EBERHARD KARLS UNIVERSITÄT TÜBINGEN



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FACULTY OF MEDICINE Department of MOLECULAR MEDICINE Study Dean for Molecular Medicine: Prof. Dr. Dr. G. Tabatabai



Program Molecular Medicine – Master of Science

MODULE HANDBOOK

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Program Molecular Medicine – Master of Science

1. Objectives of the Program

Our program aims to recruit high-quality students who are committed to a career in science. The innovative Master's program in Molecular Medicine is characterized by an interdisciplinary and a practical orientation and will allow students to acquire a higher level knowledge in selected disciplines aligned to the research strengths of the Faculty and to gain additional practical laboratory experience to prepare them for a research-based career. A particular strength of the Faculty of Medicine at the University of Tübingen is research in the focus areas of neurosciences, immunology, oncology, and infection biology.

The Master's program in Molecular Medicine is a consecutive, research-oriented program, which leads to a Master of Science (M. Sc.) degree. The program is offered by the Faculty of Medicine and the Graduate Training Centre of Neuroscience. Courses in academic, computational and soft skills are provided by the Competence Centre for University Teaching in Medicine, the Career Service and the "Zentrum für Datenverarbeitung."

The Master's program lasts one academic year and includes a total of 60 ECTS. It has been designed to provide a broad base of knowledge and the opportunity to specialize in the subjects that particularly interest you. The one-year curriculum is divided into two main parts, the first concentrating on deepening knowledge and advanced laboratory research training, the second on an individual research project (= Master's thesis).

In the first semester, students can choose from a catalog of modules in two selected areas of specialization allowing the student to tailor the program to their individual interests. A total of five modules (33 ECTS) must be taken. The Master's Thesis Research Project (27 ECTS) in the second semester forms a major component of the program and entails six months of full-time practical work in the laboratory on an autonomous research project. This module gives students experience in independently solving a scientific problem within the field of modern biomedical research and writing a scientific publication.

Learning outcomes

The program provides opportunities for students to develop and demonstrate knowledge, qualities, skills, and other attributes in the following areas:

Subject and Interdisciplinary skills

- Graduates have profound knowledge and understanding of the biomedical sciences in general and in-depth expertise in specialized fields, enabling them to participate in top class research.
- Graduates have professional skills and interdisciplinary competencies including organizational skills and the ability to communicate and work effectively in a team. As part of that, graduates also gain knowledge in computational skills and literature search.
- Graduates are capable of using critical and analytical skills to analyze problems, to propose solutions and to critically assess alternatives.

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Practical skills in research

- Graduates have well-developed practical skills and techniques in the biomedical sciences and have an awareness of good scientific practice in laboratory work.
- Graduates can design and conduct experiments independently to answer scientific questions in pursuit of their own research project. They possess the ability to assess the significance of outcomes of their experiments.
- Graduates can perform quantitative and qualitative analyses of obtained data and can present their work in written and oral form.

Personal development and future career

- Graduates have an understanding of ethical reasoning and the ethical issues associated with current biomedical research.
- Graduates earn the practical and technical skills relevant to the commencement of a dissertation.
- Graduates have the qualities needed for employment requiring a sound judgment, personal responsibility and initiative in complex professional environments.
- Graduates are capable of working in a wide variety of careers, including careers in biomedical and related sciences in research and development in academics and industry, careers in education, and careers in administration with and without a clinical background.

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2. Curriculum

2.1 Overview by Modules

(according to the module overview in the study regulations)

Module Code	Obligatory /Elective	Module Title	Recommended Semester	СР					
Compulso	Compulsory Lectures (2 have to be chosen – depending on the selected focus areas)								
1	Obligatory	1	Σ6						
1.1	Elective	1	3						
1.2	Elective	Advanced Neurosciences	1	3					
1.3	Elective	Advanced Oncology	1	3					
1.4	Elective	Advanced Infection Biology	1	3					
Compulso focus area	ry Laboratory is. Both lab ro	rotations (2 Laboratory rotations have to be chosen stations can be done in the same focus area.)	- depending on th	าย					
2	Obligatory	Laboratory Rotation A	1	Σ 12					
2.1	Elective	Laboratory Rotation Immunology A	1	12					
2.2	Elective	Laboratory Rotation Neurosciences A	1	12					
2.3	Elective	Laboratory Rotation Oncology A	1	12					
2.4	Elective	Laboratory Rotation Infection Biology A	1	12					
3	Obligatory	Laboratory Rotation B	1	Σ 12					
3.1	Elective	Laboratory Rotation Immunology B	1	12					
3.2	Elective	Laboratory Rotation Neurosciences B	1	12					
3.3	Elective	Laboratory Rotation Oncology B	1	12					
3.4	Elective	Laboratory Rotation Infection Biology B	1	12					
Compulso	ry Seminar								
4	Obligatory	Seminar Meet the Expert	1+2	3					
Compulso	ry Master The	esis							
5	Obligatory	Master Thesis	2	27					

