

Computer Science MSc (Artificial Intelligence specialization)

Compulsory subjects

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester *	Recommended semester			
							1st	2nd	3rd	4th
IPM-22fmiDNDEG	Deep Network Developments		2	2	6	A,S	6			
IPM-22fmiMTAAEG	Methods and tools for AI applications		2	2	6	A	6			
IPM-22fmiPAIEG	Principles of artificial intelligence		2	2	6	A	6			
IPM-22fRMEG	Research methodology L+Pr. **		1	2	5	A,S	5			
IPM-22fASTE	Advanced Software Technology L. **		2	0	4	S		4		
IPM-22fmiDRLEG	Deep Reinforcement Learning	IPM-22fmiDNDEG	2	2	6	S		6		
IPM-22fDAAE	Design and analysis of algorithms L. **		2	0	4	S		4		
	Compulsory subject credits in total				37		23	14		
	Elective subjects				6			6		
	Compulsory elective subjects ***				47		7	10	30	
IPM-22fTHCONS	Thesis consultation				30	A,S				30
IPM-22fPRG	Internship (4*)				0					
	Total credits per semester						30	30	30	30
	Total credits				120					

* Subjects are offered either in the Autumn semester (A) or in the Spring semester (S) or in both (A,S).

** Core subject of the Computer Science MSc study programme regardless the specialization.

*** From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 47 credits.

(4*) The required duration of the internship is 6 weeks (240 hours). The requirement of internship is fulfilled by the completion of subjects AI Project Lab I&II.

(5*) The accomplishment is mandatory for international students. Credits are counted as compulsory elective subject credits.

(6*) Fulfilment of the practice part is the prerequisite of obtaining a grade in the lecture part.

Compulsory elective subjects of Artificial Intelligence specialization

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester *	Recommended semester			
							1st	2nd	3rd	4th
IPM-22fmiCVEG	3D Computer Vision		2	2	6	A	6			
IPM-22fmiGTEG	Game theory		2	2	6	A	6			
IPM-25fmiLPENG	I Learn with Prompt Engineering		0	2	2	A,S	2			
IPM-22fmiIDSEG	Introduction to Data Science		2	2	6	A,S	6			
IPM-24fmiLEAE	Legal and ethical aspects of DS and AI		2	0	4	A	4			
IPM-22fmiLPG	Logic programming		0	2	3	A	3			
IPM-22fmiPREPG	Preparation course for master studies and developing learning skills (5*)		0	3	2	A,S	2			
IPM-22fmiTAMEG	Topics in Applied Mathematics		2	2	5	A,S	5			
IPM-22fmiACEG	Affective computing	IPM-22fmiDNDEG	2	2	6	S		6		
IPM-22fmiCOSCEG	Cognitive Science		2	2	6	S		6		
IPM-22fmiLPE	Logic programming	(6*)	2	0	3	S		3		
IPM-22fmiMLEG	Machine Learning	IPM-22fmiIDSEG	2	2	6	S		6		
IPM-22fmiMASEG	Multi-agent systems		2	2	6	S		6		
IPM-23fmiNLPFMEG	Natural Language Processing and Language-based Foundation Models	IPM-22fmiDNDEG	4	4	12	A,S		12		
IPM-23fmi3DCPAEG	3D point cloud processing and analysis		2	2	6	A			6	
IPM-22fmiAMLEG	Advanced Deep Network Development	IPM-22fmiDNDEG	2	2	6	A			6	
IPM-22fmiAIPLAB1	AI Project Lab I.		0	2	4	A			4	
IPM-22fmiAIPLAB2	AI Project Lab II.		0	4	6	A			6	
IPM-22fmiROBEG	AI Robotics		2	2	6	A			6	
IPM-22fmiCOLLIEG	Collective Intelligence		2	2	6	A			6	
IPM-22fmiCIEG	Computational Intelligence		2	2	6	A			6	
IPM-22fmiEIEG	Embodied Intelligence		2	2	6	A			6	
IPM-24fmiGNNEG	Graph Neural Networks		2	2	6	A,S			6	
IPM-23fmiSJEG	Statistics for signal processing L+Pr.		2	2	4	A			4	

From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 47 credits.

