Universität Bremen

Faculty 03: Mathematics/Computer Sciences

Wintersemester 26/27

Module Guide

for the study of

Medical Biometry/Biostatistics

Masterstudiengang

valid in connection with the examination regulations MPO 2026

According to the Examination Regulation of the Master's Program Medical Biometry/Biostatistics (Single Major Subject) dated xx xx, xxxx.

Generated: August 27, 2025

Index by areas of study

1) Draft: Compulsory Modules (87 CP)

Compulsory Modules with a sum of 87 CP. Listing according to Curriculum.

2) Draft: Elective Modules (3 CP)

For the elective area, in addition to the supplementary studies, modules or courses from related or content-related disciplines can also be completed in Faculty 3 and on the basis of a cooperation agreement with Faculty 11; for example from the following areas:

- Computer Science
- Statistics
- Special Areas of Epidemiology
- Public Health

3) Draft: Master Thesis (30 CP)

Module 03-MAT-MA-BioStat-A-1-2026: Biometrical Methods
Biometrical Methods

Assignment to areas of study:
- Draft: Compulsory Modules

Content-related prior knowledge or skills:
none

Learning content:
- Descriptive Statistics
- Point and interval estimators
- Principle of statistical testing (decision procedure, error rates, p-values, power)
- Selected statistical testing procedures (Z-test, t-test, chi-square test, two-sample t-test)
- Sample size calculation
- Introduction to statistical causal inference and causal estimands
- DAGs: directed acyclic graphs
- Basic methods of causal inference: inverse probability of treatment weighting and standardisation
- Time-depedent treatments and g-methods
- Methods for heterogeneous causal effects
- Basic concepts of machine learning
- Supervised and unsupervised learning
- Overfitting, performance evaluation and hyperparameter tuning
- Basic learning algorithms: Decision trees, random forests, neural networks

Learning outcomes / competencies / targeted competencies:
- Knowledge of the most important procedures of descriptive statistics
- Knowledge of general methodology of sample size calculation in biometrical studies
- Knowledge of the basic methods of inferential statistics
- Firm apprehension of several test and analysis methods based on the normal distribution or the binomial distribution
- Ability to translate a causal research question into formal causal estimand
- Ability to identify potential sources of bias using DAGs (with software DAGitty)
- Ability to use standard software to carry out a causal analysis and investigate heterogeneity
- Ability to interpret results and critical assess the validity of structural assumptions
- Ability to use machine learning for prediction modeling
- Ability to evaluate and benchmark learning algorithms
- Ability to implement machine learning pipelines in R
- Ability to apply the learned estimation and testing procedures in SAS and R

Calculation of student workload:
92 h Preparation / follow-up work
80 h Exam preparation
98 h SWS / presence time / working hours

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Prof. Dr. Marvin Nils Ole Wright

Frequency:
biennial cycle - winter semester

Duration:
2 semester[s]

The module is valid since / The module is valid until:
WiSe 26/27 / -

Credit points / Workload:
9 / 270 hours

Module examinations

Module examination: Basic Biometrical Methods

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Modern Methods in Biostatistics

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

Module courses

Course: Basic Biometrical Methods

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):
Lecture
Tutorial

Associated module examination:
Basic Biometrical Methods

• • • • • • • • •

Course: Modern Methods in Biostatistics

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
4,00

Teaching format(s):
Lecture
Tutorial

Associated module examination:
Modern Methods in Biostatistics

Module 03-MAT-MA-BioStat-A-2: Statistical Modeling
Statistical Modeling

Assignment to areas of study:
- Draft: Compulsory Modules

Content-related prior knowledge or skills:
none

Learning content:
a) Statistical modeling I

- Introduction to probability calculation
- Discrete and continuous random variables and their parameters, density and distribution functions
- Law of large numbers, central limit theorem
- Parameter estimation and confidence intervals

b) Statistical modeling II

- Multi-dimensional distributions, correlation
- Representation using matrices and vectors
- Linear regression, in particular parametrization of explanatory variables, dummy and effect coding of factors
- Parameter estimation, least squares methods and normal equations
- Model selection and variable selection
- Regression diagnostics
- General linear models (heteroscedastic and correlated errors)

