

## General modules (max. 15 ECTS)

	Module Name	ECTS	Prüfungsnummer	Type
	<b>Seminar</b>	5		Any seminar possible offered at TechFak
	Programming Project	5 (10)		Any project related to programming offered at TechFak

## Mathematics (min. 20 ECTS)

	Module Name	ECTS	Prüfungsnummer	Type
	<b>Functional Analysis for Engineers</b>	5	32301 / 32302	WS
	<b>Optimierung für Ingenieure</b>	7.5	40501 / 40502	SS
	Elementary Numerical Mathematics	7.5	494959	WS
	Algorithms of Numerical Linear Algebra	7.5	927938	WS
	Multigrid Methods	5	35601	SS
	Advanced Discretization Techniques	10	59001	WS
	Einführung in die Numerik PDE II			SS
	Einführung Numerik PDE	10	52401 / 52402	WS
	Introduction to Structural Optimization	5		WS, SS
	Theorie der Optimalsteuerung	10		

## Computer Science (min. 20 ECTS)

	Module Name	ECTS	Prüfungsnummer	Type
	<b>Area Simulation / HPC</b>			
	Programming Techniques for Supercomputers	5 (7.5)	278169	SS
	High End Simulation in Practice	7.5	45101	SS
	Architekturen von Superrechnern	5	44601	WS
	Computational Optics	7.5	768903	SS
	Advanced Simulation Technology	5	661589	WS
	Simulation und wissenschaftliches Rechnen 2	7.5	684900	SS
	Modellierung, Optimierung und Simulation von Energiesystemen	5	858896	WS
	Simulation und Modellierung 1	5	70901	WS

**Bold:** Compulsory Module; Abbreviations WS: winter term, SS: summer term

	<b>Module Name</b>	<b>ECTS</b>	<b>Prüfungsnummer</b>	<b>Type</b>
	<b>Area Technical Computer Science</b>			
	Hardware-Software-co-design	7,5		
	Rechnerarchitektur	5	798810	WS
	Smart Grids	5	623734	SS
	Fahrzeugkommunikation	5	716033	
	Heterogeneous Computer Architectures Online	5	275245	WS
	<b>Area Data Sciences</b>			
	Medical Image Processing for Diagnostic Applications	5		WS
	Computergraphik	7,5		WS
	Image Processing in Optical Nanoscopy	5	289629	
	Computer Vision			SS
	Pattern Recognition Deluxe	7,5	456863	WS
	Computer Graphics	5 (7,5)	38201	
	Pattern Analysis	7,5		SS
	Human Computer Interaction	5		SS
	Medical Image Processing for Interventional Applications	5	37601	SS
	Deep Learning	5	901895	WS
	Applied Visualization			SS
	Geometric Modeling	7,5		WS
	<b>Area Practical Computer Science</b>			
	Softwarearchitektur	5 (10)	453543	SS
	The AMOS Project	5 (10)	753997	
	Nailing your thesis	5 (10)		WS
	Advanced Programming Techniques	7.5	465562	WS
	Praktische Softwaretechnik	5		WS
	<b>Area Theoretical Computer Science</b>			
	Organic Computing	5	39701	
	Effiziente kombinatorische Algorithmen	5		WS

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## Technical Application Field (min. 20 ECTS)

### Technical Application Field: Information Technology – DSP

	Module Name	ECTS	Prüfungsnummer	Type
	Multimedia Communications I	5	63101	
	Multimedia Communications II	5	44801	
	Speech and Audio Signal Processing	5	64601	SS
	Multidimensional Signals and Systems	5	68401	WS
	Signalanalyse	2.5	250058	WS
	Transform. in der Signalverarbeitung	2.5	498723	SS
	Image and Video Compression			SS
	Adv. Topics in Perceptual Audio Coding			
	Audiovisual Scenes			
	Music Processing - Synthesis		2,5	WS
	Convex Optimization in Communication and Signal Processing	5	772738	WS
	<b>Digitale Signalverarbeitung</b>	5	35001	WS
	Image, Video, and Multidimensional Signal Processing			WS
	Statistical Signal Processing	5	64301	
	Machine Learning in Signal Processing	5		WS

### Technical Application Field: Information Technology – DT

	Module Name	ECTS	Prüfungsnummer	Type
	<b>Digital Communications</b>	5	78001	WS
	Fundamentals of Mobile Communications	5	31401	
	Channel Coding			
	Information Theory and Coding			WS, SS
	Transmission and Detection for Advanced Mobile Communications	2.5	34201	SS
	MIMO Communication Systems	5	63001	SS
	Radio Resource Allocation in Advanced Cellular Networks			
	Equalization and Adaptive Systems for Digital Communications	2,5		WS
	Optical Transmission Systems			

