UNIVERSITÄT TRIER

TRIER UNIVERSITY

STUDYING AT A MODERN CAMPUS-UNIVERSITY? RESEARCH IN THE OLDEST CITY IN GERMANY?

MASTER'S IN GEOINFORMATICS

Program of Study

OVERVIEW

MSc in Geoinformatics

Trier University's Master program in Geoinformatics is a study program of the Faculty of Regional and Environmental Science, in cooperation with the Departments of Computer Science and Business Informatics and Mathematics. It is coordinated by of Environmental Remote Sensing Lab and Geoinformatics – Spatial Data Science Lab and focuses on the combined use of quantitative remote sensing methods with GIS techniques to develop advanced mapping approaches for environmental observation and monitoring.

PROGRAM COORDINATOR

JProf. Dr. David Frantz
frantz@uni-trier.de

GRADUATE PROGRAM

Trier University's MSc program in Geoinformatics focuses on the application of geospatial technologies, remote sensing methods and visualization technologies.

120 ETCS Points are required to complete a master's degree in Geoinformatics; this corresponds to 16 to 18 graduate course units. These consist of ten mandatory core courses and six to eight electives. The elective courses give students the flexibility to take courses that will best suite their objectives and strengthen areas that they would like to focus on (e.g., remote sensing methods, survey statistics, or data base technologies). The final requirement for a master's degree in Geoinformatics is the successful completion and defense of a master's thesis.

The program is designed so that full-time students can complete the program in four semesters.

COMPULSORY CORE COURSES

The mandatory courses include ten core courses covering the fundamentals technologies and skills of geoinformatics and consists of lectures, lab exercises and seminars. An additional unit is devoted to the final master's thesis.

The ten compulsory courses (80 ECTS-Credit Points) are:

- Computer Programing for GIS
- Multivariate Statistics
- Environmental System Analysis
- Fundamentals of Environmental Remote Sensing
- Numerical Mathematics for Geoscientists

ECTS-CREDIT POINTS

The European Credit Transfer and Accumulation System (ECTS), was developed as a Europe-wide academic credit system for the guidance, calculation and certification of academic workload. The ECTS considers the entire academic effort and workload necessary to pass a course. ECTS credits will only be awarded for successful performance. The workload for an academic year total to 60 ECTS credit points (30 ECTS-credit points per semester). A 2-year Master's program usually comprises 120 ECTS-credit points. Further information is available on http://ec.europa.eu/education/ects/users-guide/index_en.htm.

ACADEMIC ADVISOR

Dr. Johannes Stoffels
stoffels@uni-trier.de

FURTHER INFORMATION

Visit the Geoinformatics web site at www.geoinformatik.uni-trier.de for further details about the program.

- Introduction to 3D Visualization
- Project Studies on 3D Visualization and Augmented Reality
- Geostatistics
- Time Series Analysis
- Final Master Thesis Project

ELECTIVE COURSES (6 TO 8 REQUIRED)

The elective part of the program comprises 40 ECTS-Credit Points. Students can tailor their program to suit their individual interests, choosing from a wide variety of 18 different elective courses.

Environmental Remote Sensing and Geoinformatics Lab:

- Advanced Remote Sensing Data Processing and Interpretation
- Ecosystem Remote Sensing and Modelling
- LiDAR Remote Sensing for Env. Observation and Monitoring
- Remote Sensing of Global Change Processes
- Raster data processing and image enhancement techniques
- Advanced GIS

Geoinformatics - Spatial Data Science Lab

- Geovisualization
- Cartographical Communication

Dep. of Computer Science and Business Informatics

- Big Data Analytics
- Fundamentals of Computer Graphics
- Data Mining
- Computational Geometry
- Implementation of Data Base Systems
- Elements of Computer Science