Learning outcomes / competencies / targeted competencies:
a) Statistical modeling I

- Knowledge of the basics of biometric models
- Comprehension of variability: random and systematic effects
- Comprehension of basic probability calculation
- Comprehension of the basics of inferential statistics

b) Statistical modeling II

- Knowledge of the linear model, in particular comprehension of model assumptions, mathematical reasoning and the mathematical formulation
- Knowledge of possible sources of modeling errors
- Ability to independently plan and analyze a study applying linear models
- Competence in the interpretation of parameters and model diagnostics
- Competence in using modeling and analysis software
- Competence in variable selection, model selection and the construction of prognostic indices

Calculation of student workload:
112 h SWS / presence time / working hours
148 h Preparation / follow-up work
100 h Exam preparation

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Prof. Dr. Iris Pigeot-Kübler

Frequency:
biennial cycle - winter semester

Duration:
2 semester[s]

The module is valid since / The module is valid until:
WiSe 23/24 / -

Credit points / Workload:
12 / 360 hours

Module examinations

Module examination: Statistical Modeling I

Type of examination: partial exam

Form of examination:
Oral

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Exercises Statistical Modeling I

Type of examination: partial exam

Form of examination:
Portfolio (AT § 8 Abs. 8)

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
- / 1 / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Statistical Modeling II

Type of examination: partial exam

Form of examination:
Oral

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Exercises Statistical Modeling II

Type of examination: partial exam

Form of examination:
Portfolio (AT § 8 Abs. 8)

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
- / 1 / -

Language(s) of instruction:
English

Module courses

Course: Statistical Modeling I

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):
Lecture

Associated module examination:
Statistical Modeling I

• • • • • • • • •

Course: Exercises Statistical Modeling I

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
1,00

Teaching format(s):
Tutorial

Associated module examination:
Exercises Statistical Modeling I

• • • • • • • • •

Course: Statistical Modeling II

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):
Lecture

Associated module examination:
Statistical Modeling II

• • • • • • • • •

Course: Exercises Statistical Modeling II

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
1,00

Teaching format(s):	**Associated module examination:**
Tutorial	Exercises Statistical Modeling II

Module 03-MAT-MA-BioStat-A-3: Data Management and Statistical Programming
Data Management and Statistical Programming

Assignment to areas of study:

- Draft: Compulsory Modules

Content-related prior knowledge or skills:

none

Learning content:

a) Data Management:

- Tasks and processes of data management
- Principles of designing Case Report Forms (CRF)
- Data models, databases
- Data entry, plausibility checks, queries
- Automatic/semi-automatic data capture
- Database freezing, data integrity, data security
- Quality management
- Randomization
- Practical work processes with exercises

b) Statistical Programming:

- Performance spectrum of statistical analysis programs
- Efficient organization of data management tasks
- Solving analysis exercises using the SAS programming language (including the use of macros)
- Knowledge of various areas of application, along with the benefits and limitations of software solutions
- Insight into the scope of usage of the SAS software for biometrics, in particular the implementation of methodologies which are not currently included in the software
- Planning and analysis of data management tasks and undertake investigations in SAS using generated data

Learning outcomes / competencies / targeted competencies:

a) Data Management:

- Knowledge of the tasks and processes of data management in a clinical trial
- Knowledge of the purpose and content of essential documents that are produced by data management in the course of a clinical trial
- Knowledge of the guidelines for the design of such documents
- Knowledge of typical software solutions used to process the tasks of data management in a clinical trial

b) Statistical Programming:

- Ability to execute the tasks of data management in a clinical trial
- Ability to use relevant software programs for data management and analysis tasks
- Knowledge of the current scope of biometrical methods in such software packages

Calculation of student workload:

100 h Exam preparation
112 h SWS / presence time / working hours
58 h Preparation / follow-up work

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Dr. Martin Scharpenberg

Frequency:
biennial cycle - winter semester

Duration:
2 semester[s]