	Module Name	ECTS	Prüfungsnummer	Type
	Multiuser Information and Communications Theory	5		WS

### Technical Application Field: Medical Engineering

	Module Name	ECTS	Prüfungsnummer	Type
	<b>Digitale Signalverarbeitung</b>		See TAF IT	WS
	Praktikum Vertiefung Medizinische Biotechnologie - Bildverarbeitung	2.5		
	Clinical Applications of Optical Technologies and Associated Fundamentals of Anatomy	5		
	Biomedizinische Signalanalyse	5		WS
	Visual Computing in Medicine 1	2,5		WS
	Maschinelles Lernen für Zeitreihen	5		WS
	Medizinelektronik	5		SS

### Technical Application Field: Solid Mechanics and Dynamics

	Module Name	ECTS	Prüfungsnummer	Type
	Numerische Methoden in der Mechanik	5	74401	
	Computational Dynamics	5	44501	
	Materials Modeling and Simulation	5		
	Lineare Kontinuumsmechanik	5	71301	WS
	Nichtlineare Kontinuumsmechanik	5		SS
	Nichtlineare Finite Elemente	5	42601	WS
	Introduction to FEM	5		SS
	Strukturoptimierung in der virtuellen Produktentwicklung	5		SS
	Dynamik nichtlinearer Balken	5		
	Elasticity of 1D continua	2,5		
	Mikromechanik	2,5		WS

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## Technical Application Field: Thermo and Fluid Dynamics

	Module Name	ECTS	Prüfungsnummer	Type
	Numerische Methoden der Thermofluidmechanik	7.5		WS
	Numerische Methoden der Thermofluidmechanik II	7.5		SS
	Physik der Turbulenz und Turbulenzmodellierung I	5		SS
	Physik der Turbulenz und Turbulenzmodellierung II	5	52201	WS
	Mikrofluiddynamik	5		
	Angewandte Thermofluiddynamik	5	52901	
	Strömungsakustik	5		WS
	Verbrennungstechnik			SS
	Strömungsmesstechnik	5		SS

## Technical Application Field: Mechatronics

	Module Name	ECTS	Prüfungsnummer	Type
	<b>CAE von Sensoren und Aktoren</b>	7.5	60811	WS
	Turbomaschinen	5		WS
	Numerische Simulation Elektromechanischer Wandler	7.5	668903	SS
	Numerische Strömungsmechanik I	7.5		
	Technische Akustik	5	23601	SS
	Ausgewählte Kapitel der Technischen Akustik	2,5		WS

## Technical Application Field: Computational Material Science

	Module Name	ECTS	Prüfungsnummer	Type
	Introduction to Advanced Maths and Calculus	1.5		WS
	Foundations of Finite Element Simulation	3		WS
	Materials and Structure	3	1708	WS
	Material Properties I	3	1710	WS
	Multi-scale Simulation Methods I	3		WS

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	<b>Module Name</b>	<b>ECTS</b>	<b>Prüfungsnummer</b>	<b>Type</b>
	Multi-scale Simulation Methods II	3		
	Numerische Methoden in den Werkstoffwissenschaften – Atomistische Methoden	3		
	Generalized Continuum Models of Materials with Microstructures	1,5		
	Dislocation Theory and Dislocation Simulation	3		
	Computer Lab	6		WS
	Material Properties and Structure			
	Basics in Computational Materials Science and Process Simulation 1	2,5		WS
	Computational Models of Biomaterial Failure II	3		WS
	Scientific Programming with PYTHON	1		WS
	Dislocation Theory and Dislocation Simulation	1,5		WS

### Technical Application Field: Computational Optics

	<b>Module Name</b>	<b>ECTS</b>	<b>Prüfungsnummer</b>	<b>Type</b>
	Moderne Optik III	5		WS
	Optical Technologies in Life Science	5	922257	WS
	Linear and Non-Linear Fibre Optics	5		SS
	Laser Tissue Interaction	5	763337	SS
	Komponenten optischer Kommunikationssysteme	5		WS
	Optical Properties of Modern Materials	5		SS
	Optische Übertragungstechnik	5		SS
	Advanced Optical Communication Systems	5		WS
	Optische Kommunikationsnetze	2,5		WS