

Module description

for the degree programme

Master of Science

Integrated Immunology

(Version of examination regulation: 20222)

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1	Module name 47841	Basic Immunology	10 ECTS
2	Courses / lectures	No courses / lectures available for this module!	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Lars Nitschke Prof. Dr. Thomas Winkler
5	Contents	<p>Lecture:</p> <ul style="list-style-type: none"> • basic concepts in immunology • innate immunity • antigen recognition in lymphocytes • the development of lymphocytes • the humoral immune response • cellular immune responses <p>Tutorials: In small groups (e.g. 5 students) the students will solve problems in basic immunology by problem-based learning</p> <p>Seminars: The students will present topics of basic immunology in oral talks</p>
6	Learning objectives and skills	<p>Students are able to</p> <ul style="list-style-type: none"> • understand the principles of the immune system • understand the principles of antigen recognition • explain and distinguish different immune responses • independently solve basic immunological problems • understand and summarize specific topics in immunology and present them orally • independently develop working hypotheses and to adapt existing models and programs to test these hypotheses
7	Prerequisites	None
8	Integration in curriculum	semester: 1
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222
10	Method of examination	Written examination (90 minutes) Written examination 90 min Resit examinations: 2
11	Grading procedure	Written examination (100%) Grade of written exam
12	Module frequency	only in winter semester
13	Workload in clock hours	Contact hours: 165 h Independent study: 135 h
14	Module duration	1 semester
15	Teaching and examination language	english
16	Bibliography	Janeway's Immunobiology (9th Edition)

Cellular and Molecular Immunology, Ed. Abbas, Lichtman, Pillai,
Elsevier

Immunity, Ed. DeFranco, Locksley, Robertson, Oxford University Press

1	Module name 47851	Basic Integrated Laboratory Course	10 ECTS
2	Courses / lectures	No courses / lectures available for this module! mandatory attendance	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Anja Lux	
5	Contents	<p>Course:</p> <ul style="list-style-type: none"> • identification of the organs of the immune system in mice • isolation and purification of immune cells from laboratory mice • detailed characterization of immune cells by flow cytometry • in vitro stimulation of immune cells • quantification of humoral and cellular immune responses in vitro and in vivo • histological analysis of immune organs • DNA and RNA based techniques for quantifications of immune responses • genetic engineering of mice <p>Tutorials:</p> <p>In small groups (e.g. 5 students) the students will design experimental setups for the generation and the analysis of mice with defined mutations in genes of the immune system</p>	
6	Learning objectives and skills	<p>Students are able to</p> <ul style="list-style-type: none"> • isolate immune cells from laboratory animals • perform cellular characterizations of immune cells by flow cytometry including detailed quantitative analyses • characterize humoral and cellular immuneresponses against model antigens • perform cellculture experiments with immune cells • plan and perform basic techniques in molecular biology for the molecular analysis of innate and adaptive immune responses • understand, summarize and apply major laboratory technique in immunology • independently develop experimental strategies to test a scientific hypothesis 	
7	Prerequisites	-	
8	Integration in curriculum	semester: 1	
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222	
10	Method of examination	<p>Presentation Written pass / fail Laboratory protocol (10 pages) and presentation (15 min) Resit examinations: twice</p>	
11	Grading procedure	<p>Presentation (0%) Written (0%)</p>	

		pass / fail
12	Module frequency	only in winter semester
13	Workload in clock hours	Contact hours: 180 h Independent study: 120 h
14	Module duration	1 semester
15	Teaching and examination language	english
16	Bibliography	Janeway's Immunobiology (9th Edition), Ed. Murphy & Weaver, Garland publishing Inc. Cellular and Molecular Immunology, Ed. Abbas, Lichtman, Pillai, Elsevier Immunity, Ed. DeFranco, Locksley, Robertson, Oxford University Press

