HANDBOOK OF MODULES

MODULHANDBUCH

MASTER OF SCIENCE EPIDEMIOLOGIE

MAI 2025

INTRODUCTION

All modules, which are offered for the **Master Degree Programme in Epidemiology**, are described in this Handbook. Courses are offered annually. All of the module and course descriptions include the following contents:

Contact person(s) / Email
Responsible person(s) for the module
ECTS
European Credit Transfer System: Number of earnable Credits
Contact-hours
Actual lecture hours
Self-study
Number of hours that a student spends on the preparation and follow-up of each lecture and the time spent on assignments and studying for / preparing the exam(s).
Pre-requisites
Some modules can only be attended, if the student has specific skills and knowledge.
Usability of the module
Some modules can be used for other Master Programmes. Modules, which can be attended by external students and/or participants are indicated here.
Module components
Each module comprises of different courses, which are listed here
MP Module exam
The module exam covers topics from all courses of the respective module
LV #: Course number
UF: Teaching methods
VL= Lecture, Ü= Exercise, Sem = Seminar, GP = Lab, K= Colloquium, Prak = Internship
PF: Type of proficiency exam (VL: preparatory test / MTP: Module component test)
K = written exam, MP = oral exam, HAr = research report, Ü = Exercises, Ref = Presentation, WP = Scientific Protocol, PB = Internship report, DP = Disputation, MA = Master´s Thesis
Grading
In this field, it is indicated whether the course is graded or whether student receives a pass (b) / non-pass (nb)
LV Verantwortlicher(r) / Email
Person responsible for the course
ECTS, contact hours, self-study hours, SWS for each course (hours per week per semester: this system was used prior to the introduction of the ECTS system in Germany)
LV Nummer: Course number
LV Kürzel: Course abbreviation
Languages
Modules are offered in English and/or German
Location
Most of the modules are held at the IBE. If a module is held at a different location, this is indicated here.
Learning objectives and contents
The qualifications, which a student will acquire during the course and the contents of the module, are described here. **The learning objectives and qualifications were compiled by the course lecturers. Therefore style and details of the text may vary.**
Teaching materials / references, type of proficiency exam

For general questions concerning the Master's programme please contact the Programme Secretariat: msc@ibe.med.uni-muenchen.de

For specific questions concerning the modules, please contact the person listed under the respective module.

TABLE OF CONTENTS

Overview: Structure

Master of Science of Epidemiology

	Modulbezeichnung	ECTS	Fachsemester			
			1 WiSe	2 SoSe	3 WiSe	4 SoSe
Pflichtmodule	Quantitative Methods	6	x			
	Foundations of Epidemiology	6	x			
	Public Health Practice and Research	6	x	x		
	From Concept to Analysis	-	x			
	Research Skills II	-		x		
	Research Skills III	-			x	
	Internship	24		x	x	
	Master's thesis	30				x
	Modulbezeichnung	ECTS	Wählbar in Semester			
			1 WiSe	2 SoSe	3 WiSe	4 SoSe
Wahlpflichtmodule	Epidemiology I + II	18	x		x	
	Clinical Epidemiology I + II	18	x		x	
	Environmental and Occupational Epidemiology I + II	18	x		x	
	Genetic Epidemiology I + II	18	x		x	
	Advanced Biometry I und II	18	x		x	
	Health Geography	3		x		x
	Health Communication	6		x		x
	Nutritional Epidemiology	3		x		x
	Applied Statistics in Epidemiology	6		x		x

1. Core Modules

1.1 Quantitative Methods

Contact person: Dr. Ursula Berger		Email: berger@ibe.med.uni-muenchen.de	
ECTS (Credits) 6	**Contact hours:** *75 hours*	**Self-study:** *105 hours*	

Prerequisites:
Good knowledge of calculus and algebra

Usability of the module:
- Master of Science Epidemiology

Module Exam
- Written exam (90-120 Minutes) – Graded

1. Learning objectives:
- Students acquire skills for planning, funding, organisation, analyse and presentation of epidemiological studies with the focus on biometrical aspects.

2. Content
- This module provides knowledge of descriptive and analytical statistics common in epidemiology.
- The practical application is tested in exercises.

Modulbestandteile					
Course	**LV #**	**UF**	**PF**	**ECTS (SWS)**	**Benotung**
1) Quantitative Methods	Fra3	Sem		4,5 (4)	
2) Quantitative Methods (Exercise)	Fra4	Ü	Ü und WP	1,5 (1)	b/nb

Course 1: **Quantitative Methods**		LV Nummer: Fra3	LV Kürzel: BIOS102a
Contact person: Dr. Ursula Berger		**Email:** berger@ibe.med.uni-muenchen.de	
Credits: 4,5	**Contact hours** 55 *hours*	**Self-study:** 80 *hours*	**SWS:** 4
Language(s): English		**Location:** IBE	

COURSE DESCRIPTION

1. Learning objectives:
- Students are able to distinguish between different scales of measurements, know about quantitative and qualitative variables and understand the technical terms used in applied statistics.
- Students know the basic methods to estimate and describe scale and location parameters of variables and how to graph them.
- Students have good knowledge of elementary test methods hand acquire experience when and how to apply them.
- Students acquire the ability to participate in the planning and analysis of studies, know about the importance of reliable data, and can discuss relevance and significance of statistical test results.

2. Content
This lecture
- provides an understanding of measurement scales and the application of descriptive and analytical statistics.
- provides an overview of methods and promotes confidence in the application of methods.
- gives an introduction to multiple linear regression and modelling, with emphasis on logistic and loglinear models, as well as basics and applications of survival analysis.

3. Teaching materials / references:
- Script (lecture notes)
  Lecture slides

4. Teaching method(s):
- Seminar

5. Type of proficiency examination(s):

Course 2:		LV Nummer:	LV Kürzel:
Quantitative Methods (Exercise)		Fra4	BIOS102b
Contact person: Dr. Ursula Berger		**Email:** berger@ibe.med.uni-muenchen.de	
Credits: 1,5	**Contact hours:** 20 *hours*	**Self-study:** 25 *hours*	**SWS:** 1
Language(s): English		**Location:** IBE	
COURSE DESCRIPTION			

1. Learning objectives:
The students
- can apply the theoretical concepts they learned in the lecture.
- are able to process data with a statistical software package, to compute measures of interest, and to produce output useful for report writing.
- are able to interpret statistical findings and to communicate the results of an analysis.

2. Content
The students
- deepen their theoretical knowledge acquired in the lecture and are able to apply their knowledge.
- get practical experience in handling data in statistical software packages (SAS, R) and acquire competence needed for planning, analysing and interpreting data.

3. Teaching materials / references:
- Exercise sheets
- Exercise data set

4. Teaching method(s):
- Exercises
- Working with SAS

5. Type of proficiency examination(s):
- Exercises
- Scientific protocol

1.2 Foundations of Epidemiology

Contact person: Prof. Dr. Ulrich Mansmann		Email: mansmann@ibe.med.uni-muenchen.de
Credits: 6	**Contact hours:** *75 hours*	**Self-study:** *105 hours*

Prerequisites:
Knowledge of calculus and algebra

Usability of the module:

- Master of Science Epidemiology

Module Exam
- Written exam (90-120 Minutes) – Graded

1. Learning objectives:
- Students acquire skills for planning, funding, implementation, analysis and dissemination of results in epidemiological research projects.

2. Content
- This module provides knowledge to describe, to organize and to evaluate epidemiological studies.
- The practical application is tested in exercise.

Modulbestandteile

Course	LV #	UF	PF	ECTS (SWS)	Benotung
1) Epidemiology and Research Design	Fra7	Sem		4,5 (4)	
2) Epidemiology and Research Design (Exercise)	Fra8	Ü	Ü und WP	1,5 (1)	b/nb

Course 1: **Epidemiology and Research Design**	LV Nummer: Fra7	LV Kürzel: EPI102a
Contact person: Prof. Dr. Ulrich Mansmann	Email: mansmann@ibe.med.uni-muenchen.de	

Credits: 4,5	**Contact hours** 55 *hours*	**Self-study:** 80 *hours*	**SWS:** 4

Prerequisites:
Good knowledge of calculus and algebra

Language(s): English	Location: IBE

COURSE DESCRIPTION

1. Learning objectives:
The students
- know, use and criticise epidemiological terms, principles and methods.
- use and criticise epidemiological terms, principles and methods.
- interpret and appraise the results of epidemiological studies.
- apply basic and advanced techniques of clinical and epidemiological research to specific problems, such as presenting data, calculating epidemiological measures, developing and conducting clinical and epidemiological studies, and processing and analysing data.
- communicate results of epidemiological and clinical research and write corresponding papers.

2. Content

- Basic principles of epidemiology such as clinical questions, variables, health outcomes, populations and samples.
- The principles of frequency and effect in epidemiology, their corresponding measures and designs to study frequency and risk.
- Sources of systematic bias and concepts of causality,
- The principles of clinical epidemiology, namely diagnosis, prognosis, treatment, outcomes research.
- The basic principles of systematic reviews and meta-analysis.

3. Teaching materials / references:
- Script (lecture notes)
- List of readings (journal articles, book chapters)

4. Teaching method(s):
- Seminar

5. Type of proficiency examination(s):

Course 2: Epidemiology and Research Design (Exercise)		LV Nummer: Fra8	LV Kürzel: EPI102b
Contact person: Prof. Dr. Ulrich Mansmann		**Email:** mansmann@ibe.med.uni-muenchen.de	
Credits: 1,5	**Contact hours** *20 hours*	**Self-study:** 25 *hours*	**SWS:** 1
Language(s): English		**Location:** IBE	
COURSE DESCRIPTION			

1. Learning objectives:
- The students apply basic and advanced techniques of epidemiological research, such as presenting data, calculating epidemiological measures, and processing and analysing data.

2. Content
This exercise provides
- basic principles of data description and analysis of an epidemiological data set.
- practical experience in handling data in statistical software packages (SAS, R).

