

# Utbildningsplan Rymdteknik, magister ämnesdjup för 06/07

Msc in Space Science and Technology

## Allmänt

Utbildningsplanen är reviderad 2006-01-30 av Chefen för Utbildnings- och forskningsenheten

## Omfattning

Examen på Rymdteknik, magister ämnesdjup erhålls efter fullgjorda kursfordringar om sammanlagt 80 poäng.

## Examensbenämning

Teknologie magisterexamen med huvudämne rymdteknik/Master of Science in Technology with a Major in Space Technology

## med inriktningar

Dynamics and Control of Systems and Structures (Cranfield, UK)/Dynamics and Control of Systems and Structures (Cranfield, UK)  
Space Robotics (Helsinki, Finland)/Space Robotics (Helsinki, Finland)  
Automation, Control and Communication of Space Robotics (Würzburg, Germany)/Automation, Control and Communication of Space Robotics (Würzburg, Germany)  
Space Technology and Instrumentation (Kiruna, Sweden)/Space Technology and Instrumentation (Kiruna, Sweden)  
Space Automation and Control (Prague, Czech Republic)/Space Automation and Control (Prague, Czech Republic)  
Astrophysics, Space Science, Planetology, research oriented (Toulouse, France)/Astrophysics, Space Science, Planetology, research oriented (Toulouse, France)  
Space Technique and Instrumentation, professional oriented (Toulouse, France)/Space Technique and Instrumentation, professional oriented (Toulouse, France)  
Atmospheric and Space Physics, research oriented (Kiruna, Sweden)/Atmospheric and Space Physics, research oriented (Kiruna, Sweden)

## Utbildningens innehåll och upplägg

The objective of the Joint European Master Program in Space Science and Technology is to combine the great diversity of space expertise at six European universities to a common platform of competence within the guidelines of the Bologna process.

European and Third-country students will in the framework of SpaceMaster have the possibility to study space science at the leading universities in Europe in a research oriented environment. SpaceMaster will bring together as a core group students from the whole world to share the existing space competence, to develop it together and distribute it to benefit the European space industry and research community.

The 120 ECTS are divided as following: - compulsory core modules 60 ECTS (Würzburg, Kiruna) - optional modules up to 30 ECTS (all partner universities) - Master's thesis min 30 ECTS (all partner universities).

## Behörighet

Fullgjorda kursfordringar för högskoleingenjörsexamen eller kandidatexamen omfattande 120 poäng, alternativt en motsvarande utfärdad utländsk examen i ämnet/ämnen maskinteknik, teknisk fysik, elektroteknik eller motsvarande ämne. Dessutom krävs att minst 15 poäng matematik ingår i ovanstående kursfordringar/examen.

För utländska studenter som ej har engelska som modersmål krävs vidare minimum 550/213 poäng på TOEFL prov alternativt IELTS minimum 6.0 eller motsvarande kunskaper i engelska.

## Obligatoriska kurser och poängfördelning

### Obligatoriska kurser 40 poäng

#### Alla antagna

Kod	Benämning	Poäng
	Space Dynamics 7.5 ECTS	5.0
	Spacecraft System Design 7.5 ECTS	5.0
	Programming, Embedded Control, Communication 7.5 ECTS	5.0
	Introduction in Space Physics 7.5 ECTS	5.0
RYM004	Bildbehandling och fjärranalys	5.0
RYM006	Rymdfarkosters fysiska omgivning	5.0
RYM008	Rymdelektronik	5.0
RYM011	Optik- och radarbaserad observationsteknik	5.0

#### SAMT

Examensarbete Master Thesis preparation

### Dynamics and Control of Systems and Structures (Cranfield, UK)

### Engineering Track 1 20 poäng

Valbara kurser. Minst 20.0 poäng

#### Alla antagna

Kod	Benämning	Poäng
	Multivariable Control for Aerospace Application 5 ECTS	3.0
	Statics of Structures, Dynamics of Structures 5 ECTS	3.0
	Introduction to Space Structures 2.5 ECTS	2.0
	Space Propulsion 5 ECTS	3.0
	Rigid Spacecraft Dynamics 5 ECTS	3.0
	Classical Control Methods 5 ECTS	3.0
	GPS and INS 5 ECTS	3.0
	Fiber Reinforced Plastics 5 ECTS	3.0
	Group Design Project 3 ECTS	2.0

**Space Robotics (Helsinki, Finland)****Engineering Track 2 20 poäng**

Valbara kurser. Minst 20.0 poäng

**Alla antagna**

Kod	Benämning	Poäng
	Mechatronic Miniature Automation 3 ECTS	2.0
	Positioning and Navigation Methods 3 ECTS	2.0
	Automation and Control Technology 4.5 ECTS	3.0
	Behaviors-based Robotic 3 ECTS	2.0
	Bionics 3 ECTS	2.0
	Project in Automation Technology 3-9 ECTS	4.0
	Robotics 3 ECTS	2.0
	Kinematics and Motion Planning 3 ECTS	2.0
	Field and Service Robotics 4.5 ECTS	3.0
	Machine Perception 3 ECTS	2.0

**Automation, Control and Communication of Space Robotics (Würzburg, Germany)****Engineering Track 3 20 poäng**

Valbara kurser. Minst 20.0 poäng

**Alla antagna**

Kod	Benämning	Poäng
	Automation and Control 7.5 ECTS	5.0
	Telecommunication Networks in Space 3 ECTS	2.0
	Robotics 1+2 12 ECTS	8.0
	Computer and Communication Networks 12 ECTS	8.0
	Group Project 3-9 ECTS	5.0

**Space Technology and Instrumentation (Kiruna, Sweden)****Engineering Track 4 20 poäng**

Valbara kurser. Minst 20.0 poäng

**Alla antagna**

Kod	Benämning	Poäng
RYM007	Principer för rymdinstrument	5.0
RYM030	Rymdteknikprojekt I	10.0
RYM031	Rymdteknikprojekt II	10.0
RYM032	Rymdteknik	5.0
RYM040	Rymdfarkostteknik	5.0
RYM041	Spektr. avbildande mätningar. Mätteknik/instrumentdesign	5.0

**Space Automation and Control (Prague, Czech Republic)****Engineering Track 5 20 poäng**

Valbara kurser. Minst 20.0 poäng

**Alla antagna**

Kod	Benämning	Poäng
	Hardware Support in Space Engineering 7 ECTS	5.0
	Space Sysetms, Modeling and Identification 7 ECTS	5.0
	Team Design Project 10 ECTS	7.0
	Estimation , Filtering and Fault Detection 7 ECTS	5.0
	Real Software Components for Space Control 7 ECTS	5.0
	Oprimal and Robust Control Design 7 ECTS	5.0
	Distributed Embedded Systems 7 ECTS	5.0

**Astrophysics, Space Science, Planetology, research oriented (Toulouse, France)****Science Track 1 21 poäng****Alla antagna**

Kod	Benämning	Poäng
	Instrumentation 17 ECTS	11.0

**SAMT**

Valbara kurser. Minst 10.0 poäng

**Alla antagna**

Kod	Benämning	Poäng
	Astrophysics 13 ECTS	8.0
	Space Science 13 ECTS	8.0
	Planetology 13 ECTS	8.0

**Space Technique and Instrumentation, professional oriented (Toulouse, France)****Science Track 2 20 poäng**



Machine Perception 3 ECTS	2.0	x	x			Valbar
Positioning and Navigation Methods 3 ECTS	2.0	x	x			Valbar
Automation and Control Technology 4.5 ECTS	3.0	x	x			Valbar
Robotics 3 ECTS	2.0	x	x			Valbar
Field and Service Robotics 4.5 ECTS	3.0	x	x			Valbar
Behaviors-based Robotic 3 ECTS	2.0	x	x			Valbar
Kinematics and Motion Planning 3 ECTS	2.0	x	x			Valbar
Bionics 3 ECTS	2.0	x	x			Valbar
Mechatronic Miniature Automation 3 ECTS	2.0	x	x			Valbar
Project in Automation Technology 3-9 ECTS	4.0	x	x			Valbar

#### Automation, Control and Communication of Space Robotics (Würzburg, Germany)

##### Arskurs 2 Antagna H05 Ges 06/07

		Lp1	Lp2	Lp3	Lp4	
Robotics 1+2 12 ECTS	8.0	x	x			Valbar
Automation and Control 7.5 ECTS	5.0	x	x			Valbar
Computer and Communication Networks 12 ECTS	8.0	x	x			Valbar
Telecommunication Networks in Space 3 ECTS	2.0	x	x			Valbar
Group Project 3-9 ECTS	5.0	x	x			Valbar

##### Arskurs 2 (planerad) Antagna H06 Ges 07/08

		Lp1	Lp2	Lp3	Lp4	
Robotics 1+2 12 ECTS	8.0	x	x			Valbar
Automation and Control 7.5 ECTS	5.0	x	x			Valbar
Computer and Communication Networks 12 ECTS	8.0	x	x			Valbar
Telecommunication Networks in Space 3 ECTS	2.0	x	x			Valbar
Group Project 3-9 ECTS	5.0	x	x			Valbar

#### Space Technology and Instrumentation (Kiruna, Sweden)

##### Arskurs 2 Antagna H05 Ges 06/07

		Lp1	Lp2	Lp3	Lp4	
RYM030 Rymdteknikprojekt I	10.0	x	x			Valbar
RYM031 Rymdteknikprojekt II	10.0	x	x			Valbar
RYM032 Rymdteknik	5.0	x	x			Valbar
RYM040 Rymdfarkostteknik	5.0	x				Valbar
RYM007 Principer för rymdinstrument	5.0		x			Valbar
RYM041 Spektr. avbildande mätningar. Mätteknik/instrumentdesign	5.0		x			Valbar
RYM030 Rymdteknikprojekt I	10.0			x	x	Valbar
RYM031 Rymdteknikprojekt II	10.0			x	x	Valbar
RYM032 Rymdteknik	5.0			x		Valbar
RYM032 Rymdteknik	5.0				x	Valbar

