

## Innovation & Entrepreneurship

(to be combined with a technical major, mandatory for all students)

	I&E	Technical Major
1 <sup>st</sup> Semester	Innovation Management & Entrepreneurship Basics 6 ECTS	19 ECTS
	Electives 5 ECTS	
2 <sup>nd</sup> Semester	Venture Campus – ICT Innovation 9 ECTS	17 ECTS
	Summer School 4 ECTS	
3 <sup>rd</sup> Semester	I&E Study 6 ECTS	24 ECTS
4 <sup>th</sup> Semester		Master Thesis 30 ECTS

### Electives:

Digital Innovation	6 ECTS	WS/SS
Human Side of Innovation	6 ECTS	WS
Innovation Economics	6 ECTS	WS
Innovation Marketing	6 ECTS	WS
Innovation Policy	6 ECTS	SS
Intellectual Property Management	6 ECTS	WS
Open Source and IP in the Digital Society	6 ECTS	WS/SS
Standardisation and Plattform Management	6 ECTS	SS
Strategic Innovation Management	6 ECTS	SS
Strategic Management	6 ECTS	WS
Sustainable Innovation	6 ECTS	WS

Although the electives all technically have 6 credits, only 5 credits can be counted towards your degree since the I&E Minor only requires 30 credits in total.

### Autonomous Systems

	Technical Major Autonomous Systems (AS)		
1 <sup>st</sup> Semester	Discrete Event Systems 6 ECTS	Machine Intelligence I 6 ECTS	Robotics 6 ECTS
2 <sup>nd</sup> Semester	Hybrid Systems 6 ECTS	Electives 6 ECTS	Free Choice 6 ECTS
3 <sup>rd</sup> Semester	Fundamentals of Multi-Agent Technologies 6 ECTS	Electives 12 ECTS	Free Choice 6 ECTS
4 <sup>th</sup> Semester	Master Thesis 30 ECTS		

#### Electives:

Ad-hoc and Sensor Networks	6 ECTS	WS
Analysis and Optimization of Embedded Systems	6 ECTS	SS
Applications of Robotics and Autonomous Systems	9 ECTS	WS/SS
Applied Artificial Intelligence Project	9 ECTS	WS/SS
Applied Embedded Systems Project	6 ECTS	SS
Autonomous Communications	9 ECTS	WS
Embedded Operating Systems	6 ECTS	WS+SS
Embedded Systems Security Lab	6 ECTS	WS/SS
Industrial Internet of Things	6 ECTS	SS
Introduction to Computer Vision	6 ECTS	SS
Machine Intelligence II	6 ECTS	SS
Machine Learning Lab Course	9 ECTS	SS
Networked Embedded Systems	6 ECTS	SS
Nonlinear Control Systems	6 ECTS	SS
Optical Remote Sensing	6 ECTS	WS
Robotics: Advanced	6 ECTS	SS
Software Security	6 ECTS	WS
Special Topics in Communications Networks and Autonomous Security	3 ECTS	WS/SS

#### Free Choice:

You can choose one or several modules for a total of at least 6 ECTS. These modules can be offered by other departments, i.e. they do not have to be offered by Faculty IV – Electrical Engineering and Computer Science, or other universities (limited to Freie Universität Berlin, Humboldt Universität Berlin, Universität der Künste Berlin, Universität Potsdam). It is recommendable, though, to choose them from the list of electives (see above) to complete your education within your technical major.

**Electives and Free Choice credits cannot be mixed;** you have to choose modules worth at least 6 ECTS (entry) / 12 ECTS (exit) in the Electives section and at least 6 ECTS in the Free Choice section. It is okay to take a 9 ECTS module for the Free Choice section; however, then the 3 credits above the 6 ECTS requirement for that section will not count towards your degree and they cannot count towards the Electives requirement. This also works the other way around: If you take more than the required number of credits in the Electives section, the extra credits cannot count towards the 6 ECTS Free Choice requirement.

## Cloud Computing and Services

Technical Major Cloud Computing and Services (CCS)			
1 <sup>st</sup> Semester	Distributed Algorithms 6 ECTS	Network Architectures – Basics 6 ECTS	Cloud Computing 6 ECTS
2 <sup>nd</sup> Semester	Internet of Services Lab 9 ECTS	Electives 3 ECTS	Free Choice 6 ECTS
3 <sup>rd</sup> Semester	Electives 18 ECTS		Free Choice 6 ECTS
4 <sup>th</sup> Semester	Master Thesis 30 ECTS		

### Electives:

5G and IIoT Project	9 ECTS	WS/SS
5G and IIoT Seminar	3 ECTS	WS/SS
5 <sup>th</sup> Generation Mobile Networks	6 ECTS	SS
Advanced Enterprise Computing	6 ECTS	SS
Advanced Information Management 1 (AIM-1) – Heterogeneous and Distributed Information Systems (HDIS)	6 ECTS	WS
Advanced Information Management 3 (AIM-3) – Scalable Data Science: Systems & Methods (SDSSM)	6 ECTS	WS/SS
BDAPRO - Big Data Analytics Project	9 ECTS	WS/SS
Blockchain Technologies	6 ECTS	SS
Cloud Computing	6 ECTS	WS
Cloud Prototyping	12 ECTS	WS/SS
DBT: Database Technology	6 ECTS	WS/SS
Digital Communities	6 ECTS	WS
Enterprise Computing	6 ECTS	WS
Fog Computing Project	12 ECTS	WS/SS
Hot Topics in Information Systems Engineering	3 ECTS	WS/SS
IDB-PRA: Implementation of a Database Engine (Database Technology Lab)	6 ECTS	WS
IMPRO - Project Hot Topics in Information Management	6 ECTS	WS/SS
IMSEM – Seminar Hot Topics in Information Management	3 ECTS	WS/SS
Industrial Internet of Things	6 ECTS	SS
Internet of Services Lab	9 ECTS	WS/SS
Mobile Services	6 ECTS	SS
Network Security	6 ECTS	WS
Privacy Engineering	6 ECTS	SS

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**Electives and Free Choice credits cannot be mixed;** you have to choose modules worth at least 3 ECTS (entry) / 18 ECTS (exit) in the Electives section and at least 6 ECTS in the Free Choice section. It is okay to take a 9 ECTS module for the Free Choice section; however, then the 3 credits above the 6 ECTS requirement for that section will not count towards your degree and they cannot count towards the Electives requirement. This also works the other way around: If you take more than the required number of credits in the Electives section, the extra credits cannot count towards the 6 ECTS Free Choice requirement.

## Data Science

(3<sup>rd</sup> and 4<sup>th</sup> semester at TU Berlin)

Technical Major Data Science (DS)		
3 <sup>rd</sup> Semester	Advanced Information Management 3 (AIM-3) - Scalable Data Science: Systems & Methods (SDSSM) 6 ECTS	Electives 12 ECTS
		Free Choice 6 ECTS
4 <sup>th</sup> Semester	Master Thesis 30 ECTS	

### Electives:

Advanced Information Management 1 (AIM-1) – Heterogeneous and Distributed Information Systems (HDIS)	6 ECTS	WS
BDAPRO – Big Data Analytics Project	9 ECTS	WS/SS
BDASEM - Big Data Analytics Seminar	3 ECTS	WS
Cloud Computing	6 ECTS	WS
DBT: Database Technology	6 ECTS	WS/SS
IDB-PRA: Implementation of a Database Engine (Database Technology Lab)	6 ECTS	WS
Machine Learning 1	6 ECTS	WS
Machine Learning 1-X	9 ECTS	WS/SS
Machine Learning for Remote Sensing Data Analysis	3 ECTS	WS
Speech Signal Processing and Speech Technology	6 ECTS	WS

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**Electives and Free Choice credits cannot be mixed;** you have to choose modules worth at least 12 ECTS in the Electives section and at least 6 ECTS in the Free Choice section. It is okay to take a 9 ECTS module for the Free Choice section; however, then the 3 credits above the 6 ECTS requirement for that section will not count towards your degree and they cannot count towards the Electives requirement. This also works the other way around: If you take more than 12 ECTS in the Electives section, the extra credits cannot count towards the 6 ECTS Free Choice requirement.

## Embedded Systems

Technical Major Embedded Systems (ES)				
1 <sup>st</sup> Semester	Quality Assurance of Embedded Systems 6 ECTS	Embedded Operating Systems 6 ECTS	Compiler Design 6 ECTS	Free Choice 6 ECTS
2 <sup>nd</sup> Semester	Advanced Computer Architectures 6 ECTS		Applied Embedded Systems Project 6 ECTS	
3 <sup>rd</sup> Semester	Electives 18 ECTS		Free Choice 6 ECTS	
4 <sup>th</sup> Semester	Master Thesis 30 ECTS			

### Electives:

Ad-hoc and Sensor Networks	6 ECTS	WS
Analysis and Optimization of Embedded Systems	6 ECTS	SS
Applications of Robotics and Autonomous Systems	9 ECTS	WS/SS
Applied Verification of C-Programs	3 ECTS	SS
Convex Optimization for the Internet of Things	6 ECTS	WS
Digital Image Processing	6 ECTS	WS
Embedded Systems Security Lab	6 ECTS	WS/SS
Multicore Systems	6 ECTS	WS
Networked Embedded Systems	6 ECTS	SS
Project Hot Topics in Computer Vision A	9 ECTS	WS/SS
Project Hot Topics in Computer Vision B	9 ECTS	WS/SS
Recent Advances in Computer Architecture	3 ECTS	WS
Robotics	6 ECTS	WS
Seminar Software and Embedded Systems Engineering	3 ECTS	WS/SS

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## Human Computer Interaction and Design

(3<sup>rd</sup> and 4<sup>th</sup> semester at TU Berlin)

Technical Major Human Computer Interaction and Design (HCID)			
3 <sup>rd</sup> Semester	Speech Signal Processing and Speech Technology 6 ECTS	Electives 12 ECTS	Free Choice 6 ECTS
4 <sup>th</sup> Semester	Master Thesis 30 ECTS		

### Electives:

Biometric Identification	3 ECTS	WS
Communication Acoustics	6 ECTS	WS
Computer Graphics Seminar A	3 ECTS	WS
Computer-Supported Interaction	3 ECTS	WS
Digital Image Processing	6 ECTS	WS
Human-Machine Interaction in Complex Systems	6 ECTS	WS
Image and Video Coding	6 ECTS	WS+SS
Introduction to Physiological Computing	6 ECTS	WS (+SS)
Optical Remote Sensing	6 ECTS	WS
Photogrammetric Computer Vision	6 ECTS	WS
Project Hot Topics in Computer Vision A	9 ECTS	WS/SS
Project Hot Topics in Computer Vision B	9 ECTS	WS/SS
Projects in Machine Learning and Artificial Intelligence	9 ECTS	WS
Study Project Quality and Usability (9 CP)	9 ECTS	WS/SS
Study Project Quality and Usability (6 CP)	6 ECTS	WS/SS
Usable Privacy	3 ECTS	WS

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### Internet Technology and Architecture

Technical Major Internet Technology and Architecture (ITA)					
1 <sup>st</sup> Semester	Network Architectures – Basics 6 ECTS	5G and IIoT Seminar 3 ECTS	Network Technologies (Small) 6 ECTS	Electives 3 ECTS	Free Choice 6 ECTS
2 <sup>nd</sup> Semester	Mobile Services 6 ECTS	5 <sup>th</sup> Generation Mobile Networks 6 ECTS			
3 <sup>rd</sup> Semester	Electives 18 ECTS		Free Choice 6 ECTS		
4 <sup>th</sup> Semester	Master Thesis 30 ECTS				

#### Electives:

5G and IIoT Project	9 ECTS	WS/SS
Ad-hoc and Sensor Networks	6 ECTS	WS
Advanced Algorithmics	9 ECTS	WS
Blockchain Technologies	6 ECTS	SS
Convex Optimization for the Internet of Things	6 ECTS	WS
DBT: Database Technology	6 ECTS	WS/SS
Digital Communities	6 ECTS	WS
Embedded Operating Systems	6 ECTS	WS+SS
High-Speed Network Technologies with Lab	6 ECTS	SS
IDB-PRA: Implementation of a Database Engine (Database Technology Lab)	6 ECTS	WS
Industrial Internet of Things	6 ECTS	SS
Internet of Services Lab	9 ECTS	WS/SS
Master Seminar: Operating Complex IT Systems	3 ECTS	WS/SS
Network Architectures – Internet Multimedia Lab	9 ECTS	WS
Network Architectures – Routerlab	9 ECTS	SS
Network Architectures – Specialization (large)	9 ECTS	SS (+WS)
Network Architectures – Specialization (small)	6 ECTS	SS (+WS)
Network Protocol Programming Lab	6 ECTS	SS
Network Security	6 ECTS	WS
Network Technologies (Medium)	9 ECTS	SS (+WS)
Network Technologies (Small)	6 ECTS	SS (+WS)
Networked Embedded Systems	6 ECTS	SS
Parameterized Algorithmics	6 ECTS	(tba)
Performance Evaluation of Computer Communication Systems	6 ECTS	SS
Project in Advanced Network Technologies	6 ECTS	WS/SS
Special Topics in Communication Networks and Autonomous Security	3 ECTS	WS/SS

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