3. Teaching materials / references:
- Exercise sheets
- Exercise data set

4. Teaching method(s):
- Exercises
- Working with SAS

5. Type of proficiency examination(s):
- Exercises
- Scientific protocol

1.3 From concept to analysis

Contact person:		Email:
PD Dr. Ursula Berger, Prof Ulrich Mannsman		berger@ibe.med.uni-muenchen.de

Credits:	Contact hours:	Self-study:
0		

Prerequisites:

Usability of the module:
• Master of Science Epidemiology

Module Exam

1. Learning objectives:

The students
- are familiar with the concepts of regression analysis (linear regression, logit, Poisson, Cox, GAM), the assumptions underlying these models and methods for testing these assumptions.
- will be able to decide what regression model is appropriate, design a regression analysis suitable for a scientific question, implement it in R, interpret the results correctly taking into account the model assumptions and communicate and discuss the results.

2. Content
- The 8-day block course "From Concept to Analysis" builds on the introductory courses 'Biometry', "Epidemiology and Research Design" and "Introduction to R" and extends the insight into the methods of regression modeling and their implementation in R to concrete scientific questions.

1.4 Public Health Practice and Research

Contact person:		Email:
Dr. Karin Berger-Thürmel		karin.berger@med.uni-muenchen.de

Credits:	Contact hours:	Self-study:
6	*60 hours*	*120 hours*

Prerequisites:
None

Usability of the module:
• Master of Science Epidemiology

Module Exam
• Research report (42000 Characters) – Graded

1. Learning objectives:

The students
- know and understand basic public health principles.
- know the relevance of interdisciplinarity in health services research.
- have developed competencies in public health policy and policy making and can critically assess the political debate in public health.

2. Content
- Introduction to Public Health, Health Services Research and Management
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Modulbestandteile					
Course	**LV #**	**UF**	**PF**	**ECTS (SWS)**	**Benotung**
1) Health Services Research and	Frb2	Sem		4 (3)	

Management						
2) Research Skills		Frb5	Sem		2 (1)	

Course 1: **Health Services Research and Management**		**LV Nummer:** Frb2	**LV Kürzel:** PH103
Contact person: Dr. Karin Berger-Thürmel		**Email:** karin.berger@med.uni-muenchen.de	
Credits: 4	**Contact hours:** *40 hours*	**/ Self-study:** *80 hours*	**SWS:** 3
Language(s): English		**Location:** IBE	

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COURSE DESCRIPTION

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1. <u>Learning objectives</u>:
The students
- know important methods with respect to health services research, e.g. how to systematically select appropriate outcome measures.
- know the meaning of personal factors and environmental factors for human functioning and disability in persons with a health condition and in the general population.
- are able to identify and to appraise questions relevant to health services research.
- have competencies in the management of teams and organizations.

2. <u>Content:</u>
This lecture
- provides knowledge about methods of health services research,
- presents historical developments of Public Health und Health Services Research,
- explains concepts, definitions and determinants of human functioning, disability and health,
- demonstrates principles of health services provision, e.g. access, appropriateness and quality of care,
- provides basic knowledge about health management,
- provides an introduction o health economic evaluation.

3. <u>Teaching materials / references</u>:
- Script (lecture notes)
- List of readings (journal articles, book chapters)

4. <u>Teaching method:</u>
- Seminar
- Group work

5. Type of examination/s:

Course 2: **Research Skills**		**LV Nummer:** Frb5	**LV Kürzel:** RES103
Contact person: Prof. Dr. Heidi Stöckl		**Email:** heidi.stoeckl@ibe.med.uni-muenchen.de	
Credits: 2	**Contact hours:** *20 hours*	**Self-study:** *40 hours*	**SWS:** 1
Language(s):		**Location:**	

English	IBE

COURSE DESCRIPTION

1. Learning objectives:
- The course is about aspects of planning, development and presentation of a research project.

2. Content:
- The course provides key competencies needed for research and the dissemination / publication of research results and will be adapted to current developments. (e.g. literature reviews, project protocol development (GEP or GCP); from project protocol to research proposals e.g. Grants / proposals BMBF, DFG, EU; Ethic commission, data protection etc.; Authoring publication; Presentation and Dissemination; Risk communication)

3. Teaching materials / references:
- Script (lecture notes)
- References

4. Teaching method:
- Seminar
- Group work

5. Type of examination/s:

1.5 Research Skills II

Contact person: Prof Dr. Heidi Stöckl		Email: heidi.stoeckl@ibe.med.uni-muenchen.de
Credits: 0	Contact hours:	Self-study:
Prerequisites:		
Usability of the module: • Master of Science Epidemiology		
Module Exam		

1. Learning objectives:
The students
- get to know and apply new methods.
- deepen existing methods and concepts beyond the basic knowledge and be able to implement them accordingly.

2. Content
- Different methods and concepts will be expanded upon and new methods that have not been taught previously will be discussed. The topics covered include literature research, conducting systemic reviews, participatory methods and natural experiments.

1.6 Research Skills III

Contact person:		Email:
Prof. Dr. Markus Ege		Markus.Ege@med.uni-muenchen.de
Credits: 0	Contact hours:	Self-study:
Prerequisites:		
Usability of the module: • Master of Science Epidemiology		
Module Exam		

1. Learning objectives:
The students
  • learn how to write a Master's thesis or a manuscript for publication in a scientific journal.
  • understand how a manuscript is structured and what the aims of the individual sections are.
  • learn which wording is best suited to convey the message of a thesis and how to make it attractive to readers.

2. Content
  • Students bring their own texts for discussion into the group. If they are just starting to write their own publication or thesis, they can choose some examples from PubMed and explain why the texts are good or bad..

1.7 Research Internship

Organisation:	Email:
Dr. Ursula Schlipköter	schli@ibe.med.uni-muenchen.de
ECTS (Credits) 24	
Dauer des Moduls / Module duration 4,5 Monate / 4,5 months	
Teilnahmevoraussetzung / Prerequisites: keine	
Veranstaltungssprache(n) / Language(s): Deutsch / Englisch (German / English)	
MP Modulprüfung / Module Exam Internship report (ca. 30000 Characters) pass/fail	

1. Formal Procedures:
  • Students do their 4,5 month internship in the second (Part A, 2 months) and third semester (Part B, 2 months).
  • Students select internship sites from the network of institutions and research facilities, which cooperate with the IBE.
  • At the beginning of the second semester students receive approval and consent from the examination board, based on the epidemiologic relevance and feasibility of the project as well as the respectability of the institution and the supervisor.
  • At the end of the internship the student has to summarize his progress and project experience in a report of about 25.000 characters (reflecting established scientific methods).
  • The supervisor has to certify that the student has successfully completed the internship.

2. Learning objectives:	

- To conduct a research project including data collection and analysis, following recognized procedures and scientific methods.
- To gain insight into and strengthen skills related to a selected field of activity in public health.
- At the end of the third term the student has to present his project in a short lecture (10 min) to his colleagues and the coordinators of the program.
- The aims and key messages of the work, as well as the results, where applicable, must be highlighted and discussed.

Modulbestandteile

Course	LV #	UF	PF	ECTS	Benotung
Internship	Frj3	Prak		22	
Colloquium	Frj3.1	K	VL (Ref)	2	b/nb

1.8 Master's Thesis, Colloquium and Disputation

Organisation: Dr. Ursula Schlipköter	**Email:** schli@ibe.med.uni-muenchen.de

ECTS (Credits) 30
Dauer des Moduls / Module duration 16 Wochen / 16 weeks
Teilnahmevoraussetzung / Prerequisites: Successfully accomplished core modules and internship
Veranstaltungssprache(n) / Language(s): Deutsch / Englisch (German / English)
MP Modulprüfung / Module Exam Keine

- The module Master's Thesis is composed of the Masters's Thesis, the Colloquium and the Disputation.

Lehrveranstaltung / Course	LV #	UF	PF	ECTS	Benotung
Master's Thesis	Frj6		MA	21	Benotung
Colloquium	Frj5	K	WP	6	b/nb
Disputation	Frj7		MP	3	Benotung

Lehrveranstaltung / Course 1: **Master's Thesis**	LV Nummer: Frj6	LV Kürzel:
LV-Verantwortlicher / Contact person:	**Email:**	

ECTS (Credits) 21	**Präsenzstudium/ Contact hours**	**Selbststudium / Self-study:**	**SWS:**
Veranstaltungssprache(n) / Language(s): Deutsch / Englisch (German / English)	**Veranstaltungsort / Location:**		

COURSE DESCRIPTION

1. Formal Procedure:

- The four month thesis is usually done during the fourth semester, based on a project conducted in one of the institutions and research facilities which cooperate with the IBE.

- In the first two weeks of the third semester students receive approval and consent from the examination board regarding the proposed thesis topic, based on its epidemiologic relevance and feasibility as well as the respectability of the institution and the supervisor.
- The thesis can be written in German and/or English, either as a report or as a manuscript for publication in a peer reviewed journal. [4] The student should be the first author of the publication. [5] Additional information, results and tables have to be listed in the annex for the complete appraisal of the thesis.

2. Learning objectives:
The students
- conduct a research project including precise data collection and analysis, following recognized procedures and scientific methods.
- precisely define the subject in context of the current literature, shows the epidemiologic relevance, describes and critically discusses the chosen methods and received results.

Lehrveranstaltung / Course 2: **Colloquium**	LV Nummer: Frj5	LV Kürzel:
LV-Verantwortlicher / Contact person: Dr. Ursula Schlipköter	**Email:** schli@ibe.med.uni-muenchen.de	

ECTS (Credits) 6	**Präsenzstudium/** **Contact hours**	**Selbststudium /** **Self-study:**	**SWS:**

Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:**	

COURSE DESCRIPTION

1. Learning objectives:
- Students learn to identify the scientific question of the thesis, to highlight problems and to find possible solutions.

2. Content:
- Knowledge is imparted for concepts to write a thesis, advice and support concerning the proposed scientific question as well as support regarding data collection and analysis are given.

Lehrveranstaltung / Course 3: **Disputation**	LV Nummer: Frj7	LV Kürzel: #
LV-Verantwortlicher / Contact person Dr. Ursula Schlipköter	**Email:** schli@ibe.med.uni-muenchen.de	

ECTS (Credits) 3	**Präsenzstudium/** **Contact hours**	**Selbststudium /** **Self-study:**	**SWS:**

Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:**	

COURSE DESCRIPTION

1. Learning objectives:
Students are able to present research results in a precise and comprehensible manner in context of the current literature and to discuss these critically.

2. **Content:**

- The main subject of the oral exam (30 min) is the thesis.
- Students present the basic findings of their thesis in a short presentation (15 min).
- In the following discussion (15 min) students have to show their scientific know-how of the subject and answer related questions posed by the examination board.

2 Electives

2.1 Specialization in Epidemiology

2.1.1 Specialization in Epidemiology I

Modulverantwortlicher / Contact person:		Email:
Prof. Dr. Eva Grill Dr. Ursula Schlipköter		eva.grill@med.uni-muenchen.de schli@ibe.med.uni-muenchen.de
ECTS (Credits) **12**	**Präsenzstudium/** **Contact hours** *120 Std./ hours*	**Selbststudium / Self-study:** *240 Std./ hours*

Teilnahmevoraussetzung / Prerequisites:
Keine

Verwendbarkeit des Moduls / Usability of the module:

Master of Science Epidemiology

MP Modulprüfung / Module Exam
- Klausur (90-120 Minuten) – Benotung / Written exam (90-120 minutes) – Graded

1. **Learning objectives:**
- Students have profound knowledge in modern statistical methods in various epidemiological areas that enable the students to evaluate the scientific literature and of pursuing academic work independently.
- Students acquire knowledge about public health relevant diseases, their epidemiology and possibilities of prevention.

2. **Content:**
- This module provides knowledge of various advanced quantitative methods including design and interpretation of cohort studies.
- Studies using Poisson regression and survival analysis are presented.
- Knowledge is imparted for the estimation of individual risks, validation and model adaptation checks.
- Methods in decision analysis are presented.
- Basic modelling aspects in exposure assessment and practical aspects of exposure assessment and study design in special issues are presented.
- Epidemiological skills are provided for studying infectious diseases, cardiovascular disease, tumours and drugs.

Modulbestandteile					
Lehrveranstaltung / Course	**LV #**	**UF**	**PF**	**ECTS (SWS)**	**Benotung**
Advanced Methods in Epidemiology	Frd1	Sem		3 (2)	
Advanced Methods in Epidemiology (Exercise)	Frd2	Ü	Ü und WP	3 (2)	b/nb
Applied Epidemiologie (Epidemiology of Infectious Disease)	Frd3	Sem		2 (1,5)	
Applied Epidemiologie (Epidemiology of Cardiovascular Disease)	Frd4	Sem		2 (1,5)	
Applied Epidemiologie (Pharmacoepidemiology)	Frd5	Sem		2 (1,5)	
Applied Epidemiologie (Tumour Epidemiology)	Frd6	Sem		2 (1,5)	

Options within the module		
Three of the four courses "Applied Epidemiology" have to be selected.		

Lehrveranstaltung / Course 1: **Advanced Methods in Epidemiologie**	**LV Nummer:** Frd1	**LV Kürzel:** EPI201a
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Grill	**Email:** eva.grill@med.uni-muenchen.de	

ECTS (Credits) 3	**Präsenzstudium/** **Contact hours** *30 Std./ hours*	**Selbststudium /** **Self-study:** *60 Std./ hours*	**SWS:** 2

Veranstaltungssprache(n) / **Language(s):** Englisch (English)	**Veranstaltungsort / Location:** IBE

COURSE DESCRIPTION

1. Learning objectives:
Students
- deepen their knowledge on biostatistical and epidemiological methods and the interpretation of scientific literature.
- learn the theory of and apply generalized regression models including Poisson regression and survival analyses and methods for repeated measurements.
- learn about advanced epidemiological methods including measurement error and generalized additive models.

2. Content:
- Design and interpretation of cohort studies and case-based studies, missings.
- Analyses of cohort studies using Poission regression and survival analyses.
- Introduction to methods for repeated measurements and methods for measurement error.
- Acquisition of Methods for estimating non-linear exposure-response relationships.

3. Teaching materials / references:
- Book: Modern Epidemiology, 2nd edition, Rothman and Greenland.

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 2: **Advanced Methods in Epidemiologie** **(Exercise)**	**LV Nummer:** Frd2	**LV Kürzel:** EPI201b
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Grill	**Email:** eva.grill@med.uni-muenchen.de	

ECTS (Credits) 3	**Präsenzstudium/** **Contact hours** *30 Std./ hours*	**Selbststudium /** **Self-study:** *60 Std./ hours*	**SWS:** 2

Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** IBE

COURSE DESCRIPTION

1. Learning objectives:
- Students apply the theory they have learned in the course Advanced Methods in

Epidemiology by conducting data analyses.

2. Content:
- Programming of examples in SAS and analyses of selected datasets

3. Teaching materials / references:
- Exercise sheets
- Exercise data sets

4. Teaching method:
- Tutorial
- Exercises

5. Type of examination:
- Exercises
- Scientific report

Lehrveranstaltung / Course 3: **Applied Epidemiology (Epidemiology of Infectious Diseases)**	**LV Nummer:** Frd3	**LV Kürzel:** EPI202a
LV-Verantwortlicher / Contact person: Dr. Ursula Schlipköter	**Email:** schli@ibe.med.uni-muenchen.de	

ECTS (Credits): 2	**Präsenzstudium/ Contact hours** *20 Std./ hours*	**Selbststudium / Self-study:** *40 Std./ hours*	**SWS:** 1,5
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** IBE		

COURSE DESCRIPTION

1. Learning objectives:
The students
- recognize the importance of the epidemiology of infectious diseases and its concepts.
- should be able to identify, analyse and judge examples of infectious disease epidemiology.

2. Content:
The students
- know and understand special methods of the epidemiology of infectious diseases (including, e.g. surveillance, methods to detect and differentiate infectious agents, measurements of effectiveness of vaccinations and modelling of epidemics).
  [2] Students get an overview of descriptive epidemiology of infectious diseases (including, e.g. data sources and data collection in health reporting, regulations for the protection against infectious diseases, international reporting systems).
- receive insight in investigative and analytical epidemiology of infectious diseases (including, e.g. outbreak surveys, identification and classification of new agents) and interventions (including, e.g. exposure-prophylaxis, immune-prophylaxis, chemo-prophylaxis, population-based protection against infections).
- acquire knowledge about up-to-date examples of applied infectious disease epidemiology (e.g. infections during the life span, emerging and re-emerging infections: AIDS, TB, malaria, Bioterrorism)

3. Teaching materials / references:
- script (lecture notes)
- Book

- Publications
- Internet

4. <u>Teaching method</u>:
- Seminar

5. <u>Type of examination</u>:

Lehrveranstaltung / Course 4:		
Applied Epidemiology (Epidemiology of Cardiovascular Diseases)	**LV Nummer:** Frd4	**LV Kürzel:** EPI202b
LV-Verantwortlicher / Contact person: PD Dr. Barbara Thorand	**Email :** thorand@helmholtz-muenchen.de	
ECTS (Credits): 2	**Präsenzstudium/ Contact hours** *20 Std./ hours*	**Selbststudium / Self-study:** *40 Std./ hours*	**SWS:** 1,5
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** ZENTRUM MÜNCHEN-DEUTSCHES FORSCHUNGSZENTRUM FÜR UMWELT UND GESUNDHEIT – Forschungszentrum für Umwelt und Gesundheit / IBE	

COURSE DESCRIPTION

1. <u>Learning objectives</u>:
The students
- know and understand the pathophysiology, epidemiology ("burden of disease") and risk factors for cardiovascular diseases.
- know and understand the epidemiologic and phathophysiologic relationship between cardiovascular disease and its main risk factors.
- know and understand the public health relevance of the main cardiovascular risk factors
- know the main measures to prevent cardiovascular diseases.
- know the main epidemiologic studies in the area of cardiovascular epidemiology and they are able to understand and evaluate these studies.

2. <u>Content</u>:
- Pathophysiology of key cardiovascular diseases.
- Prevalence, incidence and trends of cardiovascular morbidity and mortality.
- Prevalence and trends in the prevalence of main cardiovascular risk factors and association of these risk factors with cardiovascular outcomes. Of particular interest are the following risk factors: hypertension, smoking, dyslipoproteinemia, overweight, diabetes mellitus, psychosocial factors, dietary factors, inflammatory and haemostaseological factors, gender specific (e.g. hormones) and genetic risk factors.
- Results of clinical intervention studies and population-based intervention studies concerning reduction of cardiovascular events.
- Current recommendations of the respective associations concerning intervention strategies to prevent cardiovascular disease.

3. <u>Teaching materials / references</u>:
- script (lecture notes)
- Book
- Publications
- Internet

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 5:		LV Nummer:	LV Kürzel:
Applied Epidemiology (Pharmacoepidemiologie)		Frd5	EPI202c

LV-Verantwortlicher / Contact person: Dr. Tanja Schink, Dr. Ute Amann, Dr. Frank Andersohn		**Email:** schink@leibniz-bips.de amann@uteamann.de Frank.Andersohn@charite.de	
ECTS (Credits): 2	**Präsenzstudium/ Contact hours** *20 Std./ hours*	**Selbststudium / Self-study:** *40 Std./ hours*	**SWS:** 1,5
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE	

COURSE DESCRIPTION

1. Learning objectives:
- The students acquire knowledge about drug therapy and its epidemiology.

2. Content:
In this lecture
- the historical development and significance of pharmaco-epidemiology is shown,
- knowledge in drug utilization research, its parameters and data sources is imparted,
- Physicians' prescribing habits are illustrated,
- Patient compliance, Pharmacovigilance and adverse drug reactions are discussed,
- Reporting systems, quality assurance, analysis of causality and legal framework are pointed out and
- the international situation in this area is shown.

