

Unregelmäßige Module

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- [Grundlagen der Theoretischen Informatik III](#)
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- [Robust Geometric Computing](#)
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Algorithm Engineering

(in German: Algorithm Engineering -)

Module-ID: FIN-INF-120259

Link:	LSF
Responsibility:	Prof. Dr. Stefan Schirra
Lecturer:	Prof. Dr. Stefan Schirra
Classes:	• Lecture <i>Algorithm Engineering</i>
Applicability in curriculum:	

Abbreviation	Credit Points	Semester	Term	Duration	Language	Level
AlgEng	6	Summer	ab 1.	1 Semester	english	Master

Intended learning outcomes:

Students learn how to conduct experimental work in algorithmic computer science. They understand how to bridge the gap between theoretical research and practice by methods of Algorithm Engineering which combine design, analysis, implementation and experiments.

Content:

- Realistic computer models
- C++ software libraries
- algorithm design paradigms
- certifying algorithms
- literate programming
- designing and conducting experiments
- case studies in algorithm engineering
- implementation project

Workload:

- 56 h lecture

- 124 h independent work

Type of examination:	Teaching method / lecture hours per week (SWS):
Oral examination	Lecture 4 SWS

Prerequisites according to examination regulations:	Recommended prerequisites:
none	Basic knowledge of algorithms and data structures

Media:	Literature:
	• Müller-Hannemann, Schirra (eds): Algorithm Engineering, Springer LNCS 5971 • C. McGeoch: Algorithm Engineering

Comments:

Wird vermutlich nicht mehr angeboten werden

Computational Geometry

(in German: Computational Geometry -)

Module-ID: FIN-INF-102201

Link:	LSF
Responsibility:	Prof. Dr. Stefan Schirra
Lecturer:	Prof. Dr. Stefan Schirra
Classes:	Lectures and exercises <i>Computational Geometry</i>
Applicability in curriculum:	

Abbreviation	Credit Points	Semester	Term	Duration	Language	Level
CompGeom	6	Summer	ab 1.	1 Semester	english	Master

Intended learning outcomes:

Students know how to design and analyze algorithms for advanced geometric problems. They understand the basics of combinatorial and algebraic geometry.

Content:

- basics in combinatorial geometry
- basics in algebraic geometry
- duality
- algorithm design paradigms

Workload:

56 h classroom + 124 h independent work

Type of examination:	Teaching method / lecture hours per week (SWS):
Oral exam	• Lecture/Exercises (4 SWS)

Prerequisites according to examination regulations:	Recommended prerequisites:
keine	Basics in algorithmic geometry (for example, bachelor modul Grundzüge der Algorithmischen Geometrie)

Media:	Literature:
	• de Bergm Cheong, van Kreveld, Overmars; Computational Geometry • Devadoss, O'Rourke; Computational Geometry

Comments:

Geometric Data Structures

(in German: Geometric Data Structures -)

Module-ID: FIN-INF-102206

Link:	LSF
Responsibility:	Prof. Dr. Stefan Schirra
Lecturer:	Prof. Dr. Stefan Schirra
Classes:	• Lecture <i>Geometric Data Structures</i> • Exercises <i>Geometric Data Structures</i>
Applicability in curriculum:	

Abbreviation	Credit Points	Semester	Term	Duration	Language	Level
GeomDS	6	Summer	ab 1.	1 Semester	english	Master

Intended learning outcomes:

Students learn how to design, analyze and apply data structures for geometric problems.

Content:

- heap data structures,
- balanced binary search trees,
- self-organizing data structures,
- amortized analysis,
- interval, range and segment trees,
- augmented data structures,
- quad-trees,
- fractional cascading,
- point location data structures,
- persistent data structures,
- making data structures dynamic.

Workload:

56h in presence + 124h self-study

Type of examination:	Teaching method / lecture hours per week (SWS):
oral exam	• Lecture (3SWS) • Exercises (1SWS)

Prerequisites according to examination regulations:	Recommended prerequisites:
keine	Basics in algorithmics

Media:	Literature:
	• Samet: Foundations of Multidimensional and Metric Data Structures. • Zachmann, Langetepe: Geometric Data Structures for Computer Graphics. • Mehta, Sahmi: Handbook of Data Structures and Applications • Morin: Open Data Structures: An Introduction

Comments:

Grundlagen der Theoretischen Informatik III

(engl. Introduction to the Theory of Computation III)

Modulnummer: FIN-INF-110464

Link zum LSF:	LSF
Verantwortung:	Prof. Dr. Stefan Schirra
Dozent:in:	Prof. Dr. Stefan Schirra
Lehrveranstaltungen:	• Vorlesung <i>Grundlagen der Theoretischen Informatik III</i> • Übung <i>Grundlagen der Theoretischen Informatik III</i>
Verwendbarkeit:	

Kürzel GThI 3	CP 6	Semester Winter	Fachsem. ab 1.	Dauer 1 Semester	Sprache deutsch	Niveau Master
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Angestrebte Lernergebnisse:

Studierende lernen, formale Sprachen in die Chomsky-Hierarchie einzuordnen und beurteilen zu können. Sie verstehen algebraische Zugänge zu Formalen Sprachen. Ferner lernen sie Optionen kennen, mit schweren Problemem umzugehen, und diese anzuwenden.

Inhalt:

- Weiteres zu regulären und kontextfreien Sprachen,
- Kleene Algebren,
- Exakte Exponentialzeitalgorithmen,
- Algorithmen für spezielle Graphklassen,
- Festparameterhandhabbarkeit,
- Approximationsalgorithmen und Nichtapproximierbarkeit
- Elementare Komplexitätstheorie.