Dep. of Economic and Social Statistic

- Survey Sampling
- Monte-Carlo Simulation Methods

Governance & Sustainability Lab

- Global Climate Change and Energy Resources
- Socio Hydrology

Dep. of Department of Physical Geography

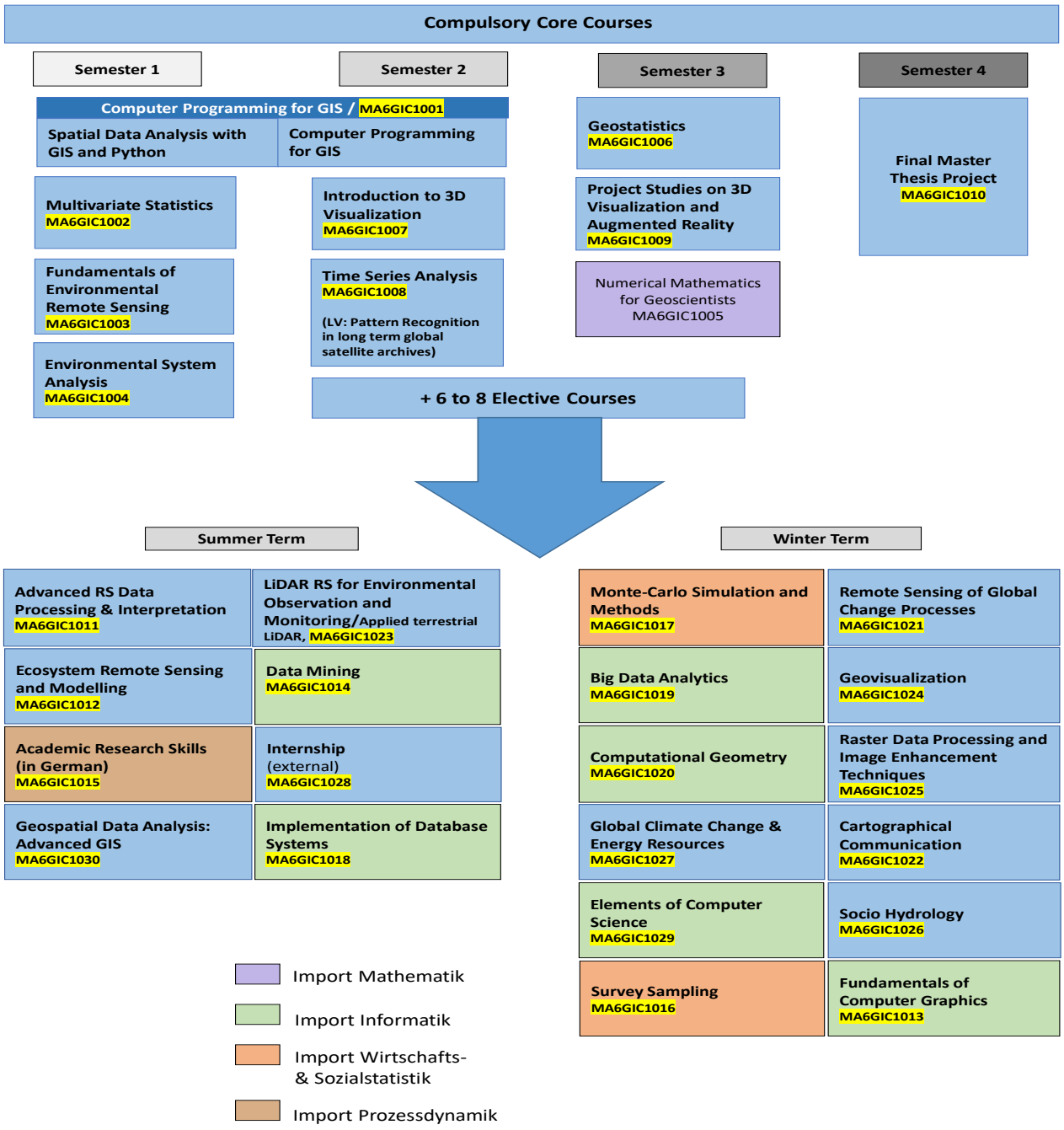
- Academic Research Skills (in German)

Off-University Training

- Internship

CURRICULUM

The core curriculum is a four-semester sequence comprising the ten compulsory core courses. There are an additional 40 ECTS-Credit Points from optional course depending on the student's background and interest.