3. Teaching materials / references:
- Script (lecture notes)
- Book
- Publications
- Internet

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 6: **Applied Epidemiology (Tumour Epidemiology)**		**LV Nummer:** Frd6	**LV Kürzel:** EPI202d
LV-Verantwortlicher / Contact person: Dr. Anne Schlesinger-Raab, Dr. Kathrin Halfter		**Email:** schlesi@ibe.med.uni-muenchen.de halfter@ibe.med.uni-muenchen.de	
ECTS (Credits): 2	**Präsenzstudium/ Contact hours** *20 Std./ hours*	**Selbststudium / Self-study:** *40 Std./ hours*	**SWS:** 1,5
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE	

COURSE DESCRIPTION (E)

1. Learning objectives:
- The students acquire knowledge about tumours, their epidemiology („burden of disease") and possibilities of prevention.

2. Content:

- Cancer definitions and classifications will be introduced and data sources of incidence and mortality will be presented.
- Students learn about risk factors and primary prevention as well as early detection and screening methods. [3] Primary therapy in accordance to guidelines, aftercare and aspects of quality of life will be discussed.
- TMR will be taken as example to show methods of work and data of a tumour registry.

3. Teaching materials / references:
- script (lecture notes)
- Book
- Publications
- Internet

4. Teaching method:
- Seminar

5. Type of examination:

2.1.2. Specialization Epidemiology II

Modulverantwortlicher / Contact person: Prof. Dr. Eva Grill		Email: eva.grill@med.uni-muenchen.de
ECTS (Credits) **6**	**Präsenzstudium/** **Contact hours** *60 Std./ hours*	**Selbststudium / Self-study:** *120 Std./ hours*

Teilnahmevoraussetzung / Prerequisites:

Verwendbarkeit des Moduls / Usability of the module: Master of Science Epidemiology

MP Modulprüfung / Module Exam
- Referat (30-60 Minuten) – Benotung / Presentation (30-60 Minutes) – Graded

1. **Learning objectives:**
- Students will learn the theory and application of generalized regression models including Poisson regression and survival analyses, methods for repeated measurements, learn about advanced epidemiological methods including measurement error and generalized additive models.

2. **Content:**
- This module provides knowledge of special study types and advanced practical methods for conducting populations-based epidemiological studies.

Modulbestandteile					
Lehrveranstaltung / Course	**LV #**	**UF**	**PF**	**ECTS (SWS)**	**Benotung**
Advanced Seminar in Epidemiology	Frd7	Sem		3 (2)	
Advanced Practical Applications of Epidemiology	Frd8	Sem	Ü	3 (2)	b/nb

Lehrveranstaltung / Course: 1 **Advanced Seminar in Epidemiology**		**LV Nummer:** Frd7	**LV Kürzel:** EPI203
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Grill		**Email:** eva.grill@med.uni-muenchen.de	
ECTS (Credits) 3	**Präsenzstudium/** **Contact hours** *30 Std./ hours*	**Selbststudium / Self-study:** 60 *Std./ hours*	**SWS:** 2
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit / IBE	

COURSE DESCRIPTION

1. Learning objectives:
The students
- discuss advanced study designs including case-only studies, case-cohort, case-crossover, ecological sentimental studies including spatial epidemiology.
- know about design and potential for biases in these studies.
- examine examples from the literature to highlight successful applications as well as hidden pitfalls when implementing these designs.

2. Content:

- Presentation of advanced study designs including case-only studies, case-cohort, case-crossover and others.
- Acquisition of ecological study designs in various applications including spatial epidemiology.
- Presentation of study designs theoretically as well as illustrated by an example from the literature.
- Discussion of sources of biases and potentials to control for bias and confounding by adequate designs.

3. Teaching materials / references:

- Interpreting Epidemiologic Evidence: Strategies for Study Design and Analysis David A. Savitz. Oxford University Press, Oxford, 2003.
- Current and „classical" literature, literature will be recommended at the beginning of the course.

4. Teaching method:

- Seminar

5. Type of examination:

Lehrveranstaltung / Course: 2		
Advanced Practical Applications of Epidemiology	**LV Nummer:** Frd8	**LV Kürzel:** EPI204
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Grill	**Email:** eva.grill@med.uni-muenchen.de	
ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *30 Std./ hours*	**Selbststudium / Self-study:** 60 *Std./ hours* **SWS:** 2
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München- Deutsches Forschungszentrum für Umwelt und Gesundheit / IBE	

COURSE DESCRIPTION

1. Learning objectives:

The students

- learn the practical issues in conducting epidemiological studies at an advanced level.
- apply design, implementation and analyses of studies.
- practise and discuss methods and problems associated with conducting large multicenter studies.

2. Content:

- Demonstration of the standardisation of methods in epidemiological studies based on standard operating procedures.
- Introduction to good epidemiological practice.
- Demonstration of the practical aspects when designing a study.
- Acquisition of skills for questionnaire development for specific questions.
- Presentation of quality assurance issues.
- Visits to ongoing research sites and practices in quality assurance.
- Documentation and quality assurance for data management and compiling analytical datasets are highlighted.
- Practical considerations for multi-center studies are demonstrated.

3. Teaching materials / references:
- Silman, A.J. & MacFarlane, G. (2002). Epidemiological Studies: A Practical Guide. (2nd ed) Cambridge University Press.
- Study Design and Statistical Analysis: A Practical Guide for Clinicians. Mitchell Katz Chapter 11 „Publishing Research".
- Recommended literature will be handed out in the course.

4. Teaching method:
- Seminar

5. Type of examination:
- Exercises

2.2 Specialization in Genetic Epidemiology

2.2.1 Genetic Epidemiology I

Modulverantwortlicher / Contact person: Dr. Christian Gieger		Email: christian.gieger@helmholtz-munich.de
ECTS (Credits) 12	Präsenzstudium/ Contact hours 120 *Std./ hours*	Selbststudium / Self-study: 235 *Std./ hours*
Teilnahmevoraussetzung / Prerequisites: Keine		
Verwendbarkeit des Moduls / Usability of the module: Master of Science Epidemiology		
MP Modulprüfung / Module Exam • Klausur (60-90 Minuten) – Benotung / Written exam (60-90 Minutes) – Graded		

1. Learning objectives:

The students
- know and understand the main characteristics of the human genome, can apply genomic knowledge in epidemiologic research, know the main issues of genetic research and can critically deal with problems in this field.
- know and apply the most important biological and medical databases as meta information for design and analysis.
- know and apply the main special study designs in genetic epidemiology.
- know and understand the main characteristics of pharmacogenetics, genetic counselling and ethical issues in the context of molecular epidemiology.

2. Content:
- Basic genetics, genetic epidemiology, biobanking and data handling in genetic epidemiology.
- Conduct and analysis of candidate gene and genome wide association studies, laboratory methods. Bioinformatics of genome wide association studies, advanced methods in genome wide association analyses.
- Special issues as pharmacogenomics, basis of genetic counselling and ethics in genetic studies.

Modulbestandteile

Lehrveranstaltung / Course	LV #	UF	PF	ECTS (SWS)	Benotung
Introduction to Genetic Epidemiology	Frd9	Sem		2 (1,5)	
Introduction to Genetic Epidemiology (GP)	Fre1	GP	WP	1 (1)	b/nb
Advanced Methods in Genetic Epidemiology	Fre2	Sem		4,5 (3)	
Advanced Methods in Genetic Epidemiology (Exercise)	Fre3	Ü	Ü	1,5 (1)	b/nb
Special Issues in Genetic Epidemiology	Fre6	Sem		3 (2)	

Lehrveranstaltung / Course 1: **Introduction to Genetic Epidemiology**	**LV Nummer:** Frd9		**LV Kürzel:** GEN101a
LV-Verantwortlicher / Contact person: Dr. Christian Gieger	**Email:** christian.gieger@helmholtz-munich.de		
ECTS (Credits) 2	**Präsenzstudium/ Contact hours** *20 Std./ hours*	**Selbststudium / Self-study:** 40 *Std./ hours*	**SWS:** 1,5
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit		

COURSE DESCRIPTION

1. Learning objectives:
The students:
- know and understand the main characteristics of the human genome, its variation in populations and the factors that determine genetic variation.
- can apply genomic knowledge in epidemiological research and know the main issues of genetic epidemiology and can critically deal with problems in this field.
- know examples of current research on complex diseases and can apply epidemiological methods when investigating the genetic contribution to complex diseases.
- know modern laboratory techniques in genomics as well as Knows modern databases and data concepts in genetic epidemiology.

2. Content:
- Introduction to basic genetics and genetic epidemiology. Illustration of biobanking and data handling in genetic epidemiology.
- Introduction to conduct and analysis of candidate gene association studies and genome wide association studies.
- Demonstration of laboratory methods and sequencing.

3. Teaching materials / references:
- script (lecture notes)

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 2: **Introduction to Genetic Epidemiology (Gerätepraktium)**	**LV Nummer:** Fre1	**LV Kürzel:** GEN101b
LV-Verantwortlicher / Contact person: Dr. Christian Gieger	**Email:** christian.gieger@helmholtz-munich.de	

ECTS (Credits) 1	**Präsenzstudium/ Contact hours** *15 Std./ hours*	**Selbststudium / Self-study:** 15 *Std./ hours*	**SWS:** 1

Teilnahmevoraussetzung / Prerequisites: Introduction to Genetic Epidemiologie (Lecture)

Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit

COURSE DESCRIPTION

1. <u>Learning objectives</u>:
The students:
- practice how to apply epidemiological methods when investigating the genetic contribution to complex diseases.
- know modern laboratory techniques in genomics and will apply these.
- can handle modern databases and data concepts in genetic epidemiology

2. <u>Content</u>:
- Application of theoretical foundations, which were taught in the course Introduction to Genetic Epidemiology.
- Definition and examples of analysis of complex diseases.

