presentations of original research data. Transferable skills: ?Through in-class discussions, peer instruction, and frequent quizzes, students learn to understand original research and its motivation and to discuss scientific contents.		
Course Name Immunologie	Course No CO45-540202	ECTS 2,5
Module Affiliation CO45-FoundMedII Foundations in Medicine II	Workload (hrs / sem) Contact Time: 17,50 Private Study: 45,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims This tutorial accompanies the Lecture Immunology and is held in the German language. It will introduce the terminology of immunology in the German language. Students will study experimental data from the relevant recent literature and analyze them critically. Each student will present a Poster about at least one publication. Next to these studies, experimental approaches in Immunology will be discussed.		

Appendix 2 - Course Data



Course Name Mikrobiologie Labor	Course No CO45-540211	ECTS 2,5
Module Affiliation CO45-FoundMedII Foundations in Medicine II	Workload (hrs / sem) Contact Time: 25,50 Private Study: 37,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims This lab course accompanies the lecture “Microbes and Infection” and will be held in the German language. In this lab course, students will learn how to sample, isolate, handle, characterize, and taxonomically identify unknown microorganisms using diverse classical and state-of-the-art technologies. Focus will be given to bacterial organisms, their cellular characteristics, biochemical properties and capabilities, and their resistance or susceptibility towards different types of antibiotics. The course participants will learn how to biochemically characterize an unknown bacterium, how to determine its antibiotics spectrum, and how to measure the minimal inhibiting concentration of an antibiotics. Growth curve experiments will be conducted. Ultimately, the students are applying molecular techniques to amplify and visualize the taxonomic marker gene encoding for the 16S rRNA of the unknown microbe, for which the nucleotide sequence will be determined and compared with that of known bacterial organisms in order to identify the unknown isolate. Students are going to summarize their results in a manuscript-style lab report.		