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Study Aroa	Codo	Modulo Titlo	Obligatory	Sem	Σ	
Study Area	Code	Module The	(O/E)	1	2	СР
	1.1	Advanced Immunology	E	1		3
Study Area Immunology	2.1	Laboratory Rotation Immunology A	E	1		12
	3.1	Laboratory Rotation Immunology B	E	1		12
	1.2	Advanced Neurosciences	E	1		3
Study Area Neurosciences	2.2	Laboratory Rotation Neurosciences A	E	1		12
	3.2	Laboratory Rotation Neurosciences B	E	1		12
	1.3	Advanced Oncology	E	1		3
Study Area Oncology	2.3	Laboratory Rotation Oncology A	E	1		12
	3.3	Laboratory Rotation Oncology B	E	1		12
•	1.4	Advanced Infection Biology	E	1		3
Study Area Infection	2.4	Laboratory Rotation Infection Biology A	E	1		12
ылоду	3.4	Laboratory Rotation Infection Biology B	E	1		12
Study Area Molecular Medicine	4	Seminar Meet the Expert	0	1	2	3
Study Area Molecular Medicine	5	Master Thesis	0		2	27
						60

2.2 Overview by Study Progress

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	Кеу
Grading:	g = graded; ug = ungraded (pass/fail) ne = no module examination
Type of Exam:	W = written exam; O = oral exam; T = term paper; P = classroom presentation; WR = written report; PP = practical performance
Duration:	duration of the examination in minutes
Weight:	courses: weighting of the examination grade towards the module grade modules: weighting of the module grade towards the final grade
Contact Hours:	CH; hours spent in the classroom per week during the semester
Status:	o = obligatory; e = elective
Type of Course	L = lecture; S = seminar; E = exercise; T = tutorial, P = Practical laboratory course
CP:	Credit Points (ECTS Credits)

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3. Module Descriptions

3.1. Modules

Module Code: 1.1	Module Title: Advanced Immunology	Type of Module: elective					
CP (ECTS Credits)	3						
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:90 h30 h / 2 CH60 h						
Duration	1 semester						
Frequency	The lecture is offered once	per year in the winter seme	ster				
Language of Instruction	English						
Forms of Teaching and Learning	Lecture						
Content	The specialist field of imm involved in the regulation of and animals. The immunor disease-induced malfunction immunology. The lectures in the series of of the immune system. The made in cellular and me evolution of immune immunobiology, antigen pro- regulatory mechanisms in and pathogens and pathon <u>Thematic focus:</u> Introduction and evolution Therapeutic antibodies Computational immunology T-cell populations Cell-cell-communication are Immunodeficiency – strates Function of neutrophil grant MHC and antigen processis Immunopathology Pattern-recognition receptor	nunology imparts knowledge of cellular and immunologica logical processes are thus ex- ons, for example in the case "Advanced Immunology" cover his includes an examination olecular immunology. The systems, therapeutic a ocessing, cellular communic immunity, the interaction in mechanisms. of immune systems of immune systems of immune systems function in immune gies/mechanisms of pathoge funcytes ing	e of the complex processes al processes in both human xamined in association with of immune defects or tumor er the detailed mechanisms n of the recent discoveries major topics include the antibodies, computational ation, negative and positive between immune systems, une systems ans				

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Objectives	The course provides important and up-to-date knowledge of cellular and molecular immunology. After completion of this module, students will be able to understand the state-of- the-art strategies, modern methodologies, and open questions in selected fields of immunology After completion of this module, students will have acquired a specialized knowledge and understanding of innate and adaptive immunology.								
Requirements for Obtaining Credit, Grading, Weight if appl.		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
	Module Component	L	е	2	3	W	90	g	100
Aplicability / Transfer	M.Sc. in Molecular Medicir	ne							
Prerequisites	B.Sc. degree								
Module Leader	Stevanović, Stefan, Prof., I	Dr. rer.	nat.						
Literature/	Janeway's Immunobiology York, 2008, 2012	/ (Murp	ohy, Tra	avers,	Walpoi	t), Gai	rland S	icience,	New
teaching materials	Further teaching materials Immunology.	will be	availab	ble on t	he web	page o	of the E	Departm	ent of

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Module Code: 1.2	Module Title: Advanced NeurosciencesType of Module: elective								
CP (ECTS Credits)	3								
Workload - Time in Class - Self-Study	Total Workload: 90 h	Time 30 h j	in Clas ⁄ 2 CH	s:		Self-S 60 h	Study:		
Duration	1 semester								
Frequency	The lecture is offered once	per ye	ar in the	e winte	r term				
Language of Instruction	English								
Forms of Teaching and Learning	Lecture								
Content	Aging is the most important risk factor for neurodegenerative diseases, and thus an understanding of the age-related neural changes is of fundamental importance. Cerebral proteopathy is a unifying term for neurodegenerative diseases in which proteins misfold and polymerize into aggregates that are resistant to clearance. Whether these protein aggregations are causative for the disease or are epiphenomena will be discussed for each disorder. This course emphasis on the molecular and cellular pathomechanisms of the most common dementias and other neurodegenerative disorders, especially Alzheimer's and Parkinson's disease. Other dementias covered in this lecture course are the heterogenous group of Frontotemporal Dementias and the Prion diseases including Creutzfeldt- Jakob disease. Additional movement disorders discussed in this lecture series include Huntington's disease and various ataxias. Finally, motor neuron disease such as Amyotrophic Lateral Sclerosis will be presented and the recent link to the								
Objectives	At the end of the course, the students will know the molecular and cellular pathogenesis of Alzheimer's disease and Parkinson's disease and related disorders. They will have an understanding of "tauopathies", "synucleinopathies", "amyloidosis", and "triplet repeat disorders". Furthermore, the students will understand the molecular and pathological commonalities among age-related neurodegenerative diseases as well as disease-specific lesions and dysfunctions. Based on the molecular and cellular pathomechanism for each disease the students will be able to identify potential therapeutic targets.								
Requirements for Obtaining Credit, Grading, Weight if appl.	Module Component	T Type of Course	o Status	HO 2	с о 3	Fype of Exam	6 Length of Exam	a Type of Evaluation	00 Calculation of Module Grade
Aplicability / Transfer	M.Sc. in Molecular Medicin	ne	1						

