Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Module Catalogue

for the Module studies (Bachelor)

Geography

Examination regulations version: 2020
Responsible: Faculty of Arts, Historical, Philological, Cultural and Geographical Studies
Responsible: Institute of Geography and Geology

Contents

The subject is divided into

Abbreviations used

Course types: **E** = field trip, **K** = colloquium, **O** = conversatorium, **P** = placement/lab course, **R** = project, **S** = seminar, **T** = tutorial, **Ü** = exercise, **V** = lecture

Term: **SS** = summer semester, **WS** = winter semester

Methods of grading: **NUM** = numerical grade, **B/NB** = (not) successfully completed

Regulations: **(L)ASPO** = general academic and examination regulations (for teaching-degree programmes), **FSB** = subject-specific provisions, **SFB** = list of modules

Other: **A** = thesis, **LV** = course(s), **PL** = assessment(s), **TN** = participants, **VL** = prerequisite(s)

Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with

the general regulations governing the degree subject described in this module catalogue:

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

15-May-2019 (2019-36)

27-Jun-2019 (2019-41)

14-Nov-2019 (2019-52)

22-Jan-2020 (2020-13)

06-May-2020 (2020-39)

22-Jul-2020 (2020-57)

17-Dec-2020 (2020-110)

10-Mar-2021 (2021-17)

09-Jun-2021 (2021-58)

22-Dec-2021 (2021-85)

05-Jul-2022 (2022-52)

31-Jan-2023 (2022-86)

15-Jun-2023 (2023-58)

13-Dec-2023 (2023-107)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.

Winter Term 2020

(0 ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 66 I Nr. 2

Module title			Abbreviation
Remote Sensing in Resource Management			04-Geo-FIR-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Methods for Analysing Remote Sensing Data			04-Geo-MFD-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences			04-Geo-WAG-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Geography and Regional Science		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation with or without slides (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Summer Term 2021

(o ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 66 I Nr. 2

Module title			Abbreviation
Remote Sensing in Resource Management			04-Geo-FIR-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Methods for Analysing Remote Sensing Data			04-Geo-MFD-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title	Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences	04-Geo-WAG-152-m01

Module coordinator	Module offered by
holder of the Professorship of Geography and Regional Science	Institute of Geography and Geology

ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation with or without slides (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Winter Term 2021

(0 ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 66 I Nr. 2

Module title			Abbreviation
Remote Sensing in Resource Management			04-Geo-FIR-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title	Abbreviation
Methods for Analysing Remote Sensing Data	04-Geo-MFD-152-m01

Module coordinator	Module offered by
holder of the Professorship of Remote Sensing	Institute of Geography and Geology

ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences			04-Geo-WAG-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Geography and Regional Science		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation with or without slides (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

--

Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Summer Term 2022

(0 ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 66 I Nr. 2

Module title			Abbreviation
Remote Sensing in Resource Management			04-Geo-FIR-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Methods for Analysing Remote Sensing Data			04-Geo-MFD-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences			04-Geo-WAG-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Geography and Regional Science		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation with or without slides (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Winter Term 2022

(0 ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 66 I Nr. 2

Module title			Abbreviation
Remote Sensing in Resource Management			04-Geo-FIR-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Methods for Analysing Remote Sensing Data			04-Geo-MFD-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences			04-Geo-WAG-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Geography and Regional Science		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation with or without slides (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Summer Term 2023

(0 ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 66 I Nr. 2

Module title			Abbreviation
Remote Sensing in Resource Management			04-Geo-FIR-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Methods for Analysing Remote Sensing Data			04-Geo-MFD-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title	Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences	04-Geo-WAG-152-m01

Module coordinator	Module offered by
holder of the Professorship of Geography and Regional Science	Institute of Geography and Geology

ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation with or without slides (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Winter Term 2023

(0 ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 66 I Nr. 2

Module title	Abbreviation
Remote Sensing in Resource Management	04-Geo-FIR-152-m01

Module coordinator	Module offered by
holder of the Professorship of Remote Sensing	Institute of Geography and Geology

ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Methods for Analysing Remote Sensing Data			04-Geo-MFD-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title	Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences	04-Geo-WAG-232-m01

Module coordinator	Module offered by
holder of the Professorship of Geography and Regional Science	Institute of Geography and Geology

ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

portfolio (approx. 15 hours total)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Summer Term 2024

(0 ECTS credits)

Module title			Abbreviation
Applications of Remote Sensing in Geography			04-Geo-FERNA-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture imparts basic knowledge about the analysis of remote sensing data for geographical questions. First, fundamental understanding of remotely sensed data as geoinformation and later geoinformation in general (geographical data, metadata, spatial overlaying of geodata, geographical information systems) is given. Following topics are analogue, visual image interpretation, digital image processing (calibration, transformation, filter) and atmospheric correction. A focus lies on the digital remote sensing based mapping, i.e. spectral analysis, classification and change detection. Furthermore, basics in modelling of remote sensing parameters is conveyed.

