

M.Sc. “Human-Robot Interaction for Sustainable Manufacturing” programme previous “People and Robots for Sustainable Work”

– Study plans –

This document presents the general syllabi of all the MSc double degrees available within the EIT Manufacturing “People and Robots for Sustainable Work” programme. Please note these are the basic versions of the study plans, to provide a better understanding of the programme and the differences among the several available combinations within the programme.

Considering universities continuously develop their education offer, some of the courses could result to be updated, changed or replaced along the years. Once enrolled, the student will be supported by a local programme coordinator to define the final study plan accordingly to the general structure of the EIT Manufacturing Master programmes. You can also find local websites with the up-to-date information about the courses.

General structure of the EIT-M Master Programme

Type of modules	Total credits for EIT-M Master	Total credits 1 st year	Total credits 2 nd year
Technical courses (TC)	45	40-50	10-20
Specialization courses (SC)	15		
Innovation & Entrepreneurship courses (I&E)	30	10-20	10-20
Master thesis (MT)	30	0	30
Tot	120	60	60

Please scroll down this document to find the different syllabi of the following available combinations.

Available entry and exit combinations from November 2022 on

ENTRY University	EXIT University
Mondragon Unibertsitatea (MU)	Technische Universität Wien (TU-Wien)
Mondragon Unibertsitatea (MU)	University of Tartu (UTARTU)
University of Applied Sciences and Arts of Southern Switzerland (SUPSI)	Technische Universität Wien (TU-Wien)

Entry university MU – exit university TU-Wien

1st year MU

Type of modules	MU courses	ECTS	Semester	Total credits
TC	MRB001 Data Analytics	3	1	33 ¹ (18 sem.1 15 sem.2)
	MRC001 Robotics: Mechanics, Modelling and Simulation ²	6	1	
	MRD001 Analysis of Sustainable Digital Control Systems	3	1	
	MRD002 Sensors and Measurements	3	1	
	MRD003 Control ³	4	1	
	MRE001 Artificial vision	6	1	
	MRA002 Electromechanical Drives	3	2	
	MRB002 Deep Learning	6	1	
	MRD005 Signal Processing	6	2	
	MRE002 Perception	6	2	
SC	MRC002 Robot Programming	6	1	12 (6 sem.1 6 sem.2)
	MRC003 Mobile Robotics	3	2	
	MRC004 Robotic Control Systems	3	2	
I&E	MRF001 Professional Placement I ⁴	3	1	18 (9 sem.1 9-12 sem.2)
	MEC101 Innovation management ⁵	3	1	
	MRF002 Professional Placement II ⁴	3	2	
	Integrated project activity ⁶	6 ⁷	1, 2	

¹ The real number of credits is 21 ECTS per semester but the integrated project activity takes 6 ECTS and therefore it is counted in the I&E module.

² There is an error in the webpage and the link is not working (see attached “MRC001-en. Robotics - mechanics, modelling and simulation.pdf” file for reference).

³ This subject is new in 2023/2024.

⁴ Limited number of available places (around 10 places available, changes year-to-year).

⁵ These subjects are proposed as alternatives for those cases where there are no available places in the Professional placement I and II courses.

⁶ There is no separate project course. The project is integrated into the other semester courses. All semesters in the university end up with a project where the students develop knowledge and know-how about robotics, innovation, and entrepreneurship concepts.

⁷ These credits are subtracted from the semester course credits and the students do not need to register or pay tuition fees for the integrated project activity. These credits must not be added to the total number of credits, but they compute as time dedicated to project development, innovation, and entrepreneurship.

2nd year TU-Wien

Type of modules	TU-Wien courses	ECTS	Semester	Total credits
TC	<i>Elective courses TC (min. 9 ECTS)</i>			min. 9 ECTS
	330.296 Cobot Studio @Pilot Factory for Industry 4.0	3	1 (WS)	
	307.440 Ecodesign, Sustainable Product Development	3	1 (WS)	
	330.291 Digital Simulation of Ergonomics and Robotics (DSER)	3	1 (WS)	
	311.189 VU Programming and Simulation of Machining Systems (CAD/CAM)	3	1 (WS)	
SC	<i>Elective courses SC (min. 6 ECTS)</i>			min. 6 ECTS
	330.265 Assistance Systems in Manufacturing 1	3	1 (WS)	
	330.273 Assistance Systems in Manufacturing 2	3	2 (SS)	
	311.189 VU Programming and Simulation of Machining Systems (CAD/CAM)	3	1 (WS)	
	193.085 Human Robot Interaction	3	1 (WS)	
	193.106 Intelligent User Interfaces	3	1 (WS)	
	311.745 Intelligent Manufacturing Systems	3	2 (SS)	
	188.501 Similarity Modeling 1 - Computational Seeing and Hearing	3	1(WS)	
	188.460 Multimedia Interfaces	3	1(WS)	
	188.413 Self-Organizing Systems	4,5	1 (WS)	
	I&E	<i>Compulsory I&E courses</i>		
330.311 Robot Challenge		9	1 (WS)	
Centrally organized summer school		5	1	
<i>Elective courses I&E (min. 1 ECTS)</i>				
330.287 Technology, Work and Organization		3	1 (WS)	
164.287 European Union – Institutions, Policies and Future Challenges		2	1 (WS)	
015.100 Creativity Engineering		3	1 (WS)	
330.255 E&I Garage - Business Model Development		5	2 (SS)	
330.124 Project and Enterprise Financing		3	2 (SS)	
330.230 Entrepreneurship and Innovation		3	2 (SS)	
015.664 Entrepreneurship	3	2 (SS)		

MT	Master thesis: focus on People and Robots for Sustainable Work	30	1, 2	30 ⁸ (5 sem.1 25 sem.2)
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Local up-to-date webpages for entry/exit university courses

The following two webpages contain the up-to-date description of both masters:

- <https://www.mondragon.edu/en/master-degree-robotics-control-systems/study-programme>
- <https://tiss.tuwien.ac.at/curriculum/public/curriculum.xhtml?key=70848>

ECTS Summary by modules and semesters

Type of modules	1 st sem.	2 nd sem.	3 rd sem.	4 th sem.	Total credits
TC	15	15	9		39
SC	6	6	6		18
I&E	9-12	6-9	15		30-33
MT			5 ⁸	25 ^{Error! Bookmark not defined.}	30
TOTALS	30-33*	27-30*	35*	25*	120*

* The workload depends on the student's individual choice of elective courses.

Highlights of this entry/exit university combination

Mondragon University provides the possibility of experiencing life and work in a company through the professional placement I and II courses where the students will learn about specific company situations and how to deal with them. These courses are, in fact, a sort of small internships.

Together with the foundations provided with the rest of the courses, students are trained to deal with the manufacturing challenges related to automation and robotic systems.

At TU-Wien, these foundations are completed with the focus on human-robot collaborative environments that are developed through the courses and access to the specific laboratories. All this is complemented through the research topics that the students will develop in their Master Thesis work through a company internship.

⁸ The start of the master thesis is subject to change. Some of them start earlier and some of them start later.

Entry university MU – exit university UTARTU

1st year MU

Type of modules	MU courses	ECTS	Semester	Total credits
TC	MRB001 Data Analytics	3	1	33 ⁹ (18 S1, 15 S2)
	MRC001 Robotics: Mechanics, Modelling and Simulation ¹⁰	6	1	
	MRD001 Analysis of Sustainable Digital Control Systems	3	1	
	MRD002 Sensors and Measurements	3	1	
	MRD003 Control ¹¹	4		
	MRE001 Artificial vision	6	1	
	MRA002 Electromechanical Drives	3	2	
	MRB002 Deep Learning	6	1	
	MRD005 Signal Processing	6	2	
	MRE002 Perception	6	2	
SC	MRC002 Robot Programming	6	1	12 (6 S1, 6 S2)
	MRC003 Mobile Robotics	3	2	
	MRC004 Robotic Control Systems	3	2	
	MRF001 Professional Placement I ¹²	3	1	
I&E	MEC101 Innovation management ¹³	6	1	18 (9-12 S1, 6-9 S2)
	MRF002 Professional Placement II ¹²	3	2	
	Integrated project activity ¹⁴	6 ¹⁵	1, 2	

⁹ The real number of credits is 21 ECTS per semester but the integrated project activity takes 6 ECTS and therefore it is counted in the I&E module.

¹⁰ There is an error in the webpage and the link is not working (see attached “MRC001-en. Robotics - mechanics, modelling and simulation.pdf” file for reference).

¹¹ This subject is new in 2023/2024.

¹² Limited number of available places (around 2-3 places available, changes year-to-year).

¹³ These subjects are proposed as alternatives for those cases where there are no available places in the Professional placement I and II courses. In this case, they get 12 ECTS in S1 and 6 ECTS in S2.

¹⁴ There is no separate project course. The project is integrated into the other semester courses. All semesters in the university end up with a project where the students develop knowledge and know-how about robotics, innovation, and entrepreneurship concepts.

¹⁵ These credits are subtracted from the semester course credits and the students do not need to register or pay tuition fees for the integrated project activity. These credits must not be added to the total number of credits, but they compute as time dedicated to project development, innovation, and entrepreneurship.

2nd year UTARTU

Type of modules	UTARTU courses (track A)	ECTS	Semester	Total credits
TC + SC + IE	Professional Practice ¹⁶	24	1	24 (24 S1)
MT	Master thesis: focus on People and Robots for Sustainable Work ¹⁷	30	2	30 (30 S2)
	Estonian for Beginners I ¹⁸	3	1	3 (3 S1)

or

Type of modules	UTARTU courses (track B)	ECTS	Semester	Total credits
TC + SC	Students can choose courses in the amount of 24 ECTS in lieu of professional practice. List of courses: https://ois2.ut.ee/#/curricula/136637/version/2021/details	18	1	18 (18 S1)
I&E	Students have to choose courses for at least 10 ECTS to comply with EIT Innovation and Entrepreneurship requirements from the list of courses from 4.2 Management Module and 4.3 Economy Module: https://ois2.ut.ee/#/curricula/136637/version/2023/details . Some proposed subjects ¹⁹ :			16-17 (16-17 S1)
	Marketing	5	1	
	Business Process Management	6	1	
	Principles of Management	6	1	
	Centrally organized summer school ²⁰	5	1	
MT	Master thesis: focus on People and Robots for Sustainable Work	30	2	30 (30 S2)

¹⁶ The professional practice includes entrepreneurship and innovation activities that vary between 10 and 20 ECTS.

¹⁷ The master thesis starts in the 1st semester where the students need to select the thesis project and supervisor even if the bulk of the work is carried out in the 2nd semester.

¹⁸ The language course is counted outside the 120 ECTS because it cannot be recognised by the entry university.

¹⁹ 7 ECTS I&E are required because the Summer School 5 ECTS are computed in the second year.

²⁰ The centrally organised summer school takes place in July of the 1st year. However, the credits are computer in the I&E courses of the exit university.

	Estonian for Beginners I	3	1	3 (3 S1)

Local up-to-date webpages for entry/exit university courses

The following two webpages contain the up-to-date description of both masters:

- <https://www.mondragon.edu/en/master-degree-robotics-control-systems/study-programme>
- <https://ois2.ut.ee/#/curricula/136637/version/2023/details>

ECTS Summary by modules and semesters

Type of modules	1 st sem.	2 nd sem.	3 rd sem.	4 th sem.	Total credits
TC	15	15	12		42
SC	6	6	6		18
I&E	9-12	6-9	12-14*		30-32*
MT				30	30
Language			3		3
TOTALS	30-33*	27-30*	33-35*	30*	123-125*

* The workload depends on the student's individual choice of elective courses.

Highlights of this entry/exit university combination

Mondragon University provides the possibility of experiencing life and work in a company through the professional placement I and II courses where the students will learn about specific company situations and how to deal with them. These courses are, in fact, a sort of small internships.

Together with the foundations provided with the rest of the courses, students are trained to deal with the manufacturing challenges related to automation and robotic systems.

At the University of Tartu, the rich innovation environment and the many startups close these foundations are completed with the focus on human-robot collaborative environments that are developed through the courses and access to the specific laboratories. All this is complemented through the research topics that the students will develop in their Master Thesis work through a company internship.