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Prerequisites	B.Sc. degree Good knowledge in cell & molecular biology and genetics.
Module Leader	Gasser, Thomas, Prof., Dr. med. Jucker, Mathias, o. Prof., Dr. sc. nat.
Literature/ teaching materials	 (1) Beal, Lang, Ludolph: Neurodegenerative Diseases - Neurobiology, Pathogenesis, and Therapeutics. University Press, Cambridge, 2005. (2) Hof, Mobbs: Functional Neurobiology of Aging, Academic Press; 1st edition (2001). For selected topics, see also: http://www.emedicine.com/. Further teaching materials will be available on the electronic platform ILIAS.

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Module Code: 1.3	Module Title: Advanced OncologyType of Module: elective							
CP (ECTS Credits)	3							
Workload - Time in Class - Self-Study	Total Workload: 90 h	Total Workload:Time in Class:Self-Study:90 h30 h / 2 CH60 h						
Duration	1 semester							
Frequency	The lecture is offered once	per year in the winter term						
Language of Instruction	English							
Forms of Teaching and Learning	Lecture							
Content	The lecture on Advanced C the molecular basis of tume pathology and diagnostics Based on the topics to be a state-of-the-art of molecula • Molecular mechanisms - genetic aspe - epigenetic as - toxicological - viral aspects - radiogenic as • Molecular pathology ar - identification - identification • Molecular strategies in - chemotherap - radiotherapy - viral therapy In addition to the theoretica research projects and key the students a better insigh specialization.	The lecture on Advanced Oncology is intended to provide further knowledge on the molecular basis of tumor development and the molecular approaches to pathology and diagnostics as well as into molecular strategies in cancer therapy. Based on the topics to be addressed the students will acquire deep insights into state-of-the-art of molecular and translational oncology with respect to • Molecular mechanisms of cancer development - genetic aspects - epigenetic aspects - toxicological/environmental aspects - toxicological/environmental aspects - viral aspects - radiogenic aspects • Molecular pathology and diagnostics - identification of biomarkers - identification of tumor cells by molecular and functional imaging • Molecular strategies in cancer therapies - chemotherapy - radiotherapy - viral therapy In addition to the theoretical backgrounds provided during the lecture current research projects and key experiments are supposed to be presented. This gives						
Objectives	After completion of this knowledge and underst transformation and cancel cancer diagnostics and the	module, students will hav anding of the basic m r development as well as o rapy.	re acquired a specialized echanisms of neoplastic f molecular approaches to					

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Requirements for Obtaining Credit, Grading, Weight if appl.		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
	Module Component	L	е	2	3	W	90	g	100
Aplicability / Transfer	M.Sc. in Molecular Medicine								
Prerequisites	B.Sc. degree								
Module Leader	Skokowa, Julia, Prof., Dr. med., Ph.D.								
Literature/ teaching materials	Teaching materials will be The Biology of Cancer (Ro	availab bert We	le on th einberg	e electi)	ronic pl	atform	ILIAS.		

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Module Code: 1.4	Module Title: Advanced Infection Biology					Type electi	e of Mo ive	dule:	
CP (ECTS Credits)	3								
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:90 h30 h / 2 CH60 h								
Duration	1 semester								
Frequency	The lecture is offered once	per ye	ar in the	e winter	r term				
Language of Instruction	English								
Forms of Teaching and Learning	Lecture								
Content	The lecture on Advanced Infection Biology is intended to provide further knowledge on the molecular basis of - Viral control of translation - trafficking of viral components - reverse transcription and integration - evolution and emergence of viruses - Bacteria-phagocyte interaction - In vivo infection models - DNA sequencing techniques, protein expression systems - Flow cytometry - Malaria vaccines - Drug resistance of Plasmodium falciparum - Reverse genetics in Plasmodium falciparum - Helminths and allergies In addition to the theoretical backgrounds provided during the lecture current research projects and key experiments are supposed to be presented. This gives the students a better insight into the research area of the chosen field of								
Objectives	After completion of this module, students will have acquired a specialized knowledge and understanding of current topics in virology, microbiology, and parasitology. In addition to the theoretical backgrounds provided during the lecture, students will have acquired understanding of state-of-the-art strategies, modern methodologies, and open questions in selected fields of infection biology.								
Requirements for Obtaining Credit, Grading, Weight if		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
appl.	Module Component	L	е	2	3	W	90	g	100

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Aplicability / Transfer	M.Sc. in Molecular Medicine
Prerequisites	B.Sc. degree Good knowledge in cell & molecular biology and genetics.
Module Leader	Schindler, Michael, Prof., Dr. rer. nat.
Literature/ teaching materials	Teaching materials will be available on the electronic platform ILIAS.