1	Module name 1998	Becoming a scientist	5 ECTS
2	Courses / lectures	No courses / lectures available for this module!	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	
5	Contents	<ul style="list-style-type: none"> • Participation in an International Meeting on Immunology • Meet the Professors of the Scientific Advisory Board and alumni to discuss career and evaluate the program on the internal retreat • Good scientific practice course
6	Learning objectives and skills	<p>The students should</p> <ul style="list-style-type: none"> • Understand advanced lectures in immunology • Advance their knowledge about the role of immune cells in the steady state and during infection, cancer, and autoimmunity • give feedback to advanced lectures • train their ability to discuss with experts (professors, speakers) advanced concepts of immunology • advance their communicational, organisational and social skills and discover career opportunities by participating on the internal retreat
7	Prerequisites	Modules Basic Immunology (II-MA-M1), Integrated Laboratory Courses Basic Immunology and Translational Immunology (II-MA-M2 and M5), Cell and Molecular Biology (II-MA-M3) or equal qualifications are recommended
8	Integration in curriculum	semester: 3;2;4
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222
10	Method of examination	Written or oral pass / fail Resit examination: twice
11	Grading procedure	Written or oral (0%) pass / fail (grading proprocedure not possible)
12	Module frequency	every semester
13	Workload in clock hours	Contact hours: 90 h Independent study: 60 h
14	Module duration	1 semester semester
15	Teaching and examination language	
16	Bibliography	<p>Fundamental Immunology, William E. Paul, Wolters Kluwer</p> <p>Nature Reviews Immunology, Nature Springer Publishing Group</p> <p>Nature Reviews Microbiology, Nature Springer Publishing Group</p>

Nature Immunology, Nature Springer Publishing Group

Immunity, Ed. DeFranco, Locksley, Robertson, Oxford University Press

1	Module name 47861	Cell- and molecular biology	5 ECTS
2	Courses / lectures	No courses / lectures available for this module!	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Lars Nitschke	
5	Contents	<ul style="list-style-type: none"> • Cell structure and compartments • Control of gene expression • Cell metabolism and communication • Cell Cycle and Apoptosis • Cytoskeleton and Cell Adhesion • Cancer 	
6	Learning objectives and skills	<p>The students should be able to</p> <ul style="list-style-type: none"> • describe and explain basic concepts of cell structure • describe and explain different concepts of gene regulation and expression • describe and explain concepts of cell metabolism and communication • describe and explain advanced concepts of cell cycle and apoptosis • read, present and analyse current primary scientific literature on cell biology • train their ability for discussion and teamwork by working in small groups • give and receive critical feedback to and from fellow students 	
7	Prerequisites	Basic knowledge in molecular biology recommended	
8	Integration in curriculum	semester: 1	
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222	
10	Method of examination	Written examination (60 minutes) Written examination Resit examination twice	
11	Grading procedure	Written examination (100%) Grade of written exam	
12	Module frequency	only in winter semester	
13	Workload in clock hours	Contact hours: 90 h Independent study: 60 h	
14	Module duration	1 semester	
15	Teaching and examination language	english	
16	Bibliography	Molecular Biology of the Cell (Bruce Alberts) 6th Edition; Alberts, Johnson, Lewis, Raff, Roberts, Walter; Garland Science, Taylor & Francis Group	

1	Module name 47891	Clinical Immunology	5 ECTS
2	Courses / lectures	No courses / lectures available for this module!	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Aline Bozec Prof. Dr. Gerhard Krönke
5	Contents	<ul style="list-style-type: none"> • Clinical insights into systemic autoimmune diseases (RA, SLE) • Organ-specific inflammatory and autoimmune diseases (IBD, MS) • Autoinflammatory diseases (incl. FMF, gout)- Clinical aspects of inherited and acquired immunodeficiencies (incl. AIDS) • Immunotherapy of cancer • Transplantation Medicine
6	Learning objectives and skills	<p>The students should</p> <ul style="list-style-type: none"> • describe and explain the pathophysiology and clinical picture of prevalent inflammatory and autoimmune diseases • describe and explain the pathophysiology and clinical picture of autoinflammatory diseases • describe and explain the basis and clinics of inherited and acquired immunodeficiencies • describe and explain the currently available concepts of cancer immunotherapy • gain overview about the way of action and potential side effects of Glucocorticoids and modern immunosuppressants and Biologics • understand the treatment strategies during the therapy of prevalent autoimmune and inflammatory diseases and during transplant rejection • participate in seminars studying relevant clinical case reports • participate in clinical ward rounds • gaining overview about the design and conduction of clinical trials
7	Prerequisites	Modules Basic Immunology (II-MA-M1), Integrated Laboratory Course "Basic Immunology" (II-MA-M2) and Cell and Molecular Biology (II-MA-M3) or equal qualifications
8	Integration in curriculum	semester: 2
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222
10	Method of examination	Written examination (45 minutes) Written examination (single /multiple choice questions) Resit examination: twice
11	Grading procedure	Written examination (100%) Grade of written exam
12	Module frequency	only in summer semester