APPLICATION DEADLINE

International students	May 31st, winter semester (non- EU citizens)
	June 15th, winter semester (EU citizens)
	January 15th, summer semester (**EU citizens only)**
German students:	March 15th, summer semester and September 15th, winter semester

ADMISSION REQUIREMENTS

Admission Semester: International students (non-EU students): only winter semester. EU- and German students: winter semester and summer semester

Start of Program: winter semester (October),

Program Duration: 4 semester (two years)

Language Requirements

- English Language test required: Applicants must provide proof of their English skills: TOEFL 550 (paper-based), 215 (computer-based), 80 (internet-based), CAE or equivalent
- No DSH / TestDaF Required

Academic requirements

- Degree (BSc or equivalent) in geoinformatics or similar
- A minimum of a 3.0 on the German grading scale

Additional documents

CV and personal statement (motivation letter) explaining your past achievements, why you chose the geoinformatics program at Trier University and how you would fit into our program.

COSTS

Trier University does not charge any tuition fees for students who have not yet obtained a Master's degree. However, there is an application fee (€50) for international students, as well as an enrolment fee (€283.30) once you are accepted and a semester fee (€270) for each subsequent semester**. If you have already completed a Master's program and have a degree, you will be required to pay the second Master's fee of €650 per semester in addition to the semester fee.**

COURSE SCHEDULE TYPES

Trier University distinguishes the following schedule types. Courses may include more than one type. If, for example, a course includes lecture and/or lab sections, all schedule types are indicated.

- Lecture: An academic discourse given by an instructor before a group. (Maximum group size: unlimited)
- Seminar: A course pursued by a small group of students under the direction of an instructor for the purpose of presenting and exchanging ideas or research findings via lectures, reports, discussions, and oral presentations. (Maximum group size: 30 students)
- Internship: An experiential course designed to provide on-the-job experience in an academic setting on or off campus, where students may earn academic credit.
- Lab Exercise: A course for a small group of students in a controlled environment with specialized equipment and/or facilities. Includes supervised computing exercises, and hands-on activities. (Maximum group size: 15 students)
- Field Exercise: A course for a small group of students focusing on field- and survey methods. (Maximum group size: 15 students)

COURSE DESCRIPTION

Compulsory Core Courses

Computer Programming for GIS

Geoinformatics – Spatial Data Science Lab
Contact: Dr. A. Müller (muellea@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter and summer	2 Semesters	Lab Exercise	10

Course Objectives
This course will introduce the fundamental concepts of computer programming to automate geoprocessing, spatial analysis and mapping tasks. The course focuses on using Python for geospatial data analysis and is split into 2 parts: Part 1 has a special focus on the use of Python within the ArcGIS-Environment. Part 2 focuses on geoprocessing with Python using open-source GIS. Software used during the course will include ArcGIS, QGIS.

Multivariate Statistics

Environmental Remote Sensing Lab
Contact: Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives
This course introduces the most relevant standard methods of multivariate statistical analysis. It considers data sampling, descriptive and inferential statistical techniques: analysis of variance (MANOVA, ANOVA), multiple correlation- and regression analysis (GLM), cluster analysis (k-means, hierarchical CA), data transformation (PCA, PLSR…), discriminant analysis, classification techniques (neural networks, kernel-based CT). All exercises are based on the R programming language. Basic knowledge of univariate statistics is assumed.