Arbeitsaufwand:

56h Präsenzzeit + 124h selbstständige Arbeit

Studien-/Prüfungsleistungen:	Lehrform / SWS:
Klausur 120 Minuten	• Vorlesung (3 SWS) • Übung (1 SWS)

Voraussetzungen nach Prüfungsordnung:	Empfohlene Voraussetzungen:
keine	Grundlagen der Theoretischen Informatik I + II (Bachelor)

Medienformen:	Literatur:
	• Sipser; Theory of Computation • Kozen; Automata and Computability • Shallit; A Second Course on Automata and Computability Theory

Hinweise:

Grundlagen der Theoretischen Informatik III

(engl. Introduction to the Theory of Computation III)

Modulnummer: FIN-INF-110464

Link zum LSF:	LSF
Verantwortung:	Prof. Dr. Stefan Schirra
Dozent:in:	Prof. Dr. Stefan Schirra
Lehrveranstaltungen:	Vorlesung <i>Grundlagen der Theoretischen Informatik III</i> Übung <i>Grundlagen der Theoretischen Informatik III</i>
Verwendbarkeit:	

Kürzel
GThI 3

CP
6

Semester
Winter

Fachsem.
ab 5.

Dauer
1 Semester

Sprache
deutsch

Niveau
Master

Angestrebte Lernergebnisse:

Studierende lernen, formale Sprachen in die Chomsky-Hierarchie einzuordnen und beurteilen zu können. Sie verstehen algebraische Zugänge zu Formalen Sprachen. Ferner lernen sie Optionen kennen, mit schweren Problemen umzugehen, und diese anzuwenden.

Inhalt:

- Weiteres zu regulären und kontextfreien Sprachen,
- Kleene Algebren,
- Exakte Exponentialzeitalgorithmen,
- Algorithmen für spezielle Graphklassen,
- Festparameterhandhabbarkeit,
- Approximationsalgorithmen und Nichtapproximierbarkeit
- Elementare Komplexitätstheorie.

Arbeitsaufwand:

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Studien-/Prüfungsleistungen:	Lehrform / SWS:
?	Vorlesung (3SWS) Übung (1SWS)

Voraussetzungen nach Prüfungsordnung:	Empfohlene Voraussetzungen:
keine	

Medienformen:	Literatur:

Hinweise:

Da es genau die gleiche Veranstaltung ist, gibt es auch keine Unterschiede zur Masterveranstaltung gleichen Namens.

Robust Geometric Computing

(in German: Robust Geometric Computing -)

Module-ID: FIN-INF-102216

Link:	LSF
Responsibility:	Prof. Dr. Stefan Schirra
Lecturer:	Prof. Dr. Stefan Schirra
Classes:	• Lecture Robust Geometric Computing • Exercises Robust Geometric Computing
Applicability in curriculum:	

Abbreviation	Credit Points	Semester	Term	Duration	Language	Level
RGC	6	Winter	ab 1.	1 Semester	english	Master

Intended learning outcomes:

Students understand robustness and numerical precision issues in the implementation of geometric algorithms and know methods how to deal with these problems, for example, by exact decisions or verified geometric computing

Content:

- basics of floating-point arithmetic
- error analysis
- floating-point filters and interval arithmetic
- software number types with arbitrary precision
- geometric filters
- computing with algebraic numbers

Workload:

Präsenzzeiten: 3 SWS Vorlesung 1 SWS Frontalübungen und praktische Übungen Selbstständige Arbeit: Bearbeiten der Übungen und Nachbereitung der Vorlesungen 180h = 4 SWS = 56h
Präsenzzeit + 124h selbstständige Arbeit

Type of examination:	Teaching method / lecture hours per week (SWS):
participation in the implementation project oral exam	Lecture (3 SWS) Exercises (1 SWS)

Prerequisites according to examination regulations:	Recommended prerequisites:
keine	C++ programming language

Media:	Literature:
	Boissonnat (Ed.); Effective Computational Geometry Mehlhorn, Yap; Robust Geometric Computation (draft)

Comments:

Topics in Algorithmics

(in German: Topics in Algorithmics -)

Module-ID: FIN-INF-120263

Link:	LSF
Responsibility:	Prof. Dr. Stefan Schirra
Lecturer:	Prof. Dr. Stefan Schirra
Classes:	Lecture/Exercises Topics in Algorithmics
Applicability in curriculum:	

Abbreviation TinA	Credit Points 6	Semester Summer	Term ab 1.	Duration 1 Semester	Language english	Level Master
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Intended learning outcomes:

Students know how to find efficient algorithmic solutions or understand that no such solutions (are likely to) exist.

Content:

Varying content in (theoretical) algorithmics, e.g. advanced graph algorithms, algorithmic motion planning, advanced data structures, computer algebra, computational group theory)

Workload:

Präsenzzeiten: 4 SWS Vorlesung + Übung Selbstständige Arbeit: Bearbeiten der Übungen und Nachbereitung der Vorlesungen, Vorbereiten der Präsentation 180h = 4 SWS = 56h Präsenzzeit + 124h selbstständige Arbeit

Type of examination:	Teaching method / lecture hours per week (SWS):
oral exam	Lecture/Exercises (4 SWS)

Prerequisites according to examination regulations:	Recommended prerequisites:
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keine	Basics in algorithms and data structures and analysis of algorithms.
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Media:	Literature:

Comments: