Module Catalogue

for the Subject

Computer Science und Sustainability

as a Bachelor's with 1 major

with the degree "Bachelor of Science"

(180 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

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Bachelor's with 1 major, 180 ECTS credits

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Learning Outcomes

German contents and learning outcome available but not translated yet.

Nach erfolgreichem Abschluss verfügen die Studierenden über folgende Fähigkeiten:

- die Methoden algorithmischen Denkens und Arbeitens,
- analytisches Denken, Abstraktionsvermögen und die Fähigkeit, komplexe Zusammenhänge zu strukturieren,
- fundierte Grundkenntnisse, Methodenkenntnisse und die Entwicklung der für die Informatik typischen Denkstrukturen sowie
- aktuelle Methodenkenntnisse für nachhaltige IT-Systeme und in der IT für Nachhaltigkeit.

Das Ziel des Studienganges ist es, Studierende mit hervorragenden Berufsperspektiven für „Informatik und Nachhaltigkeit" auszubilden. Die Studierenden sollten technisch-informatisches Interesse mitbringen und sich für interdisziplinäre Fragestellungen im Themenbereich Nachhaltigkeit interessieren. Sie erwartet eine fundierte Ausbildung, die informatische Berufsfelder öffnet und gleichzeitig gesellschaftliche Fragen zur Nachhaltigkeit diskutiert. Der Studiengang schafft die Voraussetzungen, um disziplinübergreifend mit Expertinnen und Experten aus anderen Bereichen zu arbeiten (T-Shaped Future Careers).

Der erfolgreiche Abschluss des Bachelorstudiums „Informatik und Nachhaltigkeit" qualifiziert auch für die Master-Studiengänge in Informatik an der Universität Würzburg.

In den in den Modulbeschreibungen erläuterten Lernergebnissen erlernen die Studierenden zudem die im Leitbild der Universität sowie den Qualitäts- und Qualifikationszielen der Fakultät für Mathematik und Informatik formulierten Elemente:

- zur Entwicklung ihrer Persönlichkeit
- Sie haben sich wissenschaftliches Denken und Arbeiten als fachliche Expertinnen und Experten auf der ihnen entsprechenden Niveaustufe 6 des Hochschulqualifikationsrahmens angeeignet.
- Sie wenden die Regeln guter Wissenschaftlicher Praxis auch in fachfremden Bereichen an und können als fachliche Expertinnen und Experten zielgruppenspezifisch fachkundig fundierte komplexere Zusammenhänge verständlich darstellen.
- Sie wissen um ihre gesellschaftspolitische Verantwortung als in der Informatik und Nachhaltigkeit gebildete Akademikerinnen und Akademiker und können fachlich begründete Bewertungen einer breiteren Öffentlichkeit vermitteln.
- Sie werden zu forschungsbasiertem Fachwissen aber auch kritischem Denken hingeführt, um Lösungen für Probleme aus gesellschaftlicher, ethischer und nachhaltiger Sicht zu hinterfragen.
- Sie erwerben multidisziplinäre Kompetenzen für interdisziplinäre Zusammenarbeit, um Fragestellungen zwischen verschiedenen Wissensbereichen hinsichtlich Nachhaltigkeit zu bearbeiten.

Berufsziele

Den Absolventinnen und Absolventen des Studienfachs Bachelor Informatik und Nachhaltigkeit bieten sich hervorragende Berufsperspektiven. Das Studium „Informatik und Nachhaltigkeit" macht die Studierenden mit den wichtigsten Teilgebieten der Informatik sowie Nachhaltigkeit in einem der Vertiefungsbereiche des Studiums vertraut. Die Studentinnen und Studenten lernen, nachhaltige IT-Systeme zu entwickeln – zum Beispiel energieeffiziente Systeme (Green IT). Zusätzlich erfahren sie, wie die Informatik im Umweltbereich zu nachhaltigen Ansätzen führen kann.

- Berufseinstieg in einem Unternehmen oder einer öffentlichen Institution: Informatik und Nachhaltigkeit sowie die damit verbundene Digitalisierung sind hochrelevante Themen in Gesellschaft und Wirtschaft (national, international).

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- Das Berufsfeld beinhaltet gängige Methoden aus dem Bereich Informatik mit vielfältigen beruflichen Möglichkeiten in nahezu jeder Branche, siehe Berufsziele des Bachelorstudiengangs Informatik.
- Informatiker und Informatikerinnen sind Mangelware in fast allen Bereichen der Wirtschaft.

Durch die Verankerung von Nachhaltigkeit im Studiengang ergeben sich Aufgabenbereiche insbesondere im Umweltschutz, Umweltmanagement und -technik, in der Geographie, in der Geologie und in der Biologie. Das Berufsfeld umfasst z.B.

- Softwareentwicklung (Cloud, Server, Mobile Systeme),
- Entwicklung von nachhaltigen und wirtschaftlichen IT-Systemen,
- Aufgaben im Bereich Umweltinformatik, Umweltmanagement, Geoinformatik,
- Beratung hinsichtlich Simulationssoftware, Data Management, Nachhaltigkeit in IT-Systemen,
- Administration von Netzen und Systemen, IT-Management sowie
- IT-Projektmanagement, Aufgaben eines Digital Officer.

Qualifikationsziele

Nach erfolgreichem Abschluss des Studiums verfügen die Absolventinnen und Absolventen über die folgenden Kompetenzen:

1. Allgemeine Kompetenzen

- Kritische Reflexion und Einordnung von wissenschaftlichen Erkenntnissen.
- Schriftliche und mündliche Präsentation erworbener Kenntnisse.
- Durchführung eigener wissenschaftlicher & angewandter Projekte.
- Verfassen wissenschaftlicher Texte nach fachlichen Standards.
- Projekt- und Teamarbeit.
- Ethik und professionelles Selbstverständnis.
- Gesellschaftliche, ökologische, ethische Verantwortung zu Informatik und Nachhaltigkeit.

2. Methodische Kompetenzen

- Methoden algorithmischen Denkens und Arbeitens.
- Analytisches Denken und Abstraktionsvermögen.
- Fähigkeit, komplexe Zusammenhänge zu verstehen und zu strukturieren.
- Fundierte Grundkenntnisse, Methodenkenntnisse und die Entwicklung der für die Informatik typischen Denkstrukturen.
- Aktuelle Methodenkenntnisse für nachhaltige IT-Systeme und der IT für Nachhaltigkeit.
- Analyse-, Design- und Bewertungsmethoden für nachhaltige IT-Systeme und für IT für Nachhaltigkeit.

3. Inhaltliche Kompetenzen

- Programmierung, programmiertechnische Verfahren, Algorithmen und Datenstrukturen.
- Softwareentwurf und Softwareanalyse.
- Speichern, Verarbeiten, Auswerten von Daten in (Umwelt-) Informationssystemen.
- Rechnernetze und Informationsübertragung, Umweltbeobachtung mit Sensorik.
- Modellbildung und Simulation für Nachhaltige IT und IT für Nachhaltigkeit.
- Nachhaltigkeitskonzepte und Bewertungen.
- Ressourcenbewusstes System Engineering und Ressourcen-Beschränkung von technischen Systemen.
- Herstellen interdisziplinärer Bezüge zu Anwendungsfeldern (Mensch-Umwelt-Beziehungen, Umwelt- und Erdbeobachtung, Klima, Ökosysteme).

Wissenschaftliche Befähigung

- Die Absolventinnen und Absolventen können die mathematischen, technischen, theoretischen und praktischen Grundlagen der Kerninformatik sowie in den Anwendungsfächern (Biologie und Geographie) anwenden.

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- Die Absolventinnen und Absolventen verstehen die wesentlichen Zusammenhänge und Konzepte der einzelnen Teilgebiete der Informatik und Nachhaltigkeit.
- Die Absolventinnen und Absolventen können tiefergehende Kenntnisse in mindestens einem Teilgebiet abrufen
- Die Absolventinnen und Absolventen können unter Anleitung softwaregetriebene Experimente durchführen, analysieren, auswerten und die erhaltenen Ergebnisse darstellen.
- Die Absolventinnen und Absolventen sind in der Lage, sich mit Hilfe von Fachliteratur in neue Aufgabengebiete einzuarbeiten und die Ergebnisse zu interpretieren und zu bewerten. Sie können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten.
- Die Absolventinnen und Absolventen besitzen Abstraktionsvermögen, analytisches Denken, interdisziplinäre Problemlösungskompetenz und die Fähigkeit, Zusammenhänge zu strukturieren.
- Die Absolventinnen und Absolventen sind in der Lage, Methoden der Informatik und Nachhaltigkeit unter Anleitung auf konkrete praktische oder theoretische Aufgabenstellungen anzuwenden, Lösungswege zu entwickeln und die Ergebnisse zu interpretieren und zu bewerten.
- Die Absolventinnen und Absolventen sind in der Lage, eine Forschungsarbeit zu gestalten, in der sie gelerntes Wissen von Forschungsmethoden benutzen und damit eine abgeleitete Forschungsfrage (auch in den Anwendungsfächern) beantworten.
- Die Studierenden kennen und verstehen Konzepte zum Erreichen von Nachhaltigkeit, Ansätze zur Bewertung der Nachhaltigkeit von technischen Systemen, Konflikte und Trade-offs zur Erreichung von Nachhaltigkeit. Die Studierenden schaffen ein Bewusstsein für Zielkonflikte in der Nachhaltigkeitsdiskussion. Sie können ihre Erkenntnisse auf Praxisbeispiele übertragen, um Nachhaltigkeitskonzepte anzuwenden und zu bewerten.

Befähigung zur Aufnahme einer Erwerbstätigkeit
- Kommunikationskompetenz: Die Absolventinnen und Absolventen können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten. Außerdem beherrschen sie die Fachsprache der Expertinnen und Experten der Anwendungsfächer.
- Teamfähigkeit, Konfliktkompetenz: Die Absolventinnen und Absolventen sind in der Lage, konstruktiv und zielorientiert in einem Team zusammenzuarbeiten und auftretende Konflikte zu lösen. Sie können ihre erworbenen Kompetenzen in unterschiedlichen interkulturellen Kontexten und in international zusammengesetzten Teams anwenden.
- Praxisbezug: Die Absolventinnen und Absolventen kennen wichtige Anforderungen und Arbeitsweisen im gewerblichen Umfeld, in Forschung und Entwicklung sowie in den Anwendungsfächern des Studiengangs.
- Problemlösungskompetenz: Die Absolventinnen und Absolventen sind befähigt, Probleme zu analysieren und zu lösen und sich in weniger vertraute, insbesondere interdisziplinäre Themenkomplexe einzuarbeiten.