Environmental System Analysis

Dep. of Hydrology
Contact: Dr. R. Bierl (bierl@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives

This course is designed to introduce the students to the principles of environmental system analysis. It provides an overview of environmental systems (connections, cycles, feedback-loops), strategies for analyzing and using environmental system models, basic modeling concepts in environmental systems analysis, population growth and growth limits, and the impacts of natural disasters on environmental systems. Laboratory exercises concentrate on applying simulation tools for environmental system analysis

Fundamentals of Environmental Remote Sensing

Environmental Remote Sensing Lab
Contact: Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de), Dr. H. Buddenbaum (buddenba@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives

The course provides expert knowledge and hands-on experience of multi-scale remote sensing. Lecture and lab exercises cover the introduction to multi-scale remote sensing systems, advanced radiometric processing of multispectral data, derivation of qualitative surface characteristics with different spectral and radiometric properties.
The course concludes with instruction and methods on how to conduct an image processing and interpretation workflow (implementation of digital image processing concepts and specific analysis techniques in the frame of a case study. Use of vegetation indices and linear transformations). Software used during the course will include: Erdas Imagine, R-Programming Language.

Numerical Mathematics for Geoscientists

Dep. of Mathematics
Contact: Dr. M. Ries (ries@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives

This course introduces the fundamentals of numerical mathematics. It provides the foundation of numerical methods and the analysis of their basic properties. Topics to be covered include numerical display of figures, direct methods for systems of linear equations, interpolation by polynomials, cubic splines and Bézier functions, iterative methods to solve linear equations, equalization calculus and approximation, Eigenvalues. The concepts in the lectures are illustrated using Matlab and Wolfram Alpha. Exercises are focusing on techniques of numerical mathematics in their particular application to geoscience and environmental problems.

Introduction to 3D Visualization

Geoinformatics – Spatial Data Science Lab
Contact: Dr. S. Willmes (willmes@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Lecture Lab Exercise	5

Course Objectives

The course introduces the fundamentals of geovisualization with a special focus on 3D-visualization techniques. Students will learn the basics on how to plan, conceptualize and run a study project, while also learning how to model and program a testing scene with cartographical techniques on specialized programs. Students will also learn how to empirically evaluate results and how to present them. Thematic topics include visualization methods, data models and structures, actual research situations, spatial recognition, empirical methods, system and program requirements, usability engineering.

Project studies on 3D Visualization and Augmented Reality

Geoinformatics – Spatial Data Science Lab
JProf. Dr. D. Frantz (frantz@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives

In this course students practice the skills learned in Introduction to 3D Visualization by developing and running their own study project. Thematic topics include time and resource planning, project management, planning an empirical evaluation, establish a testing scene, scientific documentation, develop actual research themes for geovisualization, presenting the project concepts and the results.
Recommended previous knowledge: Introduction to 3D Visualization

Geostatistics

Environmental Remote Sensing Lab
Contact: Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives

Introduction to geostatistical methods and applications with emphasis on spatial point patterns and geostatistical concepts as well as geostatistical interpolation techniques (variogramm analysis, spatial trend analysis, regionalization: kriging and cokriging, model validation). Concepts in lectures are illustrated in lab exercises using R-Programming Language and ArcGIS software package. Recommended previous knowledge: multivariate statistics.

Time Series Analysis

Environmental Remote Sensing Lab
Contact: Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Lecture Lab Exercise	5

Course Objectives

Offers a competent handling of time-series analysis methods, concepts and techniques. First part of the course focuses on global satellite archives, related data formats and metadata concepts. Students are introduced to software environments (IDL/ENVI, R-Programming Language) for analysis of spatio-temporal patterns. The lab exercises cover the following topics: homogeneity analysis of time-series, temporal/spatial autocorrelation, exponential smoothing, trend analysis, ARIMA-models, spectral- and cross-spectral analysis, continuous and discrete wavelet analysis.