3. <u>Teaching materials / references</u>:
- specific software for molecular epidemiology
- Databases in genetic epidemiology

4. <u>Teaching method</u>:
- Practical training (laboratory techniques, statistical evaluation),

5. <u>Type of examination</u>:
- Scientific protocol

Lehrveranstaltung / Course 3: **Advanced Methods in Genetic Epidemiology**	**LV Nummer:** Fre2	**LV Kürzel:** GEN201a
LV-Verantwortlicher / Contact person: Dr. Christian Gieger	**Email:** christian.gieger@helmholtz-munich.de	

ECTS (Credits) 4,5	**Präsenzstudium/ Contact hours** *40 Std./ hours*	**Selbststudium / Self-study:** *90 Std./ hours*	**SWS:** 3

Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit

<table>
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1. Learning objectives:
The students
- know the design issues of genome wide studies
- know the statistical methods and concepts in genome wide studies
- know and can use the most important biological and medical databases as meta information for design and analysis
- know the theory and main methods in functional genomics and understand the interface with genetic epidemiology.
- know and understand the use of integrated biomedical information for hypothesis generation and analysis.
- overview by means of a case study the complete process from design of a study to publication of results.

2. Content:
- Introduction to bioinformatics and biostatistics of genome wide association analyses
- Advanced methods in genome wide association analyses.
- Presentation of meta-data: biological and medical annotation and integrated resources.
- By means of a case study the bioinformatics view, the biological view and the statistical view of genome wide association studies is demonstrated.

3. Teaching materials / references:
- Script (lecture notes**)**
- Internet

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 4: Advanced Methods in Genetic Epidemiology (Exercise)	**LV Nummer:** Fre3	**LV Kürzel:** GEN201b
LV-Verantwortlicher / Contact person: Dr. Christian Gieger		**Email:** christian.gieger@helmholtz-munich.de

ECTS (Credits) 1,5	**Präsenzstudium/ Contact hours** *15 Std./ hours*	**Selbststudium / Self-study:** *30 Std./ hours*	**SWS:** 1

Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München - Deutsches Forschungszentrum für Gesundheit und Umwelt

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1. Learning objectives:
- Students know all the steps from study design to publication of results.

2. Content:
- Application and specification of the course contents *Advanced Methods in Genetic Epidemiology* through practical exercises.

3. Teaching materials / references:
- Exercise sheets
- Exercise data set
- Internet

4. Teaching method:
- Exercises

5. Type of examination:
- Exercises

Lehrveranstaltung / Course 5: **Special Issues in Genetic Epidemiology**		**LV Nummer:** Fre6	**LV Kürzel:** GEN203
LV-Verantwortlicher / Contact person: Dr. Christian Gieger		**Email:** christian.gieger@helmholtz-munich.de	
ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *30 Std./ hours*	**Selbststudium / Self-study:** *60 Std./ hours*	**SWS:** 2
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit	
COURSE DESCRIPTION			

1. Learning objectives:
The students
- know and understand the main characteristics of pharmacogenomics, genetic counselling and ethical issues in the context of molecular epidemiology.
- learn selected examples in the field of pharmacogenomics, genetic counselling and ethical issues in the context of molecular epidemiology.
- know main issues of the issues listed above and can critically deal with problems in this field. Students
- learn with examples from the human genome project die advantages and problems of genetic research.
- know and can handle with modern laboratory techniques in pharmacogenomics and learn exemplarily monogenetic diseases their aetiology, consequences and forms.

2. Content:
- Illustration of the basis of pharmacogenomics with the help of selected examples.
- Introduction to genetic counselling, selected monogenic diseases, their forms and aetiology.
- Illustration of ethics in genetic studies

3. Teaching materials / references:
- Script (lecture notes)
- Current and introductory literature (to be announced)
- Internet

4. Teaching method:
- Seminar
- Group work

5. Type of examination:

2.2.2 Genetic Epidemiology II

Modulverantwortlicher / Contact person: Dr. Christian Gieger		**Email:** christian.gieger@helmholtz-munich.de	
ECTS (Credits) 6	**Präsenzstudium/ Contact hours** 55 *Std./ hours*	**Selbststudium / Self-study:** 105 *Std./ hours*	
Teilnahmevoraussetzung / Prerequisites:			
Verwendbarkeit des Moduls / Usability of the module: Master of Science Epidemiology			

MP Modulprüfung / Module Exam
- Klausur (60-90 Minuten) – Benotung / Written exam (60-90 minutes) – Graded

Modulbestandteile					
Lehrveranstaltung / Course	**LV #**	**UF**	**PF**	**ECTS (SWS)**	**Benotung**
Genetic Epidemiology of Complex Human Diseases	Fre4	Sem		4,5 (3)	
Genetic Epidemiology of Complex Human Diseases (Exercise)	Fre5	Ü	Ref	1,5 (1)	b/nb

Lehrveranstaltung / Course 1: **Genetic Epidemiology of Complex Human Diseases**	**LV Nummer:** Fre4	**LV Kürzel:** GEN202a
LV-Verantwortlicher / Contact person: Dr. Christian Gieger	**Email:** christian.gieger@helmholtz-munich.de	

ECTS (Credits) 4,5	**Präsenzstudium/ Contact hours** *40 Std./ hours*	**Selbststudium / Self-study:** *90 Std./ hours*	**SWS:** 3
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit		

COURSE DESCRIPTION

1. Learning objectives:
The students
- know and can apply the main special study design in genetic epidemiology.
- get an overview and learn selected examples in detail from the current state-of-the-art SNP-based research.
- know and can apply concepts in genetic epidemiological research and can interpret literature, can perform data analysis on selected data sets, and can present results from genetic epidemiological research.

2. Content:
- Introduction to family-based studies and SNP selection and population genetics.
- Introduction to Population-based studies and Genetic epidemiological studies on selected phenotypes.
- Illustration of Gene-Environment Interactions. Demonstration of advanced

concepts with applications.
- Illustration of GWA, its interpretation, problems and future.

3. Teaching materials / references:
- Lecture notes
- Literature recommendation
- Internet

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 2: **Genetic Epidemiology of Complex Human Diseases (Exercise)**	**LV Nummer:** Fre5	**LV Kürzel:** GEN202b
LV-Verantwortlicher / Contact person: Dr. Christian Gieger	**Email:** christian.gieger@helmholtz-munich.de	
ECTS (Credits) 1,5	**Präsenzstudium/ Contact hours** *15 Std./ hours*	**Selbststudium / Self-study:** *15 Std./ hours*	**SWS:** 1
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München- Deutsches Forschungszentrum für Umwelt und Gesundheit	

COURSE DESCRIPTION (E)

1. Learning objectives:
- Students apply the imparted knowledge on a selected project.

2. Content:
- Analysis, interpretation and discussion of a selected data set.

3. Teaching materials / references:
- Exercise data set
- Internet

4. Teaching method:
- Practical training (data analysis exercise, literature review)
- Case-study (one selected data set analyzed)

5. Type of examination:
- Presentation

2.3 Specialization in Clinical Epidemiology

2.3.1 Clinical Epidemiology I

Modulverantwortlicher / Contact person: Prof. Dr. Eva Hoster		Email: ehoster@ibe.med.uni-muenchen.de	
ECTS (Credits) 12	**Präsenzstudium/ Contact hours** *130 Std./ hours*	**Selbststudium / Self-study:** *230 Std./ hours*	

Teilnahmevoraussetzung / Prerequisites:

Verwendbarkeit des Moduls / Usability of the module:
Master of Science Epidemiology

MP Modulprüfung / Module Exam
• Klausur (60-90 Minuten) – Benotung / Written exam (60-90Minutes) – Graded

1. Learning objectives:

Students are able
- to use appropriately IT-instruments for own clinical study projects.
- to design a clinical study project in accordance with regulatoric conditions.

2. Content:
- Technical basics and concepts of information technology in hospital environments, regulatoric boundary conditions of clinical research.

Modulbestandteile					
Lehrveranstaltung / Course	**LV #**	**UF**	**PF**	**ECTS (SWS)**	**Benotung**
Medical Informatics and Regulatory Issues in Clinical Research	Fre7	Sem		3 (3)	
Medical Informatics and Regulatory Issues in Clinical Research (Exercise)	Fre8	Ü	Ü	3 (1,5)	b/nb
Advanced Methods in Clinical Epidemiology: Design, Evidence Synthesis, Safety and Quality	Fre9	Sem		3 (3)	
Advanced Methods in Clinical Epidemiology: Design, Evidence Synthesis, Safety and Quality (Exercise)	Frf1	Ü	Ü	3 (1,5)	b/nb

Lehrveranstaltung / Course 1: **Medical Informatics and Regulatory Issues in Clinical Research**	**LV Nummer:** Fre7	**LV Kürzel:** KLIN201a
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster	**Email:** ehoster@ibe.med.uni-muenchen.de	
ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *45 Std./ hours*	**Selbststudium / Self-study:** *45 Std./ hours*	**SWS:** 3
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** IBE	
COURSE DESCRIPTION		

1. <u>Learning objectives</u>:
Students are aware
- of basic concepts of data modeling and programming.
- of the basic structure of relational databases and internet applications.

2. <u>Content</u>:
- The first part of this seminar presents basic concepts of information processing as well as specific information technologies and aspects of IT project management that are of particular relevance to medical/clinical information systems.
- Basic concepts covered include procedural and declarative programming, data types, coding of information, data formats and standardisation.
- Internet and database technologies are covered in greater detail, with a special focus on security and data protection.
- These topics are supplemented by methods of IT project development and implementation with special emphasis on the requirements of clinical research and quality assurance
- The second part consists of an introduction to legal and ethical foundations of clinical trials and the resulting practical considerations.
- Following a presentation of the main assertions of relevant legal sources (Arzneimittelgesetz, AMG; Medizinproduktegesetz, MPG; European Law) and guidelines, in particular Good Clinical Practice (GCP-ICH), the curriculum includes the specific implementation of clinical trials and the compilation of the core documents. The latter includes general procedural documentation (e.g., Standard Operating Procedure; SOP) as well as trial-specific documents: protocol, patient informed consent, case report form (CRF), trial report.
- In addition, the structure of quality assurance and the special requirements of drug safety and concomitant legal obligations concerning documentation and notification are covered.