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Module Code: 2.1	Module Title: Module Laboratory Rotation Immunology A				Type elect	e of Mo ive	odule:		
CP (ECTS Credits)	12								
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:360 h270 h / 19 CH90 h								
Duration	8 weeks (6 weeks practica	l and 2	weeks	self-stu	dy)				
Frequency	The practical course is offe	ered thre	oughou	t the ye	ear				
Language of Instruction	English								
Forms of Teaching and Learning	Practical laboratory course	(19 CF	1)						
Content	Students are required to per which they concentrate on immunology research group research in the respective doctoral student or, ideally, Projects in the laboratory regulations and style men presentation of the project. Each student has to prep laboratory rotation research Molecular Medicine.	Students are required to perform a 6-week practical laboratory course (full-time) in which they concentrate on a research project in the laboratory of their choice (in immunology research groups). The project is assigned in accordance with ongoing research in the respective laboratory; it is supervised either by an advanced doctoral student or, ideally, by a postdoctoral researcher. Projects in the laboratory are concluded by a written report (according to the regulations and style mentioned on the grading sheet, attached) and by an oral presentation of the project. Each student has to prepare and give an oral presentation of one of the two laboratory rotation research projects presented in the interdisciplinary seminar							
Objectives	In the 6-week research pe state-of-the-art methods. become acquainted with trained in the analysis and basic training necessary fo	riod, sta They a various d comp r writing	udents are face s resea bilation g scient	acquire ed with arch ap of data tific rep	e a wide curren oproach for sc orts.	e range nt sciel nes. In ientific	of prac ntific qu additio reports	ctical si uestion on, the and re	kills in s and y are eceive
Requirements for Obtaining Credit, Grading, Weight if appl.	Module Component	A Type of Course	6 Status	년 19	e 3 12	PP PWR	Length of Exam	a a Type of Evaluation	001 Calculation of Module Grade
	More information on calcul sheet attached.	lation o	of the m	odule (grade c	an be i	found ii	n the gi	rading

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Applicability / Transfer	M.Sc. in Molecular Medicine					
Prerequisites	B.Sc. degree					
Module Leader	Stevanović, Stefan, Prof., Dr. rer. nat.					
	These will be provided by the supervisor before the practical laboratory course begins.					
Literature / teaching materials	Janeway's Immunobiology, (Murphy, Travers, Walport), Garland Science, New York, 2008, 2012					
	Teaching materials are also available on the electronic platform ILIAS.					

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Module Code: 2.2	Module Title: Laboratory Rotation Net	uroscie	ences A	Ą		Type elect	e of Mo ive	odule:	
CP (ECTS Credits)	12								
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:360 h270 h / 19 CH90 h								
Duration	8 weeks (6 weeks practica	l and 2	weeks	self-stu	ıdy)				
Frequency	The practical course is offe	ered thr	oughou	t the ye	ear				
Language of Instruction	English								
Forms of Teaching and Learning	Practical laboratory course	(19 CH	1)						
Content	Students are required to p they work on small research Research groups and varie In general, the assigned respective laboratory and ideally, a postdoc. The lab projects will be regulations and style men presentation of the project. Each student has to prep laboratory rotation research Molecular Medicine.	Students are required to perform a 6-week long, all day laboratory rotation where they work on small research projects in laboratories of their choice (Neuroscience Research groups and various teachers of the Centre for Neurosensory Systems). In general, the assigned study is in line with currently ongoing research in the respective laboratory and supervised at least by an advanced doctoral student or, ideally, a postdoc. The lab projects will be concluded with a written report (according to the regulations and style mentioned on the grading sheet, attached) and by an oral presentation of the project. Each student has to prepare and give an oral presentation of one of the two laboratory rotation research projects presented in the interdisciplinary seminar							
Objectives	During these 6 weeks, st state-of-the-art methods. research approaches; the scientific report, and they h	udents They ey are nave lea	will ac get to trained arned th	quire a know in ana ne basio	a wide curren alyzing cs of ho	range t scien and co w to wr	of prac ntific qu ompilin ite a re	etical sl Jestions g data port.	kills in s and for a
Requirements for Obtaining Credit, Grading, Weight if appl.	Module Component	Jype of Course	6 Status	ਤ 19	в. 12	PP WR	Length of Exam	a a Type of Evaluation	Calculation of Module Grade
	More information on calcu sheet attached.	lation o	of the m	nodule g	grade d	an be i	found ii	n the g	rading

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Applicability / Transfer	M.Sc. in Molecular Medicine
Prerequisites	B.Sc. degree
Module Leader	Gasser, Thomas, Prof., Dr. med.
Literature / teaching materials	Will be provided by the supervisor before the start of the rotation. Teaching materials will be available on the electronic platform ILIAS.