13	Workload in clock hours	Contact hours: 60 h Independent study: 90 h
14	Module duration	1 semester
15	Teaching and examination language	english
16	Bibliography	<ul style="list-style-type: none"> • Janeways Immunobiology, Ed.Murphy & Weaver, Garland publishing Inc. • Cellular and Molecular Immunology, Ed.Abbas, Lichtman, Pillai, Elsevier • Immunity, Ed. DeFranco, Locksley, Robertson, Oxford University Press

1	Module name 1999	Master's thesis (M.Sc. Integrated Immunology 20222) Master's thesis	30 ECTS
2	Courses / lectures	Vorlesung: "Fundamentals of R programming for bioinformatics" (nur für Master Integrated Immunology) (4 SWS)	7,5 ECTS
3	Lecturers	Dr. Fulvia Ferrazzi	

4	Module coordinator	Prof. Dr. Falk Nimmerjahn	
5	Contents	<ul style="list-style-type: none"> Independent work on an actual topic of the respective research area within a fixed period (6 months) generate a scientific report oral presentation and discussion of the results (30 min) within a seminar 	
6	Learning objectives and skills	The students are <ul style="list-style-type: none"> able to work independently with experimental molecular, cell biological and immunological methods in vitro and in vivo on a specific scientific question are able to describe experimental results professionally according to the demands/terminology in immunology and molecular and cellular biology able to present the results of the scientific project in a report are able to apply the acquired skills in future research projects in immunology, cell and molecular biology 	
7	Prerequisites	recommended: further modules of the Master program (II-MA1,2,3,4,5,6)	
8	Integration in curriculum	semester: 4;3	
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222	
10	Method of examination	Oral Written (6 Monate) PL: Master thesis (ca. 75 pages) SL: Thesis defense (30 min presentation and discussion) Resit examination: once	
11	Grading procedure	Oral (3%) Written (97%) Grading of the thesis (100%)	
12	Module frequency	every semester	
13	Resit examinations	The exams of this moduls can only be resit once.	
14	Workload in clock hours	Contact hours: 900h Independent study: ?? h (keine Angaben zum Arbeitsaufwand im Eigenstudium hinterlegt)	
15	Module duration	1 semester	
16	Teaching and examination language		

1	Module name 1996	Practical project work (M.Sc. Integrated Immunology 2022) Practical project work	15 ECTS
2	Courses / lectures	No courses / lectures available for this module!	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Lars Nitschke	
5	Contents	Internship The students will perform an individual research project in an external laboratory, preferentially in an international laboratory (3 month), mentored by an external and an internal lecturer. Progress reports will be given in the external laboratories. Presentations of the results of the projects of all students will be presented and discussed in a mandatory workshop. A report has to be delivered in written form.	
6	Learning objectives and skills	Students <ul style="list-style-type: none"> • gain deepened insights into external research laboratories • acquire strong communications skills • will be able to independently plan and perform small research projects • will be able to document and summarize their research projects • will be able to discuss their progress in an external research environment • will be able to productively work and integrate in a research team 	
7	Prerequisites	Basic Immunology Module and Translational Immunology Laboratory Course (II-MA-M1 and II-MA-M2)	
8	Integration in curriculum	semester: 3;4	
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222	
10	Method of examination	Course achievement pass / fail Progress report and presentation Resit examination: twice	
11	Grading procedure	Course achievement (0%) pass / fail	
12	Module frequency	only in winter semester	
13	Workload in clock hours	Contact hours: 410 h Independent study: 40 h	
14	Module duration	1 semester	
15	Teaching and examination language		
16	Bibliography	current scientific literature individual publications of the external research laboratory	

1	Module name 1997	Theoretical project work (M.Sc. Integrated Immunology 20222) Theoretical project work	10 ECTS
2	Courses / lectures	No courses / lectures available for this module!	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Christian Bogdan	
5	Contents	Preparation of an immunological text, e.g. <ul style="list-style-type: none"> • grant application for a scientific project • review article for a scientific journal • chapter for a scientific book / text book • chapter for the English version of the Wikipedia encyclopaedia 	
6	Learning objectives and skills	The students should <ul style="list-style-type: none"> • comprehensively summarize the state-of-the-art knowledge of a defined immunological topic • critically discuss conflicting data in basic and/or clinical immunology • extract key results from the current scientific literature to provide a succinct summary on an immunological theme or problem • adequately cite and understand a body of literature • identify open questions and matters of debate in basic and/or clinical immunology and develop a research plan (including appropriate methodological approaches) to resolve these scientific issues • give and receive critical feedback to and from fellow students 	
7	Prerequisites	Modules "Basic Immunology" (II-MA-M1), "Translational Immunology" (II-MA-M4), and "Clinical Immunology" (II-MA-M6); Integrated Laboratory Courses "Basic Immunology" (II-MA-M2) and "Translational Immunology lab course (II-MA-M5)" are recommended	
8	Integration in curriculum	semester: 3;4	
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222	
10	Method of examination	Written or oral Grade of written essay Presentation of key points (pass /fail) Resit examination: twice	
11	Grading procedure	Written or oral (100%) Grade of written essay	
12	Module frequency	only in winter semester	
13	Workload in clock hours	Contact hours: 30 h Independent study: 270 h	
14	Module duration	1 semester	
15	Teaching and examination language		