3. <u>Teaching materials / references</u>:
- Textbooks on medical applications, e.g., Shortliffe et al., Medical Informatics
- Introductory textbooks on general informatics and databases
- Original articles, laws and regulations on legal aspects of information processing.
- Book about clinical studies (e.g. Schuhmacher und XXX)
- Law books and official guidelines (ICH E XXX-YYY)

4. <u>Teaching method</u>:
- Seminar

5. <u>Type of examination</u>:

Lehrveranstaltung / Course 2: **Medical Informatics and Regulatory Issues in Clinical Research (Exercise)**	**LV Nummer:** Fre8	**LV Kürzel:** KLIN201b
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster	**Email:** ehoster@ibe.med.uni-muenchen.de	
ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *20 Std./ hours*	**Selbststudium / Self-study:** *70 Std./ hours*	**SWS:** 1,5
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** IBE	

COURSE DESCRIPTION

1. <u>Learning objectives</u>:
The students
- can formulate simple specifications of data structures and requirements related to database systems and internet [2] applications for clinical trials.
- are able to compile the documents needed during planning and execution of clinical trials.

2. <u>Content</u>:
- In addition to specific exercise problems on the basic concepts of information processing, a major focus of this exercise is to "run through" an example trial.

3. <u>Teaching materials / references</u>:
- Exercise sheets

4. <u>Teaching method</u>:
- Provision of exercises
- Supervision

5. <u>Type of examination</u>:
- Exercises

Lehrveranstaltung / Course 3: **Advanced Methods in Clinical Epidemiology: Design, Evidence Synthesis, Safety and Quality**	**LV Nummer:** Fre9	**LV Kürzel:** KLIN202a
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster		**Email:** ehoster@ibe.med.uni-muenchen.de

ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *45 Std./ hours*	**Selbststudium / Self-study:** *45 Std./ hours*	**SWS:** 3
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE	

COURSE DESCRIPTION

1. Learning objectives:

The students

- have an understanding about how to develop complex study designs (sequential designs, adaptive / flexible designs, preliminary analysis, adaptation of designs) in theory and practice.
- know how to verify the effectiveness of complex interventions and gain in depth knowledge about the development of guidelines for clinical practice.
- are able to critically assess register-based evidence and have gained an understanding about concepts of pharmaceutical safety in the clinic and in clinical studies.
- know concepts of quality assurance in the clinic as well as advanced concepts of research in the provision of health care.

2. Content:

- Complex designs (sequential studies, adaptive and flexible designs) are introduced.
- Practical and regulatory implications in studies with complex designs are discussed.
- Advanced topics for prognostic studies, diagnosis studies, and studies in health economics will be introduced.
- The methodological strategy of IQWiG ("Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen") and NICE ("National Institute for Clinical Excellence") will be presented.
- Praxis and theory in the development of treatment guidelines will be taught and aspects of safety, pharmacovigilance and pharmacoepidemiology will be introduced.
- Instruments and strategies of quality assurance in the clinic will be presented as well as study designs for assessing clinical quality and foundations of health services research will be introduced.

3. Teaching materials / references:

- Course book
- Original medical articles
- Original literature about methodological aspects of the course

4. Teaching method:

- Seminar

5. Type of examination:

Lehrveranstaltung / Course 4:			
Advanced Methods in Clinical Epidemiology: Design, Evidence Synthesis, Safety and Quality (Exercise)		**LV Nummer:** Frf1	**LV Kürzel:** KLIN202b
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster		**Email:** ehoster@ibe.med.uni-muenchen.de	
ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *20 Std./ hours*	**Selbststudium / Self-study:** *70 Std./ hours*	**SWS:** 1,5
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE	
COURSE DESCRIPTION			

1. Learning objectives:
- Students know how to apply the theory learned within the course "Advanced Methods in Clinical Epidemiology: Design, Evidence Synthesis, Safety and Quality".

2. Content:
- Exercises for each of the topics discussed in the course "Advanced Methods in Clinical Epidemiology: Design, Evidence Synthesis, Safety and Quality".

3. Teaching materials / references:
- Exercise sheets

4. Teaching method:
- Provision of exercises
- Supervision

5. Type of examination:
- Exercises

2.3.2 Clinical Epidemiology II

Modulverantwortlicher / Contact person: Prof. Dr. Eva Hoster	Email: ehoster@ibe.med.uni-muenchen.de

ECTS (Credits) 6	Präsenzstudium/ Contact hours *70 Std./ hours*	Selbststudium / Self-study: *110 Std./ hours*

Teilnahmevoraussetzung / Prerequisites:

Verwendbarkeit des Moduls / Usability of the module:

Master of Science Epidemiology

MP Modulprüfung / Module Exam
- Klausur (60-90 Minuten) – Benotung / Written exam (60-90 Minutes) – Graded

1. **Learning objectives:**
- Students know how to choose the appropriate endpoint for our clinical question at hand by choosing and applying the appropriate statistical model to quantify complex clinical phenomena.

2. **Content:**
- Concepts for primary endpoints in clinical research, modelling of clinical phenomena using advanced statistical instruments.
-

Modulbestandteile					
Lehrveranstaltung / Course	**LV #**	**UF**	**PF**	**ECTS (SWS)**	**Benotung**
Defining and Measuring Endpoints for Clinical Studies	Frf2	Sem		1,5 (2)	
Defining and Measuring Endpoints for Clinical Studies (Exercise)	Frf3	Ü	HAr	1,5 (1)	b/nb
Clinical Epidemiology: Advanced Statistical Methods	Frf4	Sem		1,5 (2)	
Clinical Epidemiology: Advanced Statistical Methods (Exercise)	Frf5	Ü	HAr	1,5 (1)	b/nb

Lehrveranstaltung / Course 1: **Defining and Measuring Endpoints for Clinical Studies**	LV Nummer: Frf2	LV Kürzel: KLIN203a

LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster	Email: ehoster@ibe.med.uni-muenchen.de	

ECTS (Credits) 1,5	Präsenzstudium / Contact hours *25 Std./ hours*	Selbststudium / Self-study: *20 Std./ hours*	SWS: 2

Veranstaltungssprache(n) / Language(s): Englisch (English)	Veranstaltungsort / Location: IBE

COURSE DESCRIPTION

1. **Learning objectives:**
The students
- have an understanding about the concept of a clinically relevant endpoint as well

as the concept of a surrogate endpoint.
- gain insight into the meaning of scores in clinical research and are able to critically asses their use in case studies.
- know about the role of scores for measures in human functioning and their application in various medical areas for clinical research questions.

2. Content:
- Training in the concepts of clinically relevant study endpoints and of surrogate endpoints is given.
- The meaning of Scores as endpoints of clinical studies is explained.
- An introduction in the process of Score development is given.
- Knowledge is imparted in the basic concepts: validity, reliability and objectivity.
- Training in applying functional scores in various medical areas is given as well as an introduction to the International Classification of Functioning, Disability and Health (ICF) and the definition of the ICF core sets.
- Knowledge about new developments in the definition and the measure of human functioning will be applied in case studies.

3. Teaching materials / references:
- Original medical articles
- Original literature about methodological aspects of the course

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 2: **Defining and Measuring Endpoints for Clinical Studies (Exercise)**		**LV Nummer:** Frf3	**LV Kürzel:** KLIN203b
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster		**Email:** ehoster@ibe.med.uni-muenchen.de	
ECTS (Credits) 1,5	**Präsenzstudium/ Contact hours** *10 Std./ hours*	**Selbststudium / Self-study:** *35 Std./ hours*	**SWS:** 1
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE	
COURSE DESCRIPTION			

1. Learning objectives:
- The students are able to apply the learned theory within the course "Defining and Measuring Endpoints for Clinical Studies" to problems of clinical research.

2. Content:
- Application and specification of the topics discussed in the course "Defining and Measuring Endpoints for Clinical Studies" through practical exercises to the case studies introduced during the seminar.

3. Teaching materials / references:
- Exercise sheets

4. Teaching method:
- Exercises

5. Type of examination:
- Research report

Lehrveranstaltung / Course 3: **Clinical Epidemiology: Advanced Statistical Methods**	**LV Nummer:** Frf4	**LV Kürzel:** KLIN204a
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster	**Email:** ehoster@ibe.med.uni-muenchen.de	
ECTS (Credits) 1,5	**Präsenzstudium/ Contact hours** *25 Std./ hours*	**Selbststudium / Self-study:** *20 Std./ hours*	**SWS:** 2
Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** IBE	

COURSE DESCRIPTION

1. Learning objectives:

The students
- will be able to apply the Cox regression to individual prognosis.
- are trained to apply modern regression methods for modelling of clinical issues (semiparametric regression, splines, generalized additive models (GAM), quantile regression).
- will be able to use Bayesian methods especially in modelling of longitudinal and clustered data.

2. Content:
- The students are introduced into the advanced Cox models.
- The modelling of functional relationships as well as model adaption checks are presented and how to use the Cox model for the estimation of individual risks.
- Furthermore, Students are introduced to semiparametric regression methods by training in the basic concepts of GAMs and quantile regression.
- Knowledge of validation and model diagnostic in complex regression methods is imparted.
- Fundamentals, concepts of and the use of MCMC (Markov Chain Monte Carlo) methods in Bayesian statistics are presented.
- An introduction to the theory and application of LMEs (linear mixed effect models) as well as GEEs (generalized estimating equations) is given.