The accomplishment of the following listed subjects is mandatory only for EIT students.

Students do not participating in the EIT Digital Master programme can obtain elective subject credits for fulfilling them:

IPM-22ñ&EBEG	I&E Basics
IPM-22ñ&EBDL1G	Business Development Lab I.
IPM-22ñ&EBDL2G	Business Development Lab II.
IPM-22ñ&EIAOEEG	Innosocial aspects of entrepreneurship
IPM-22ñ&ETSSG	Thematic Summer Schools with I&E project
IPM-22ñ&ESTEG	I&E Study

Computer Science MSc (Cybersecurity specialization)

Compulsory subjects

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester*	Recommended semester			
							1st	2nd	3rd	4th
IPM-24fkBIOS1EG	Introduction to Offensive Security I. L+Pr.		1	1	4	A	4			
IPM-24fkBIMCSG	Introductory mathematics for Cybersecurity Specialisation		0	1	1	A	1			
IPM-24fkBPETEG	Privacy enhancing technologies L.+Pr.		1	1	4	A	4			
IPM-22fRMEG	Research methodology L+Pr. **		1	2	5	A,S	5			
IPM-24fkBSKCE	Symmetric key cryptography L.	(6*)	2	0	2	A	2			
IPM-24fkBSKCG	Symmetric key cryptography Pr.	IPM-24fkBIMCSG (7*)	0	2	2	A	2			
IPM-22fASTE	Advanced Software Technology L. **		2	0	4	S		4		
IPM-24fkBIDSE	Introduction to data security L.		2	0	4	S		4		
IPM-24fkBIOS2EG	Introduction to Offensive Security II. L.+ Pr.	IPM-24fkBIOS1EG	1	1	4	S		4		
IPM-22fDAAE	Design and analysis of algorithms L. **		2	0	4	S		4		
IPM-24fkBNSE	Network security L.	(6*)	2	0	2	S		2		
IPM-24fkBPKCE	Public Key Cryptography	IPM-24fkBSKCE	2	0	4	S		4		
IPM-22fkBCRPE	Cryptographic protocols L.	(6*)	2	0	3	A			3	
IPM-22fkBCRPG	Cryptographic protocols Pr.		0	2	3	A			3	
IPM-24fkBPTE	Penetration testing L.	(6*)	2	0	3	A			3	
IPM-24fkBPTG	Penetration testing Pr.	IPM-24fkBIOS1EG (7*)	0	2	3	A			3	
IPM-24fkBTCG	Topics in cryptography seminar Pr.		0	2	4	A			4	
	Compulsory subject credits in total				56		18	22	16	
	Elective subjects				6		6			
	Compulsory elective subjects ***				28		6	8	14	
IPM-22fTHCONS	Thesis consultation				30	A,S				30
IPM-22fPRG	Internship (4*)				0					
	Total credits per semester						30	30	30	30
	Total credits				120					

* Subjects are offered either in the Autumn semester (A) or in the Spring semester (S) or in both (A,S).

** Core subject of the Computer Science MSc study programme regardless the specialization.

*** From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 28 credits.

(4*) The required duration of the internship is 6 weeks (240 hours). The requirement of internship is fulfilled by the completion of subjects Cyber Security Lab I&II.

(5*) The accomplishment is mandatory for international students. Credits are counted as compulsory elective subject credits.

(6*) Fulfilment of the practice part is the prerequisite of obtaining a grade in the lecture part.

(7*) Weak prerequisite: the two subjects can be taken in the same semester, fulfilment of the prerequisite subject is a requirement of obtaining a grade in the other subject.