Persönlichkeitsentwicklung
- Eigenverantwortlichkeit, Selbstständigkeit: Entwicklung der Bereitschaft und Befähigung zum selbstständigen und selbstverantwortlichen Lernen und Arbeiten und damit des lebenslangen Lernens.
- Wissenschaftliche Praxis: Die Absolventinnen und Absolventen kennen die Regeln guter wissenschaftlicher Praxis und beachten sie.
- Diskussionskultur: Die Absolventinnen und Absolventen können ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten.
- Kritikfähigkeit und verantwortliches Handeln: Die Absolventinnen und Absolventen erlangen die Fähigkeit zur Kritik und Reflexion von Lösungen aus unterschiedlichen Sichtweisen (technisch, gesellschaftlich, ethisch, nachhaltig) auf Basis des erworbenen Wissens, um zu eigenständigem Denken und begründeten selbstbestimmten Entscheidungen zu gelangen.

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Befähigung zum gesellschaftlichen Engagement

- Ethisches Handeln: Die Absolventinnen und Absolventen können naturwissenschaftliche Entwicklungen kritisch reflektieren und deren Auswirkungen auf die Wirtschaft, Gesellschaft und die Umwelt in Ansätzen erfassen. Sie haben gelernt, was Nachhaltigkeit und Nachhaltigkeitsziele sind, welche direkten und indirekten Auswirkungen Informationstechnik auf Umwelt und Gesellschaft hat und wie Informatik dazu beitragen kann, Umweltprobleme und Herausforderungen der Nachhaltigkeit zu lösen.
- Kritikfähigkeit und verantwortliches Handeln: Die Absolventinnen und Absolventen haben ihr Wissen bezüglich wirtschaftlicher, gesellschaftlicher, naturwissenschaftlicher, kultureller etc. Fragestellungen erweitert und können begründet Position beziehen und verantwortlich handeln.
- Kultur der Partizipation: Die Absolventinnen und Absolventen entwickeln die Bereitschaft und Fähigkeit, ihre Kompetenzen in partizipative Prozesse einzubringen und aktiv an Entscheidungen mitzuwirken.

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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:

ASPO2015

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

09-Jun-2021 (2021-69)

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.

Module Catalogue for the Subject
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Compulsory Courses

(115 ECTS credits)

Module Catalogue for the Subject
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Computer Science and Sustainability

(90 ECTS credits)

Bachelor's with 1 major Computer Science und Su-
stainability (2021)

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cord Bachelor (180 ECTS) Informatik und Nachhaltigkeit - 2021

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Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Fundamentals of Programming		10-I-GdP-172-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science II		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Data types, control structures, foundations of procedural programming, selected topics of C, introduction to object orientation in Java, selected topics of C++, further Java concepts, digression: scripting languages.

Intended learning outcomes

The students possess a fundamental knowledge about programming languages (in particular Java, C and C++) and are able to independently develop average to high level Java programs.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

--

Additional information

--

Workload

150 h

Teaching cycle

--

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

§ 49 I Nr. 1 b)
§ 69 I Nr. 1 b)

Module appears in

Bachelor's degree (1 major) Physics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major) Physics (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Business Information Systems (2021)
Bachelor's degree (1 major) Mathematical Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)

Module Catalogue for the Subject
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Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2023)
Bachelor's degree (1 major) Business Information Systems (2024)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)
Bachelor's degree (1 major) Economathematics (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Algorithms and data structures	10-I-ADS-152-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Design and analysis of algorithms, recursion vs. iteration, sort and search methods, data structures, abstract data types, lists, trees, graphs, basic graph algorithms, programming in Java.

Intended learning outcomes

Students are proficient in independently designing, precisely describing and analyzing algorithms. The students know the basic paradigms for the design of algorithms and can implement them in practical programs. Students are able to estimate the runtime behavior of algorithms and prove the correctness of algorithms.

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

V (4) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

--

Workload

300 h

Teaching cycle

Teaching cycle: only in winter semester

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

§ 49 I Nr. 1 a)
§ 69 I Nr. 1 a)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Economathematics (2015)
Bachelor's degree (1 major) Human-Computer Systems (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
First state examination for the teaching degree Realschule Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)

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Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits
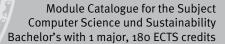
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Mathematics (2023)

Bachelor's with 1 major Computer Science und Su-
stainability (2021)

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Module Catalogue for the Subject
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Module title		Abbreviation
Software Technology		10-I-ST-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Object-oriented software development with UML, development of graphical user interfaces, foundations of databases and object-relational mapping, foundations of web programming (HTML, XML), software development processes, unified process, agile software development, project management, quality assurance.

Intended learning outcomes

The students possess a fundamental theoretical and practical knowledge on the design and development of software systems.

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

V (4) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

--

Workload

300 h

Teaching cycle

Teaching cycle: only in summer semester

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

§ 49 I Nr. 1 b)
§ 69 I Nr. 1 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Economathematics (2015)
Bachelor's degree (1 major) Human-Computer Systems (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
First state examination for the teaching degree Realschule Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Business Information Systems (2016)
Bachelor's degree (1 major) Aerospace Computer Science (2017)

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Bachelor's degree (1 major) Economathematics (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Business Information Systems (2019)
Module studies (Bachelor) Orientierungsstudien (2020)
Bachelor's degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Business Information Systems (2021)
Bachelor's degree (1 major) Economathematics (2021)
Bachelor's degree (1 major) Economathematics (2022)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2023)
Bachelor's degree (1 major) Economathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2024)
Bachelor's degree (1 major) Economathematics (2024)
Bachelor's degree (1 major) Digital Business & Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Practical course in software	10-I-SWP-152-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

ECTS	Method of grading	Only after succ. compl. of module(s)
10	(not) successfully completed	10-I-PP, 10-I-ST

Duration	Module level	Other prerequisites
1 semester	undergraduate	In addition, the knowledge and skills acquired in module 10-I-ADS are required. Prior attendance of this module is therefore highly recommended.

Contents

Completion of a project assignment in groups, problem analysis, creation of requirements specifications, specification of solution components (e. g. UML) and milestones, user manual, programming documentation, presentation and delivery of the runnable software product in a colloquium.

Intended learning outcomes

The students possess the practical skills for the design, development and execution of a software project in small teams.

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

P (6)

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

practical project (Completion of a larger software project in groups (approx. 300 hours per person) and final presentation (approx. 10 minutes per group)

Allocation of places

--

Additional information

--

Workload

300 h

Teaching cycle

--

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

§ 69 I Nr. 1 d)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Mathematics (2023)

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Module title	Abbreviation
Practical Course in Programming	10-I-PP-191-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1-2 semester	undergraduate	Intended learning outcomes of the following module are required: 10-I-GdP. It is therefore strongly recommended to complete this before.

Contents

The programming language Java. Independent creation of small to middle-sized, high-quality Java programs.

Intended learning outcomes

The students are able to independently develop small to middle-sized, high-quality Java programs.

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

P (6)

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

practical examination (programming exercises, approx. 240 hours) and written examination (approx. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).

Allocation of places

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Additional information

--

Workload

300 h

Teaching cycle

--

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

§ 49 I Nr. 1 c)
§ 69 I Nr. 1 d)

Module appears in

Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Computer Science (2019)
Module studies (Bachelor) Orientierungsstudien (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Mathematics (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Computer Networks and Information Transmission	10-I-RIÜ-191-m01

Module coordinator	Module offered by
holder of the Chair of Computer Science III	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

- Computer networks and the Internet: Structure and Mechanisms of Telecommunication
- Communication Protocols: Basic Principles and the Layer Model
- Computer and Communication Systems: Network Systems, Data Traffic in Distributed Systems and inter-network Communication
- The Internet: Important Protocols and Routing
- Architecture and Structure of Computer Networks: Network Architecture, Access Mechanisms, Flow Control and Traffic Management
- Coding Theory: Mechanisms for Error Detection and Error Correction
- Information Theory: Entropy of Data
- Digital Communication Systems: Signal Modulation

Intended learning outcomes

Students command the technical, theoretical as well as practical knowledge to understand the structure of computer networks, the Internet and communication systems for telecommunication.

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

V (4) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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

§ 22 II Nr. 3 b), § 69 I Nr. 1 c)

Module appears in

Bachelor's degree (1 major) Computer Science (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)

Bachelor's degree (1 major) Mathematics (2023)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Databases		10-I-DB-152-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Relational algebra and complex SQL statements; database planning and normal forms; transaction management.

Intended learning outcomes

The students possess knowledge about database modelling and queries in SQL as well as transactions.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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)

§ 49 I Nr. 1 b)
§ 69 I Nr. 1 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Business Information Systems (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
Bachelor's degree (1 major) Functional Materials (2015)
First state examination for the teaching degree Realschule Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Master's degree (1 major) Physics (2016)
Bachelor's degree (1 major) Business Information Systems (2016)
Bachelor's degree (1 major) Aerospace Computer Science (2017)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Business Information Systems (2019)
Bachelor's degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Functional Materials (2021)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Business Information Systems (2021)
Bachelor's degree (1 major) Mathematical Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2023)
Bachelor's degree (1 major) Business Information Systems (2024)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)
Bachelor's degree (1 major) Functional Materials (2025)
Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Geographical Information Systems (GIS)	04-Geo-GIS-152-m01

Module coordinator	Module offered by
holder of the Professorship of Physical Geography	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

Introduction to GIS; application examples from Geography, earth and environmental sciences; introduction to GIS ArcGIS; data models to GIS: factual and geometrical data (vector and grid data); geometrical, topological and topical data modelling; data administration with ArcGIS (ArcCatalog); conception and structure of a GIS project (ArcGIS); plain principle, meta data, data format, attribute data; relational data model; software components of ArcGIS (ArcMap, ArcToolbox, ArcInfo Workstation); data acquisition and preparation of geometrical and factual data (digitisation, measurement; administration of geometrical and factual data (introduction to structure of a geodata base); geographical analysis of geodata (linkage, intersection, topical and geographical queries, geographical interpolation, terrain analysis from digital elevation data); interpretation, visualisation and result presentation of geodata (signatures, diagrams and map design, topical maps)

Intended learning outcomes

Students achieve knowledge of the type and development, management, processing and presenting of geographical data. They acquire skills in dealing with GIS and in the organisation of GIS projects as well as in the processing and interpretation of spatial analysis of GIS (GIS software).