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Module Code: 2.3	Module Title: Laboratory Rotation Oncology A				Type elect	e of Mo ive	odule:		
CP (ECTS Credits)	12								
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:360 h270 h / 19 CH90 h								
Duration	8 weeks (6 weeks practica	l and 2	weeks	self-stu	ıdy)				
Frequency	The practical course is offe	ered thr	oughou	t the ye	ear				
Language of Instruction	English								
Forms of Teaching and Learning	Practical laboratory course	(19 CH	1)						
Content	Students perform a 6-wee small research projects groups). In general, the as the respective laboratory a or postdoc. Projects in the laboratory regulations and style men presentation of the project. Each student has to prep laboratory rotation researd Molecular Medicine.	Students perform a 6-week long, all day laboratory rotation where they work on small research projects in laboratories of their choice (Oncology Research groups). In general, the assigned study is in line with currently ongoing research in the respective laboratory and supervised at least by an advanced doctoral student or postdoc. Projects in the laboratory are concluded by a written report (according to the regulations and style mentioned on the grading sheet, attached) and by an oral presentation of the project. Each student has to prepare and give an oral presentation of one of the two laboratory rotation research projects presented in the interdisciplinary seminar							
Objectives	During these 6 weeks, st state-of-the-art methods. research approaches; the scientific report, and they h The course is intended to molecular oncology.	udents They ey are nave lea provide	will ac get to trained arned th e import	equire a know in ana ne basid tant and	a wide curren alyzing cs of ho d recen	range t scier and co w to wr t knowl	of prac atific qu ompiling ite a re ledge o	tical sh uestions g data port. f cellula	kills in s and for a ar and
Requirements for Obtaining Credit, Grading, Weight if appl.	Module Component	Type of Course	0 Status	ਲ 19	е О	A Type of Exam	Length of Exam	a a Type of Evaluation	Calculation of Module Grade
	More information on calcu sheet attached.	lation c	of the m	nodule g	grade d	an be i	found ii	n the g	rading

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Applicability / Transfer	M.Sc. in Molecular Medicine
Prerequisites	B.Sc. degree
Module Leader	Skokowa, Julia, Prof., Dr. med., Ph.D.
Literature / teaching materials	Will be provided by the supervisor before the start of the rotation. Teaching materials will be available on the electronic platform ILIAS.

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Module Code: 2.4	Module Title: Laboratory Rotation Infe	Type of Module: elective					
CP (ECTS Credits)	12						
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:360 h270 h / 19 CH90 h						
Duration	8 weeks (6 weeks practical	and 2 weeks self-study)					
Frequency	The practical course is offe	red throughout the year					
Language of Instruction	English						
Forms of Teaching and Learning	Practical laboratory course	(19 CH)					
Content	Students are required to per they work on small researc assigned study is in line wi laboratory and supervised postdoc. Projects in the laboratory regulations and style men presentation of the project. Each student has to prep laboratory rotation researc Molecular Medicine.	erform a 6-week long, all day h projects in laboratories of t th currently ongoing research at least by an advanced doct are concluded by a writte tioned on the grading sheet pare and give an oral prese ch projects presented in th	laboratory rotation where heir choice. In general, the n in the respective toral student or, ideally, a n report (according to the t, attached) and by an oral entation of one of the two e interdisciplinary seminar				
Objectives	In the 6-week research period, students acquire a wide range of practical skills in state-of-the-art methods. They are faced with current scientific questions and become acquainted with various research approaches. In addition, they are trained in the analysis and compilation of data for scientific reports and receive basic training necessary for writing scientific reports. The course is intended to provide important and recent knowledge of cellular and molecular microbiology, virology, or parasitology. The students should be able to understand and present research questions, hypotheses, experimental approaches and methods, results from their experiments and the data evaluation and interpretation.						

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Requirements for		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
Grading, Weight if						PP		g	
appl.	Module Component	Р	е	19	12	Р		g	100
						WR		g	
	Projects in the laboratory regulations and style men presentation of the project.	are co tioned	onclude on the	ed by a grading	writte g sheet	n repoi , attach	rt (acco ned) an	ording and by a	to the n oral
Applicability / Transfer	M.Sc. in Molecular Medicin	e							
Prerequisites	B.Sc. degree								
Module Leader	Schindler, Michael, Prof., L	Dr. rer. I	nat.						
Literature / teaching materials	Will be provided by the sup Teaching materials will be	ervisor availab	before le on th	the sta e electi	rt of the ronic pl	e rotatio atform	on. ILIAS.		

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Module Code: 3.1	Module Title: Module Laboratory Rotation Immunology B				Type elect	e of Mo ive	odule:		
CP (ECTS Credits)	12	12							
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:360 h270 h / 19 CH90 h								
Duration	8 weeks (6 weeks practica	l and 2	weeks	self-stı	ıdy)				
Frequency	The practical course is offe	ered thr	oughou	t the ye	ear				
Language of Instruction	English								
Forms of Teaching and Learning	Practical laboratory course	(19 CH	H)						
Content	Students are required to per which they concentrate or immunology research group research in the respective doctoral student or, ideally Projects in the laboratory regulations and style ment presentation of the project.	Students are required to perform a 6-week practical laboratory course (full-time) in which they concentrate on a research project in the laboratory of their choice (in immunology research groups). The project is assigned in accordance with ongoing research in the respective laboratory; it is supervised either by an advanced doctoral student or, ideally, by a postdoctoral researcher. Projects in the laboratory are concluded by a written report (according to the regulations and style mentioned on the grading sheet, attached) and by an oral							
Objectives	In the 6-week research pe state-of-the-art methods. become acquainted with trained in the analysis an basic training necessary fo	riod, st They a variou d comp r writing	udents are face s resea bilation g scient	acquire ed with arch a _l of data tific rep	e a wide curre oproact for sc orts.	e range nt sciei hes. In ientific	of pra ntific q additio reports	ctical si uestion on, the and re	kills in s and y are eceive
Requirements for Obtaining Credit,		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
Grading, Weight if						PP		g	
	Module Component	Р	е	19	12	Р		g	100
	More information on calcu sheet attached.	lation c	of the m	nodule g	grade o	WR an be i	found ii	g n the gi	rading
Applicability / Transfer	M.Sc. in Molecular Medicir	ie							

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Prerequisites	B.Sc. degree
Module Leader	Stevanović, Stefan, Prof., Dr. rer. nat.
l iterations /	These will be provided by the supervisor before the practical laboratory course begins.
Literature / teaching materials	Janeway's Immunobiology, (Murphy, Travers, Walport), Garland Science, New York, 2008, 2012
	Teaching materials are also available on the electronic platform ILIAS.

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Module Code: 3.2	Module Title: Laboratory Rotation Neurosciences B				Type elect	e of Mo ive	odule:		
CP (ECTS Credits)	12								
Workload - Time in Class - Self-Study	Total Workload:Time in Class:Self-Study:360 h270 h / 19 CH90 h								
Duration	8 weeks (6 weeks practica	l and 2	weeks	self-stu	idy)				
Frequency	The practical course is offe	ered thr	oughou	t the ye	ear				
Language of Instruction	English								
Forms of Teaching and Learning	Practical laboratory course	(19 CH	1)						
Content	Students are required to p they work on small researc Research groups and varie In general, the assigned respective laboratory and ideally, a postdoc. Projects in the laboratory regulations and style men presentation of the project.	Students are required to perform a 6-week long, all day laboratory rotation where they work on small research projects in laboratories of their choice (Neuroscience Research groups and various teachers of the Centre for Neurosensory Systems). In general, the assigned study is in line with currently ongoing research in the respective laboratory and supervised at least by an advanced doctoral student or, ideally, a postdoc. Projects in the laboratory are concluded by a written report (according to the regulations and style mentioned on the grading sheet, attached) and by an oral							
Objectives	During these 6 weeks, st state-of-the-art methods. research approaches; the scientific report, and they h	udents They ey are nave lea	will ac get to trained arned th	quire a know in ana ne basio	a wide curren alyzing cs of ho	range t scien and co w to wr	of prac ntific qu ompilin ite a re	etical sk Jestions g data port.	kills in s and for a
Requirements for Obtaining Credit, Creding, Weight if		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
appl.	Madula Orana ang sa			10	10	PP		g	100
	Module Component	P	e	19	12	P WR		g a	
	More information on calcu sheet attached.	lation c	of the m	l Iodule (grade d	an be i	found ii	n the g	rading
Applicability / Transfer	M.Sc. in Molecular Medicir	ne							

Program Molecular Medicine – Master of Science

Prerequisites	B.Sc. degree
Module Leader	Gasser, Thomas, Prof., Dr. med.
Literature / teaching materials	Will be provided by the supervisor before the start of the rotation. Teaching materials will be available on the electronic platform ILIAS.

Program Molecular Medicine – Master of Science

Module Code: 3.3	Module Title: Laboratory Rotation Mol	lecular	Oncol	ogy B		Type elect	e of Mo ive	odule:	
CP (ECTS Credits)	12								
Workload - Time in Class - Self-Study	Total Workload: 360 h	Time 270 ł	in Clas n / 19 C	s: H		Self-S 90 h	Study:		
Duration	8 weeks (6 weeks practica	l and 2	weeks	self-stu	ıdy)				
Frequency	The practical course is offe	ered thr	oughou	it the ye	ear				
Language of Instruction	English								
Forms of Teaching and Learning	Practical laboratory course	(19 CF	- 1)						
Content	Students perform a 6-wee small research projects groups). In general, the as the respective laboratory a or postdoc. Projects in the laboratory regulations and style men presentation of the project.	ek long, in labo signed ind sup are co tioned	all day oratorie study is ervised onclude on the	y labora s of ti s in line l at leas ed by a grading	atory ro heir ch with cu st by ar a writte g shee	otation noice ((urrently n advan n repo t, attacl	where Oncolog ongoin ced doo rt (acco hed) ar	they wo gy Res g resea ctoral s ording a nd by a	ork on search arch in tudent to the n oral
Objectives	During these 6 weeks, st state-of-the-art methods. research approaches; the scientific report, and they h The course is intended to molecular oncology.	udents They ey are have lea provide	will ac get to trained arned th e impor	cquire a know in and ne basid tant and	a wide curren alyzing cs of ho d recen	range at scier and co w to wr t knowl	of prac atific qu ompilin ite a re ledge o	tical sl uestions g data port. f cellula	kills in s and for a ar and
Requirements for Obtaining Credit,		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
Grading, Weight if appl.						PP		g	
	Module Component	P	e	19	12	P WP		g g	100
	More information on calcu sheet attached.	lation c	of the m	l nodule ;	grade d	an be	found i	ן ש n the gi	rading
Applicability / Transfer	M.Sc. in Molecular Medicir	e							

Program Molecular Medicine – Master of Science

Prerequisites	B.Sc. degree
Module Leader	Skokowa, Julia, Prof., Dr. med., Ph.D.
Literature / teaching materials	Will be provided by the supervisor before the start of the rotation. Teaching materials will be available on the electronic platform ILIAS.