Final Master Project

Environmental Remote Sensing Lab
Contact: Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter and Summer	1 Semester	Thesis	30

Course Objectives

The master thesis project prepares students for developing their master thesis. The students receive counseling on how to formulate a research question and develop a dissertation project.
In the final master project, the student should demonstrate skills in formulating main and secondary research questions, and in planning, conducting, analyzing and reporting on a topic within the field of geoinformatics. In addition to the thesis, the course is concluded with a presentation.

Elective Courses (6 to 8 required)

Advanced Remote Sensing Data Processing and Interpretation

Environmental Remote Sensing Lab
Contact: Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise Field Exercise	5

Course Objectives

Extends the fundamentals of environmental remote sensing focusing on integrated lab- and fieldwork. There is a focus on: radiative transfer modelling of multi- and hyperspectral data using Landsat-TM / ETM / OLI and Hyspex data sets (water vapor estimation and sensor recalibration). Different transformation (e.g., PCA, SMA, SA;) techniques will be revised. Classification strategies are extended to non-parametric methods (e.g., SVM). Statistical models based on field data will be applied to image data to estimate or classify environmental variables (e.g., soil moisture levels, organic-carbon contents). The field work includes planning and execution of a hyperspectral field campaign (e.g., field survey of reference data and atmospheric measurements). Both proprietary software (e.g., ENVI (Harris Geospatial)) and open-source software/programming languages (e.g. QGIS / R programming Language, Python) are used for data handling.

Ecosystem Remote Sensing and Modelling

Environmental Remote Sensing Lab, Dep. of Geobotany
Contact: Dr. Johannes Stoffels (stoffels@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Seminar Field Exercise	5

Course Objectives

This course explores interdisciplinary ecosystem assessments and resource inventories. Advanced concepts in plant physiology and vegetation remote sensing are introduced as well as ecosystem monitoring techniques using multi-temporal remote sensing data. In the field exercise course students will gain hands-on experience in ground surveying techniques and experimental/analytical laboratory methods and acquire skills in coordination of group-based field work and presentation techniques.

Implementation of Data Base Systems

Dep. of Computer Science and Business Informatics
Contact: Dr. B. Walter (walter@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Lecture Lab Exercise	5

Course Objectives

Students will gain knowledge and practical skills inmodeling, querying and manipulation of complex objects within databases. Thematic topics include: database models, object-oriented databases, object-relational database systems, querying languages (OQL, SQL2003, PL/SQL), XML-databases (SQL/XML, XQuery).

LiDAR Remote Sensing for Environmental Observation and Monitoring

Environmental Remote Sensing Lab
Contact: Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Seminar Lab Exercise Field Exercise	5

Course Objectives

Introduction to core principles of 3D-data acquisition, analysis and visualization using terrestrial and airborne LiDAR systems. Objects of interest are building and vegetation structures and/or geomorphological units. An introduction will be given to relevant acquisition techniques and software (e.g., JRC 3D Reconstructor, Faro Scene). Both airborne and terrestrial LiDAR-data are analyzed and processed in practical exercises using open-source and proprietary software (e.g., Agisoft Photoscan, CloudCompare or ERDAS IMAGINE). Practical acquisition with a terrestrial laser scanning system is planned and wil focus on relevant research topics (e.g., biomass estimation of crops or geo-archaeological reconstructions). Data handling techniques for raw data and point clouds will also be introduced.

Fundamentals of Computer Graphics

Dep. of Computer Science and Business Informatics
Contact: Prof. Dr. S. Diehl (diehl@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Lecture Field Exercise	5

Course Objectives

The course provides a theoretical background (raster and vector data, image and video formats, rendering pipeline (illumination, transformation, modelling languages (e.g., X3D)) and practical skills (3D visualization and animation using open-source software (e.g. Blender, Maya)) related to 2D and 3D computer graphics. Knowledge is applied in the context of visualizing both general and scientific information.

Data Mining

Dep. of Computer Science and Business Informatics
Contact: Prof. Dr. R. Bergmann (bergmann@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives

Fundamental data mining methods are introduced. Thematic topics are machine learning, decision trees, handling of noisy data, analogy based and probabilistic learning, neural networks, cluster analysis. A practical data mining project will be conducted using selected data mining tools (e.g., SPSS Clementine / Modeler).

Survey Sampling

Dep. of Economic and Social Statistic
Contact: Prof. Dr. R. Münnich (muennich@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Lab Exercise	5

Course Objectives

This course introduces the concepts of survey statistics with a focus on sampling procedures. Thematic topics include multilevel random sampling and design-/modeling-based estimation techniques. The students will gain comprehensive practical experience in the application of the theoretical knowledge within the lab exercises.

Monte-Carlo Simulation Methods

Dep. of Economic and Social Statistic
Contact: Prof. Dr. R. Münnich (muennich@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Lecture Lab Exercise	5

Course Objectives

This course covers the theory and techniques of the Monte Carlo method. The basics of survey statistics are introduced, with a focus in two-stage sampling, multistage sampling and selection probability. Lab exercises enable the students to gain comprehensive practical experience through theoretical knowledge application.

Geovisualization

Geoinformatics – Spatial Data Science Lab
Contact: Dr. A. Müller (muella@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Seminar Lab Exercise E-Learning	5

Course Objectives

Using techniques of geovisualization, GIS provides a far richer and more flexible environment for portraying attribute distributions than traditional paper maps. Basics (computer vision and graphics, fundamentals of scientific visualization) and techniques (interactive visualization, visualization of dynamic model components, structuring of data) of geovisualization are introduced. Students will gain skills in visualization suitability assessment and data structuring techniques for environmental data. Knowledge and practical experience is gained by designing, programming and presentation of applied visualization techniques.

Computational Geometry

Dep. of Computer Science and Business Informatics
Contact: Prof. Dr. S. Naeher (naeher@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Seminar Lab Exercise	10

Course Objectives

Algorithms and data structures for geometric questions are introduced. The course schedule covers the following fundamental approaches and paradigms: “divide and conquer”, plane-sweep, duality, randomization, convex hulls, motion planning for robots, elimination of hidden lines and areas, Boolean operators on polygons, derivation of nearest neighbors. A central topic covered in the course is the robustness problem and its’ consequences caused by rounding errors introduced by floating point arithmetic.

Cartographical Communication

Geoinformatics – Spatial Data Science Lab
Contact: Dr. A. Müller (muellea@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Seminar Lab Exercise	5

Course Objectives

Introduction to the theoretical basics of communication in general and cartographical communication in particular. The course will provide students with an understanding of cartographic communication and which cartographic media is used depending on the context. Topics are: conception, implementation and evaluation of communication systems, communication theories, human communication, empiric cartography, structure of different media, information flow processes, cartographical media in the process of communication, communication and spatial actions, methods of conception for cartographic communication processes (requirement analysis, research, conception models), technology of cartographic media, network-based communication tools, communication in spatial planning and scientific communication.

Remote Sensing of Global Change Processes

Environmental Remote Sensing Lab
Contact: Achim Röder (roeder@uni-trier.de), Johannes Stoffels (stoffels@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Seminar Lab Exercise	5

Course Objectives

The research seminar provides students with an opportunity to address a wide range of research questions at various scales. It includes applications as diverse as mapping land use change syndromes at continental scales to the characterization of habitat development of large herbivores and carnivores using GPS-tracking and habitat modelling.
The seminar is designed in a flexible way to respond to opportunities arising from ongoing research projects and accommodate scientific interests of students. A major component is the development of soft skills in science, such as oral presentation techniques, poster preparation or scientific writing. Software used during the course will include: ArcGIS, QGIS, R-Programming Language, Erdas Imagine,IDL/ENVI.

