Master's degree programme Information and Communication Engineering (M.Sc.) PO2023

TECHNISCHE UNIVERSITÄT DARMSTADT

Study and examination plan (Appendix I)

Date: 2024-07-03

Key		Examination components						Semester			
Assessment system:	St = standard (graded); bnb = passed/not passed							Examinations are assigned to semesters for guidance only.			
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All modules of areas 1. Core competencies to 4. Studium Generale (exactly 90 CP)							**90**				
1. Core Competencies (min. 7 modules; min. 40 CP, max. 42 CP)						**o**	**40-42**	**24**	**18**	**0**	**0**
18-ho-2010	Advanced Digital Integrated Circuit Design (V3 + Ü1)	St		K	90	f	6	6			
18-jk-2020	Antennas and Adaptive Beamforming (V3 + Ü1)	St		K	90	f	6	6			
18-sm-2010	Communication Networks II (V3 + Ü1) *)	St		K	120	f	6	6			
18-kl-2010	Communication Technology II (V2 + Ü2)	St		K	90	f	5	5			
18-pe-2020	Convex Optimization in Signal Processing and Communications (V2 + Ü1 + PR1)	St		mP/K	20/120	f	6		6		
18-zo-2060	Digital Signal Processing (V3 + Ü1)	St		K	180	f	6	6			
18-kp-2110	Data-driven Modeling - Machine Learning (V2 + Ü1 + PR1)	St		mP/K	30/120	f	6		6		
18-pe-2070	Matrix Analysis and Computations (V3 + Ü1)	St		mP/K	20/120	f	6		6		
18-kl-2020	Mobile Communications (V3 + Ü1)	St		K	90	f	6		6		
18-pr-1050	Optical Communications – Components (V3 + Ü1)	St		K	90	f	6		6		
18-dg-2150	Technical Electrodynamics for iCE (V2 + Ü2)	St		K	180	f	5	5			
2. Optionals (min. 28 CP; exactly 1 subarea) [change of modules according to APB § 30 Abs. 5]						**o**	**min. 28**	**0**	**10**	**18**	**0**
2.1. Communication Hardware						**f**	**min. 28**	**0**	**10**	**18**	**0**
2.1.1. Communication Hardware - Lectures (min. 2 modules)						**o**		**0**	**4**	**6**	**0**
16-17-5110	Printed Electronics (V2)	St		mP	30	f	4		4		
18-bu-2010	Microsystem Technology (V2 + Ü1)	St		K	90	f	4	4			
18-bu-2030	Lab-on-Chip Systeme (V2 + Ü2)	St		mP/K	30/90	f	5		5		
18-hb-2010	Low-Level Synthese (V2 + PR2)	St		mP	30	f	6		6		
18-hb-2020	High-Level Synthese (V2 + PR2)	St		mP	30	f	6			6	
18-ho-2040	Microprocessor Systems (V2 + Ü1)	St		K	90	f	4		4		
18-ho-2200	Computer Aided Design for SoCs (V2 + Ü1 + PR1)	St		K	90	f	5		5		
18-ho-2210	Industrial Electronics (V2 + Ü1)	St		mP/K	30/90	f	4			4	
18-me-2020	Introduction to Spintronics (V3 + Ü1)	St		mP/K	45/120	f	6			6	
18-pr-2010	Terahertz Systems and Applications (V2 + Ü1)	St		mP/K	25/90	f	4		4		
18-su-2020	Real-Time Systems (V3 + Ü1)	St		mP/K	30/90	f	6		6		
18-bu-1010	Foundations of Precision Engineering (V2 + Ü1 + PR1)	St		mP/K	30/90	f	6	6			
18-kn-1050	Electromechanical Systems I (V2 + Ü2)	St		K	120	f	5	5			
18-hb-2030	Computer Systems II (V3 + Ü1)	St		mP	30	f	6		6		
18-jk-2020	Antennas and Adaptive Beamforming (V3 + Ü1)	St		K	90	f	6			6	
18-jk-2130	Microwave Engineering II (V3 + Ü1)	St		K	90	f	6			6	
18-ja-2010	MIMO - Communication and Space-Time-Coding (V2 + Ü1) *(formerly: 18-pe-2030)*	St		mP/K	20/120	f	4	4			
18-zo-2070	Speech and Audio Signal Processing (V2 + Ü1 + SE1)	St		mP/K	90/90	f	6	6			
18-dg-1030	Finite Integration Technique (V2)	St		mP	30	f	3		3		
18-pr-1050	Optical Communications – Components (V3 + Ü1)	St		K	90	f	6		6		
18-dg-2150	Technical Electrodynamics for iCE (V2 + Ü2)	St		K	180	f	5	5			
18-ho-2010	Advanced Digital Integrated Circuit Design (V3 + Ü1)	St		K	90	f	6			6	
18-me-2020	Introduction to Spintronics (V3 + Ü1)	St		mP/K	45/120	f	6			6	

