Recomended pass through the study plan

Name of the pass: SpaceMaster - Passage through study

Faculty/Institute/Others: Faculty of Electrical Engineering
Department: Department of Control Engineering
Pass through the study plan: Erasmus Mundus Master Course - SpaceMaster II
Branch of study guranteed by the department: Cybernetics and Robotics
Guarantor of the study branch: prof. Ing. Michael Šebek, DrSc.
Program of study: Cybernetics and Robotics
Type of study: Follow-up master full-time
Note on the pass:

Coding of roles of courses and groups of courses:
P - compulsory courses of the program, PO - compulsory courses of the branch, Z - compulsory courses, S - compulsory elective courses, PV - compulsory elective courses, F - elective specialized courses, V - elective courses, T - physical training courses

Coding of ways of completion of courses (KZ/Z/ZK) and coding of semesters (Z/L):
KZ - graded assesment, Z - assesment, ZK - examination, L - summer semester, Z - winter semester

Number of semester: 1

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
BE3M35CSP	**CanSat-Projekt**	Z,ZK	9	2P+2S	Z	P
BE3M35ISP	**Introduction to Space Physics**	Z,ZK	8	2P+2S	Z	P
BE3M35SDY	**Space Dynamics**	Z,ZK	5	2P+2S	Z	P
BE3M35SSD	**Spacecraft System Design**	Z,ZK	8	2P+2S	Z	P

Number of semester: 2

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	P
BE3M35ORO	**Optic- and Radar-based Observations**	Z,ZK	8	2P+2S	L	P
BE3M35SPP	**Space Plasma Physics**	Z,ZK	7	2P+2S	Z	P
BE3M35SEI	**Spacecraft Environment Interactions**	Z,ZK	7	2P+2S	L	P

Number of semester: 3

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
BE3M35CSA	**Control Systems for Aircraft and Spacecraft** *Martin Hromčík **Martin Hromčík** Martin Hromčík (Gar.)*	Z,ZK	7	2P+2L	Z	P
BE3M35IDP	**Individuální projekt** *Kristian Hengster-Movric **Kristian Hengster-Movric** Kristian Hengster-Movric (Gar.)*	Z	8	0P+6S	Z	P
BE3M35SSM	**Space systems, modeling and identification** *Petr Hušek **Petr Hušek** Petr Hušek (Gar.)*	Z,ZK	7	4P+2C	Z	P

Number of semester: 4

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
BE3M35DIP	**Diploma Thesis** *Kristian Hengster-Movric, Martin Hlinovský **Martin Hlinovský** Kristian Hengster-Movric (Gar.)*	Z	30	22S	L	P

BE3M35ORC	**Optimal and robust control design** *Zdeněk Hurák* ***Zdeněk Hurák*** *Zdeněk Hurák (Gar.)*	Z,ZK	8	2P+2C	L	P

List of groups of courses of this pass with the complete content of members of individual groups

List of courses of this pass:

Code	Name of the course	Completion	Credits
BE3M35CSA	Control Systems for Aircraft and Spacecraft	Z,ZK	7
System Approach. Object, System, Model. Dynamic Systems Continuous and Discrete Time, Qualitative Analysis of Systems. Poincare Map, Chaos. Linear Systems. System Stability, Uncertainty and Robustness. Controllability and Observability. State Feedback, State Injection, Duality. Stochastic Systems, Realization of Stochastic Processes.			
BE3M35CSP	CanSat-Projekt	Z,ZK	9
BE3M35DIP	Diploma Thesis	Z	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.			
BE3M35ELS	Electronics in Space	Z,ZK	8
BE3M35IDP	Individuální projekt	Z	8
Independent work in the form of a project. 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 project will be defended within the framework of a subject.			
BE3M35ISP	Introduction to Space Physics	Z,ZK	8
BE3M35ORC	Optimal and robust control design	Z,ZK	8
This advanced course on control design will cover modern methods for optimal and robust control design. Emphasis will be put on practical computational design skills. Unifying idea of the course is that of minimization of a system norm. Depending on which norm is minimized, different properties of the resulting controller are guaranteed. Minimizing H2 norm leads to the celebrated LQ/LQG optimal control trading off the performance and the effort, while minimizing Hinf norm shifts the focus to robustness against uncertainties in the model. Mu-synthesis as an extensions to Hinf optimal control design that take the structure of the uncertainty into consideration represents a very powerfull tool for robust control design. Standing a little bit aside yet being useful in space missions are the methods for time-optimal and suboptimal control. As a self-contained add-on to the course, introduction to the topic of semidefinite programming and linear matrix inequalities (LMI) will be made, as these constitute a very elegant theoretial and a powerful computational tool for solving all the previously introduced tasks in optimal and robust control.			
BE3M35ORO	Optic- and Radar-based Observations	Z,ZK	8
BE3M35SDY	Space Dynamics	Z,ZK	5
BE3M35SEI	Spacecraft Environment Interactions	Z,ZK	7
BE3M35SPP	Space Plasma Physics	Z,ZK	7
BE3M35SSD	Spacecraft System Design	Z,ZK	8
BE3M35SSM	Space systems, modeling and identification	Z,ZK	7

For updated information see http://bilakniha.cvut.cz/en/f3.html
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