3. Teaching materials / references:
- Book
- Script on how to handle statistical methods (R as a language): vignette
- Original literature about methodological aspects of the course
- Applied medical articles

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 4:				
Clinical Epidemiology: Advanced Statistical Methods (Exercise)		**LV Nummer:** Frf5		**LV Kürzel:** KLIN204b
LV-Verantwortlicher / Contact person: Prof. Dr. Eva Hoster		**Email:** ehoster@ibe.med.uni-muenchen.de		
ECTS (Credits) 1,5	**Präsenzstudium/ Contact hours** *10 Std./ hours*	**Selbststudium / Self-study:** *35 Std./ hours*		**SWS:** 1
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE		
COURSE DESCRIPTION				

1. <u>**Learning objectives**</u>**:**
   - Practical applications of the learned theory within the course: "Clinical Epidemiology: Advanced Statistical Methods"
   -

2. <u>**Content**</u>**:**
   - Exercises for each of the topics discussed in the course: : "Clinical Epidemiology: Advanced Statistical Methods"

3. <u>**Teaching materials / references**</u>**:**
   - Exercise sheets

4. <u>**Teaching method**</u>**:**
   - Exercises

5. <u>**Type of examination**</u>**:**
   - Research report

2.4 Specialization in Environmental and Occupational Epidemiology

2.4.1 Environmental and Occupational Epidemiology I

Modulverantwortlicher / Contact person: Prof. Dr. Annette Peters, Prof. Dr. Katja Radon	**Email:** peters@helmholtz-muenchen.de Katja.Radon@med.uni-muenchen.de

ECTS (Credits) 12	**Präsenzstudium/ Contact hours** *90 Std./ hours*	**Selbststudium / Self-study:** *240 Std./ hours*

Teilnahmevoraussetzung / Prerequisites:

Verwendbarkeit des Moduls / Usability of the module:

Master of Science Epidemiology

MP Modulprüfung / Module Exam
- Klausur (90-120 Minuten) – Benotung / Written exam (90-120 Minutes) – Graded

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COURSE DESCRIPTION

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1. <u>**Learning objectives:**</u>
The students
- know and understand methods and basic principles of environmental toxicology and environmental epidemiology;
- are able to design, perform, and analyse an epidemiological study of health risks caused by environmental or occupational factors;
- know the main radiation-induced health effects and the main epidemiological studies in the fields of ionizing and non-ionizing radiation

2. <u>**Content:**</u>
- Basics of environmental toxicology and, environmental epidemiology;
- essential environmental exposures;
- major problematic fields of Environmental and Occupational Epidemiology in Germany, Europe and globally;
- important exposures in the environment and particularities in the work site;
- important study designs and their application in EE and OE;
- basics of radiation physics, known radiation induced health effects, methods in radiation epidemiology.

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Modulbestandteile

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Lehrveranstaltung / Course	LV #	UF	PF	ECTS (SWS)	Benotung
Fundamentals of Environment, Occupation and Health	Frm3	VL		3 (2)	
Environmental Epidemiology	Frf6	Sem		3 (2)	
Occupational Epidemiology	Frf7	Sem		3 (2)	
Radiation Epidemiology	Frf8	Sem		3 (2)	

Lehrveranstaltung / Course 1: **Basics of Environment, Work and Health**		**LV Nummer:** Frm3	**LV Kürzel:** ENVR201
LV-Verantwortlicher / Contact person: Prof. Dr. Annette Peters, Prof. Dr. Katja Radon		**Email:** peters@helmholtz-muenchen.de Katja.Radon@med.uni-muenchen.de	
ECTS (Credits): 3	**Präsenzstudium/ Contact hours** 30 *Std./ hours*	**Selbststudium / Self-study:** 60 *Std./ hours*	**SWS:** 2
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** Bibliothek der Arbeitsmedizin, Ziemssenstr. 1	

COURSE DESCRIPTION

1. Learning objectives:
The students
- know and understand basic concepts and problems of the subject area "environmental and occupational health" as well as methods and basic principles of environmental epidemiology, occupational epidemiology and environmental toxicology.
- know essential environmental and occupational exposures and their evaluation.
- know pros and cons of different study designs in environmental and occupational epidemiology.
- know methods of exposure assessment.
- are able to apply the methods in case studies.
- are able to analyse and evaluate health effects related to environmental exposures and of possible intervention measures.
- acquire knowledge and ability to develop measures of environmental health promotion.

2. Content:
Within this lecture,
- concepts and problems of the subject area "environmental and occupational health" will be highlighted,
- basics of environmental epidemiology, occupational epidemiology, environmental toxicology, exposure and risk assessment will be presented, and
- knowledge of essential environmental exposures as well as different areas of environmental and occupational health will be imparted.

3. Teaching materials / references:
- Lecture notes
- References / Scientific literature (journal articles, book chapters)
- Paul Wilkinson. Environmental Epidemiology. 2006
- Mark J. Nieuwenhuijsen. Exposure Assessment in Occupational and Environmental Epidemiology. 2003
- Howard Frumkin. Environmental Health. From Global to Local. 2005
- Rainer Fehr et al. Umwelt und Gesundheit. 2005

4. Teaching method:
- Lecture with discussion
- Group work
- E-Learning

5. Type of examination/s:

Lehrveranstaltung / Course 2: **Environmental Epidemiology**		**LV Nummer:** Frf6	**LV Kürzel:** ENVR201a
LV-Verantwortlicher / Contact person: Prof. Dr. Annette Peters, Dr, Susanne Breitner, Dr. Alexandra Schneider		**Email:** peters@helmholtz-muenchen.de susanne.breitner@helmholtz-munich.de alexandra.schneider@helmholtz-munich.de	
ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *30 Std./ hours*	**Selbststudium / Self-study:** *60 Std./ hours*	**SWS:** 2
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit / IBE	
COURSE DESCRIPTION			

1. Learning objectives:
The students
- are able to design, perform, and analyse an epidemiological study of health risks caused by environmental factors, thereby collaborating with statisticians and measurement engineers.
- are able to adequately communicate study results and the risks of environmental pollutants and know about current problematic areas of environmentally epidemiology.

2. Content:
- Presentation of major problematic fields of Environmental Epidemiology (EE) in Germany, Europe and globally and important exposures in the environment.
- Important study designs and their application in EE and particularities of exposure assessment in EE are identified.
- The problems of measurement errors are discussed.
- Presentation of particularities with vulnerable persons.
- Acquisition of critical judgement of litherature in EE and Utilisation of routine data.
- Compilation of a study journal for epidemiological environmental studies.

3. Teaching materials / references:
- Script (lecture notes)
- References

4. Teaching method:
- Seminar

5. Type of examination:

Lehrveranstaltung / Course 3: **Occupational Epidemiology**		**LV Nummer:** Frf7	**LV Kürzel:** ENVR201b
LV-Verantwortlicher / Contact person: PD Dr. Tobias Weinmann, Laura Wengenroth .		**Email:** laura.wengenroth@med.uni-muenchen.de Tobias.Weinmann@med.uni-muenchen.de	
ECTS (Credits): 3	**Präsenzstudium/ Contact hours**	**Selbststudium / Self-study:**	**SWS:** 2

	30 *Std./ hours*	60 *Std./ hours*	
Veranstaltungssprache(n) / Language(s): Englisch / English		**Veranstaltungsort / Location:** Bibliothek der Arbeitsmedizin, Ziemssenstr. 1	

4. Unterrichtsform:
- Seminar (E-Learning, Gruppenarbeit)

5. Prüfungsform/en:

COURSE DESCRIPTION

1. Learning objectives:
The students
- know the most important problems in occupational epidemiology (OE) in Germany, Europe and globally and will be able to define them.
- will learn how to analyse and interpret disease clusters in the enterprise.
- will know different study designs and their use in OE.
- will be familiar with The special features of exposure assessment in OE.
- will be enabled to use Job Exposure Matrices.
- will know and understand special features of the workplace, especially the healthy worker
- will be able to critically analyse the literature in OE. They will be able to use routine data in praxis and to use screening data.
- will know and understand the calculation of SMRs
- will be able to develop a study protocol for a study in occupational epidemiology.
- will be enabled to to plan, implement and analyse an epidemiological study related to occupational health risks in cooperation with statisticians and safety engineers.
- will acquire knowledge to adequately disseminate the results and to critically assess existing literature.
- will be able to describe and critically assess new problem areas related to occupational epidemiology (e.g. psycho-mental burden, globalisation, etc).

2. Content:
- Introduction to and definition of the most important problems in occupational epidemiology (OE) in Germany, Europe and globally.
- Analysis and interpretation of disease clusters in the enterprise. Comparison of different study designs and their use in OE will be contrasted and the methods of industry based and population based studies.
- Discussion of special features of exposure assessment in OE. Application of Job Exposure Matrices.
- Development of special features of the workplace, especially the healthy worker effect.
- Critical analysis of the literature in OE. Application of routine data in praxis and of screening data. Calculation of SMRs. Development of a study protocol for a study in occupational epidemiology.

3. Teaching materials / references:
- H. Checkoway, N. Pearce, D. Kriebel: Research Methods in Occupational Epidemiology. 2004.
- M. Nieuwenhuijsen: Exposure Assessment in Occupational and Environmental Epidemiology. 2003.
- ggf. R. Leonard, B. Dawson: Applied Occupational Epidemiology for Industrial Hygienists. 2007.
- D. Coggon, G. Rose, D. Parker: Epidemiology for the uninitiated, 5th edition (www.bjm.com/epidem/epid/shtml
- e-learning case study
- Handouts

4. Teaching method:
- Seminar (E-Learning, group work)

5. Type of examination/s:

Lehrveranstaltung / Course 4:		LV Nummer:	LV Kürzel:
Radiation Epidemiology		Frf8	ENVR201c
LV-Verantwortlicher / Contact person: Dr. Peter Scholz-Kreisel		**Email:** pscholz-kreisel@bfs.de	
ECTS (Credits) 3	**Präsenzstudium/ Contact hours** *30 Std./ hours*	**Selbststudium / Self-study:** *60 Std./ hours*	**SWS:** 2
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE	

COURSE DESCRIPTION

1. Learning objectives:
The students
- know the basics of radiation physics, the main sources and doses (medicine, occupation, environment, accident)
- know the main radiation-induced health effects
- know and understand methods in radiation epidemiology (e.g. risk models, dosimetry) and are able to apply these methods by themselves
- have an overview over the main epidemiological studies in the fields of ionizing and non-ionizing radiation
- are able to critically evaluate and communicate results of studies in radiation epidemiology, particular in areas of conflict between population, media, authorities and policy
- know and understand main radiation protection concepts as well as the duties and objectives of national and international radiation protection organisations.