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18-me-2040	Nanoelectronics (V2 + SE1)	St		mP/K	30/90	f	5		5		
18-sc-2010	Modelling and Simulation of Circuits (V2 + Ü1)	St		mP	20	f	4		4		
18-kb-2040	Radio Frequency Systems for Particle Accelerators (V2 + Ü2)	St		mP	30	f	5		5		
18-zh-2010	Hardware for Neural Networks (V2 + Pr2)	St		K	90	f	6		6		
	...										
2.1.2. Communication Hardware - Labs and Projects (min. 1/max. 3 modules)						**o**		**0**	**6**	**12**	**0**
18-hb-2040	Project Seminar Reconfigurable Systems (PJ3)		St	M/S		f	6		6		
18-ho-2120	Advanced Integrated Circuit Design Lab (PR3)		St	M/S		f	6		6		
18-ho-2160	Seminar Integrated Electronic Systems Design A (SE2)		St	mP	45	f	4		4		
18-jk-2060	Project Seminar Advanced μWave Components & Antennas (PJ4)		St	mP	30	f	8		8		
18-pe-2040	Project Seminar Emerging Topics in Sensor Array and Multichannel Processing (PJ4)		St	mP	40	f	8			8	
18-pe-2050	Project Seminar Emerging Topics in MIMO Communication Networks (PJ4)		St	mP	40	f	8		8		
18-pr-2030	Project Seminar Terahertz Technology, Communication and Sensors (PJ4)		St	M/S		f	8		8		
18-su-2080	Seminar Software System Technology (SE2)		St	M/S		f	4		4		
18-ho-1090	HDL Lab (PR3)		St	M/S		f	6		6		
18-ho-2161	Seminar: Integrated Electronic Systems Design B (SE3)		St	mP	45	f	6		6	(6)	
20-00-0968	Embedded Systems Hands-On 2: Designing Hardware Accelerators for Systems-on-Chip (Pr4)	St		M/S		f	6				
20-00-1001	Advanced Topics in Embedded Systems and Applications (PP6)	St		M/S		f	9				
18-zo-2030	Digital Signal Processing Lab (PR3)		St	S	120	f	6		(6)	6	
18-pr-2020	International Summer School 'Microwaves and Lightwaves' (SE2)		St	mP	30	f	4		4		
18-zh-2020	Project Seminar Hardware for Neural Networks (PJ3)		St	mP	30	f	6		(6)	6	
18-me-2030	Project Seminar Spintronic Devices (PJ3)		St	M/S		f	6		6		
18-me-2050	Thin films and spintronics lab (PR3)		St	M/S	25	f	5		5	(5)	
18-sc-1020	Projektseminar Elektromagnetisches CAD (PJ4)	St		M/S		f	8		8	(8)	
	...										
2.2. Communication Systems and Networking						**f**	**min. 28**	**0**	**10**	**18**	**0**
2.2.1. Communication Systems and Networking - Lectures (min. 2 modules)						**o**		**0**	**10**	**4**	**0**
18-jk-2040	Introduction to Radar Systems Engineering (V2)	St		mP	30	f	3	3			
18-kp-1010	Information Theory I: Fundaments (V3 + Ü1)	St		K	120	f	6	6			
18-pe-2010	Information Theory II: Networks (V3 + Ü1)	St		mP/K	20/120	f	6		6		
18-ja-2010	MIMO - Communication and Space-Time-Coding (V2 + Ü1)	St		mP/K	20/120	f	4			4	
18-pe-2060	Sensor Array Processing and Adaptive Beamforming (V2 + Ü1)	St		mP/K	20/120	f	4		4		
18-pe-2080	Graph signal processing, learning and optimization (V3 + Ü1)	St		mP/K	20/120	f	6	6			
18-pr-2010	Terahertz Systems and Applications (V2 + Ü1)	St		mP/K	25/90	f	4		4		
18-zo-2010	Adaptive Filters (V3 + Ü1)	St		mP/K	20/90	f	6		6		
18-zo-2070	Speech and Audio Signal Processing (V2 + Ü1 + SE1)	St		M/S	15/90	f	6			6	
18-sm-2280	Software Defined Networking (V2 + Ü2)	St		mP/K	20/90	f	6			6	
20-00-0056	Network, Traffic and Quality Management for Internet Services (V2)	St		M/S		f	3		3		
20-00-0512	Network Security (IV4)	St		M/S		f	6		6		