Intended learning outcomes

The students explain applications of earth observation and remote sensing. They explain geographical data and reflect their essential characteristics. They summarise fundamental aspects of (digital) image processing and assess different methodological approaches for the evaluation of remote sensing data for geographical questions.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Introduction to Geographical Remote Sensing			04-Geo-FERNE-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The lecture gives an overview of the principles of remote sensing, that are: theoretical basics, history of remote sensing / physical principles (energy and radiation, interactions radiation - atmosphere, interactions radiation - surfaces, objects under investigation: soils, vegetation, water) / thermal remote sensing: radiation laws, radiant temperature, emissivity / detectors: characterisation of remote sensing data, platforms and sensors (passive and active systems, e.g. hyperspectral and LiDAR) / radar remote sensing / radar interferometry / basics for remote sensing parameters (land, atmosphere, oceans).

Intended learning outcomes

The students describe basics of earth observation. They outline and explain the radiation path through the atmosphere to the object under investigation and back to the sensor. They emphasise essential characteristics of remote sensing data, sensors and platforms.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Remote Sensing in Resource Management			04-Geo-FIR-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Against the background of geographical questions, the spectrum of opportunities for remote sensing technologies is developed within this module. According to the student's topic choices, different aspects of remote sensing for the monitoring of environmentally relevant processes in the oceans, the atmosphere and on the land surface are examined, including: Urban applications such as urban growth and urban climate, whereby land surface parameters such as imperviousness and thermal extinction of surfaces are further deepened / remote sensing for environmental monitoring, such as assessment and long-term observation of conventions, support of tasks of nature conservation like habitat designation by modelling of species distributions / remote sensing in health management / hydrological applications of remote sensing such as parameters for modelling run-off in drainage areas or flood mapping and water masks / agricultural applications from crop mapping through extensive growth monitoring and drought forecasts to precision farming. For the respective fields of application, relevant parameters are presented in detail and the spectrum of methods is deduced.

Intended learning outcomes

The students describe, illustrate, explain, and question third party's research results in remote sensing for the first time and evaluate the value of earth observation for answering geographical research questions.

Courses (type, number of weekly contact hours, language — if other than German)

S (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title			Abbreviation
Methods for Analysing Remote Sensing Data			04-Geo-MFD-152-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Remote Sensing		Institute of Geography and Geology	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module essentially conveys methodological basics: geometric corrections / radiometric corrections (calculation of reflectances, atmospheric correction and correction of viewing and illumination angles) / spatial and spectral filters / image enhancement for visual image interpretation / analysis of spectral profiles / information extraction (rationing, indices, transformations) / classification of remote sensing data and accuracy assessment / pixel based vs. object-oriented analysis / multi-temporal data analysis (time series generation, change detection) / joint usage of remote sensing data with other geoinformation in geographical information systems (raster and vector data).

Intended learning outcomes

The students apply fundamental methods for the processing and analysis of mainly optical earth observation data. They create maps from remotes sensing data self-reliantly and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)

S (2) + T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 45 minutes) with related term paper (approx. 15 pages)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

max. 20 places. Should the number of applications exceed the number of available places, places will be allocated according to the number of subject semesters with the individual student's progression through their degree programme being taken into account. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title	Abbreviation
Scientific Writing and Presentation Skills in Earth Sciences	04-Geo-WAG-232-m01

Module coordinator	Module offered by
holder of the Professorship of Geography and Regional Science	Institute of Geography and Geology

ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Students will be provided with basics of scientific work in Geography: This includes dealing with literature, conception and writing of scientific texts as well as being able to present in an university style.

Intended learning outcomes

Students achieve basics concerning methods of scientific work. This refers to the fundamental design of scientific texts and oral presentations, application adequate working techniques as well as the necessary information competence.

Courses (type, number of weekly contact hours, language — if other than German)

T (2)
Module taught in: German and/or English

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

portfolio (approx. 15 hours total)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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