2. Content:
- Basics of radiation physics, sources and doses;
- Known radiation induced health effects;
- Methods in radiation epidemiology
- Review of main epidemiological studies on ionizing and non-ionizing radiation
- From risk assessment, risk evaluation, risk communication to regulation.
- Introduction in radiation protection concepts, national and international organisations.

3. Teaching materials / references:
- Script (lecture notes)
- References (scientific papers)

4. Teaching method:
- Seminar
- Group work

5. Type of examination:

2.4.2 Environmental and Occupational Epidemiology II

Modulverantwortlicher / Contact person:		Email:
Prof. Dr. Annette Peters		peters@helmholtz-muenchen.de
ECTS (Credits) 6	**Präsenzstudium/ Contact hours** *60 Std./ hours*	**Selbststudium / Self-study:** *120 Std./ hours*

Teilnahmevoraussetzung / Prerequisites:

Verwendbarkeit des Moduls / Usability of the module:
Master of Science

MP Modulprüfung / Module Exam
- Referat (30-60 Minuten) – Benotung / Presentation (30-60 Minutes) – Graded

COURSE DESCRIPTION

1. Learning objectives:
The students
- have basic knowledge of risk assessment and its main application areas and are familiar with various aspects of exposure modelling.
- gain experience with practical methods and problems associated with exposure assessment.

2. Content:
- Basics of risk communication and assessment;
- exposure assessment in environmental and occupational studies.

Modulbestandteile

Lehrveranstaltung / Course	LV #	UF	PF	ECTS (SWS)	Benotung
Risk Assessment in Environmental and Occupational Epidemiology	Frf9	Sem		3 (2)	
Practical Applications of Environmental and Occupational Epidemiology	Frg1	Sem		3 (2)	

Lehrveranstaltung / Course 1	LV Nummer:	LV Kürzel:
Risk Assessment in Environmental and Occupational Epidemiology	Frf9	**ENVR202**

LV-Verantwortlicher / Contact person: Prof. Dr. Annette Peters, Dr. Susanne Breitner, Dr. Alexandra Schneider	**Email:** peters@helmholtz-muenchen.de susanne.breitner@helmholtz-munich.de alexandra.schneider@helmholtz-munich.de

ECTS (Credits): 3	**Präsenzstudium/ Contact hours** *30 Std*	**Selbststudium / Self-study:** *60*	**SWS:** 2

Veranstaltungssprache(n) / Language(s): Englisch (English)	**Veranstaltungsort / Location:** Helmholtz Zentrum München-Deutsches Forschungszentrum für Umwelt und Gesundheit / IBE

COURSE DESCRIPTION

1. <u>Learning objectives</u>:
The students
- have basic knowledge of risk assessment and its main application areas.
- are familiar with various aspects of exposure modelling and conventional deterministic exposure assessment

2. <u>Content:</u>
- Presentation of basics of risk assessment and its application areas.
- Basic modelling aspects in exposure assessment.
- Description of exposure scenarios.
- Definitions of data sources for exposure assessment.
- Demonstration of variability and uncertainty in risk assessment: alternative approaches.
- Presentation of Human Biomonitoring basics and application areas.
- Communication of risk characterisation.

3. <u>Teaching materials / references</u>:
- Script (lecture Notes)

4. <u>Teaching method:</u>
- Seminar
- Group Work

5. <u>Type of examination/s:</u>

Lehrveranstaltung / Course 2:	LV Nummer:	LV Kürzel:
Practical Applications of Environmental and Occupational Epidemiology	Frg1	**ENVR203**

LV-Verantwortlicher / Contact person: Prof. Dr. Annette Peters, Dr. Susanne Breitner, Dr. Alexandra Schneider	**Email:** peters@helmholtz-muenchen.de susanne.breitner@helmholtz-munich.de alexandra.schneider@helmholtz-munich.de

ECTS (Credits) 3	Präsenzstudium/ Contact hours *30 Std./ hours*	Selbststudium / Self-study: 60 *Std./ hours*	SWS: 2
Veranstaltungssprache(n) / Language(s): Englisch (English)		**Veranstaltungsort / Location:** IBE	

COURSE DESCRIPTION

1. Learning objectives:
- Students learn about the practical issues in conducting studies to assess environmental and occupational health.

2. Content:
- The course focuses on design, implementation and analyses of environmental and occupational studies.
- Methods and problems associated with exposure assessment are presented, discussed and practised.
- Highlighting strategies identifying environmental agents responsible for health effects by historical examples and visiting ongoing research

3. Teaching materials / references:
- B.C. Armstrong, E. White, R. Saracci: Principles of Exposure Measurement in Epidemiology
- M. Nieuwenhuijsen: Exposure Assessment in Occupational and Environmental Epidemiology. 2003

4. Teaching method:
- Seminar

5. Type of examination:

2.5 Advanced Biometry I and II

Contact person: Prof. Dr Anne-Laure Boulesteix		Email: boulesteix@ibe.med.uni-muenchen.de
Credits: 18	**Contact hours:**	**Self-study:**
Prerequisites:		
Usability of the module: • Master of Science Epidemiology		
Module Exam • Oral presentation (75% of the grade) • Home work (25% of the grade)		

1. Learning objectives:
The students
- know complex statistical methods
- can apply these methods to concrete examples
- can evaluate advanced statistical methods in published scientific articles

2. Content
- This module teaches knowledge and the application of complex statistical methods in epidemiology
- Students choose four of the following topics:
  - Statistics for clinical studies
  - Statistics for diagnostic studies

- Longitudinal data analysis
- Learning with statistics, especially for high-dimensional data
- Survival analysis (3 ECTS)
- In an introductory lecture, students receive materials on the selected topics in the form of lecture slides and books as well as exercise sheets. The solutions to the exercise sheets must be handed in by a certain date. These exercise sheets are not graded. They are intended to facilitate communication between lecturers and students and to show students what is expected of them in the module. Each week, students can discuss the solutions to the exercise sheets and ask questions to the teacher(s) at a personal meeting.

3 Additional Electives

3.1 Health Geography – GIS and geospatial method

Contact person: PD Dr. Daniela Koller, PD Dr. Ursula Berger		Email: berger@ibe.med.uni-muenchen.de
Credits: 3	**Contact hours:**	**Self-study:**
Prerequisites:		
Usability of the module: • Master of Science Epidemiology		
Module Exam • Written homework based on pratical exercises		

1. Learning objectives:

The students
  • Are able to explain the relationships between health and geography
  • Can apply basic spatial analyses using GIS and spatial statistics..

2. Content
  • This seminar introduces students to the interdisciplinary topics of health geography. The focus is on regional factors influencing health and methods for measuring and analyzing spatial patterns of diseases and risk factors ("spatial epidemiology").
  • Students learn how to use basic functions of a free open source geographic information system (GIS) and how to create simple maps.
  • In a field exercise, health factors are geocoded and transferred to GIS. Spatial statistical methods and applications will be presented using an open source tool.
  • The seminar combines frontal lectures with breaks for discussions and exercises in the theoretical part.
  • In the practical part, GIS and spatial statistics will be taught in step-by-step computer lectures and data will be collected in field work.

3.2 Health Communication

Contact person: Brigitte Strahwald		Email: bstrahwald@ibe.med.uni-muenchen.de
Credits: 6	**Contact hours:**	**Self-study:**
Prerequisites:		
Usability of the module: • Master of Science Epidemiology		
Module Exam • Oral presentation – individual performance • Written report – individual performance • Project work – group performance		

1. Learning objectives:

The students can
  • analyse and critically evaluate key topics and methods of health communication
  • communicate the results via different channels and formats
  • implement and critically apply what they have learned in a health communication project.

2. Content

- The course provides an overview of the topic of health communication and teaches basic knowledge and selected practical skills. The focus is on health communication in general, health campaigns, health literacy, risk communication and crisis communication.

3.3 Nutritional Epidemiology

Contact person:		Email:
Prof. Dr. Jakob Linseisen		jakob.linseisen@med.uni-augsburg.de
Credits: 3	**Contact hours:**	**Self-study:**
Prerequisites:		
Usability of the module: • Master of Science Epidemiology		
Module Exam • Written exam		

1. Learning objectives:
The students
- Are able to correctly describe and interpret dietary intake data
- Can use dietary data appropriately as exposure variables in statistical models of the association between diet and disease

2. Content
- The aim of this course is to familiarise students with the strengths and limitations of methods for describing nutrition and dietary habits. In addition, students will learn about biomarkers for diet and their use in epidemiological studies as well as current methods of evidence generation in the field of nutrition and disease risk and the formulation of public recommendations.

3.4 Applied statistics in Epidemiology

Contact person:		Email:
Dr. Roman Hornung		hornung@ibe.med.uni-muenchen.de
Credits: 6	**Contact hours:**	**Self-study:**
Prerequisites:		
Usability of the module: • Master of Science Epidemiology		
Module Exam • Written exam		

1. Learning objectives:
The students
- Are able to correctly describe and interpret dietary intake data
- Can use dietary data appropriately as exposure variables in statistical models of the association between diet and disease

2. Content
- The aim of this course is to familiarise students with the strengths and limitations of methods for describing nutrition and dietary habits. In addition, students will learn about biomarkers for diet and their use in epidemiological studies as well as current methods of evidence generation in the field of nutrition and disease risk and the formulation of public recommendations.

4 Electives from the MPH-Programme

All electives from th MSc PH programme that are presented in English can be attended by the students of the MSc Epidemiology programme. For details regarding these electives please refer to the Handbook of Modules of the MSc PH programme.