## Study plan

## Name of study plan: Erasmus Mundus Master Course - SpaceMaster 2024-2030

Faculty/Institute/Others: Faculty of Electrical Engineering Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Cybernetics and Robotics Type of study: Follow-up master full-time Required credits: 120 Elective courses credits: 0 Sum of credits in the plan: 120 Note on the plan:

Name of the block: Compulsory courses in the program Minimal number of credits of the block: 98 The role of the block: P

Code of the group: 2024\_SPACEMASTER\_P Name of the group: Compulsory subjects of the programme Requirement credits in the group: In this group you have to gain 98 credits Requirement courses in the group: In this group you have to complete 11 courses Credits in the group: 98 Note on the group:

Note on the gro	Sup.					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BDIP30	Diploma Thesis	Z	30	22s	L	Р
BE3M35DRS	Dynamics and Control of Networks Kristian Hengster-Movric Kristian Hengster-Movric (Gar.)	Z,ZK	6	2P+2C	Z	Ρ
BE3M35SRL	Flight Control Systems Martin Hrom ík Martin Hrom ík (Gar.)	Z,ZK	6	2P+2L	Z	Р
BE3M35LSY1	Linear Systems Petr Hušek Petr Hušek Petr Hušek (Gar.)	Z,ZK	6	3P+2S	Z	Р
BE3M35ORR	Optimal and Robust Control Zden k Hurák Zden k Hurák Zden k Hurák (Gar.)	Z,ZK	6	2P+2C	L	Р
BE3MPROJ6	Project	Z	6	0p+6s	Z	Р
BE3M35SPC	Space Communication	Z,ZK	8	2P+2S	Z	Р
BE3M35SPI	Space Instruments	Z,ZK	8	2P+2S	L	Р
BE3M35SPP	Space Physics	Z,ZK	7	2P+2S	Z	Р
BE3M35SSD	Spacecraft System	Z,ZK	8	2P+2S	Z	Р
BE3M35TSS	The Solar System	Z,ZK	7	2P+2S	Z	Р

#### Characteristics of the courses of this group of Study Plan: Code=2024\_SPACEMASTER\_P Name=Compulsory subjects of the programme

BDIP30 Diploma Thesis Ζ 30 Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination. BE3M35DRS Dynamics and Control of Networks Z.ZK 6 This course responds to an ever-increasing demand for understanding contemporary networks large-scale complex systems composed of many components and subsystems interconnected into a single distributed entity. Herein, we will consider fundamental similarities between diverse areas such as e.g. forecasting the spread of global pandemics, public opinion dynamics and manipulation of communities through social media, formation controls for unmanned vehicles, energy generation and distribution in power grids, etc. Understanding such compelling issues goes far beyond the boundaries of any single physical, technological or scientific domain. Therefore, we will analyze phenomena across different domains, involving societal, economic and biological networks. For such networked systems, the resulting behavior depends not only on the characteristics of their individual components and details of their physical or logical interactions, but also on a precise way those components are interconnected the detailed interconnection topology. For that reason, the first part of the course introduces fundamental theoretical and abstract computational network analysis concepts; in particular, the algebraic graph theory, network measures and metrics and fundamental network algorithms. The second part of the course subsequently views networks as dynamical systems, studies their properties and ways in which these are controlled, using mainly methods of automatic control theory.

BE3M35SRL	Flight Control Systems	Z,ZK	6
The course is devote	ed to classical and modern control design techniques for autopilots and flight control systems. Particular levels are discussed, st	arting with the dar	mpers attitude
angle stabilizers, to	guidance and navigation systems. Next to the design itself, important aspects of aircraft modelling, both as a rigid body and con	sidering flexibility	of the structure
are discussed			
BE3M35LSY1	Linear Systems	Z,ZK	6
	course is to introduce mathematical tools for the description, analysis, and partly also synthesis, of dynamical systems. The focu		
	put systems and their properties such as stability, controllability, observability and state realization. State feedback, state estimat		, v
	plained in detail. Partially covered will be also time-varying and nonlinear systems. Some of the tools introduced in this course ar	,	•
	e analysis of controllability and observability in the design of flexible space structures, the design of state feedback in aircraft co		
variables. The main	mativation, howayar is to pays the way for the advanced courses of the study program. The procession for this course include i	undergreducte lov	al linear algobr
	motivation, however, is to pave the way for the advanced courses of the study program. The prerequsites for this course include us and Lanlace and z transforms	undergraduate lev	el linear algebra
differential equations	s, and Laplace and z transforms.	-	
differential equations	s, and Laplace and z transforms. Optimal and Robust Control	Z,ZK	6
differential equations	s, and Laplace and z transforms.	Z,ZK	6
differential equations BE3M35ORR This advanced cours assignments.	s, and Laplace and z transforms. Optimal and Robust Control	Z,ZK	6
differential equations BE3M35ORR This advanced cours	s, and Laplace and z transforms. Optimal and Robust Control se will be focused on design methods for optimal and robust control. Major emphasis will be put on practical computational skills	Z,ZK and realistically c	6 complex proble
differential equations BE3M35ORR This advanced cours assignments. BE3MPROJ6	s, and Laplace and z transforms. Optimal and Robust Control se will be focused on design methods for optimal and robust control. Major emphasis will be put on practical computational skills Project	Z,ZK and realistically c	6 complex proble
differential equations BE3M35ORR This advanced cours assignments. BE3MPROJ6 BE3M35SPC	s, and Laplace and z transforms. Optimal and Robust Control se will be focused on design methods for optimal and robust control. Major emphasis will be put on practical computational skills Project Space Communication	Z,ZK and realistically c Z,ZK	6 complex proble 6 8
differential equations BE3M35ORR This advanced cours assignments. BE3MPROJ6 BE3M35SPC BE3M35SPI	s, and Laplace and z transforms. Optimal and Robust Control se will be focused on design methods for optimal and robust control. Major emphasis will be put on practical computational skills Project Space Communication Space Instruments	Z,ZK and realistically of Z,ZK Z,ZK	6 complex proble 6 8

Name of the block: Compulsory elective courses Minimal number of credits of the block: 22 The role of the block: PV

Code of the group: 2024\_SPACEMASTER\_PV

Name of the group: Compulsory optionally subjects

Requirement credits in the group: In this group you have to gain at least 22 credits (at most 55) Requirement courses in the group: In this group you have to complete at least 3 courses ( at most 8) Credits in the group: 22

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BE3M35ELS	Electronics in Space	Z,ZK	8	2P+2S	L	PV
BE3M35ISRT	Introduction to Spectroscopy and Radiative Transfer	Z,ZK	8	2P+2S	Z	PV
BE3M35OCS	Onboard Computer and Onboard Software	Z,ZK	7	2P+2S	Z	PV
BE3M35PAT	Polar Atmosphere	Z,ZK	8	2P+2S	L	PV
BE3M35PSA	Propulsion with Space Applications	Z,ZK	7	2P+2S	L	PV
BE3M35SEP	Space Engineering Project 1	Z,ZK	7	2P+2S	Z	PV
BE3M35SEI	Spacecraft Environment Interactions	Z,ZK	7	2P+2S	L	PV
BE3M35SIS	Swedish for International Students 1	Z,ZK	3	2P+2S	Z	PV

### Characteristics of the courses of this group of Study Plan: Code=2024\_SPACEMASTER\_PV Name=Compulsory optionally subjects

BE3M35ELS	Electronics in Space	Z,ZK	8
BE3M35ISRT	Introduction to Spectroscopy and Radiative Transfer	Z,ZK	8
BE3M35OCS	Onboard Computer and Onboard Software	Z,ZK	7
BE3M35PAT	Polar Atmosphere	Z,ZK	8
BE3M35PSA	Propulsion with Space Applications	Z,ZK	7
BE3M35SEP	Space Engineering Project 1	Z,ZK	7
BE3M35SEI	Spacecraft Environment Interactions	Z,ZK	7
BE3M35SIS	Swedish for International Students 1	Z,ZK	3

# List of courses of this pass:

Code	Name of the course	Completion	Credits
BDIP30	Diploma Thesis	Z	30
Independent final cor	mprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or h	er branch of study	, which will
be specified by b	branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehe	ensive final examir	nation.
BE3M35DRS	Dynamics and Control of Networks	Z,ZK	6
	nds to an ever-increasing demand for understanding contemporary networks large-scale complex systems composed of many com	-	-
	single distributed entity. Herein, we will consider fundamental similarities between diverse areas such as e.g. forecasting the sprea	0 1	<i>,</i> <b>,</b>
	manipulation of communities through social media, formation controls for unmanned vehicles, energy generation and distribution in pr	-	-
	ues goes far beyond the boundaries of any single physical, technological or scientific domain. Therefore, we will analyze phenomer		
•	onomic and biological networks. For such networked systems, the resulting behavior depends not only on the characteristics of the cal or logical interactions, but also on a precise way those components are interconnected the detailed interconnection topology. Fo		
	as of logical interactions, but also on a precise way those components are interconnected the detailed interconnection topology. To		
	algorithms. The second part of the course subsequently views networks as dynamical systems, studies their properties and ways i		
	using mainly methods of automatic control theory.		oontroniou,
BE3M35ELS	Electronics in Space	Z,ZK	8
BE3M35ISRT	Introduction to Spectroscopy and Radiative Transfer	Z,ZK	8
BE3M35LSY1	Linear Systems	Z,ZK	6
	course is to introduce mathematical tools for the description, analysis, and partly also synthesis, of dynamical systems. The focus w	,	-
multi-input multi-outp	ut systems and their properties such as stability, controllability, observability and state realization. State feedback, state estimation,	, and the design of	f stabilizing
controllors will be oval	lained in detail. Partially covered will be also time-varying and nonlinear systems. Some of the tools introduced in this course are rea	dily applicable to	
controllers will be expr		auliy applicable to	engineering
•	e analysis of controllability and observability in the design of flexible space structures, the design of state feedback in aircraft control		° °
problems such as the	e analysis of controllability and observability in the design of flexible space structures, the design of state feedback in aircraft contro otivation, however, is to pave the way for the advanced courses of the study program. The prerequsites for this course include unde	ol, and the estimati	ion of state
problems such as the variables. The main m	e analysis of controllability and observability in the design of flexible space structures, the design of state feedback in aircraft control iotivation, however, is to pave the way for the advanced courses of the study program. The prerequsites for this course include unde differential equations, and Laplace and z transforms.	ol, and the estimati rgraduate level line	ion of state ear algebra,
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broblems such as the variables. The main m BE3M35OCS BE3M35ORR This advanced course	e analysis of controllability and observability in the design of flexible space structures, the design of state feedback in aircraft control otivation, however, is to pave the way for the advanced courses of the study program. The prerequsites for this course include unde differential equations, and Laplace and z transforms. Onboard Computer and Onboard Software Optimal and Robust Control e will be focused on design methods for optimal and robust control. Major emphasis will be put on practical computational skills and assignments.	ol, and the estimati rgraduate level line Z,ZK Z,ZK I realistically comp	ion of state ear algebra, 7 6 lex problem
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For updated information see <u>http://bilakniha.cvut.cz/en/f3.html</u> Generated: day 2025-07-20, time 18:50.