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)

portfolio (approx. 20 pages, including 3 maps, 2 logs)
Language of assessment: German and/or English

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 appears in

Bachelor's degree (1 major) Geography (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Physical Geography) (2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Human Geography) (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Sustainability and IT	10-I-NIT-212-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

The module addresses social challenges in relation to sustainability, concepts for sustainability, and sustainability goals. The students get an overview of environmental informatics, sustainability informatics, and computational methods for environmental protection and environmental research. The subject areas of the study program are treated as application areas. Other foci are the effect of information technology through its provision and use, the environmental and sustainability balance of IT, and methods for designing sustainable IT systems.

Intended learning outcomes

In the module, students learn what sustainability and sustainability goals are, what direct and indirect effects information technology has on the environment and society, and how information technology can contribute to solving environmental problems and sustainability challenges. Basics for sustainable information technology are learned.

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

V (2) + Ü (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. 60 to 120 minutes)
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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

Teaching cycle: every year, winter semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title			Abbreviation
Environmental Monitoring			10-I-UB-212-m01

Module coordinator		Module offered by
holder of the Professorship for sensors and embedded systems for earth observation		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

The module teaches basic methods of environmental observation, suitable indicators and sensors for the collection of environmental data, methods for the qualitative and quantitative evaluation of the collected environmental data, further analysis and visualization of environmental data.

Intended learning outcomes

The students know important indicators and procedures for environmental observation. They will be able to develop concepts for environmental monitoring with technical sensors and devices, as well as to evaluate the measurement data with suitable methods.

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

V (2) + Ü (2)

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. 60 to 120 minutes)
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

UNIVERSITÄT WÜRZBURG
Julius-Maximilians-

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Sustainability Concepts and Assessment		10-I-NuB-212-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

In this module, we get to know basic concepts of sustainability and we learn how to assess the sustainability of technical systems. Applications from the specialization areas of this study program yield practical examples of systems and their interactions.

Intended learning outcomes

The students know and understand concepts for achieving sustainability and approaches for evaluating the sustainability of technical systems. They understand conflicts and compromises for achieving sustainability. The students get aware of contradicting goals in the sustainability discussion. They can transfer their knowledge to practical examples in order to apply and evaluate sustainability concepts for problem areas from the specializations of this study program.

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

V (2) + Ü (2)

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. 60 to 120 minutes)
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

UNIVERSITÄT WÜRZBURG
Julius-Maximilians-

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Modeling and Simulation		10-I-MuS-212-m01

Module coordinator	Module offered by
holder of the Professorship for modeling and simulation	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Modeling and simulation play a central role in computer science and in the natural sciences for the analysis of systems. The module includes basic modeling paradigms, basics of simulation (discrete, continuous, hybrid, parallel), its implementation and evaluation.

Intended learning outcomes

The students learn the basics of various modeling formalisms and types of simulations as well as their application. They will acquire the skills to translate these systems into models for given problems and tasks, to develop simulation scenarios with suitable software, and to carry out and analyze simulation studies.

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

V (2) + Ü (2)

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. 60 to 120 minutes)
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, winter semester

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

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Energy-Aware Engineering		10-I-EnAE-212-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science III		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

In this module we learn about methods and metrics to evaluate energy demand and energy efficiency of technical systems. We study energy-aware mechanisms for transmitting data (for example, sensor data in the Internet of Things) and for operating technical systems (such as data centers and computer clouds).

Intended learning outcomes

The students are able to analyze and optimize technical systems with respect to their energy demands.

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

V (2) + Ü (2)

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. 60 to 120 minutes)
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Mathematics

(25 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Mathematics 1 for students in Computer Science		10-M-INF1-152-m01

Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Propositional logic, set theory, proof techniques, relations; sequences, limits and lambda-symbols; the ring of integers; elementary group theory; residue class rings; basics in linear algebra, linear maps and matrix calculus, systems of linear equations.

Intended learning outcomes

The student gets acquainted with fundamental concepts and methods of advanced mathematics. He/She learns to apply these methods to problems in natural and engineering sciences, in particular in computer science, and is able to interpret the results.

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

V (4) + Ü (2)
Module taught in: Ü: German 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)

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
exchange program Mathematics (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Mathematics 2 for students in Computer Science	10-M-INF2-152-m01

Module coordinator	Module offered by
Dean of Studies Mathematik (Mathematics)	Institute of Mathematics

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Determinants, eigenvalue theory; event and probability spaces, combinatorics, random variables, examples of distributions, parameter estimates; basics in analysis.

Intended learning outcomes

The student gets acquainted with fundamental concepts and methods of advanced mathematics. He/She learns to apply these methods to problems in natural and engineering sciences, in particular in computer science, and is able to interpret the results.

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

V (4) + Ü (2)
Module taught in: Ü: German 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)

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

--

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
exchange program Mathematics (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Graphs and Discrete Optimization	10-I-GudO-212-m01

Module coordinator	Module offered by
holder of the Professorship for optimization under resource constraints	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

We deal with algorithms for well-known graph problems such as round-trip problems, maximum flow, matching, coloring, and planar graphs. We study methods of discrete optimization; for example, how to model graph problems as (integer) linear programs.

Intended learning outcomes

The students are able to model typical problems of computer science as graph problems and discrete optimization. Students can decide which tools from the module help to solve a given problem algorithmically.

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

V (2) + Ü (2)

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. 60 to 120 minutes)
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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

Teaching cycle: every year, summer semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Compulsory Electives

(35 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Interdisciplinary principles of sustainability

(5 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Introduction to Geography for Computer Scientists	04-Geo-EGI-212-m01

Module coordinator	Module offered by
holder of the Professorship of Climatology	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 basics of geography and geology for computer scientists with a focus on su-stainability. In particular, an overview of the relevant subject areas such as physical geography like climate geo-graphy, geographical remote sensing and human geography is given.

Intended learning outcomes

The students learn the basics of geography as well as its diverse problems and tasks.

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

V (3)
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)

a) written examination (approx. 45 minutes) or
b) oral examination of one candidate each (approx. 30 minutes) or
c) term paper (approx. 20 pages)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Basics in Biology		07-GBio-212-m01

Module coordinator		Module offered by
Ricarda Scheiner		Faculty of Biology

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Introduction into basic aspects in biology

Intended learning outcomes

Students are able to understand basic concepts in biology and are able to describe biological principles in the fields of cytology, morphology, physiology, developmental biology, evolution, genetics, microbiology and ecology using selected examples. They understand basic biological principles and rules and can recognize them in biological examples.

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

V (4)

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. 60 minutes)

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every semester

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

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Module appears in

First state examination for the teaching degree Grundschule English (2009)
First state examination for the teaching degree Grundschule Biology (2009)
First state examination for the teaching degree Grundschule Chemistry (2009)
First state examination for the teaching degree Grundschule Geography (2009)
First state examination for the teaching degree Grundschule Protestant Theology (2009)
First state examination for the teaching degree Grundschule German (2009)
First state examination for the teaching degree Grundschule History (2009)
First state examination for the teaching degree Grundschule History (2015)
First state examination for the teaching degree Grundschule Catholic Theology (2009)
First state examination for the teaching degree Grundschule Mathematics (2009)
First state examination for the teaching degree Grundschule Music (2009)
First state examination for the teaching degree Grundschule Physics (2009)
First state examination for the teaching degree Grundschule Social Science (2009)
First state examination for the teaching degree Grundschule Science of Sport (2009)
First state examination for the teaching degree Hauptschule English (2009)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

First state examination for the teaching degree Hauptschule Biology (2009)
First state examination for the teaching degree Hauptschule Chemistry (2009)
First state examination for the teaching degree Hauptschule Geography (2009)
First state examination for the teaching degree Hauptschule Protestant Theology (2009)
First state examination for the teaching degree Hauptschule German (2009)
First state examination for the teaching degree Hauptschule History (2009)
First state examination for the teaching degree Hauptschule Catholic Theology (2009)
First state examination for the teaching degree Hauptschule Mathematics (2009)
First state examination for the teaching degree Hauptschule Music (2009)
First state examination for the teaching degree Hauptschule Physics (2009)
First state examination for the teaching degree Hauptschule Social Science (2009)
First state examination for the teaching degree Hauptschule Science of Sport (2009)
First state examination for the teaching degree Realschule English (2009)
First state examination for the teaching degree Realschule Biology (2009)
First state examination for the teaching degree Realschule Chemistry (2009)
First state examination for the teaching degree Realschule Geography (2009)
First state examination for the teaching degree Realschule Protestant Theology (2009)
First state examination for the teaching degree Realschule French Studies (2009)
First state examination for the teaching degree Realschule German (2009)
First state examination for the teaching degree Realschule History (2009)
First state examination for the teaching degree Realschule Computer Science (2012)
First state examination for the teaching degree Realschule Catholic Theology (2009)
First state examination for the teaching degree Realschule Mathematics (2009)
First state examination for the teaching degree Realschule Music (2009)
First state examination for the teaching degree Realschule Physics (2009)
First state examination for the teaching degree Realschule Science of Sport (2009)
First state examination for the teaching degree Gymnasium English (2009)
First state examination for the teaching degree Gymnasium Biology (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Gymnasium Geography (2009)
First state examination for the teaching degree Gymnasium French Studies (2009)
First state examination for the teaching degree Gymnasium German (2009)
First state examination for the teaching degree Gymnasium History (2009)
First state examination for the teaching degree Gymnasium Greek Philology (2009)
First state examination for the teaching degree Gymnasium Computer Science (2009)
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First state examination for the teaching degree Gymnasium Catholic Theology (2009)
First state examination for the teaching degree Gymnasium Latin Philology (2009)
First state examination for the teaching degree Gymnasium Mathematics (2012)
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First state examination for the teaching degree Gymnasium Music (2009)
First state examination for the teaching degree Gymnasium Physics (2009)
First state examination for the teaching degree Gymnasium Russian (2009)
First state examination for the teaching degree Gymnasium Social Science (2009)
First state examination for the teaching degree Gymnasium Spanish Studies (2009)
First state examination for the teaching degree Gymnasium Science of Sport (2009)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2009)
First state examination for the teaching degree Sonderpädagogik Pedagogy of Secondary Education (2009)
First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2009)
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First state examination for the teaching degree Mittelschule Biology (2013)
First state examination for the teaching degree Mittelschule Chemistry (2013)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

