II. Semester-based distribution of modules

- **Semester 1**

Teaching Unit TU	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF1.1.1	**4h30**	**3h00**	**4h30**	**12h00**	**7h15**	**12**	**12**			
Fundamental Electronics	1h30	1h30	1h30	4h30	2h30	4	4	20%	20%	60%
Instrumentation and Sensors	1h30	1h30	1h30	4h30	2h30	4	4	20%	20%	60%
Microprocessors	1h30	0	1h30	3h00	2h15	4	4	20%	20%	60%
UEF1.1.2	**4h30**	**3h00**	**4h00**	**11h30**	**5h15**	**9**	**9**			
Introduction to Signal Processing	1h30	1h30	1h00	4h00	1h45	3	3	20%	20%	60%
Operating Systems Essentials	1h30	0	1h30	3h00	1h45	3	3	20%	20%	60%
Networking fundamentals	1h30	1h30	1h30	4h30	1h45	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM1.1.1	**3h00**	**1h30**	**2h00**	**6h30**	**3h30**	**6**	**6**			
Introduction to artificial intelligence	1h30	0	1h00	2h30	1h45	3	3	20%	20%	60%
Database Essentials for Embedded Systems	1h30	1h30	1h00	4h00	1h45	3	3	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET1.1.1	**0**	**0**	**1h00**	**1h00**	**1h15**	**2**	**2**			
Reverse Engineering & PCB Design	0	0	1h00	1h00	1h15	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED1.1.1	**1h00**	**0**	**0**	**1h00**	**0h45**	**1**	**1**			
Engineering Ethics and Safety	1h00	0	0	1h00	0h45	1	1	100%		0%
Total Semester S1	**13h00**	**7h30**	**11h30**	**32h00**	**18:00**	**30**	**30**			

- **Semester 2**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF1.2.1	**4h30**	**1h30h**	**4h00**	**10h00**	**3h45**	**9**	**9**			
Electronics Functions	1h30	1h30	1h00	4h00	1h15	3	3	20%	20%	60%
Microcontrollers	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Advanced sensors and Actuators	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
UEF1.2.2	**4h30**	**3h00**	**4h00**	**11h30**	**3h45**	**9**	**9**			
Stochastic Processes and Estimation	1h30	1h30	1h00	4h00	1h15	3	3	20%	20%	60%
Operating Systems for Programmers	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Advanced Networking	1h30	1h30	1h30	4h30	1h15	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM1.2.1	**4h30**	**1h30**	**2h30**	**8h30**	**3h30**	**9**	**9**			
Control Systems	1h30	1h30	1h00	4h00	1h15	3	3	20%	20%	60%
Machine Learning	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Regulations & Standards for Unmanned System	1h30	0	0	1h30	1h00	3	3	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET1.2.1	**0**	**0**	**1h00**	**1h00**	**2h00**	**2**	**2**			
Capstone Project I	0	0	1h00	1h00	2h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED1.2.1	**0**	**0**	**0**	**0**	**6h00**	**1**	**1**			
Training Internship	/	/	/	/	6h00	1	1	100%		0%
Total Semester S2	**13h30**	**6h00**	**11h30**	**31h00**	**19h00**	**30**	**30**			

- **Semester 3**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF2.1.1	**6h00**	**1h30**	**4h30**	**12h00**	**6h15**	**11**	**11**			
Power Electronics	1h30	0h45	1h00	3h15	1h45	3	3	20%	20%	60%
Industrial Networks and Communication Protocols	1h30	0h45	1h30	3h45	1h45	3	3	20%	20%	60%
Digital Signal Processors	1h30	0	1h00	2h30	1h45	3	3	20%	20%	60%
Multi-Sensor Data Fusion	1h30	0	1h00	2h30	1h00	2	2	20%	20%	60%
UEF2.1.2	**4h30**	**0**	**3h30**	**8h00**	**4h30**	**8**	**8**			
Introduction to Real-Time Operating Systems	1h30	0	1h30	3h00	1h45	3	3	20%	20%	60%
Digital Filtering	1h30	0	1h00	2h30	1h45	3	3	20%	20%	60%
Human-Machine Interface for Embedded Systems	1h30	0	1h00	2h30	1h00	2	2	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM2.1.1	**4h30**	**3h00**	**3h30**	**11h00**	**4h45**	**8**	**8**			
Digital Control Systems	1h30	1h30	1h00	4h00	1h45	3	3	20%	20%	60%
Deep Learning	1h30	0	1h30	3h00	1h45	3	3	20%	20%	60%
Operations Research	1h30	1h30	1h00	4h00	1h15	2	2	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET2.1.1	**1h00**	**0**	**0**	**1h00**	**1h00**	**2**	**2**			
Introduction to embedded systems security	1h00	0	0	1h00	1h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED2.1.1	**2h00**	**0**	**0**	**2h00**	**0h30**	**1**	**1**			
Project Management for Engineers	1h00	0	0	1h00	0h30	1	1	100%		0%
Total Semester S3	**17h00**	**4h30**	**11h30**	**33h00**	**17h00**	**30**	**30**			