The module is valid since / The module is valid until:
WiSe 23/24 / -

Credit points / Workload:
9 / 270 hours

Module examinations

Module examination: Data Management

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Statistical Programming

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

Module courses

Course: Data Management

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
4,00

Teaching format(s):
Laboratory class

Associated module examination:
Data Management

• • • • • • • • •

Course: Statistical Programming

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
4,00

Teaching format(s):
Laboratory class

Associated module examination:
Statistical Programming

Module 03-MAT-MA-BioStat-A-4: Basic Epidemiology
Basic Epidemiology

Assignment to areas of study:
- Draft: Compulsory Modules

Content-related prior knowledge or skills:
none

Learning content:
- Basic Epidemiology, in particular goals and methods of epidemiology
- Definitions, fundamental concepts, as well as typical problems and approaches of epidemiology
- Interpretation and assessment of epidemiological studies using publications

Learning outcomes / competencies / targeted competencies:
- Knowledge of epidemiological study designs
- Knowledge of descriptive and comparative epidemiological measures and standardization
- Understanding of sources of error, bias and confounding, misclassification
- Knowledge of experimental and observational study designs
- Knowledge of data sources and data acquisition
- Knowledge of methods for quality assurance and good epidemiological practice
- Ability to interpret and critically assess epidemiological study results with regards to methods, presentation of results and discussion
- Ability to present study results
- Ability to moderate a scientific discussion

Calculation of student workload:
56 h SWS / presence time / working hours
70 h Exam preparation
54 h Preparation / follow-up work

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Prof. Dr. Iris Pigeot-Kübler

Frequency:
biennial cycle - winter semester

Duration:
2 semester[s]

The module is valid since / The module is valid until:
WiSe 24/25 / -

Credit points / Workload:
6 / 180 hours

Module examinations

Module examination: Epidemiology I

Type of examination: module exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / 0 / 0

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Epidemiology II

Type of examination: module exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / 0 / 0

Language(s) of instruction:
English

Module courses

Course: Epidemiology I

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):
Seminar

Associated module examination:
Epidemiology I

• • • • • • • • •

Course: Epidemiology II

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):
Seminar

Associated module examination:
Epidemiology II

Module 03-MAT-MA-BioStat-A-5-2026: Biometrical Methods - Special Aspects
Biometrical Methods - Special Aspects

Assignment to areas of study:
- Draft: Compulsory Modules

Content-related prior knowledge or skills:
none

Learning content:
a) Multiple Testing Problems:

- Basics and the theory of multiple testing
- Methods for the comparison of multiple groups and subgroup analyses for multiple endpoints
- Graphical multiple tests

b) Survival Analysis:

- Basics: Censoring, Survival function, hazard and cumulative hazard
- Nonparametric, semiparametric and parametric methods
- Complex modeling approaches
- Sample size calculation

c) Nonparametric Methods:

- Ideas and basics of nonparametric methods (methods without distributional assumptions)
- Methods for paired and unpaired samples, for two or more groups, for multifactorial designs

d) Bayes Statistics:

- Multivariate, marginal and conditional distributions and Bayes' Rule (discrete and continuous)
- The principle of Bayesian inference
- Conjugate Priors with examples (e.g. Beta-binomial model for a proportion, Poisson-gamma model for a rate, Normal-normal model for a mean)
- Mixtures of conjugate priors
- Improper, objective, Jeffrey and reference priors
- Computational approaches (e.g. Markov Chain Monte Carlo (MCMC) method, Gibbs sampling, Metropolis-Hastings (MH) sampling, MCMC)
- Empirical Bayes (optional)
- Frequentist properties of Bayesian methods (optional)
- Application of Bayesian methods in clinical trials and medical studies

Learning outcomes / competencies / targeted competencies:
- Knowledge of the differentiation and specialization of biometrical methodologies to specific questions
- Ability to apply these methods to clinical practice and to interpret the results
- Competence in the applying software solutions to corresponding problems

Calculation of student workload:
100 h Exam preparation
140 h SWS / presence time / working hours
120 h Preparation / follow-up work