First state examination for the teaching degree Mittelschule Geography (2013)
First state examination for the teaching degree Mittelschule Protestant Theology (2013)
First state examination for the teaching degree Mittelschule German (2013)
First state examination for the teaching degree Mittelschule History (2013)
First state examination for the teaching degree Mittelschule Catholic Theology (2013)
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First state examination for the teaching degree Grundschule German (2015)
First state examination for the teaching degree Grundschule Catholic Theology (2015)
First state examination for the teaching degree Grundschule Mathematics (2015)
First state examination for the teaching degree Grundschule Pedagogy of Primary Education (2015)
First state examination for the teaching degree Grundschule Physics (2015)
First state examination for the teaching degree Grundschule Social Science (2015)
First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2015)
First state examination for the teaching degree Grundschule Didactics in Biology (Primary School) (2015)
First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2015)
First state examination for the teaching degree Grundschule Didactics in Geography (Primary School) (2015)
First state examination for the teaching degree Grundschule Didactics in German (Primary School) (2015)
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First state examination for the teaching degree Grundschule Music Education in Primary School (2015)
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First state examination for the teaching degree Realschule German (2015)
First state examination for the teaching degree Realschule History (2015)
First state examination for the teaching degree Realschule Computer Science (2015)
First state examination for the teaching degree Realschule Catholic Theology (2015)
First state examination for the teaching degree Realschule Mathematics (2015)
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First state examination for the teaching degree Gymnasium English (2015)
First state examination for the teaching degree Gymnasium Biology (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
First state examination for the teaching degree Gymnasium French Studies (2015)
First state examination for the teaching degree Gymnasium German (2015)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

First state examination for the teaching degree Gymnasium History (2015)
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First state examination for the teaching degree Gymnasium Social Science (2015)
First state examination for the teaching degree Gymnasium Spanish Studies (2015)
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First state examination for the teaching degree Sonderpädagogik Didactics in Catholic Theology (Primary School) (2015)
First state examination for the teaching degree Sonderpädagogik Art Education in Primary School (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Science of Sport (Primary School) (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Mathematics (Primary School) (2015)
First state examination for the teaching degree Sonderpädagogik Music Education in Primary School (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2015)
First state examination for the teaching degree Sonderpädagogik Ergonomics (Teaching at the German Mittelschule) (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Biology (Middle School) (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Geography (Middle School) (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Middle School) (2015)
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First state examination for the teaching degree Sonderpädagogik Teaching at the German Mittelschule (2015)
First state examination for the teaching degree Mittelschule English (2015)
First state examination for the teaching degree Mittelschule Biology (2015)
First state examination for the teaching degree Mittelschule Chemistry (2015)
First state examination for the teaching degree Mittelschule Geography (2015)
First state examination for the teaching degree Mittelschule Protestant Theology (2015)
First state examination for the teaching degree Mittelschule German (2015)
First state examination for the teaching degree Mittelschule History (2015)
First state examination for the teaching degree Mittelschule Catholic Theology (2015)
First state examination for the teaching degree Mittelschule Mathematics (2015)

UNIVERSITÄT WÜRZBURG
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Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

First state examination for the teaching degree Mittelschule Physics (2015)

First state examination for the teaching degree Mittelschule Social Science (2015)

First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2015)

First state examination for the teaching degree Mittelschule Ergonomics (Teaching at the German Mittelschule) (2015)

First state examination for the teaching degree Mittelschule Didactics in Biology (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in Geography (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in Protestant Theology (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in German (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in History (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in Catholic Theology (Middle School) (2015)

First state examination for the teaching degree Mittelschule Art Education in Middle School (2015)

First state examination for the teaching degree Mittelschule Didactics in Science of Sport (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in Mathematics (Middle School) (2015)

First state examination for the teaching degree Mittelschule Music Education in Middle School (2015)

First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2015)

First state examination for the teaching degree Mittelschule Didactics in Social Science (Middle School) (2015)

First state examination for the teaching degree Mittelschule Science of Sport (2015)

First state examination for the teaching degree Mittelschule Teaching at the German Mittelschule (2015)

First state examination for the teaching degree Grundschule Protestant Theology (2015)

First state examination for the teaching degree Grundschule Music (2015)

First state examination for the teaching degree Grundschule Didactics in Protestant Theology (Primary School) (2015)

First state examination for the teaching degree Realschule Music (2015)

First state examination for the teaching degree Gymnasium Music (2015)

First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2015)

First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Primary School) (2015)

First state examination for the teaching degree Mittelschule Music (2015)

First state examination for the teaching degree Gymnasium French Studies (2016)

First state examination for the teaching degree Gymnasium Italian Studies (2016)

First state examination for the teaching degree Gymnasium Spanish Studies (2016)

First state examination for the teaching degree Realschule French Studies (2016)

First state examination for the teaching degree Grundschule English (2016)

First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2016)

First state examination for the teaching degree Realschule English (2016)

First state examination for the teaching degree Gymnasium English (2016)

First state examination for the teaching degree Mittelschule English (2016)

First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2016)

First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2016)

First state examination for the teaching degree Gymnasium Greek Philology (2018)

First state examination for the teaching degree Grundschule Physics (2018)

First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2018)

First state examination for the teaching degree Realschule Physics (2018)

First state examination for the teaching degree Gymnasium Physics (2018)

First state examination for the teaching degree Mittelschule Physics (2018)

First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2018)

First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2018)

First state examination for the teaching degree Gymnasium Mathematics (2019)

Module studies (Bachelor) Biology (2019)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module studies (Bachelor) Orientierungsstudien (2020)

First state examination for the teaching degree Mittelschule Biology (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Biology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Biology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule German (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in German (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule English (2020 (Prüfungsordnungsversion 2016))

First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2020 (Prüfungsordnungsversion 2016))

First state examination for the teaching degree Mittelschule Protestant Theology (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Protestant Theology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Geography (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Geography (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule History (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in History (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Catholic Theology (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Catholic Theology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Mathematics (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Mathematics (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Art Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Science of Sport (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Didactics in Science of Sport (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Music (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Music Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Mittelschule Teaching at the German Mittelschule (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2020 (Prüfungsordnungsversion 2016))

First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Geography (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in German (Middle School) (2020 (Prüfungsordnungsversion 2015))

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

First state examination for the teaching degree Sonderpädagogik Didactics in History (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Catholic Theology (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Art Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Science of Sport (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Mathematics (Middle School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Music Education in Middle School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Teaching at the German Mittelschule (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Art Education in Primary School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Music Education in Primary School (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Science of Sport (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in German (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Mathematics (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Protestant Theology (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Sonderpädagogik Didactics in Catholic Theology (Primary School) (2020 (Prüfungsordnungsversion 2015))

First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2020)

First state examination for the teaching degree Grundschule Physics (2020)

First state examination for the teaching degree Gymnasium Physics (2020)

First state examination for the teaching degree Realschule Physics (2020)

First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2020)

First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2020)

First state examination for the teaching degree Mittelschule Physics (2020)

First state examination for the teaching degree Grundschule Political and Social Studies (2020)

First state examination for the teaching degree Grundschule Didactics in Political and Social Studies (Primary School) (2020)

First state examination for the teaching degree Sonderpädagogik MS-Didaktik Career and Economics (2020)

First state examination for the teaching degree Sonderpädagogik Didactics in Political and Social Studies (Secondary School) (2020)

First state examination for the teaching degree Mittelschule MS-Didaktik Career and Economics (2020)

First state examination for the teaching degree Mittelschule Didactics in Political and Social Studies (Secondary School) (2020)

First state examination for the teaching degree Mittelschule Political and Social Studies (2020)

First state examination for the teaching degree Gymnasium Political and Social Studies (2020)

First state examination for the teaching degree Grundschule History (2021)

First state examination for the teaching degree Gymnasium History (2021)

First state examination for the teaching degree Realschule History (2021)

First state examination for the teaching degree Mittelschule History (2021)

First state examination for the teaching degree Grundschule Pedagogy of Primary Education (2021)

First state examination for the teaching degree Gymnasium English (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

First state examination for the teaching degree Gymnasium Philosophy and Ethics (2021)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
First state examination for the teaching degree Sonderpädagogik Pedagogy of Primary Education (2021)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2022)
First state examination for the teaching degree Gymnasium Russian (2023)
First state examination for the teaching degree Gymnasium Mathematics (2023)
First state examination for the teaching degree Gymnasium English (2023)
First state examination for the teaching degree Realschule English (2023)
First state examination for the teaching degree Grundschule English (2023)
First state examination for the teaching degree Grundschule Didactics in English (Primary School) (2023)
First state examination for the teaching degree Mittelschule English (2023)
First state examination for the teaching degree Mittelschule Didactics in English (Middle School) (2023)
First state examination for the teaching degree Sonderpädagogik Didactics in English (Middle School) (2023)
First state examination for the teaching degree Gymnasium Geography (2023)
First state examination for the teaching degree Realschule Geography (2023)
First state examination for the teaching degree Grundschule Geography (2023)
First state examination for the teaching degree Mittelschule Geography (2023)
First state examination for the teaching degree Grundschule German (2024)
First state examination for the teaching degree Gymnasium German (2024)
First state examination for the teaching degree Realschule German (2024)
First state examination for the teaching degree Sonderpädagogik Didactics in German (Middle School) (2024)
First state examination for the teaching degree Mittelschule Didactics in German (Middle School) (2024)
First state examination for the teaching degree Grundschule Didactics in German (Primary School) (2024)
First state examination for the teaching degree Sonderpädagogik Didactics in German (Primary School) (2024)
First state examination for the teaching degree Mittelschule German (2024)
First state examination for the teaching degree Grundschule Music Education in Primary School (2024)
First state examination for the teaching degree Sonderpädagogik Music Education in Primary School (2024)
First state examination for the teaching degree Mittelschule Music Education in Middle School (2024)
First state examination for the teaching degree Sonderpädagogik Music Education in Middle School (2024)
First state examination for the teaching degree Gymnasium Latin Philology (2024)
First state examination for the teaching degree Gymnasium English (2024)
First state examination for the teaching degree Mittelschule MS-Didaktik Career and Economics (2024)
First state examination for the teaching degree Sonderpädagogik MS-Didaktik Career and Economics (2024)
First state examination for the teaching degree Grundschule History (2024)
First state examination for the teaching degree Gymnasium History (2024)
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First state examination for the teaching degree Mittelschule History (2024)
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First state examination for the teaching degree Gymnasium Greek Philology (2024)
First state examination for the teaching degree Grundschule Art Education in Primary School (2024)
First state examination for the teaching degree Sonderpädagogik Art Education in Primary School (2024)
First state examination for the teaching degree Sonderpädagogik Art Education in Middle School (2024)
First state examination for the teaching degree Mittelschule Art Education in Middle School (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Sustainable computer science

(5 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
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Subfield computer science

(5 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
IT Security	10-I-SEC-191-m01

Module coordinator	Module offered by
holder of the Chair of Computer Science II	Institute of Computer Science

ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The course provides a broad sweep through concepts and technologies related to IT security:
- Theoretical aspects: information-theoretic security, computational security, introduction to cryptography (historical and modern ciphers, hash functions, pseudo-random generators, message authentication codes, public key cryptography)
- Network security: protocol security, security of TCP/IP, public key infrastructure, user authentication
- Software security: Software vulnerabilities, common programming errors and exploitation techniques, reverse engineering and obfuscation, malware and anti-malware
- Platform security: access control models, security policies, operating system security, virtualization, security mechanisms with support in hardware

Intended learning outcomes

Students will be introduced to the main concepts and abstractions of IT security. They learn how to model threats and analyze security of a system critically from the attacker view point. After visiting the lecture students are going to understand the purpose and function of several security technologies, as well as their limitations. The exercises provide some hands-on experience of security flows in software.