Compulsory elective subjects of Cybersecurity specialization

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester *	Recommended semester			
							1st	2nd	3rd	4th
IPM-24fkbIQIE	Introduction to Quantum Information L.	(6*)	2	0	2	A	2			
IPM-24fkbIQIG	Introduction to Quantum information Pr.		0	2	2	A	2			
IPM-24fkbMFCE	Mathematical foundation of cryptocurrencies L.		2	0	4	A	4			
IPM-22fkbPCMSG	Preparation course for master studies and developing learning skills Pr. (5*)		0	3	2	A	2			
IPM-24fkbSCSE	Side-channel security L.	(6*)	2	0	2	A	2			
IPM-24fkbSCSG	Side-channel security Pr.		0	2	2	A	2			
IPM-22fkbODSEG	Numerical Methods for Optimization L+Pr.		2	2	6	S		6		
IPM-24fkbQCRE	Quantum Cryptography L.	(6*)	2	0	2	S		2		
IPM-24fkbQCRG	Quantum cryptography Pr.	IPM-24fkbIQIE	0	2	2	S		2		
IPM-22fkbSQTE	Software quality and testing L.	(6*)	2	0	3	S		3		
IPM-22fkbSQTG	Software quality and testing Pr.		0	2	3	S		3		
IPM-24fkbVASG	Vulnerability analysis seminar Pr.		0	2	4	S		4		
IPM-22fkbSCLAB1	Cyber Security Lab I		0	2	4	A,S			4	
IPM-22fkbSCLAB2	Cyber Security Lab II.	IPM-22fkbSCLAB1 (7*)	0	2	4	A,S			4	
IPM-22fkbDFISE	Development of Financial IT Systems L.	(6*)	2	0	3	A			3	
IPM-22fkbDFISG	Development of Financial IT Systems Pr.		0	2	3	A			3	
IPM-24fkbPQCE	Post-quantum cryptography L.		2	0	4	A			4	
IPM-24fkbCRAE	Provably secure modular design of cryptographic protocols L.	(6*)	2	0	2	A			2	
IPM-24fkbCRAG	Provably secure modular design of cryptographic protocols Pr.		0	2	2	A			2	
IPM-24fkbSMCE	Secure multiparty computation L.		2	0	4	A			4	
IPM-24fkbZKPAE	Zero-knowledge proofs and applications L.		2	0	4	A			4	

From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 28 credits.

The accomplishment of the following listed subjects is mandatory only for EIT students.

Students do not participating in the EIT Digital Master programme can obtain elective subject credits for fulfilling them:

IPM-22f&EBEG	I&E Basics
IPM-22f&EBDL1G	Business Development Lab I.
IPM-22f&EBDL2G	Business Development Lab II.
IPM-22f&EIAOEEG	Innosocial aspects of entrepreneurship
IPM-22f&ETSSG	Thematic Summer Schools with I&E project
IPM-22f&ESTEG	I&E Study

Computer Science MSc (Digital Industry 4.0 specialization)

Code	Subject	Subject prerequisite	Lecture (L)	Exam (E)	Practice (Pr)	Practice Grade (PG)	Consultation	Credit	Semester	1st Semester	2nd Semester	3rd Semester	4th Semester
IPM-20fi4FEPEG	Factory Engineering for Programmers		2	X	2	PG	1	5	1	2+2+1			
IPM-20fiDSEG	Introduction to Data Science L+Pr.		2	X	2	PG	1	5	1	2+2+1			
IPM-20fi4ICSE	Introduction to Computer Security L.		2	E	0		0	2	1	2+0+0			
IPM-20fi4ICSG	Introduction to Computer Security Pr.		0		2	PG	1	3	1	0+2+1			
IPM-20fi4PAIEG	Principles of artificial intelligence L+Pr.		2	X	2		1	5	1	2+2+1			
IPM-20fi4ROBEG	Robotics L+Pr.		2	X	2		1	5	1	2+2+1			
IPM-20fSTEG	Software Technology L+Pr.		2	X	2	PG	1	5	1	2+2+1			
IPM-13fes�PCMSG	Preparation course for master studies and developing learning skills				2	PG		0	1	0+2+0			
IPM-20fi4ICEG	Industrial communications		2	X	2	PG	1	5	2		2+2+1		
IPM-20fi4IDEG	Industrial Databases		2	X	2	PG	1	5	2		2+2+1		
IPM-20fi4DMEG	Digital Manufacturing		2	X	2	PG	2	6	2		2+2+2		
IPM-20fi4MLEG	Machine Learning L+Pr.		2	X	2		1	5	2		2+2+1		
IPM-20fWATEG	Web engineering L+Pr.		2	X	2	PG	1	5	2		2+2+1		
IPM-20fi4CNCPEG	CNC programming		2	X	2	PG	1	5	3			2+2+1	
IPM-20fi4DMEG	Data Mining L+Pr		2	X	2		1	5	3			2+2+1	
IPM-20fi4DFLAB1	Digital Factory Lab I.		0		4	PG	1	5	3			0+4+1	
IPM-20fi4DFLAB2	Digital Factory Lab II.		0		4	PG	1	5	3			0+4+1	
IPM-20fi4HBPEG	Hardware based programming		1	X	3	PG	1	5	3			1+3+1	
IPM-20fTHCONS	Elective courses							9	2,3		4+0+0	5+0+0	
IPM-20fPRG	Internship					PG		0	2-4				
IPM-18fTHCONZ	Thesis consultation							30	4				signature
	Total credits per semester									30	30	30	30
	Total credits							120					

Computer Science MSc (Financial Technology specialization)

Compulsory subjects

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester*	Recommended semester			
							1st	2nd	3rd	4th
IPM-22fpiDSEG	Introduction to Data Science L+Pr.		2	2	6	A,S	6			
IPM-22fpiIFE	Introduction to Finance L.	(6*)	2	0	2	A	2			
IPM-22fpiIFG	Introduction to Finance Pr.		0	2	3	A	3			
IPM-22fRMEG	Research methodology L+Pr. **		1	2	5	A,S	5			
IPM-22fASTE	Advanced Software Technology L. **		2	0	4	S		4		
IPM-22fpiCISE	Complex information systems L.	(6*)	2	0	3	S		3		
IPM-22fpiCISG	Complex information systems Pr.		0	2	3	S		3		
IPM-22fDAAE	Design and analysis of algorithms L. **		2	0	4	S		4		
IPM-22fpiSESCE	Service Science L.	(6*)	2	0	3	S		3		
IPM-22fpiSESCG	Service Science Pr.		0	2	3	S		3		
IPM-22fpiBIE	Business Intelligence and Data Visualization L.	(6*)	2	0	3	A			3	
IPM-22fpiBIG	Business Intelligence and Data Visualization Pr.		0	2	3	A			3	
IPM-22fpiDFISE	Development of Financial IT Systems L.	(6*)	2	0	3	A			3	
IPM-22fpiDFISG	Development of Financial IT Systems Pr.		2	0	3	A			3	
IPM-22fpiFTLAB1	Fintech Lab I.		0	2	4	A			4	
IPM-22fpiFTLAB2	Fintech Lab II.		0	4	6	A			6	
	Compulsory subject credits in total				58		16	20	22	
	Elective subjects				6			6		
	Compulsory elective subjects ***				26		14	4	8	
IPM-22fTHCONS	Thesis consultation				30	A,S				30
IPM-22fPRG	Internship (4*)				0					
	Total credits per semester						30	30	30	30
	Total credits				120					

* Subjects are offered either in the Autumn semester (A) or in the Spring semester (S) or in both (A,S).

** [Core subject of the Computer Science MSc study programme regardless the specialization.](#)

*** From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 26 credits.

(4*) The required duration of the internship is 6 weeks (240 hours). The requirement of internship is fulfilled by the completion of subjects FinTech Lab I&II.

(5*) [The accomplishment is mandatory for international students. Credits are counted as compulsory elective subject credits.](#)

(6*) Fulfilment of the practice part is the prerequisite of obtaining a grade in the lecture part.

Compulsory elective subjects of Financial Technology specialization

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester *	Recommended semester			
							1st	2nd	3rd	4th
IPM-22fpiDNDEG	Deep Network Development L+Pr.		2	2	6	A,S	6			
IPM-24fpiMFCE	Mathematical foundation of cryptocurrencies L.		2	0	4	A	4			
IPM-22fpiPCMSG	Preparation course for master studies and developing learning skills Pr. (5*)		0	3	2	A,S	2			
IPM-22fpiPAIEG	Principles of artificial intelligence L+Pr.		2	2	6	A	6			
IPM-24fpiPETEG	Privacy enhancing technologies L+Pr.		1	1	4	A	4			
IPM-22fpiACEG	Affective computing L+Pr.	IPM-22fpiDNDEG	2	2	6	S		6		
IPM-22fpiCOSCEG	Cognitive sciences L+Pr.		2	2	6	S		6		
IPM-22fpiDMDDBE	Data models and databases L.	(6*)	2	0	3	S		3		
IPM-22fpiDMDBG	Data models and databases Pr.		0	2	3	S		3		
IPM-22fpiDRLEG	Deep Reinforcement Learning L+Pr.	IPM-22fpiDNDEG	2	2	6	S		6		
IPM-22fpiMLEG	Machine Learning L+Pr.	IPM-22fpiDSEG	2	2	6	S		6		
IPM-24fpiVASG	Vulnerability analysis seminar Pr.		0	2	4	S		4		
IPM-22fpiADNDEG	Advanced Deep Network Development L+Pr.	IPM-22fpiDNDEG	2	2	6	A			6	
IPM-22fpiCOLLIEG	Collective Intelligence L+Pr.		2	2	6	A			6	
IPM-22fpiCIEG	Computational Intelligence L+Pr.		2	2	6	A			6	
IPM-22fpiNSEG	Network Science L+Pr.		2	2	6	A			6	
IPM-22fpiPME	Project Management L.		2	0	2	A			2	

From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 26 credits.

The accomplishment of the following listed subjects is mandatory only for EIT students.

Students do not participating in the EIT Digital Master programme can obtain elective subject credits for fulfilling them:

IPM-22fi&EBEG	I&E Basics
IPM-22fi&EBDL1G	Business Development Lab I.
IPM-22fi&EBDL2G	Business Development Lab II.
IPM-22fi&EIAOEEG	Innosocial aspects of entrepreneurship
IPM-22fi&ETSSG	Thematic Summer Schools with I&E project
IPM-22fi&ESTEG	I&E Study

Computer Science MSc (Software and Service Architectures specialization)

Compulsory subjects

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester *	Recommended semester			
							1st	2nd	3rd	4th
IPM-22fesZPCMSG	Preparation course for master studies and developing learning skills Pr. (5*)		0	3	2	A,S	2			
IPM-22fRMEG	Research methodology L+Pr. **		1	2	5	A,S	5			
IPM-22fesZTPE	Theory of programming L.	(6*)	2	0	3	A	3			
IPM-22fesZTPG	Theory of programming Pr.		0	2	3	A	3			
IPM-22fASTE	Advanced Software Technology L. **		2	0	4	S		4		
IPM-22fDAAE	Design and analysis of algorithms L. **		2	0	4	S		4		
IPM-22fesZDAAG	Design and analysis of algorithms Pr.		0	2	3	S		3		
IPM-22fesZFSE	Formal semantics L	(6*)	2	0	3	S		3		
IPM-22fesZFSG	Formal semantics Pr.		0	2	3	S		3		
IPM-22fesZSQTE	Software quality and testing L.	(6*)	2	0	3	S		3		
IPM-22fesZSQTG	Software quality and testing Pr.		0	2	3	S		3		
IPM-22fesZSALAB1	Software Technology Lab I		0	4	5	A,S		5		
IPM-22fesZDDSE	Design of distributed systems L.	(6*)	2	0	3	A			3	
IPM-22fesZDDSG	Design of distributed systems Pr.		0	2	3	A			3	
IPM-22fesZPME	Project Management L.		2	0	2	A			2	
IPM-22fesZSALAB2	Software Technology Lab II		0	4	5	A,S			5	
	Compulsory subject credits in total				54		13	28	13	
	Elective subjects				6			2	4	
	Compulsory elective subjects ***				30		17		13	
IPM-22fTHCONS	Thesis consultation				30	A,S				30
IPM-22fPRG	Internship (4*)				0					
	Total credits per semester						30	30	30	30
	Total credits				120					

* Subjects are offered either in the Autumn semester (A) or in the Spring semester (S) or in both (A,S).

** Core subject of the Computer Science MSc study programme regardless the specialization.

*** From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 30 credits.

(4*) The required duration of the internship is 6 weeks (240 hours). The requirement of internship is fulfilled by the completion of subjects Software Technology Lab I&II.

(5*) The accomplishment is mandatory. Credits are counted as compulsory subject credits.

(6*) Fulfilment of the practice part is the prerequisite of obtaining a grade in the lecture part.

Compulsory elective subjects of Software and Service Architectures specialization

Code	Subject	Subject prerequisite	Lecture (L)	Practice (Pr)	Credit	Semester *	Recommended semester			
							1st	2nd	3rd	4th
IPM-22feszaAE	Advanced Algorithms L.	(6*)	0	2	3	A	3			
IPM-22feszaAG	Advanced Algorithms Pr.		2	0	3	A	3			
IPM-22feszaJPEG	Advanced Java programming L.+Pr.		2	2	6	A	6			
IPM-22feszaIDSEG	Introduction to Data Science L+Pr.		2	2	6	A,S	6			
IPM-22feszaMCE	Models of computation L.	(6*)	2	0	2	A	2			
IPM-22feszaMCG	Models of computation Pr.		0	2	3	A	3			
IPM-22feszaPAIEG	Principles of artificial intelligence L+Pr.		2	2	6	A	6			
IPM-22feszaCISE	Complex information systems L.	(6*)	2	0	3	S		3		
IPM-22feszaCISG	Complex information systems Pr.		0	2	3	S		3		
IPM-22feszaFUNLEG	Functional Languages L+Pr.		2	2	6	S		6		
IPM-22feszaMLEG	Machine Learning L+Pr.	IPM-22feszaIDSEG	2	2	6	S		6		
IPM-22feszaSESCE	Service Science L.	(6*)	2	0	3	S		3		
IPM-22feszaSESCG	Service Science Pr.		0	2	3	S		3		
IPM-22feszaADSEG	Analysis of distributed systems L+Pr.		2	2	6	A			6	
IPM-22feszaMTAIEG	Methods and tools for AI applications L+Pr.		2	2	6	A			6	
IPM-22feszaSEAPEG	Scalable enterprise applications L.+Pr.		2	2	6	A			6	

From the list of compulsory elective subjects, students are required to fulfill subjects in the amount of 30 credits.

The accomplishment of the following listed subjects is mandatory only for EIT students.

Students do not participating in the EIT Digital Master programme can obtain elective subject credits for fulfilling them:

IPM-22fi&EBEG	I&E Basics
IPM-22fi&EBDL1E	Business Development Lab I.
IPM-22fi&EBDL1G	Business Development Lab I.
IPM-22fi&EBDL2E	Business Development Lab II.
IPM-22fi&EBDL2G	Business Development Lab II.
IPM-22fi&EIAOEEG	Innosocial aspects of entrepreneurship
IPM-22fi&ETSSG	Thematic Summer Schools with I&E project
IPM-22fi&ESTEG	I&E Study