Program Molecular Medicine – Master of Science

Module Code: 3.4	Module Title: Laboratory Rotation Infe	ection E	Biology	B		Type elect	e of Mo ive	odule:	
CP (ECTS Credits)	12								
Workload - Time in Class - Self-Study	Total Workload: 360 h	Time 270 h	in Clas 1 / 19 C	s: H		Self-S 90 h	Study:		
Duration	8 weeks (6 weeks practica	l and 2	weeks	self-stu	dy)				
Frequency	The practical course is offe	ered thr	oughou	t the ye	ear				
Language of Instruction	English								
Forms of Teaching and Learning	Practical laboratory course	e (19 CH	1)						
Content	Students are required to per they work on small researce assigned study is in line wi laboratory and supervised postdoc. Projects in the laboratory regulations and style men	erform a ch proje ith curre at least r are co tioned	a 6-wee cts in la ently on by an by an onclude on the	ek long, aborato going r advanc ed by a grading	all day ries of t esearch ed doct a writte g sheet	labora heir ch h in the toral stu n repo t, attaci	tory rota oice. In respec ident of rt (acco hed) an	ation wi genera tive r, ideall <u></u> ording nd by a	here al, the y, a to the n oral
Objectives	In the 6-week research pe state-of-the-art methods. become acquainted with trained in the analysis and basic training necessary fo The course is intended to molecular microbiology, vin The students should be hypotheses, experimenta experiments and the data e	riod, st They a variou d comp or writing provide rology, d able to al app evaluati	udents are face s resea ilation g scient o g scient import or paras o undel roaches ion and	acquire ed with arch aj of data tific rep tant and sitology rstand s and interpr	a wide curren oproach for sc orts. d recen r. and pr meth etation.	e range nt scien nes. In ientific t known resent nods,	e of pra ntific qu additio reports ledge o researc results	ctical si uestion on, the and re f cellula f cellula from	kills in s and y are eceive ar and stions, their
Requirements for Obtaining Credit, Grading, Weight if		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
appl.	Module Component	P		10	12	PP P		g a	100
						, WR		g	
	More information on calcu sheet attached.	lation c	of the m	odule g	grade c	an be	found ii	n the g	rading

Program Molecular Medicine – Master of Science

Applicability / Transfer	M.Sc. in Molecular Medicine
Prerequisites	B.Sc. degree
Module Leader	Schindler, Michael, Prof., Dr. rer. nat.
Literature / teaching materials	Will be provided by the supervisor before the start of the rotation. Teaching materials will be available on the electronic platform ILIAS.

Program Molecular Medicine – Master of Science

Module Code: 4	Module Title: Seminar Meet the Exper	rt	Type of Module: obligatory
CP (ECTS Credits)	3		
Workload - Time in Class - Self-Study	Total Workload: 90 h	Time in Class: 45 h / 3 CH	Self-Study: 45 h
Duration	2 semesters		
Frequency	Seminars are offered are o	ffered all year round	
Language of Instruction	English		
Forms of Teaching and Learning	Seminar, Journal Club, Congress, Symposium	Colloquium, Problem-based	learning (PBL) seminar,
Content	Part A: The module comprises • weekly lectures a research centers • colloquia (expert • journal clubs and • participation in so Some formats require regi- on a regular basis. Atten- Meet the Expert Cell Biolog Other formats do not nee students might decide on a Students shall keep a rec attendance sheet. Part B: Interdisciplinary Se Each student has to prese talk followed by a discussion	that are organized in the fra and various institutes, meetings with guest speaker ientific congresses/symposia stration (e.g. journal clubs) a dance is monitored via the gy & Immunology). d registration (e.g. progres a weekly basis if they are in ord of their attendance and minar Molecular Medicine ent one of the two Laborator on with fellow students and su	amework of the focus area (s) a/etc. nd students need to attend coordinator (e.g. Seminar (erested in the topic or not. the different topics via an (y Rotations in a 10-minute upervisors.
Objectives	The students work indeper present the research area members of the seminar gr The seminar participants to research area that is the and discuss scientific subject Initial contacts with exter University are thus made po The students acquire scies insight into all specialist for fellow students.	ndently or in small groups an and the specific content of roup. hus accumulate background topic the publication and lea ects with experts. mal guest researchers and ossible. ntific presentation skills. Fu ields of the Master program	d know to read and then to the paper effectively to the information on the specific arn how to pose questions researchers of Tübingen rthermore, students get an n and the projects of their

MODULE HANDBOOK

Requirements for Obtaining Credit,		Type of Course	Status	СН	СР	Type of Exam	Length of Exam	Type of Evaluation	Calculation of Module Grade
Grading, Weight if	Module Component	S	о	3	3			ne	
аррі.	Preparation of the subject attendance of at least 1 Additionally, attendance to Attendance is monitored students monitor their sem written on the attendance s	matter 5 sem the Inte via ar inar da sheet).	prior to nar da erdiscip a atten tes the	the e tes, ac linary s dance mselves	xpert le ctive pa Seminal sheet s (title a	ecture/s articipa Molec (no sig and dat	eminar tion in ular Me gnature e of the	/journal discus dicine. neces semin	l club, sions. sary), ar are
Applicability / Transfer	M.Sc. in Molecular Medicin	e							
Prerequisite to attend the activities	B.Sc. degree								
	Stevanović, Stefan, Prof., I	Dr. rer.	nat.						
Module Leader	Gasser, Thomas, Prof., Dr.	med.							
	Sкокоwa, Julia, Prof., Dr. r Schindler, Michael, Prof., L	ned., P Dr. rer. i	n.D. nat.						
Literature / teaching materials	Teaching materials also av	ailable	on the	electroi	nic plati	form IL	IAS.		