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

V (2) + Ü (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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

Allocation of places

--

Additional information

--

Workload

150 h

Teaching cycle

--

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

--

Module appears in

Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Computer Science (2019)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)
Bachelor's degree (1 major) Games Engineering (2025)

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Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Introduction into Human-Computer Interaction		10-I-MCS-191-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science IX		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Human-Computer Interaction studies the design, evaluation, and implementation of interactive computer systems. Special focus lies on fundamental psychological and physiological properties of the human users, the technical principals and models of modern computer systems, as well as on the derived boundary conditions of designing usable and human-oriented interactions with technical systems. The topics of this course cover the human perception and cognition, the human memory and attention, the design of interactive systems, popuplar evaluation methods, principles of computer systems, input processing techniques, human interfaces and typical means of interaction, from text-based input methods over graphical user interfaces to multi-modal interfaces. Accompanying practical tasks convey to the students typical methods of requirement analysis, prototyping and evaluation.

Intended learning outcomes

After successfully completing this course, students have a fundamental understanding of human-computer interface design principles. They understand the possibilities and limitations of technology and user and the applications of modern user interfaces. They know the necessary steps of user-centric design and typical design principles.

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

V (3) + Ü (1)

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. 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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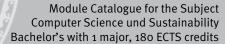**Additional information**

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Workload

150 h

Teaching cycle

--

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Business Information Systems (2021)
Bachelor's degree (1 major) Mathematical Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Practical course in hardware		10-I-HWP-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Practical experiments on hardware aspects, for example in communication technology, robots or the structure of a complete microprocessor.

Intended learning outcomes

The students are able to independently review, prepare and perform experiments with the help of experiment descriptions, to independently search for additional information as well as to document and evaluate experiment results.

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

P (6)

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: completion of approx. 3 to 10 project assignments (approx. 250 hours total) and presentation of results (approx. 10 minutes per project)

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

--

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

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Computer Science (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Mathematics (2023)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Interactive Computer Graphics	10-I-ICG-152-m01

Module coordinator	Module offered by
holder of the Chair of Computer Science IX	Institute of Computer Science

ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Computer graphics studies methods for digitally synthesising and manipulating visual content. This course specifically concentrates on interactive graphics with an additional focus on 3D graphics as a requirement for many contemporary as well as for novel human-computer interfaces and computer games. The course will cover topics about light and images, lighting models, data representations, mathematical formulations of movements, projection as well as texturing methods. Theoretical aspects of the steps involved in ray-tracing and the raster pipeline will be complemented by algorithmical approaches for interactive image syntheses using computer systems. Accompanying software solutions will utilise modern graphics packages and languages like OpenGL, GLSL and/or DirectX.

Intended learning outcomes

At the end of the course, the students will have a broad understanding of the underlying theoretical models of computer graphics. They will be able to implement a prominent variety of these models, to build their own interactive graphics applications and to choose the right software tool for this task.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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)

§ 22 II Nr. 3 b)

Module appears in

First state examination for the teaching degree Gymnasium Computer Science (2015)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Bachelor's with 1 major Computer Science und Su-
stainability (2021)

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cord Bachelor (180 ECTS) Informatik und Nachhaltigkeit - 2021

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Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Digital computer systems		10-I-RAL-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Introduction to digital technologies, Boolean algebras, combinatory circuits, synchronous and asynchronous circuits, hardware description languages, structure of a simple processor, machine programming, memory hierarchy.

Intended learning outcomes

The students possess a knowledge of the fundamentals of digital technologies up to the design and programming of easy microprocessors as well as knowledge for the application of hardware description languages for the design of digital systems.

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

V (4) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

--

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Orientierungsstudien (2020)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Business Information Systems (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2023)
Bachelor's degree (1 major) Business Information Systems (2024)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Bachelor's with 1 major Computer Science und Su-
stainability (2021)

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cord Bachelor (180 ECTS) Informatik und Nachhaltigkeit - 2021

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Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Knowledge-based Systems		10-I-WBS-152-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science VI		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Foundations in the following areas: knowledge management systems, knowledge representation, solving methods, knowledge acquisition, learning, guidance dialogue, semantic web.

Intended learning outcomes

The students possess theoretical and practical knowledge for the understanding and design of knowledge-based systems including knowledge formalisation and have acquired experience in a small project.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Business Information Systems (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Business Information Systems (2016)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science (2019)

Bachelor's degree (1 major) Business Information Systems (2019)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Bachelor's degree (1 major) Business Information Systems (2020)

Bachelor's degree (1 major) Aerospace Computer Science (2020)

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Bachelor's degree (1 major) Business Information Systems (2021)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)

Bachelor's degree (1 major) Mathematics (2023)

Bachelor's degree (1 major) Business Information Systems (2023)

Bachelor's degree (1 major) Business Information Systems (2024)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Data Mining	10-I-DM-152-m01

Module coordinator	Module offered by
holder of the Chair of Computer Science VI	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Foundations in the following areas: definition of data mining and knowledge, discovery in databases, process model, relationship to data warehouse and OLAP, data preprocessing, data visualisation, unsupervised learning methods (cluster and association methods), supervised learning (e. g. Bayes classification, KNN, decision trees, SVM), learning methods for special data types, other learning paradigms.

Intended learning outcomes

The students possess a theoretical and practical knowledge of typical methods and algorithms in the area of data mining and machine learning. They are able to solve practical knowledge discovery problems with the help of the knowledge acquired in this course and by using the KDD process. They have acquired experience in the use or implementation of data mining algorithms.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Business Information Systems (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Business Information Systems (2016)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Business Information Systems (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Business Information Systems (2021)
Master's degree (1 major) Information Systems (2022)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2023)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Advanced Programming		10-I-APR-172-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science II		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

With the knowledge of basic programming, taught in introductory lectures, it is possible to realize simpler programs. If more complex problems are to be tackled, suboptimal results like long, incomprehensible functions and code duplicates occur. In this lecture, further knowledge is to be conveyed on how to give programs and code a sensible structure. Also, further topics in the areas of software security and parallel programming are discussed.

Intended learning outcomes

Students learn advanced programming paradigms especially suited for space applications. Different patterns are then implemented in multiple languages and their efficiency measured using standard metrics. In addition, parallel processing concepts are introduced culminating in the use of GPU architectures for extremely quick processing.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

Allocation of places

--

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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Computer Science (2019)
Master's degree (1 major) Nanostructure Technology (2020)
Master's degree (1 major) Physics (2020)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Business Information Systems (2020)

Master's degree (1 major) Physics International (2020)

Master's degree (1 major) Quantum Engineering (2020)

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Master's degree (1 major) Quantum Technology (2021)

Bachelor's degree (1 major) Business Information Systems (2021)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)

Bachelor's degree (1 major) Business Information Systems (2023)

Master's degree (1 major) Quantum Engineering (2024)

Master's degree (1 major) Physics International (2024)

Bachelor's degree (1 major) Business Information Systems (2024)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Bachelor's degree (1 major) Digital Business & Data Science (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Computational Complexity		10-I-KT-191-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Complexity measurements and classes, general relationships between space and time classes, memory consumption versus computation time, determinism versus indeterminism, hierarchical theorems, translation methods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of complexity measurements and classes, general relationships between space and time classes, memory consumption versus computation time, determinism versus indeterminism, hierarchical theorems, translation methods, P-NP problem, completeness problems, Turing reduction, interactive proof systems.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
Assessment offered: In the semester in which the course is offered and in the subsequent semester
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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Cryptography and Data Security	10-I-KD-191-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Private key cryptography systems, Vernam one-time pad, AES, perfect security, public key cryptography systems, RSA, Diffie-Hellman, Elgamal, Goldwasser-Micali, digital signature, challenge-response methods, secret sharing, millionaire problem, secure circuit evaluation, homomorphous encryption.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of private key cryptography systems, Vernam one-time pad, AES, perfect security, public key cryptography, RSA, Diffie-Hellman, Elgamal, Goldwasser-Micali, digital signature, challenge-response method, secret sharing, millionaire problem, secure circuit evaluation, homomorphous encryption

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
Assessment offered: In the semester in which the course is offered and in the subsequent semester
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

--

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

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Bachelor's degree (1 major) Games Engineering (2025)

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Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Automation and Control Technology		10-I-AR-152-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science VII		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Overview of automation systems, foundations of control technology, simple design methods, model creation, differential equations, nomenclature, transfer function, step response and realising of easy linear controllers, structure images and structure image reduction, locus curves and Bode diagrams, frequency characteristic, persistent control deviation, controller design through parameter optimisation, basics of fuzzy control, scanning systems, eigenvalue based system analysis, classification of automation and control systems, examples.

Intended learning outcomes

The students master the fundamentals of automation and control.

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

V (4) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

240 h

Teaching cycle

--

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

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Operating Systems		10-I-BS-191-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science II		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Introduction to computer systems, development of operating systems, architecture principles, interrupt processing in operating systems, processes and threads, CPU scheduling, synchronisation and communication, memory management, device and file management, operating system virtualisation.

Intended learning outcomes

The students possess knowledge and practical skills in building and using essential parts of operating systems.