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Prof. Dr. Werner Brannath

Frequency:
biennial cycle - summer semester

Duration:
2 semester[s]

The module is valid since / The module is valid until:
WiSe 26/27 / -

Credit points / Workload:
12 / 360 hours

Module examinations

Module examination: Survival Analysis

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Multiple Testing

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Non-Parametric Statistics

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Bayesian Statistics

Type of examination: partial exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

Module courses

Course: Survival Analysis

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):
Lecture
Tutorial

Associated module examination:
Survival Analysis

• • • • • • • • •

Course: Multiple Testing

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):
Lecture
Tutorial

Associated module examination:
Multiple Testing

• • • • • • • • •

Course: Non-Parametric Statistics

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):
Seminar

Associated module examination:
Non-Parametric Statistics

• • • • • • • • •

Course: Bayesian Statistics

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):
Seminar

Associated module examination:
Bayesian Statistics

Module 03-MAT-MA-BioStat-A-6: Complex Statistical Modeling
Complex Statistical Modeling

Assignment to areas of study:
- Draft: Compulsory Modules

Content-related prior knowledge or skills:
none

Learning content:
Theory of the generalized linear model, in particular:

- Univariate and multiple logistic regression
- Logit transformation, odds ratio
- Parameter estimation (maximum likelihood), interpretation of the parameters of the generalized linear model
- Model selection, variable selection, quality criteria, diagnostics
- Exponential families, link functions, canonical links
- Poisson regression
- The proportional odds model, logistic regression with multiple categories
- Introduction to generalized estimating equations
- Introduction to the generalized linear mixed model
- Introduction to propensity score methods

Learning outcomes / competencies / targeted competencies:
- Knowledge of the definitions, properties and mathematical basics of complex models, in particular of generalized linear models
- Overview of differentiation and specialization of the models covered, regarding special questions
- Knowledge of the areas of application along with the potential and limitations of the models
- Establishing connections between modeling and methods of planning and analysis of studies
- Knowledge of the corresponding model related theories of analysis (estimation, testing)
- Knowledge of the corresponding methods of sample size calculation
- Ability to choose appropriate models in complex designs
- Ability to assess the appropriateness of a chosen model
- Ability to independently perform the biometrical planning, analysis and interpretation in such models

Calculation of student workload:
74 h Preparation / follow-up work
50 h Exam preparation
56 h SWS / presence time / working hours

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Dr. Martin Scharpenberg

Frequency:
biennial cycle - winter semester

Duration:
1 semester[s]

The module is valid since / The module is valid until:
WiSe 23/24 / -

Credit points / Workload:
6 / 180 hours

Module examinations

Module examination: Complex Statistical Modeling

Type of examination: partial exam

Form of examination:
Oral

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Exercises Complex Statistical Modeling

Type of examination: partial exam

Form of examination:
Portfolio (AT § 8 Abs. 8)

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
- / 1 / -

Language(s) of instruction:
English

Module courses

Course: Complex Statistical Modeling

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):
Lecture

Associated module examination:
Complex Statistical Modeling

• • • • • • • • •

Course: Exercises Complex Statistical Modeling

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
1,00

Teaching format(s):
Tutorial

Associated module examination:
Exercises Complex Statistical Modeling

Module 03-MAT-MA-BioStat-B-1: Clinical / Diagnostic Trials, Laws, Guidelines and Ethics

Clinical / Diagnostic Trials, Laws, Guidelines and Ethics

Assignment to areas of study:

- Draft: Compulsory Modules

Content-related prior knowledge or skills:

none

Learning content:

Clinical Trials I:

- Study types of clinical trials: from observational studies to randomized trials
- Causality, stochastics, evidence, question, hypotheses, trial design
- Determination of target population, criteria for evaluation and parameters
- Randomization and blinding
- Sample size calculation

Clinical Trials II:

- Principles of conducting randomized therapy trials: Organization, documentation and data management, clinical monitoring
- Analysis and interpretation of randomized trials
- Population Analysis: Per protocol, full analysis set, intention to treat principle
- Estimands
- Overview of common statistical procedures
- Handling of drop outs and missing data
- Analysis of follow-up data
- Interim analysis strategies
- Subgroup analyses
- Confirmatory vs. exploratory analyses

Diagnostic Studies:

- Definition and examples for diagnostic tests and medical screening/classification tools
- The development and investigation of diagnostics tests and medical screening/classification tools
- Measures of test and classification accuracy (e.g. accuracy, sensitivity, specificity, ROC curve)
- Statistical methods for the estimation of accuracy
- Definition and estimation of positive and negative predictive values
- Statistical methods for the comparison of diagnostic tests
- Study designs and hypothesis tests for diagnostics studies
- Methods to account for covariate effects on diagnostic tests
- Statistical methods for biomarker selection and biomarker combination

Laws & Guidelines:

- Basic legal terms
- Overview of national and international regulations and standards in clinical research
- International Conference on Harmonization (ICH) guidelines
- Special conditions and requirements for particular populations (e.g. children, persons who are incapable of giving consent)

Ethics:

- Basic ethical requirements
- Bioethics
- Declaration of Helsinki
- Ethical reasoning for quality assurance in clinical research
- Ethical principles of good clinical practice (GCP)

Learning outcomes / competencies / targeted competencies:
Clinical Trials I:

- Knowledge of general basics and the design of clinical trials
- Ability to plan biometrical clinical trials according to legal and regulatory requirements
- Competence in the elaboration of trial designs and aspects of trial planning, as well as the ability to impart such concerns and proposals to an interdisciplinary team
- Ability to conduct the quality management of a clinical trial and to critically assess scientific publications of study results

Clinical Trials II:

- Knowledge of basic aspects of the conduct, analysis and interpretation of clinical trials in special consideration of legal environment as well as the methodological and organizational aspects
- Ability to plan, support and correctly analyze biometrical trials according to legal and regulatory requirements
- Knowledge of the corresponding statistical methods
- Knowledge of the measures for securing equality of observation and treatment
- Ability to identify confounding effects and bias
- Competence in imparting study concerns or interesting aspects to an interdisciplianary team

Diagnostic Studies:

- To understand the basic and more advanced principles driving the investigation and evaluation of diagnostic tests and medical screening/classification tools
- To be able to describe and estimate test and classification accuracy
- To know how to plan and analyze a typical diagnostic study
- Basic knowledge of statistical methods for biomarker selection and combination

Laws & Guidelines:

- Knowledge of the legal basics for clinical research in German, European and international law, as well as the relevant regulatory provisions and guidelines
- Knowledge of the main laws and guidelines as well as their application
- Knowledge of the principles of quality assurance
- Competence in dealing with exceptional cases
- Competence in working alongside regulatory authorities and legal practitioners
- Ability to independently make out legal texts

Ethics:

- Knowledge of ethical principles of medical research
- Ability to introduce ethical aspects in the planning of clinical trials
- Ability to critically assess the ethical aspects of varying concepts that underpin a study
- Knowledge of ethical aspects of quality assurance
- Ethical competence in dealing with exceptional cases

Calculation of student workload:
160 h Preparation / follow-up work
108 h Exam preparation
182 h SWS / presence time / working hours

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Dr. Martin Scharpenberg

Frequency:
biennial cycle - winter semester

Duration:
2 semester[s]

The module is valid since / The module is valid until:
WiSe 24/25 / -

Credit points / Workload:
15 / 450 hours

Module examinations

Module examination: Clinical Trials I

Type of examination: partial exam

Form of examination:
Portfolio (AT § 8 Abs. 8)

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Clinical Trials II

Type of examination: partial exam

Form of examination:
Portfolio (AT § 8 Abs. 8)

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Diagnostic Studies

Type of examination: partial exam

Form of examination:
Portfolio (AT § 8 Abs. 8)

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Ethical Aspects, Laws and Guidelines

Type of examination: partial exam

Form of examination:
Written examination

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

Module courses

Course: Clinical Trials I

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):

Associated module examination:
Clinical Trials I

• • • • • • • • •

Course: Clinical Trials II

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):

Associated module examination:
Clinical Trials II

• • • • • • • • •

Course: Diagnostic Studies

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
3,00

Teaching format(s):
Lecture

Associated module examination:
Diagnostic Studies

• • • • • • • • •

Course: Ethical Aspects, Laws and Guidelines

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):
Lecture

Associated module examination:
Ethical Aspects, Laws and Guidelines

Module 03-MAT-MA-BioStat-B-2: Fundamentals of Medicine
Fundamentals of Medicine

Assignment to areas of study:
- Draft: Compulsory Modules

Content-related prior knowledge or skills:
none

Learning content:
Medical Basics:

- Introduction to general medical terminology, nomenclature and medical approaches
- Anatomy and function of muscles and bones
- Anatomy and function of internal organs (e.g. cardiovascular system, liver, pancreas, gastrointestinal tract, kidneys and urinary tract)
- Neuroanatomy and neurophysiology
- Physiology of sensory perception
- Trauma and growth

Molecular Medicine:

- Cell metabolism using the example of glucose
- Birth and death of a cell, regulation of cell functions: hormones, signal transduction
- Gene expression
- Hereditary diseases (basics and perinatal diagnostics)
- Hemostasis
- Medical analytical laboratory
- Basics of microbiology: Parasites, Bacteria, Fungi
- Diagnostic in microbiology

Pharmacotherapy:

- Demarcation of experimental and clinical pharmacology
- Basics of pharmacodynamics and pharmacokinetics, PK/PD modeling
- Choosing an efficient and rational drug therapy
- Adiposis, Diabetes, Dyslipidemia
- Systematological and pharmacotherapeutic approaches to neurological diseases
- Systematology of psychiatric drugs
- Clinical and therapeutic treatment of mental disorders
- Drug therapy of Asthma and COPD
- Drugs for pain therapy, principles of anesthesia
- Bone diseases
- Clinic and therapy of gastrointestinal diseases
- Clinic and therapy of infectious diseases

Special Areas of Medicine (e.g. Oncology):

- Medical terminology and basic principles of a special area of medicine

Learning outcomes / competencies / targeted competencies:
Medical Basics:

- Knowledge and understanding of basic medical terminology
- Knowledge of the basic anatomy, physiology, as well as knowledge of organ systems
- Knowledge of the key terms of internal medicine
- Competence in applying medical vocabulary in dialogues with physicians during the planning, conduct and analysis stages of clinical trials

Molecular Medicine:

- Knowledge of basic molecular medicine
- Basic knowledge of cell functions, hemostasis and laboratory medicine

Pharmacotherapy:

- Knowledge of the key terms of pharmacokinetics, pharmacodynamics and pharmacogenomics
- Knowledge of the tools of experimental and clinical pharmacology within the framework of medical research

Special Areas of Medicine:

- Knowledge of the key terms of a special area of medicine (e.g. oncology)
- Knowledge of common therapy approaches in that area

Calculation of student workload:
120 h Exam preparation
130 h SWS / presence time / working hours
110 h Preparation / follow-up work

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Prof. Dr. Bernd Mühlbauer

Frequency:
biennial cycle - winter semester

Duration:
3 semester[s]

The module is valid since / The module is valid until:
SoSe 24 / -

Credit points / Workload:
12 / 360 hours

Module examinations

Module examination: Basic Medicine and Molecular Medicine

Type of examination: partial exam

Form of examination:
Written examination

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Pharmacology

Type of examination: partial exam

Form of examination:
Written examination

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

• • • • • • • • •

Module examination: Special Areas of Medicine

Type of examination: partial exam

Form of examination:
Written examination

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
1 / - / -

Language(s) of instruction:
English

Module courses

Course: Basic Medicine and Molecular Medicine

Frequency:
biennial cycle - winter semester

Language(s) of instruction:
English

Contact hours:
4,00

Teaching format(s):
Lecture

Associated module examination:
Basic Medicine and Molecular Medicine

• • • • • • • • •

Course: Pharmacology

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):
Lecture

Associated module examination:
Pharmacology

• • • • • • • • •

Course: Special Areas of Medicine

Frequency:

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):

Associated module examination:
Special Areas of Medicine

Module 03-MAT-MA-BioStat-C-1: Internship
Internship

Assignment to areas of study:
- Draft: Compulsory Modules

Content-related prior knowledge or skills:
none

Learning content:
Students shall experience working situations and job requirements in a pertinent professional field of activity inside or outside the university. They should learn to define and analyze the problems and tasks that occur, using all the professional qualifications they have acquired up until this point. Furthermore, they should learn to develop and apply biometrical approaches to such problems and tasks.

Learning outcomes / competencies / targeted competencies:
- Develop and promote the professional orientation
- Imparting deepened knowledge of the organization and functioning of a professional field
- Apply the knowledge and skills acquired in the studies
- Promote the development of practical questions in the studies
- Give an insight and contacts to possible professional fields

Calculation of student workload:
10 h Exam preparation
170 h SWS / presence time / working hours

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Dr. Stephan Kloep

Frequency:
biennial cycle - summer semester

Duration:
1 semester[s]

The module is valid since / The module is valid until:
WiSe 23/24 / -

Credit points / Workload:
6 / 180 hours

Module examinations

Module examination: Modulprüfung

Type of examination: partial exam

Form of examination:
Internship report

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
- / 1 / -

Language(s) of instruction:
English

Module courses

Course: Intership

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
-

Teaching format(s):
Laboratory class

Associated module examination:
Modulprüfung

Module 03-MAT-MA-BioStat-E-2026: Elective Module
Elective Module

Assignment to areas of study:
- Draft: Elective Modules

Content-related prior knowledge or skills:
none

Learning content:
See the corresponding module description(s).

Learning outcomes / competencies / targeted competencies:
See the corresponding module description(s).

Calculation of student workload:

Are there optional courses in the modules?
yes

Language(s) of instruction:
English

Responsible for the module:
Dr. Martin Scharpenberg

Frequency:
each semester

Duration:
1 semester[s]

The module is valid since / The module is valid until:
WiSe 20/21 / -

Credit points / Workload:
3 / 90 hours

Module examinations

Module examination: Examination according to the module description.

Type of examination: module exam

Form of examination:
Announcement at the beginning of the semester

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
- / - / -

Language(s) of instruction:
English

Module courses

Course: According to the module description.

Frequency:
each semester

Language(s) of instruction:
English

Contact hours:
-

Teaching format(s):

Associated module examination:
Modulprüfung gemäß Modulbeschreibung

Module 03-MAT-MA-BioStat-D-1-2026: Master Thesis
Master Thesis

Assignment to areas of study:
- Draft: Master Thesis

Content-related prior knowledge or skills:
none

Learning content:
- Scientific work under supervision
- Specialization in a subject of biostatistics

Learning outcomes / competencies / targeted competencies:
Be able to work independently and scientifically, in particular:

- Independently search for and become acquainted with relevant literature
- Reflect on the current state of research
- Develop of own research results if possible
- Adhere to rules of good scientific practice

Be able to write a comprehensive academic work

Be able to present the research work orally

Calculation of student workload:
28 h SWS / presence time / working hours
872 h Exam preparation

Are there optional courses in the modules?
no

Language(s) of instruction:
English

Responsible for the module:
Prof. Dr. Werner Brannath

Frequency:
each semester

Duration:
1 semester[s]

The module is valid since / The module is valid until:
WiSe 26/27 / -

Credit points / Workload:
30 / 900 hours

Module examinations

Module examination: Master Thesis including Seminar

Type of examination: module exam

Form of examination:
Master Thesis

The examination is ungraded?
no

Number of graded components / ungraded components / prerequisites of the examination:
2 / 1 / -

Language(s) of instruction:
English

Module courses

Course: Seminar

Frequency:
biennial cycle - summer semester

Language(s) of instruction:
English

Contact hours:
2,00

Teaching format(s):
Seminar

Associated module examination:
Master Thesis including Seminar