Big Data Analytics

Dep. of Computer Science and Business Informatics
Contact: Dr. M. Ley (ley@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Lecture Lab Exercise	5

Course Objectives

Introduction to the internal mechanisms of databases and file systems. Thematic contents are: hard disk technologies, layermodel of database management systems (DBMS), buffer systems and external memory handling, access path administration, file systems and journaling file systems (FAT, Unix, Berkeley FFS, ReiferFS, NTFS, XFS), Yao-Lehman-algorithm (B-trees), joins and sorting algorithms, query evaluation techniques.

Global Climate Change and Energy Resources

Governance & Sustainability Lab
Contact: Prof. Dr. A. Bruns (brunsa@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Lecture	5

Course Objectives

The course will provide students with an in-depth understanding of interdisciplinary contexts and interactions with focus on energy production and consequences of energy use. Application of a system-oriented mindset and operation methods, enabling the students to analyze complex environmental problems, to develop and present approaches for solutions. The course content will focus on global climate change, including basic concepts in climatology, circulation of atmosphere and oceans, biogeochemical cycles, spatial and temporal scales, palaeo-reconstructions and climate models, global circulation models, Milankovitch theory and global warming with a specific focus on implications for global policy. A second major component addresses the complex of energy resources and renewable energies, and touches upon aspects of fossil resources and energy use, solar radiation, wind energy, hydroelectricity, biomass and geothermal energy.

Socio-Hydrology

Governance & Sustainability Lab
Contact: Prof. Dr. A. Bruns (brunsa@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Lecture Seminar	5

Course Objectives

Socio-Hydrology is a novel way of looking at water. In modern water studies social and political factors long have been neglected. The emerging new science of socio-hydrology is centred around social and political aspects of water utilization and aims at unravelling how different actors' shape the way water bodies are used. Also, with a focus on how aquatic ecosystems are produced and managed. After an introduction in the development of hydrology as a discipline, and the anthropogenic transformation of water bodies, the class will focus on the condition of aquatic ecosystems, water security vs. water scarcity, water infrastructures, water rights, conflicts about water. The lecture concludes with an outlook on future water studies in the context of global environmental change. In addition to the lecture, the seminar will focus on global water problems and selected water issues from a socio-political perspective.

Academic Research Skills (in German)

Dep. of Department of Physical Geography
Contact: Prof. Dr. M. Casper (casper@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Summer	1 Semester	Seminar Workshop	5

Course Objectives

This course offers an introduction to scientific theory and includes practical parts focused on the preparation and follow-up work of a scientific workshop (e.g., organization, time schedule, reviewing process, editing process, discussions). At a scientific workshop students will present current research and innovative methods.

Raster data processing and image enhancement techniques

Environmental Remote Sensing Lab
Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
Winter	1 Semester	Seminar Lab Exercise	5

Course Objectives

The course is aimed at providing basic concepts of image processing and image enhancement techniques to resolve geometric, radiometric, and other problems found in raw remotely sensed data. Image enhancement techniques include contrast stretching, edge enhancement, filtering, as well as deriving new data by calculating differences, ratios, or other quantities from reflectance values. A special focus of the Lab Exercise is on the generation of high-quality satellite mosaics. The course provides students with extensive hands-on-experience with professional digital image processing (e.g., Adobe Photoshop).

Internship

Environmental Remote Sensing Lab

Contact: , Prof. Dr. T. Udelhoven (udelhoven@uni-trier.de)

Course Offerings by Semester	Length of Course	Course Schedule Type	ECTS CP
	8 to 12 weeks	Internship	10

Course Objectives

An internship over a minimum of 8 weeks (or equivalent in full time work) is an optional component in the study program. Students undertake a significant experiential engagement, typically with a non-profit, governmental, or community-based organization or a company within the field of geoinformatics. Students are encouraged to use this for building links with potential employment opportunities, to gather some professional experience or to acquire additional skills.

Further information on the courses, including general information, course schedule, lecture notes, assignments, and other important information is available on PORTA https://portasystem.uni trier.de (Trier University's course management system).