Program Molecular Medicine – Master of Science

Program Molecular Medicine – Master of Science

Module Code: 5	Module Title: Master Thesis					Type oblig	e of Mo atory	odule:	
CP (ECTS Credits)	27								
Workload - Time in Class - Self-Study	Total Workload: 810 h	Time 540 h	in Clas / 39 C	s: H		Self-S 270 h	Study: 1		
Duration	6 months								
Frequency	Each semester								
Language of Instruction	English								
Forms of Teaching and Learning	Practical work								
Content	depending on the project								
Objectives	The student is able to -to study published data to -to understand the gene experimental design and sufficient and appropriate of -documentation, oral and v The Master thesis module 6 months. The practical of character of the project. If search and writing the Mass At the end of the master research project idea and the help of published data and written form.	get ins eral flo method controls vritten p contain vork sh One to ster thes thesis, design . They	ight a row fron lology t and pu presenta sould n two m sis. the stud and p should	esearch o the i ublished ation of practic ot exce onths f dents s erform be abl	n field idea o nterpre I data i experin al work eed 5 nas to has to the ap the to pro	f an o tation o nto acco e and w months be calo be able propria esent ti	experin of the r ount data riting p , deper culated to dev te expense heir res	nent via results rocess nding c for lite relop al eriment rearch i	a the taking within on the rature n own s with in oral
Requirements for Obtaining Credit, Grading, Weight if appl.	Module Component - optional oral presentation - written thesis => graded I Upon the successful com student obtains 27 CP (No	P Of resu of resu of two r obletion	o Stattrs of the ing of C	E 39 gradec s (exam module CP)	27 27 t) niner) exami	Type of Exam	Length of Exam "Maste	g Type of Evaluation	Calculation of Module Grade
Applicability / Transfer	M.Sc. in Molecular Medicir	ne ne							

Program Molecular Medicine – Master of Science

Prerequisite to attend the activities	B.Sc. degree Successful completion of modules counting for at least 18 CP
Module Leader	Iftner, Thomas, Prof., Dr. rer. nat./various researchers from Tübingen University
Literature / teaching materials	a) will be provided by the supervisor before the start of the Thesisb) literature research by the student

Program Molecular Medicine – Master of Science

Grading Sl	heet	Laborat	ory rot	ation/	eberhard UNIVER	^{karls} SITÄT	
Medicine	101.50		Culai		TÜBIN	GEN	R.S
medicine							
Student:		Mustermann	n, Thomas	<u> </u>	<u> </u>		
Title:		Clinical appl	ication of PCF	2			
Institute/Research	group:	Institute for	Mustermöbe	l, Musterhaus	en lab		
Time period:		1970/01/01 -	1970/02/15				
Supervisor:		Dr. Musterfr	au, Bettina				
Type of		Lab rotation	Oncology 1				
Please enter only	/ number	s 1.0, 1.3, 1.7,	2.0, 2.3, 2.7, 3 blank if not g	3.0, 3.3, 3.7, 4. graded.	0, 5.0 in Grade cc	olumn. Leav	ve cell
	Weighting (%)	The student.				Grad	е
Laboratory work							
Theoretical and practical skills	50	is able to un experiments documents a	derstand and s after a suita and analyzes i	independent ble amount of results approp	ily conduct f training; priately.	1,3	
Motivation							
Motivation	20	is reliable, p	unctual, and	able to work i	n a team.	1,0)
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				,	
Report							
Content and form	15	presents the the uniform data; uses pr orthography	e acquired dat and formal co roper citation and gramma	a concisely; p prrect present ; pays attention.	ays attention to ation of the on to accurate	3,3	,
Durantation							
Content, structure	15	presents the appropriate uses adequa	e acquired dat media; adher te language.	a well structures to the give	ured; uses en time frame;	1,3	
Result						1,5	

Program Molecular Medicine – Master of Science

Grading Sh	eet L	aborat	orv rota	ation/	EBERHARD) KARLS	68
intornchin			oular	,	UNIVER TURIN	IGEN	
internship	101.50	. WOIE	Luidi		TODIT		
Medicine							
<u></u>							
Student:		Mustermann	, Thomas				
Title:		Clinical appli	cation of PCR	R			
Institute/Research	group:	Institute for l	Mustermöbel	l, Musterhaus	en lab		
Time period:		1970/01/01 -	1970/02/15				
Supervisor:		Dr. Musterfra	au, Bettina				
Type of		Lab rotation	Oncology 1		(
Review:							
							-
							ا
Send si (sigrid.czarnotta)	igned for @med.ur	m to: Prüfung hi-tuebingen.	gsamt Moleku .de), Studieno	ulare Medizin dekanat Med.	, Frau Sigrid Czar Fakultät, Univer	motta	;en,
Send si (sigrid.czarnotta)	igned for @med.ur	m to: Prüfung ni-tuebingen.	gsamt Moleku .de), Studieno	ulare Medizin dekanat Med.	, Frau Sigrid Czar Fakultät, Univer	rnotta rsität Tübing	jen,
Send si (sigrid.czarnotta)	igned for @med.ur	m to: Prüfung ni-tuebingen.	gsamt Moleku .de), Studiend	ulare Medizin dekanat Med.	, Frau Sigrid Czar Fakultät, Univer	rnotta rsität Tübing	jen,
Send si (sigrid.czarnotta)	igned for @med.ur	m to: Prüfung ni-tuebingen.	gsamt Moleku .de), Studieno Signature Supe	ulare Medizin dekanat Med. ervisor	, Frau Sigrid Czar Fakultät, Univer	rnotta rsität Tübing	;en,