Entry university SUPSI – exit university TU-Wien

1st year SUPSI

Master of Science in Engineering - Mechatronics & Automation - SUPSI

Type of modules	SUPSI courses	ECTS	Semester	Total credits
TC	TSM Industrial control	3	2	33 (18 sem.1 15 sem.2)
	TSM PredContr: Model Predictive Control (ZH, Tue afternoon)	3	1	
	FTP OrdDiff: Ordinary Differential Equations and Dynamical Systems	3	1	
	FTP ModSim Modelling Simulation and Optimization	3	2	
	TSM IntAuto: Integrated Automation (ZH, Mon Afternoon)	3	2	
	FTP AppStat: Applied Statistics and Data Analysis	3	2	
	CM IntSust: Integrated Sustainable Management of Production Systems	3	1	
	FTP MultiASys: Multi-agent systems	3	2	
	PMS: Project on Human Robot collaboration*	9	1	
SC	PSM MS_AdvRob: Advanced robotics**	6	2	9 (3 sem.1, 6 sem.2)
	TSM AdvRobot: Advanced Robotics (ZH, Tue morning)	3	1	
I&E	CM InnoLEAN: Innovation and Lean	3	1	13 (8 sem.1 5 sem.2)
	PSM_ Project on Robotics and Automation*	10 (5+5)	1, 2	
I&E	Centrally organized summer school	5	2	5 (5 sem.2)

*PSM modules: they are example of possible individual projects to be included in this curriculum. Similar topics could be identified depending on the students' interest and opportunities in the university labs or companies collaborating with the university.

** Lab offered in Lugano to a class with group assignment

2nd year TUWien

Type of modules	TU-Wien courses	ECTS	Semester	Total credits
TC	<i>Elective courses TC (min. 12 ECTS)</i>			

	330.265 Assistance Systems in Manufacturing 1	3	1 (WS)	min. 12 ECTS
	330.273 Assistance Systems in Manufacturing 2	3	2 (SS)	
	330.296 Cobot Studio @Pilot Factory for Industry 4.0	3	1 (WS)	
	330.291 Digital Simulation of Ergonomics and Robotics (DSER)	3	1 (WS)	
	VU Programming and Simulation of Machining Systems (CAD/CAM)	3	1 (WS)	
	307.440 Ecodesign, Sustainable Product Development	3	1 (WS)	
SC	<i>Compulsory courses SC</i>			
	376.081 Machine Vision	4,5	1 (WS)	
	<i>Elective courses SC (min. 1,5 ECTS):</i>			
	307.490 Product Lifecycle Management (VO)	2	2 (SS)	
	193.085 Human Robot Interaction	3	1 (WS)	
	VU Programming and Simulation of Machining Systems (CAD/CAM)	3	1 (WS)	
	307.520 Mobile Robotics	3	2 (SS)	
	311.745 Intelligent Manufacturing Systems	3	2 (SS)	
	325.112 Robot Control	3	2 (SS)	
	328.011 Digital Control	3	2 (SS)	
	193.106 Intelligent User Interfaces	3	1 (WS)	
	188.501 Similarity Modeling 1 - Computational Seeing and Hearing	3	1(WS)	
	188.460 Multimedia Interfaces	3	1(WS)	
	188.413 Self-Organizing Systems	4,5	1 (WS)	
I&E	<i>Compulsory courses I&E:</i>			min. 12 ECTS
	330.311 Robot Challenge	9	1 (WS)	
	<i>Elective courses I&E (min. 3 ECTS)</i>			
	330.258 Innovation Theory	3	1 (WS)	
	330.287 Technology, Work and Organization	3	1 (WS)	
	164.287 European Union - Institutions, Policies and Future Challenges	2	1 (WS)	
	015.100 Creativity Engineering	3	1 (WS)	
	330.124 Project and Enterprise Financing	3	2 (SS)	
	330.255 E&I Garage - Business Model Development	5	2 (SS)	
	330.230 Entrepreneurship and Innovation	3	2 (SS)	
	015.664 Entrepreneurship	3	2 (SS)	

MT	Master thesis: focus on People and Robots for Sustainable Work	30	2	30
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Local up-to-date webpages for entry/exit university courses

The following two webpages contain the up-to-date description of both masters:

- <https://www.supsi.ch/en/mse-mechatronics-automation>
- <https://tiss.tuwien.ac.at/curriculum/public/curriculum.xhtml?key=70848>

ECTS Summary by modules and semesters

Type of modules	ECTS in S1	ECTS in S2	ECTS in S3	ECTS in S4	Total credits
TC	18	15		12	45
SC	3	6		6	15
I&E	8	10		12	30
MT				30	30
Tot	29	31	25	35	120

Highlights of this entry/exit university combination

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At TU-Wien, these foundations are completed with the focus on human-robot collaborative environments that are developed through the courses and access to the specific laboratories. All this is complemented through the research topics that the students will develop in their Master Thesis work through a company internship.