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20-00-0745	Physical Layer Security in Wireless Systems (IV3)	St		M/S		f	6			6	
20-00-0748	Mobile Networking (IV4)	St		M/S		f	6			6	
20-00-0780	Wireless Network for Emergency Response: Fundamentals, Design, and Build-up from Scratch (IV3)	St		M/S		f	6			6	
18-jk-2020	Antennas and Adaptive Beamforming (V3 + Ü1)	St		K	90	f	6	6			
18-jk-2130	Microwave Engineering II (V3 + Ü1)	St		K	90	f	6			6	
18-pe-2070	Matrix Analysis and Computations (V3 + Ü1)	St		mP/K	20/120	f	6		6		
18-mu-2010	Robust Data Science With Biomedical Applications (V3 + Ü1)	St		K	180	f	6	6			
18-dg-1030	Finite Integration Technique (V2)	St		mP	30	f	3		3		
18-pe-2020	Convex Optimization in Signal Processing and Communications (V2 + Ü1 + PR1)	St		mP/K	20/120	f	6		6		
18-kl-2020	Mobile Communications (V3 + Ü1)	St		K	90	f	6		6		
18-kl-2010	Communication Technology II (V2 + Ü2)	St		K	90	f	5			5	
18-zo-2060	Digital Signal Processing (V3 + Ü1)	St		K	180	f	6	6			
18-kp-2110	Data-driven Modeling - Machine Learning (V2 + Ü1 + PR1)	St		mP/K	30/120	f	6		6		
18-sm-2340	Resilient Communication Networks (V2 + Ü1)	St		mP/K	30/90	f	4		4		
18-ja-2020	Synthetic Molecular communication (V2 + Ü1)	St		mP/K	20/120	f	4		4		
18-kp-2130	Clinical applications of brain imaging, stimulation, and modelling (V3 + Ü1)	St		mP/K	25/90	f	6			6	
20-00-0120	*TK3: Ubiquitous / Mobile Computing (IV4)* **)	St		M/S		f	6		6		
	...										
2.2.2. Communication Systems and Networking - Labs and Projects (min. 1/max. 3 modules)						**o**		**0**	**0**	**14**	**0**
18-kl-2040	Project Seminar Wireless Communications (PJ4)		St	M/S		f	8		8		
18-pe-2040	Project Seminar Emerging Topics in Sensor Array and Multichannel Processing (PJ4)		St	mP	40	f	8			8	
18-pe-2050	Project Seminar Emerging Topics in MIMO Communication Networks (PJ4)		St	mP	40	f	8		8		
18-pr-2030	Project Seminar Terahertz Technology, Communication and Sensors (PJ4)		St	M/S		f	8		8		
18-zo-2030	Digital Signal Processing Lab (PR3)		St	K+B	120	f	6		6	(6)	
18-sm-2090	Multimedia Communications Seminar II (SE2)		St	M/S		f	4			4	
18-sm-2130	Multimedia Communications Project II (PR6)		St	M/S		f	9		9		
20-00-0549	Advanced Seminar on Networking, Security, Mobility, and Wireless Communications (SE4)		St	M/S		f	4			4	
20-00-0552	Lab Exercise on Secure Mobile Networking (PR4)		St	M/S		f	6		6		
20-00-0582	Seminar on Networking, Security, Mobility, and Wireless Communications (SE2)		St	M/S		f	3		3		
20-00-0615	Practical Lab on System and IoT Security (PR4)		St	M/S		f	6			6	
20-00-0935	Privacy-Preserving Technologies (SE2)		St	M/S		f	3			3	
20-00-1064	IoT and wireless protocols in embedded systems (PR4)		St	M/S		f	6		6		
18-zo-2040	Advanced Topics in Statistical Signal Processing (SE4)		St	M/S		f	8			8	
18-zo-2050	Signal Detection and Parameter Estimation (SE4)		St	M/S		f	8		8		
18-sm-2070	Multimedia Communications Lab II (PR3)		St	M/S		f	6		(6)	6	
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2.3. Communication Algorithms						**f**	**min. 28**	**0**	**10**	**18**	**0**
2.3.1. Communication Algorithms - Lectures (min. 2 modules)						**o**		**0**	**4**	**10**	**0**
18-kp-1010	Information Theory I: Fundaments (V3 + Ü1)	St		K	120	f	6	6			
18-pe-2010	Information Theory II: Networks (V3 + Ü1)	St		mP/K	20/120	f	6		6		
18-pe-2060	Sensor Array Processing and Adaptive Beamforming (V2 + Ü1)	St		mP/K	20/120	f	4		4		
18-pe-2080	Graph signal processing, learning and optimization (V3 + Ü1)	St		mP/K	20/120	f	6	6			
18-zo-2010	Adaptive Filters (V3 + Ü1)	St		mP/K	20/90	f	6		6		
18-zo-2070	Speech and Audio Signal Processing (V2 + Ü1 + SE1)	St		mP/K	90/90	f	6			6	
20-00-0085	Introduction to Cryptography (IV4)	St		M/S		f	6			6	
20-00-0121	Ubiquitous computing in business processes (V2)	St		M/S		f	3			3	
20-00-0157	Computer Vision I (IV4)	St		M/S		f	6			6	
18-zo-2110	Data Science I (V2 + Ü2)	St		mP/K	45/90	f	5		5		
20-00-0629	Robot Learning (V4)	St		M/S		f	6			6	
04-10-0588	Combinatorial Optimization (VU0)	St		mP/K		f	5		5		
20-00-1011	Statistical Relational Artificial Intelligence: Logic, Probability, and Computation (IV4)	St		M/S		f	6			6	
20-00-1017	Scalable Data Management Systems (IV4)	St		M/S		f	6			6	
20-00-1058	Introduction to Artificial Intelligence (IV3)	St		M/S		f	5			5	
18-pe-2070	Matrix Analysis and Computations (V3 + Ü1)	St		mP/K	20/120	f	6		6		
18-kp-2110	Data-driven Modeling - Machine Learning (V2 + Ü1 + PR1)	St		mP/K	30/120	f	6		6		
18-ad-2090	Computer Vision in Engineering (V2)	St		mP/K	30/90	f	3			3	
18-pe-2020	Convex Optimization in Signal Processing and Communications (V2 + Ü1 + PR1)	St		mP/K	20/120	f	6		6		
18-kl-2020	Mobile Communications (V3 + Ü1)	St		K	90	f	6		6		
20-00-0056	Network, Traffic and Quality Management for Internet Services (V2)	St		M/S		f	3				
18-sm-2280	Software Defined Networking (V2 + Ü2)	St		mP/K	20/90	f	6	6			
18-sm-2010	Communication Networks II (V3 + Ü1)	St		K	120	f	6			6	
18-zo-2060	Digital Signal Processing (V3 + Ü1)	St		K	180	f	6	6			
18-kl-2070	Fundamentals of Reinforcement Learning (V2 + Ü2)	St		mP/K	20/60	f	5		5		
18-de-2050	Serious Games (iV4) *(vormals: 20-00-0366)*	St		M/S		f	6				
20-00-0512	Network Security (iV4)		St	M/S		f	6				
20-00-0120	TK3: Ubiquitous/Mobile Computing (iV4)		St	M/S		f	6				
18-mu-2010	Robust Data Science With Biomedical Applications (V3 + Ü1)	St		K	180	f	6			6	
18-ja-2010	MIMO - Communication and Space-Time-Coding (V2 + Ü1) *(formerly: 18-pe-2030)*	St		mP/K	20/120	f	4	4			
18-ad-2110	*Automated Driving (V2)* **)	St		K	90	f	3	3			
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2.3.2. Communication Algorithms - Labs and Projects (min. 1/max. 3 modules)						**o**		**0**	**6**	**8**	**0**
18-zo-2030	Digital Signal Processing Lab (PR3)		St	K + B	120	f	6		6		
18-zo-2040	Advanced Topics in Statistical Signal Processing (SE4)		St	M/S		f	8			8	
18-zo-2050	Signal Detection and Parameter Estimation (SE4)		St	M/S		f	8		8		
20-00-0418	Visual Computing Lab (PR4)		St	M/S		f	6			6	
20-00-1022	Protection in Infrastructures and Networks (SE2)		St	M/S		f	3			3	
20-00-0553	Project on Secure Mobile Networking (Pr6)		St	M/S		f	9				
18-sm-2090	Multimedia Communications Seminar II (SE2)		St	M/S		f	4		(4)	4	
18-sm-2070	Multimedia Communications Lab II (PR3)		St	M/S		f	6		6	(6)	
20-00-0552	Lab Exercise on Secure Mobile Networking (Pr4)		St	M/S		f	6				
18-sm-2130	Multimedia Communications Project II (PR6)		St	f		f	9		9	(9)	
18-zo-2120	Data Science II (SE4)		St	M/S	90	f	8			8	
18-zo-2100	*Robust and Biomedical Signal Processing (SE4)* **)		St	mP	30	f	8		8		
	…										
3. Optional supplements						**f**		**0**	**0**	**0**	**0**
all modules from subareas 2.1, 2.2, 2.3											
4. Studium Generale (min. 12 CP) [Modulwechsel nach APB § 30 Abs. 6]						**o**	**min. 12**	**6**	**3**	**11**	**0**
please find a detailed module handbook about the Studium Generale online											
4.1 Humanities and Social Sciences						**f**		**0**	**0**	**0**	**0**
Modules from department 2 and 3, ...											
02-22-1111	Introduction to sociology of work and technology (V2)	St		S		f	5		5		
03-03-0047	Work, Organizational, and Business Psychology (V2)		St	K	90	f	3	3			
02-21-2027	Ethics and Application (KU2)		bnb	M/S		f	5	5			
02-21-2025	Ethics and Technology Assessement (KU2)		bnb	M/S		f	5	5			
	…										
4.2 Entrepreneurship und Management						**f**		**0**	**3**	**6**	**0**
Modules from department 1, ...											
EI - Lectures (Basic modules) (*)											
	…										
EI - Lectures (Advanced modules) (*)											
*) *Note: Please pay attention to the recommended prerequisites and choose basic modules*											
	…										
4.3 Engineering and Natural Sciences						**f**		**3**	**0**	**5**	**0**
Modules from departments 4, 5, 7, 10, 11, 13, 15, 16, and 20											
	…										

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TECHNISCHE UNIVERSITÄT DARMSTADT

Study and examination plan (Appendix I)

Date: 2024-07-03

Key		Examination components						Semester			
Assessment system:	St = standard (graded); bnb = passed/not passed							Examinations are assigned to semesters for guidance only.			
Form of examination:	A = submission, B = report, H = homework assignment, HU = homework, worksheets, K = written exam, Kq = colloquium, M = oral examination as specified in module description, mP = oral examination, M/S = oral/written examination as specified in module description, mP/K = oral examination or written examination, P = minutes, Pt = presentation, R = paper, S = written examination as specified in module description, SF = special form, Th = thesis, f = facultative										
Status:	o = obligatory; f = facultative										
Form of teaching:	V = lecture, SE = seminar, Ü = exercise, PJ = project seminar, PR = practical, EV = introductory course; KU = course, KO = colloquium, IV = integrated course, TT = tutorial, VU = lecture incl. exercise, PP = project practical, PS = proseminar, FS = research seminar, HÜ = lecture room exercise, GÜ = group exercise, EX = specialised excursion							Study load per semester (CPs)			
CP:	Credit points										
TUCaN number and assignment of CPs to module elements are informative in nature. The CPs are credited once the module is completed. Please note additional information within and at the end of the study and examination. The CPs stated in the respective semester columns indicate a recommended possible course of your studies at the start of your degree programme in the winter semester.		Technical examination	Study examination	Form of examination	Duration (min.)	Status	Total CPs	1.	2.	3.	4.
4.4 Languages, Soft Skills						**o**		**3**	**0**	**0**	**0**
4.4.1. German as Foreign Language (min. 1 module)						**o**		3	0	0	0
All German Courses of the Language Resource Centre											
4.4.2. Foreign Languages, Soft Skills						**f**		**0**	**0**	**0**	**0**
Modules from the Language Resource Centre and other											
18-de-1999	Application in Teaching (Tutor Activities) (TT, one course per group)					f	3	(3)	(3)	(3)	(3)
…											
4.5 Introduction into professional life						**f**		**0**	**0**	**0**	**0**
18-kn-1060	Excursion SAE (EX0)		bnb	B		f	1		1		
16-21-5030	Work and Process Organization (V2 + Ü1)	St		K	90	f	4		4		
16-21-5020	Human Factors/Ergonomics (V4 + Ü2)	St		K	90	f	8			8	
18-gt-4010	Standardization, Testing and Approvals in the Electrotechnical Area (V2)	St		mP	30	f	3		3		
18-fi-3010	Patents - How to protect technical inventions (V2)	St		K	90	f	3		3		
…											
5. Master's Thesis (30 CP)						**o**	**30**	**0**	**0**	**0**	**30**
18-00-5000	Master's Thesis	St		Th			30				
					Summe		**120**	**30**	**31**	**29**	**30**

Footnote 1: Modules marked with **) and in italics are currently inactive.
Footnote 2: 18-sm-2010 Communication networks II can be replaced by 18-sm-2340 Resilient Communication Networks