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

V (2) + Ü (2)
Module taught in: 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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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

--

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2019)
Master's degree (1 major) Nanostructure Technology (2020)
Master's degree (1 major) Physics (2020)
Bachelor's degree (1 major) Business Information Systems (2020)
Master's degree (1 major) Physics International (2020)
Master's degree (1 major) Quantum Engineering (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Master's degree (1 major) Quantum Technology (2021)
Bachelor's degree (1 major) Business Information Systems (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Business Information Systems (2023)
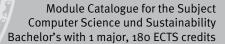Master's degree (1 major) Quantum Engineering (2024)
Master's degree (1 major) Physics International (2024)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Computer Architecture		10-I-RAK-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Instruction set architectures, command processing through pipelining, statical and dynamic instruction scheduling, caches, vector processors, multi-core processors.

Intended learning outcomes

The students master the most important techniques to design fast computers as well as their interaction with compilers and operating systems.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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)

§ 22 II Nr. 3 b)
§ 69 I Nr. 1 c): Rechnerarchitektur

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Master's degree (1 major) Physics (2016)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Master's degree (1 major) Physics International (2020)

Bachelor's degree (1 major) Aerospace Computer Science (2020)

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)

Bachelor's degree (1 major) Mathematics (2023)

Master's degree (1 major) Physics International (2024)

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

UNIVERSITÄT WÜRZBURG
Julius-Maximilians-

Module title	Abbreviation
Control Principles of Modern Communication Systems	10-I-RK-212-m01

Module coordinator	Module offered by
holder of the Chair of Computer Science III	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

The module teaches control principles in the Internet, in computer networks and modern communication systems, central and distributed mechanisms for control and data exchange, architecture and basic mechanisms in current broadband and home access networks. Simple methods of assessing performance and an introduction to traffic theory are given.

Intended learning outcomes

The students have extensive knowledge of the structure, architecture and control principles of modern communication systems and can apply the knowledge to evaluate the systems and protocols in simulations and measurements. They also get to know basic methods for theoretical analysis.

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

V (2) + Ü (2)

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. 60 to 120 minutes)
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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

Teaching cycle: every year, winter semester

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

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Selected Basics of Computer Science		10-I-GI-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Selected topics in computer science.

Intended learning outcomes

The students are able to understand solutions to fundamental problems in computer science and to transfer them to related topics.

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

V (4) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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 appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Logic for informatics	10-I-LOG-152-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Syntax and semantics of propositional logic, equivalence and normal forms, Horn formulas, SAT, resolution, infinite formula sets, syntax and semantics of predicate logic.

Intended learning outcomes

The students are proficient in the following areas: syntax and semantics of propositional logic, equivalence and normal forms, Horn formulas, SAT, resolution, infinite formula sets, syntax and semantics of predicate logic.

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

V (2) + Ü (2)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Mathematics (2023)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Bachelor's degree (1 major) Games Engineering (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Theoretical Informatics		10-I-TIV-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of calculations, P-NP problem, NP completeness.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of computations, P-NP problem, NP completeness.

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

V (4)

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. 60 to 120 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).

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)

§ 49 I Nr. 1 a)
§ 69 I Nr. 1 a)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
First state examination for the teaching degree Realschule Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Tutorial Theoretical Informatics	10-I-TIT-191-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of calculations, P-NP problem, NP completeness.

Intended learning outcomes

The students possess a fundamental and applicable knowledge in the areas of computability, decidability, countability, finite automata, regular sets, generative grammars, context-free languages, context-sensitive languages, complexity of computations, P-NP problem, NP completeness.

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

Ü (2)

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

a) exercises (consisting in completion of approx. 11 home work exercise sheets, presentation of own solutions in the exercise groups as well as approx. 5 short assessments written in the exercise group) or
b) written examination (approx. 180 to 240 minutes)
Die Prüfungsart ist vom Prüfling festzulegen

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 appears in

Bachelor's degree (1 major) Computer Science (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Seminar - Selected Topics in Computer Science 1		10-I-SEM1-152-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Independent review of a current topic in computer science on the basis of literature and, where applicable, software with written and oral presentation. The topics in modules 10-I-SEM1 and 10-I-SEM2 must come from different areas (this usually means that they are assigned by different lecturers).

Intended learning outcomes

The students are able to independently review a current topic in computer science, to summarise the main aspects in written form and to orally present these in an appropriate way.

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

S (2)

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 elaboration (approx. 10 to 15 pages) and presentation (approx. 30 to 45 minutes) with subsequent discussion on a topic from the field of computer science
Language of assessment: German and/or English

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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Business Information Systems (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Business Information Systems (2016)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Computer Science (2019)
Bachelor's degree (1 major) Business Information Systems (2019)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
Bachelor's degree (1 major) Business Information Systems (2020)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Business Information Systems (2021)
Bachelor's degree (1 major) Business Information Systems (2023)
Bachelor's degree (1 major) Business Information Systems (2024)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Subfield Aerospace Computer Science

(ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Introduction to Aviation Systems		10-I-LFS-172-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Physical foundations of aircraft aerodynamics, flight stability, airplane technology and structure of aircraft, foundations of aviation propulsion and suitable material.

Intended learning outcomes

The students possess the theoretical and practical knowledge necessary to correctly classify aerospace systems, correctly identify the most important system relationships, formulate requirements for new systems and do calculations for selected basic system elements.

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

V (2) + Ü (1)

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. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 30 minutes).
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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Aerospace Computer Science (2017)
Module studies (Bachelor) Orientierungsstudien (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Introduction to Space Systems		10-I-RFS-172-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

History of space flight, carrier rockets, orbits of spacecraft, environment conditions in space, special aspects of space applications, foundations of subsystems of spacecraft. Introduction to aviation systems.

Intended learning outcomes

The students possess the theoretical and practical knowledge necessary to correctly classify aerospace systems, correctly identify the most important system relationships, formulate requirements for new systems and do calculations for selected basic system elements.

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

V (2) + Ü (1)

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. 60 to 120 minutes)
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 30 minutes).
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)

§ 22 II Nr. 3 b)

Module appears in

Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

UNIVERSITÄT WÜRZBURG
Julius-Maximilians-

Module title	Abbreviation
Fundamentals and Programming of Avionics	10-I-MEC-172-m01

Module coordinator	Module offered by
holder of the Chair of Computer Science VIII	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Fundamental principles of data processing, especially for aerospace applications. What is information? Guidance for reliable systems, analogue, digital, FPGAs, radiation effects, micro programming, CPUs, DMAs, memory, memory organisation, system architecture, input and output, sensors and actuators, energy systems, reliability, fault tolerance. Programming of embedded systems in C++.

Intended learning outcomes

Understanding of analogue and digital data processing in embedded systems. Structure of hardware and programming. Embedded programming in C++, knowledge about common sensors and actuators as well as input and output systems.

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

V (4) + Ü (2) + P (2)

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. 120 minutes) and practical examination (approx. 6 programming exercises approx. 4 hours each), weighted 1:1
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Aerospace Laboratory	10-InNa-LRLA-212-m01

Module coordinator	Module offered by
holder of the Chair of Computer Science VIII	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Structure and control of satellites and airplanes, control and (very little) regulation of physical/mechanical systems, sensors and actuators, energy, structure (construction) of a satellite model/simulator, construction of a ground segment for different components and systems of air and space flight, structure of simplified subsystems of air and space flight. Life cycle of a complex development consisting of software, hardware, electronics and mechanics. Selection of suitable components.

Intended learning outcomes

The students will be able to construct and integrate prototypical subsystems consisting of software, hardware, electronics and mechanics by themselves as well as to operate, test and document these. The whole life cycle of a development will be tested: capture of requirements, rudimentary design, detailed design, modelling, implementation (software, hardware, mechanics), test design, inspection, maintenance, transfer to the successor model.

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

V (2) + P (2)

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

Solving of approx. 6 practical assignments (approx. 4 hours each)
Assessment offered: Once a year, summer semester

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

Teaching cycle: every year, summer semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Subfield Mathematics

(ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Introduction to Discrete Mathematics for students of other subjects	10-M-DIMaf-152-m01

Module coordinator	Module offered by
Dean of Studies Mathematik (Mathematics)	Institute of Mathematics

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Techniques from combinatorics, introduction to graph theory (including applications), cryptographic methods, error-correcting codes.

Intended learning outcomes

The student is acquainted with the fundamental concepts and results in discrete mathematics, masters the relevant proof techniques, is able to apply methods from number theory and algebra to discrete mathematics and realises the scope of applications of discrete structures.

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

V (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Numerical Mathematics 1 for students of other subjects		10-M-NUM1af-152-m01

Module coordinator		Module offered by
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Solution of systems of linear equations and curve fitting problems, nonlinear equations and systems of equations, interpolation with polynomials, splines and trigonometric functions, numerical integration.

Intended learning outcomes

The student is acquainted with the fundamental concepts and methods in numerical mathematics, applies them to practical problems and knows about their typical fields of application.

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

V (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Physics (2015)
Bachelor's degree (1 major) Nanostructure Technology (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
Bachelor's degree (1 major) Functional Materials (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Physics (2020)
Bachelor's degree (1 major) Nanostructure Technology (2020)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Functional Materials (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Quantum Technology (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)
Bachelor's degree (1 major) Functional Materials (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Stochastics 1 for students of other subjects	10-M-STO-1af-152-m01

Module coordinator	Module offered by
Dean of Studies Mathematik (Mathematics)	Institute of Mathematics

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Combinatorics, Laplace models, selected discrete distributions, elementary measure and integration theory, continuous distributions: normal distribution, random variable, distribution function, product measures and stochastic independence, elementary conditional probability, characteristics of distributions: expected value and variance, limit theorems: law of large numbers, central limit theorem.

Intended learning outcomes

The student is acquainted with fundamental concepts and methods in stochastics, applies these methods to practical problems and knows about the typical fields of application.

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

V (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
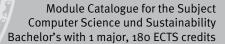Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Ordinary Differential Equations for students of other subjects		10-M-DGLaf-152-m01

Module coordinator	Module offered by
Dean of Studies Mathematik (Mathematics)	Institute of Mathematics

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Existence and uniqueness theorem; continuous dependence of solutions on initial values; systems of linear differential equations; matrix exponential series; linear differential equations of higher order.

Intended learning outcomes

The student is acquainted with the fundamental concepts and methods of the theory of ordinary differential equations. He/she is able to apply these methods to practical problems.

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

V (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2015)
Bachelor's degree (1 major) Functional Materials (2015)
Bachelor's degree (1 major) Aerospace Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major) Functional Materials (2021)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Functional Materials (2025)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Operations Research for students of other subjects	10-M-ORSaf-152-m01

Module coordinator	Module offered by
Dean of Studies Mathematik (Mathematics)	Institute of Mathematics

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Linear programming, duality theory, transport problems, integral linear programming, graph theoretic problems.

Intended learning outcomes

The student is acquainted with the fundamental methods in operations research, as required as a central tool for solving many practical problems especially in economics. He/She is able to apply these methods to practical problems, both theoretically and numerically.

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

V (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes, usually chosen) or
b) oral examination of one candidate each (15 to 30 minutes) or
c) oral examination in groups (groups of 2, 10 to 15 minutes per candidate)
Language of assessment: German and/or English
Assessment offered: In the semester in which the course is offered and in the subsequent semester
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

--

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Master's degree (1 major) Physics (2016)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Master's degree (1 major) Physics (2020)
Master's degree (1 major) Physics International (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Computer science for sustainability

(20 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Geography with a focus on climate

(20 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Special Problems of Physical Geography 1 (Earth System: Man and Environment)		04-Geo-SPG1-152-m01

Module coordinator	Module offered by
holder of the Chair of Soil Geography	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 module focuses the geofactors bedrock, topography, climate, soils, water, and plants and their relevance for landscape forming processes as well as for land-use. Basic geofactors of natural landscapes related to anthropogenic impact (land-use, settlements, infrastructure, etc.) wil be discussed.

Intended learning outcomes

The students learn synthesis and integration of their knowledge on geofactors. They are able to consider natural and cultural aspects for site-specific and planning assessment.

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

V (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

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 appears in

Bachelor's degree (1 major) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Physical Geography) (2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Human Geography) (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
First state examination for the teaching degree Gymnasium Geography (2023)
Bachelor's degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Methods of Physical Geography 1	04-Geo-MPG1-152-m01

Module coordinator	Module offered by
holder of the Professorship of Climatology	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 is dedicated to an advanced methodical knowledge of data analysis in "Physical Geography". There are several alternative courses, e.g. dealing with climatological measurements, climate modelling, geophysical methods, pedologic field methods, remote sensing and advanced GIS applications.

Intended learning outcomes

The students improve their methodical skills in terms of cartography, data analysis, statistics, lab techniques, modelling and IT techniques, exemplified by means of scientific projects.

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

Ü (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)

a) written examination (approx. 45 minutes) or
b) oral examination of one candidate each (approx. 30 minutes) or
c) presentation (approx. 30 minutes) or
d) portfolio (approx. 20 pages, including 3 maps, 2 logs) or
e) term paper (approx. 20 pages)
Language of assessment: German and/or English

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 appears in

Bachelor's degree (1 major) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Physical Geography) (2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Human Geography) (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

UNIVERSITÄT
WÜRZBURG
Julius-Maximilians-

Module title	Abbreviation
Applied physical geography	04-Geo-PPG-152-m01

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

ECTS	Method of grading	Only after succ. compl. of module(s)	
10	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	--	

Contents

This module consists of an applied project dealing with a specific issue in "Physical Geography" and comprising the following procedures: data collection, data analysis and presentation of results.

Intended learning outcomes

The students learn how to practically implement a given objective in Physical Geography. They also gain experience in independent an autonomous teamwork.

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

S (4)
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)

a) project (approx. 30 pages) or
b) presentation (approx. 30 minutes) or
c) term paper (approx. 20 pages)
Language of assessment: German and/or English
Assessment offered: Once a year, summer semester

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

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major, 1 minor) Geography (Focus Physical Geography) (2015)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Selected Basics of Sustainability in Geography		10-I-AGGN-211-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents
Selected Basics of Sustainability in Geography

Intended learning outcomes
The students are able to understand solutions to fundamental problems in geography in the context of sustainability and to transfer them to related topics.

Courses (type, number of weekly contact hours, language — if other than German)
V (2) + Ü (2) Course type: alternatively S (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) written examination (approx. 60 to 120 minutes) or b) term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate). Language of assessment: German and/or English

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 appears in
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Geography with a focus on remote sensing

(20 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

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 appears in

Bachelor's degree (1 major) Geography (2015)
Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (Minor, 2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Physical Geography) (2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Human Geography) (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

First state examination for the teaching degree Gymnasium Geography (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Geography (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
First state examination for the teaching degree Gymnasium Geography (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 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 appears in

Bachelor's degree (1 major) Geography (2015)
Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Physical Geography) (2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Human Geography) (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major) Computer Science (2017)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Computer Science (2019)
Module studies (Bachelor) Geography (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

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)
Language of assessment: German and/or English
Assessment offered: Once a year, winter semester

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 appears in

Bachelor's degree (1 major) Geography (2015)
Module studies (Bachelor) Geography (2020)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Geography (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Methods of Physical Geography 1	04-Geo-MPG1-152-m01

Module coordinator	Module offered by
holder of the Professorship of Climatology	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 is dedicated to an advanced methodical knowledge of data analysis in "Physical Geography". There are several alternative courses, e.g. dealing with climatological measurements, climate modelling, geophysical methods, pedologic field methods, remote sensing and advanced GIS applications.

Intended learning outcomes

The students improve their methodical skills in terms of cartography, data analysis, statistics, lab techniques, modelling and IT techniques, exemplified by means of scientific projects.

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

Ü (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)

a) written examination (approx. 45 minutes) or
b) oral examination of one candidate each (approx. 30 minutes) or
c) presentation (approx. 30 minutes) or
d) portfolio (approx. 20 pages, including 3 maps, 2 logs) or
e) term paper (approx. 20 pages)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

--

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

§ 66 I Nr. 2

Module appears in

Bachelor's degree (1 major) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (Minor, 2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Physical Geography) (2015)
Bachelor's degree (1 major, 1 minor) Geography (Focus Human Geography) (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

UNIVERSITÄT WÜRZBURG
Julius-Maximilians-

Module title	Abbreviation
Selected Basics of Sustainability in Geography	10-I-AGGN-211-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Selected Basics of Sustainability in Geography

Intended learning outcomes

The students are able to understand solutions to fundamental problems in geography in the context of sustainability and to transfer them to related topics.

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

V (2) + Ü (2)
Course type: alternatively S (2)

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

a) written examination (approx. 60 to 120 minutes) or
b) term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion
if announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups of 2 candidates (approx. 15 minutes per candidate).
Language of assessment: German and/or English

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 appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Biology

(20 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Plant and Animal Ecology	07-3A3OEKO-152-m01

Module coordinator	Module offered by
Dean of Studies Biologie (Biology)	Faculty of Biology

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This module will provide students with an overview of the interactions of plants and animals with their abiotic and biotic environments. The module will focus on the functional adaptation to environmental conditions as well as on the structure and dynamics of populations, communities and ecosystems. Students will be introduced to fundamental model concepts of ecology, will become familiar with examples of research findings and will acquire the fundamental knowledge necessary to develop an understanding of current ecological problems.

Intended learning outcomes

Students are familiar with the fundamental principles of research in the field of ecology and with the most important abiotic and biotic factors that influence the distribution and frequency of occurrence of organisms in their environment. In addition, they understand the scientific relevance ecology has to the assessment of environmental issues.

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

V (2) + Ü (2)

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. 90 minutes)
creditable for bonus

Allocation of places

--

Additional information

--

Workload

180 h

Teaching cycle

--

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

§ 61 I Nr. 4

Module appears in

Bachelor's degree (1 major) Biology (2015)
Bachelor's degree (1 major) Geography (2015)
Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Mathematics (2015)
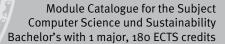Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2015)
First state examination for the teaching degree Gymnasium Biology (2015)
Bachelor's degree (1 major) Biology (2017)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Biology (2021)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2020)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2021)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Biology (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
exchange program Biosciences (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Geography (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Module title		Abbreviation
Computational Biology - from Genom to Ecosystem		07-SQF-CB-171-m01

Module coordinator		Module offered by
holder of the Chair of Bioinformatics		Faculty of Biology

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Introduction to methods in computational biology according to the various research areas of the Centre for Computational and Theoretical Biology. We will discuss a wide variety of topics from genomics through to cell biology and ecosystems. Participants will become familiar with current approaches and tools for reproducible research, such as image analysis, sequence data analysis or computer simulations, and will gain an insight into the fields of big data, high-performance computing and modern IT infrastructures.

Intended learning outcomes

The participants have gained proficiency in the essential tools and methods for data analysis, image processing and modelling of biological processes and can use quantitative computational methods to address biological questions.

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

S (2)

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

a) written examination (approx. 45 to 60 minutes) or
b) log (approx. 10 to 20 pages) or
f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours).
Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German and/or English
Assessment offered: Once a year

Allocation of places

20 places.
Should the number of applications exceed the number of available places, places will be allocated as follows: Students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits will be given preferential consideration. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one place in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in the same procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration.
A waiting list will be maintained and places re-allocated as they become available.
Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics))

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot.

Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50 % of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25 % of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25 % of places): lottery.

Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

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 appears in
Bachelor's degree (1 major) Biology (2017)
Bachelor's degree (1 major) Biology (2021)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Biology (2022)
exchange program Biosciences (2022)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title			Abbreviation
Mathematical Biology and Biostatistics			07-M-BST-152-m01

Module coordinator		Module offered by	
holder of the Chair of Bioinformatics		Faculty of Biology	

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

Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	

Contents
Fundamental principles of the most important mathematical and statistical methods in biology.

Intended learning outcomes
Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.

Courses (type, number of weekly contact hours, language — if other than German)
V (2) + Ü (2)

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. 60 minutes)   creditable for bonus

Allocation of places
--

Additional information
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Workload
120 h

Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module appears in
Bachelor's degree (1 major) Biochemistry (2015)   Bachelor's degree (1 major) Biology (2015)   Bachelor's degree (1 major) Computer Science (2015)   Bachelor's degree (1 major) Mathematics (2015)   Bachelor's degree (1 major) Computational Mathematics (2015)   Bachelor's degree (1 major, 1 minor) Biology (Minor, 2015)   Bachelor's degree (1 major) Biology (2017)   Bachelor's degree (1 major) Biochemistry (2017)   Bachelor's degree (1 major) Computer Science (2017)   Bachelor's degree (1 major) Computer Science (2019)   Bachelor's degree (1 major) Biology (2021)   Bachelor's degree (1 major, 1 minor) Biology (Minor, 2020)   Bachelor's degree (1 major, 1 minor) Biology (Minor, 2021)   Bachelor's degree (1 major) Computer Science und Sustainability (2021)   Bachelor's degree (1 major) Biochemistry (2022)   Bachelor's degree (1 major) Biology (2022)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Mathematics (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Interdisciplinary Project I		07-S1-IP1-152-m01

Module coordinator		Module offered by
Coordinator BioCareers		Faculty of Biology

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	Please consult with course advisory service in advance.

