

## Mathematics (min. 20 ECTS)

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	<b>Functional Analysis</b>	5	32301 / 32302	WE, E, WS
	<a href="#">Optimierung für Ingenieure</a>	7.5	40501 / 40502	WE, E, SS
	Elementary Numerics for Engineers	7.5	40602	WE, E, WS
	Numerical Linear Algebra	7.5	950103	WE, E, WS
	Multigrid Methods	5	35601	WE, E, SS
	Advanced Discretization Techniques	10	59001	OE, E, WS
	<a href="#">Einführung in die Numerik PDE II</a>			SS
	Einführung Numerik PDE	10	52401 / 52402	WE, E, WS
	<a href="#">Introduction to Structural Optimization</a>	5		WS, SS
	Theorie der Optimalsteuerung	10		

## Computer Science (min. 20 ECTS)

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	<b>Area Simulation / HPC</b>			
	<a href="#">Programming Techniques for Supercomputers</a>	5 (7.5)	278169	OE, E, SS
	<a href="#">High End Simulation in Practice</a>	7.5	45101	SS
	Architekturen von Superrechnern	5	44601	WS
	<a href="#">Computational Optics</a>	7.5	768903	SS
	Advanced Simulation Technology	5		WS
	HPC Software Project	10	695344	
	<a href="#">Simulation und wissenschaftliches Rechnen 2</a>	7.5	684900	WE, E, S, SS
	Modellierung, Optimierung und Simulation von Energiesystemen	5		WS
	Simulation und Modellierung 1	5		
	<b>Area Technical Computer Science</b>			
	<a href="#">Hardware-Software-co-design</a>	7,5		
	<a href="#">Organic Computing</a>	5	39701	!
	<a href="#">Cyber-Physical Systems</a>	5	44701	WS

**Bold:** Compulsory Module; Abbreviations *OE*: Oral Exam, *WE*: Written Exam; *E*: Exercise, *S*: Seminar, *P*: Practical Training

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	Smart Grids	5	623734	SS
	Fahrzeugkommunikation	5	716033	
	Heterogeneous Computer Architectures Online	5		WS
	<b>Area Data Sciences</b>			
	Diagnostic Medical Image Processing	5 (7,5)		WS
	Computergraphik	7,5		WS
	Image Processing in Optical Nanoscopy	5	289629	
	Computer Vision			SS
	Pattern Recognition Deluxe	7,5		WS
	Computer Graphics	5 (7,5)	38201	
	Pattern Analysis	7,5		SS
	Human Computer Interaction	5		SS
	Interventional Medical Image Processing	5 (7,5)	37601	SS
	Deep Learning	5	901895	OE,WS
	Applied Visualization			SS
	<b>Area Practical Computer Science</b>			
	Softwarearchitektur	5 (10)	453543	SS
	Datenschutz und Compliance	2,5		
	The AMOS Project	5 (10)	753997	
	Nailing your thesis	5 (10)		WS
	Product Management	5 (10)		WS
	Free/Libre, and Open Source Software	5		
	Datenschutz, Compliance und Elektronische Signaturen	5		SS
	Advanced Programming Techniques	7,5	465562	WS
	DIY - Individual Prototyping and Systems Engineering	10	304635	
	Testen von Softwaresystemen	5		
	<b>Area Theoretical Computer Science</b>			
	Logik-Basierte Wissensrepräsentation für Mathematisch/Technisches Wissen		221236	SS

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## Technical Application Field (min. 20 ECTS)

### Technical Application Field: Information Technology – DSP

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	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			
	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	

### Technical Application Field: Information Technology – DT

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	Digital Communications	5	78001	WS
	Fundamentals of Mobile Communications	5	31401	
	Channel Coding			
	Information Theory and Coding			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			
	Optical Transmission Systems			
	Informationstheorie	5	36001	

## Technical Application Field: Medical Engineering

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	Praktikum Vertiefung Medizinische Biotechnologie - Bildverarbeitung	2.5		
	Optical Technologies in Life Science	5	922257	
	Clinical Applications of Optical Technologies and Associated Fundamentals of Anatomy	5		

## Technical Application Field: Solid Mechanics and Dynamics

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	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	
	Introduction to FEM	5		SS
	Strukturoptimierung in der virtuellen Produktentwicklung	5		SS
	Dynamik nichtlinearer Balken	5		
	Elasticity of 1D continua	2,5		

## Technical Application Field: Thermo and Fluid Dynamics

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	Numerische Methoden der Thermofluidmechanik I	7.5		

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

### Technical Application Field: Mechatronics

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

### Technical Application Field: Computational Material Science (!!!)

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

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	Material Properties and Structure			

## Technical Application Field: Computational Optics

	Module Name	ECTS	Prüfungsnummer	Type / Amount
	Grundkurs Optik III	5		
	Grundkurs Optik IV / Basic Course in optics V:Nonlinear optics	5		
	Experimentalphysik 3: Optik und Quanteneffekte	7.5		
	Lasertissue Interaction	5	763337	SS, WE
	Biologisches und Technisches Sehen	5		
	Photonik II	5		SS
	Optische Übertragungstechnik	5		SS
	Advanced Optical Communication Systems	5		