- **Semester 4**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF2.2.1	**6h00**	**1h30**	**5h30**	**13h00**	**4h30**	**12**	**12**			
Internet of Things (IoT)	1h30	0h45	1h30	3h45	1h00	3	3	20%	20%	60%
Electric Machines	1h30	0h45	1h00	3h15	1h00	3	3	20%	20%	60%
FPGA and Hardware Design	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Advanced Real-Time Operating Systems	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
UEF2.2.2	**4h30**	**1h30**	**3h30**	**9h30**	**2h45**	**8**	**8**			
Cryptography	1h30	0h45	1h30	3h45	1h00	3	3	20%	20%	60%
Embedded Vision and Intelligent Image Processing	1h30	0	1h00	2h30	0h45	2	2	20%	20%	60%
Regulation and Control	1h30	0h45	1h00	3h15	1h00	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM2.2.1	**3h00**	**1h30**	**3h30**	**8h00**	**3h15**	**8**	**8**			
Fundamentals of Robotics	1h30	0h45	1h00	3h15	1h15	3	3	20%	20%	60%
Wireless Communication Essentials	1h30	0h45	1h00	3h15	1h15	3	3	20%	20%	60%
Embedded AI	0	0	1h30	1h30	0h45	2	2	100%	0%	
Cross-disciplinary Teaching Unit (UET)										
UET2.2.1	**0**	**0**	**1h00**	**1h00**	**2h00**	**2**	**2**			
Capstone Project II	0	0	1h00	1h00	2h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED2.2.1	**0**	**0**	**0**	**0**	**6h00**	**1**	**1**			
Training Internship II	/	/	/	/	6h00	1	1	100%		0%
Total Semester S4	**13h30**	**4h30**	**13h00**	**31h30**	**18h30**	**30**	**30**			

- **Semester 5**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF3.1.1	**6h00**	**0**	**5h30**	**11h30**	**8h15**	**12**	**12**			
Program Optimization and System Performance	1h30	0	1h30	3h00	2h00	3	3	20%	20%	60%
Power Supply and Auxiliary Peripherals	1h30	0	1h00	2h30	2h15	3	3	20%	20%	60%
Parallel Computing on GPUs	1h30	0	1h30	3h00	2h00	3	3	20%	20%	60%
Embedded Operating Systems	1h30	0	1h30	3h00	2h00	3	3	20%	20%	60%
UEF3.1.2	**4h30**	**0**	**3h00**	**7h30**	**6h00**	**9**	**9**			
Systems Security	1h30	0	1h00	2h30	2h00	3	3	20%	20%	60%
Network security	1h30	0	1h00	2h30	2h00	3	3	20%	20%	60%
Reliability and Safety of embedded systems	1h30	0	1h00	2h30	2h00	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM3.1.1	**4h30**	**0**	**3h30**	**8h00**	**4h00**	**6**	**6**			
Distributed Computing for Embedded Systems	1h30	0	1h30	3h00	1h15	2	2	20%	20%	60%
Fundamentals of Autonomous Navigation	1h30	0	1h00	2h30	1h15	2	2	20%	20%	60%
Introduction to quantum computing	1h30	0	1h00	2h30	1h30	2	2	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET3.1.1	**0**	**0**	**1h00**	**1h00**	**2h00**	**2**	**2**			
Capstone Project III	0	0	1h00	1h00	2h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED3.1.1	**1h00**	**0**	**1h00**	**2h00**	**0h45**	**1**	**1**			
Entrepreneurship and Startup Development	1h00	0	0	1h00	0h45	1	1	100%		0%
Total Semester S1	**16h00**	**0h**	**13h00**	**29h00**	**21h00**	**30**	**30**			

- **Semester 6**

Internships in companies or research laboratories culminating in a thesis and an oral defense.

		Semester Hourly Volume	Coefficients	Credits
Internship and Final Year Project	14 Weeks	420 hours	30	30
Total	14 Weeks	420 hours	30	30

III - Detailed Syllabus by Subject

a. Module codes

- **Semester 1**

Core Teaching Unit (UEF1)		Core Teaching Unit (UEF2)	
Module	**Code**	**Module**	**Code**
Fundamental Electronics	FE	Introduction to signal Processing	ISP
Instrumentation and Sensors	I/S	Operating Systems Essentials	OS-E
Microprocessors	µp	Database Essentials for Embedded Systems	DB

Methodology Teaching Unit (UEM		Cross-disciplinary Teaching Unit (UET)	
Module	**Code**	**Module**	**Code**
Networking fundamentals	NetF	Reverse Engineering & PCB Design	PCB
Introduction to artificial intelligence	IAI	**Discovery Teaching Unit (UED)**	
		Engineering Ethics and Safety	EES

- **Semester 2**

Core Teaching Unit (UEF1)		Core Teaching Unit (UEF2)	
Module	**Code**	**Module**	**Code**
Electronic Functions	EF	Stochastic Processes and Estimation	SPE
Microcontrollers	µC	Operating Systems for Programmers	OS-P
Advanced sensors and Actuators	ASA	Advanced networking	ANET

Methodology Teaching Unit (UEM)		Cross-disciplinary Teaching Unit (UET)	
Module	**Code**	**Module**	**Code**
Control Systems	CS	Capstone Project I	CP1
Regulations & Standards for Unmanned System	RSUS	**Discovery Teaching Unit (UED)**	
Machine Learning	ML	Training Internship	TI1

- **Semester 3**

Core Teaching Unit (UEF1)		Core Teaching Unit (UEF2)	
Module	**Code**	**Module**	**Code**
Power Electronics	PE	Introduction to Real-Time Operating Systems	IRTOS
Industrial Networks and communication Protocols	INCP	Digital Filtering	DF
Digital Signal Processors	DSP	Human-Machine Interface for embedded systems	HMI
Multi-Sensor Data Fusion	MSDF		

Methodology Teaching Unit (UEM)		Cross-disciplinary Teaching Unit (UET)	
Module	**Code**	**Module**	**Code**
Digital Control Systems	DCS	Introduction to embedded systems security	ICS
Deep Learning	DL	**Discovery Teaching Unit (UED)**	
Operations Research	OR	Project Management for Engineers	PME

- **Semester 4**

Core Teaching Unit (UEF1)		Core Teaching Unit (UEF2)	
Module	**Code**	**Module**	**Code**
Internet of things (IoT)	IoT	Cryptography	CRYP
Electric machines	EM	Embedded Vision and Intelligent Image Processing	VIP
FPGA and Hardware Design	FPGA	Regulation and Control	R&C
Advanced Real-Time Operating Systems	ARTOS		

Methodology Teaching Unit (UEM)		Cross-disciplinary Teaching Unit (UET)	
Module	**Code**	**Module**	**Code**
Fundamentals of robotics	ROBO	Capstone Project II	CP2
Wireless communication Essentials	WCE	**Discovery Teaching Unit (UED)**	
Embedded IA	EAI	Training Internship II	TI2

- **Semester 5**

Core Teaching Unit (UEF1)		Core Teaching Unit (UEF2)	
Module	**Code**	**Module**	**Code**
Program Optimization and System Performance	POSP	Systems Security	SySe
Power Supply and Auxiliary Peripherals	PSAP-	Network security	NCS
Parallel Computing on GPUs	GPU	Reliability and Safety of embedded systems	NSES
Embedded Operating Systems	EOS		

Methodology Teaching Unit (UEM)		Cross-disciplinary Teaching Unit (UET)	
Module	**Code**	**Module**	**Code**
Distributed Computing for Embedded Systems	DCES	Capstone Project III	CP3
Fundamentals of autonomous navigation	Nav	**Discovery Teaching Unit (UED)**	
Introduction to quantum computing	QC	Entrepreneurship and Startup Development	ESD