1	Module name 47871	Translational Immunology	10 ECTS
2	Courses / lectures	No courses / lectures available for this module!	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Klaus Überla Prof. Dr. David Vöhringer	
5	Contents	<ul style="list-style-type: none"> • Immunology of Infectious Diseases • Tumor Immunology • Autoimmunity and Allergy • Neuroimmunology • Immunodeficiencies 	
6	Learning objectives and skills	<p>The students should</p> <ul style="list-style-type: none"> • describe and explain basic concepts of microbiology and infectious diseases • describe and explain immune responses to pathogens and tumors and their immune escape mechanisms • describe and explain concepts of prophylactic and therapeutic immunizations • describe and explain break of tolerance and development of hypersensitivity reactions • understand major therapeutic strategies against autoimmunity and allergy • describe and explain immune responses in the central nervous system • understand complex mechanisms of neuroimmunological diseases • understand the pathogenesis of immunodeficiencies and their therapies • read, present and analyze current primary scientific literature • train their ability for discussion and teamwork by working in small groups • give and receive critical feedback to and from fellow students 	
7	Prerequisites	Modules Basic Immunology (II-MA-M1), Basic Laboratory Course (II-MA-M2), Cell and Molecular Biology (II-MA-M3) or equal qualifications	
8	Integration in curriculum	semester: 2	
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222	
10	Method of examination	Written examination (90 minutes) Written examination (multiple/single choice questions) Resit examination: twice	
11	Grading procedure	Written examination (100%) Grade of written exam	
12	Module frequency	only in summer semester	
13	Workload in clock hours	Contact hours: 165 h Independent study: 135 h	

14	Module duration	1 semester
15	Teaching and examination language	english
16	Bibliography	<ul style="list-style-type: none">• Janeway's Immunobiology, Ed.Murphy & Weaver, Garland publishing Inc.• Cellular and Molecular Immunology, Ed.Abbas, Lichtman, Pillai, Elsevier• Immunity, Ed.DeFranco, Locksley, Robertson, Oxford University Press

1	Module name 47881	Translational Immunology Integrated Laboratory Course	10 ECTS
2	Courses / lectures	No courses / lectures available for this module! mandatory attendance	
3	Lecturers	No lecturers available since there are no courses / lectures for this module!	

4	Module coordinator	Prof. Dr. Matthias Tenbusch Prof. Dr. David Vöhringer	
5	Contents	<ul style="list-style-type: none"> • Detect and propagate pathogens • Characterize immune responses to pathogens and vaccines • Usage of tissue culture and animal models of infectious and allergic diseases, autoimmune disorders and tumor immunology 	
6	Learning objectives and skills	<p>The students should</p> <ul style="list-style-type: none"> • obtain skills for detection and propagation of pathogens • obtain skills for characterization of specific immune responses • describe and explain in vitro and in vivo models for the study of immune responses • understand complex mechanisms of immune pathogenesis 	
7	Prerequisites	Modules Basic Immunology (II-MA-M1), Basic Integrated Laboratory Course (II-MA-M2), and Cell and Molecular Biology (II-MA-M3)	
8	Integration in curriculum	semester: 2	
9	Module compatibility	Pflichtmodul Master of Science Integrated Immunology 20222	
10	Method of examination	Written Presentation pass / fail Laboratory Protocol (10 pages) and presentation (15 minutes) Resit examination: twice	
11	Grading procedure	Written (0%) Presentation (0%) pass / fail	
12	Module frequency	only in summer semester	
13	Workload in clock hours	Contact hours: 180 h Independent study: 120 h	
14	Module duration	1 semester	
15	Teaching and examination language	english	
16	Bibliography	<ul style="list-style-type: none"> • Janeways Immunobiology, Ed. Murphy & Weaver, Garland publishing Inc. • Cellular and Molecular Immunology, Ed. Abbas, Lichtman, Pillai, Elsevier • Immunity, Ed. De Franco, Locksley, Robertson, Oxford University Press 	