Contents

Contents of the project to be determined by the competent coordinators; contents will vary according to topic.

Intended learning outcomes

Students have developed skills which qualify them to work in their profession.

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

R (5)
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)

a) written examination (approx. 45 to 60 minutes) or
b) log (approx. 10 to 20 pages) or
c) oral examination of one candidate each (approx. 30 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or
e) presentation (approx. 20 to 30 minutes) or
f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours).
Students will be informed about the method and length of the assessment prior to the course.
creditable for bonus

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

--

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

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Module appears in

Bachelor's degree (1 major) Biology (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2015)
Bachelor's degree (1 major) Biology (2017)
Bachelor's degree (1 major) Biology (2021)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2020)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2021)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Bachelor's degree (1 major) Biology (2022)
Bachelor's degree (1 major) Mathematics (2023)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Evolutionary Ecology	07-4S1EVO-171-m01

Module coordinator		Module offered by
holder of the Chair of Animal Ecology and Tropical Biology		Faculty of Biology

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Every organism survives and reproduces in an environment defined by its con-specifics, members of other species, and the abiotic attributes of the world around it. In this course, we explore mechanisms of evolutionary adaptation to these conditions and thus why individuals, populations, or species differ from each other. Important principles of phenotypic adaptation will be introduced and explained with examples from areas like "life-history evolution", evolution of morphological and behavioural traits, or the coevolution between hosts and parasites. The course includes a lecture as well as exercises on theoretical and empirical issues.

Intended learning outcomes

Students will understand fundamental principles and drivers of phenotypic evolution. They know important theoretical concepts and exemplary methods for studying the evolution of certain attributes and understanding their adaptive value. Students thus gain an insight into tight interactions between environment (ecology) and trait evolution.

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

Ü (4) + V (1)

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

a) written examination (approx. 45 to 60 minutes) or
b) log (approx. 10 to 20 pages) or
c) oral examination of one candidate each (approx. 30 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or
e) presentation (approx. 20 to 30 minutes) or
f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours).
Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German and/or English
creditable for bonus

Allocation of places

20 places.
Should the number of applications exceed the number of available places, places will be allocated as follows: Students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits will be given preferential consideration. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one place in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in the same procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration.

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

A waiting list will be maintained and places re-allocated as they become available.

Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot.

Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50 % of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25 % of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25 % of places): lottery.

Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

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 appears in
Bachelor's degree (1 major) Biology (2017)
Bachelor's degree (1 major) Biology (2021)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2021)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Biology (2022)
exchange program Biosciences (2022)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Ecology and Nature Conservation		07-4S1NAT-171-m01

Module coordinator		Module offered by
holder of the Chair of Animal Ecology and Tropical Biology		Faculty of Biology

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Global environmental change due to the destruction and fragmentation of natural habitats, climate change, intensive land use and invasive species have significant impacts on ecological communities and ecosystem functions. This course discusses essentials of community ecology, landscape ecology, agroecology and forest ecology and provides knowledge on the diversity and biotic interaction of different animal groups. A focus is on the application of ecological mechanisms for sustainable use of biological resources and nature conservation. The course comprises lectures as well as field exercises in various terrestrial habitats.

Intended learning outcomes

Participants are familiar with fundamental ecological principles and mechanisms as well as ecological field methods and have developed taxonomical skills. They are able to independently investigate issues relating to global change and nature conservation, applying theoretical concepts and empirical methods.

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

Ü (4) + S (1)

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

a) written examination (approx. 45 to 60 minutes) or
b) log (approx. 10 to 20 pages) or
c) oral examination of one candidate each (approx. 30 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or
e) presentation (approx. 20 to 30 minutes) or
f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours).
Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German and/or English
creditable for bonus

Allocation of places

20 places.
Should the number of applications exceed the number of available places, places will be allocated as follows: Students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits will be given preferential consideration. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one place in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in the same procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration.
A waiting list will be maintained and places re-allocated as they become available.

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot.

Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50 % of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25 % of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25 % of places): lottery.

Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

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 appears in

Bachelor's degree (1 major) Biology (2017)

Bachelor's degree (1 major) Biology (2021)

Bachelor's degree (1 major, 1 minor) Biology (Minor, 2021)

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Bachelor's degree (1 major) Biology (2022)

exchange program Biosciences (2022)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Selected Basics of Sustainability in Biology		10-I-AGBN-211-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

ECTS	Method of grading	Only after succ. compl. of module(s)	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Selected Basics of Sustainability in Biology

Intended learning outcomes

The students are able to understand solutions to fundamental problems in biology in the context of sustainability and to transfer them to related topics.

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

V (2) + Ü (2)
Course type: alternatively S (2)

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

a) written examination (approx. 45 to 60 minutes) or
b) log (approx. 10 to 20 pages) or
c) oral examination of one candidate each (approx. 30 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or
e) presentation (approx. 20 to 30 minutes) or
f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)
Students will be informed about the method and length of the assessment prior to the course
Language of assessment: German and/or English

Allocation of places

--

Additional information

--

Workload

150 h

Teaching cycle

--

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

--

Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Key Skills Area

(20 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

General Key Skills

(5 ECTS credits)

In addition to the modules listed below, students may also take modules offered by JMU as part of the pool of general transferable skills (ASQ).

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

General Key Skills (subject-specific)

(ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Tutor activity 1		10-I-TUT1-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1-2 semester	undergraduate	--

Contents

Tutoring activities in the area of computer science.

Intended learning outcomes

Imparting knowledge and skills to students of computer science.

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

T (2)

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

Wrap-up report on tutoring activities (5 to 10 pages)

Allocation of places

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Additional information

--

Workload

60 h

Teaching cycle

--

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

§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)

Module appears in

Bachelor's degree (1 major) Computer Science (2015)
First state examination for the teaching degree Realschule Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Tutor activity 2		10-I-TUT2-152-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1-2 semester	undergraduate	--

Contents
Tutoring activities in the area of computer science.

Intended learning outcomes
Imparting knowledge and skills to students of computer science.

Courses (type, number of weekly contact hours, language — if other than German)
T (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Wrap-up report on tutoring activities (5 to 10 pages)

Allocation of places
--

Additional information
--

Workload
60 h

Teaching cycle
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 22 II Nr. 2 f) § 22 II Nr. 3 f)

Module appears in
Bachelor's degree (1 major) Computer Science (2015)
First state examination for the teaching degree Realschule Computer Science (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Tutor activity 3		10-I-TUT3-152-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1-2 semester	undergraduate	--

Contents

Tutoring activities in the area of computer science.

Intended learning outcomes

Imparting knowledge and skills to students of computer science.

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

T (2)

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

Wrap-up report on tutoring activities (5 to 10 pages)

Allocation of places

--

Additional information

--

Workload

60 h

Teaching cycle

--

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

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Module appears in

Bachelor's degree (1 major) Computer Science (2015)
Bachelor's degree (1 major) Computer Science (2017)
Bachelor's degree (1 major) Computer Science (2019)
Bachelor's degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor's degree (1 major) Artificial Intelligence and Data Science (2024)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Subject-specific Key Skills

(15 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Seminar - Selected Topics in Computer Science and Sustainability		10-I-SEM-InNa-212-m01

Module coordinator		Module offered by
Dean of Studies Informatik (Computer Science)		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents
Independent review of a current topic in computer science and sustainability on the basis of literature and, where applicable, software with written and oral presentation.

Intended learning outcomes
The students are able to independently review a current topic in computer science, to summarize the main aspects in written form and to orally present these in an appropriate way.

Courses (type, number of weekly contact hours, language — if other than German)
S (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
term paper (approx. 10 to 15 pages) and presentation (approx. 30 to 45 minutes) with subsequent discussion Language of assessment: German and/or English

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 appears in
Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title		Abbreviation
Computer Science and Ethics		10-I-IuE-212-m01

Module coordinator		Module offered by
holder of the Chair of Computer Science III		Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

The content of the module focuses on the connection between ethics and computer science, implications for computer science (e.g. in implementation) and also technical possibilities (e.g. in the design of software, mechanisms or algorithms, in the operation of systems or networks).

Intended learning outcomes

The aim of the module is the scientific discourse on ethical problems in computer science. After completing the module, students have a basic awareness of computer science based on hypothetical but realistic case studies on ethical conflict cases.

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

V/S (2)

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

a) written examination (approx. 60 to 120 minutes) or
b) term paper (10 to 15 pages) and presentation (30 to 45 minutes) with subsequent discussion
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, winter semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Project Presentation	10-InNa-PV-212-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Presentation of a project developed by the student (e. g. Bachelor's thesis, software project) analogous to a presentation for laypersons with a knowledge of computer science at a trade fair. The project, which may also be work-in-progress, is presented with the help of a poster, a short talk and optionally a live demonstration.

Intended learning outcomes

The students are able to present a project they developed and to create the required media.

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

S (5)

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 of a project developed by the candidate analogous to a presentation for laypersons with a knowledge of computer science at a trade fair as well as discussion (approx. 10 to 15 minutes total)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every semester

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Thesis

(10 ECTS credits)

Module Catalogue for the Subject
Computer Science und Sustainability
Bachelor's with 1 major, 180 ECTS credits

Module title	Abbreviation
Bachelor's Thesis Computer Science and Sustainability	10-InNa-BA-212-m01

Module coordinator	Module offered by
Dean of Studies Informatik (Computer Science)	Institute of Computer Science

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

Duration	Module level	Other prerequisites	
1 semester	undergraduate	--	

Contents

Researching and writing on a defined problem within a given time frame and adhering to the principles of good scientific practice.

Intended learning outcomes

The students are able to research and write on a defined problem, adhering to the principles of good scientific practice.

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

No courses assigned to module

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

Bachelor's thesis (approx. 50 to 100 pages)
Language of assessment: German and/or English

Allocation of places

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Additional information

Time to complete: 10 weeks.

Workload

300 h

Teaching cycle

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

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Module appears in

Bachelor's degree (1 major) Computer Science und Sustainability (2021)