##### Arskurs 2 (planerad) Antagna H06 Ges 07/08

		Lp1	Lp2	Lp3	Lp4	
RYM030 Rymdteknikprojekt I	10.0	x	x			Valbar
RYM031 Rymdteknikprojekt II	10.0	x	x			Valbar
RYM032 Rymdteknik	5.0	x	x			Valbar
RYM040 Rymdfarkostteknik	5.0	x				Valbar
RYM007 Principer för rymdinstrument	5.0		x			Valbar
RYM041 Spektr. avbildande mätningar. Mätteknik/instrumentdesign	5.0		x			Valbar
RYM030 Rymdteknikprojekt I	10.0			x	x	Valbar
RYM031 Rymdteknikprojekt II	10.0			x	x	Valbar
RYM032 Rymdteknik	5.0			x		Valbar
RYM032 Rymdteknik	5.0				x	Valbar

#### Space Automation and Control (Prague, Czech Republic)

##### Arskurs 2 Antagna H05 Ges 06/07

		Lp1	Lp2	Lp3	Lp4	
Space Sysetms, Modeling and Identification 7 ECTS	5.0	x	x			Valbar
Oprimal and Robust Control Design 7 ECTS	5.0	x	x			Valbar
Estimation , Filtering and Fault Detection 7 ECTS	5.0	x	x			Valbar
Real Software Components for Space Control 7 ECTS	5.0	x	x			Valbar
Distributed Embedded Systems 7 ECTS	5.0	x	x			Valbar
Hardware Support in Space Engineering 7 ECTS	5.0	x	x			Valbar
Team Design Project 10 ECTS	7.0	x	x			Valbar

##### Arskurs 2 (planerad) Antagna H06 Ges 07/08

		Lp1	Lp2	Lp3	Lp4	
Space Sysetms, Modeling and Identification 7 ECTS	5.0	x	x			Valbar
Oprimal and Robust Control Design 7 ECTS	5.0	x	x			Valbar
Estimation , Filtering and Fault Detection 7 ECTS	5.0	x	x			Valbar

Real Software Components for Space Control 7 ECTS	5.0	x	x			Valbar
Distributed Embedded Systems 7 ECTS	5.0	x	x			Valbar
Hardware Support in Space Engineering 7 ECTS	5.0	x	x			Valbar
Team Design Project 10 ECTS	7.0	x	x			Valbar

**Astrophysics, Space Science, Planetology, research oriented (Toulouse, France)**

**Arskurs 2 Antagna H05 Ges 06/07**

		Lp1	Lp2	Lp3	Lp4	
Instrumentation 17 ECTS	11.0	x	x			
Astrophysics 13 ECTS	8.0	x	x			Valbar
Space Science 13 ECTS	8.0	x	x			Valbar
Planetology 13 ECTS	8.0	x	x			Valbar

**Arskurs 2 (planerad) Antagna H06 Ges 07/08**

		Lp1	Lp2	Lp3	Lp4	
Instrumentation 17 ECTS	11.0	x	x			
Astrophysics 13 ECTS	8.0	x	x			Valbar
Space Science 13 ECTS	8.0	x	x			Valbar
Planetology 13 ECTS	8.0	x	x			Valbar

**Space Technique and Instrumentation, professional oriented (Toulouse, France)**

**Arskurs 2 Antagna H05 Ges 06/07**

		Lp1	Lp2	Lp3	Lp4	
Technology and Systems 7 ECTS	5.0	x	x			
Technology for Missions 11 ECTS	7.0	x	x			
Practical lectures 12 ECTS	8.0	x	x			

**Arskurs 2 (planerad) Antagna H06 Ges 07/08**

		Lp1	Lp2	Lp3	Lp4	
Technology and Systems 7 ECTS	5.0	x	x			
Technology for Missions 11 ECTS	7.0	x	x			
Practical lectures 12 ECTS	8.0	x	x			

**Atmospheric and Space Physics, research oriented (Kiruna, Sweden)**

**Arskurs 2 Antagna H05 Ges 06/07**

		Lp1	Lp2	Lp3	Lp4	
Numerical Methods in Space Physics 7.5 ECTS	5.0	x				Valbar
RYM035 Solsystemets fysik	5.0	x				Valbar
RYM009 Rymplasmafysik	5.0		x			Valbar
RYM013 Atmosfärfysik	5.0		x			Valbar
RYM025 Solens fysik	5.0		x			Valbar

**Arskurs 2 (planerad) Antagna H06 Ges 07/08**

		Lp1	Lp2	Lp3	Lp4	
Numerical Methods in Space Physics 7.5 ECTS	5.0	x				Valbar
RYM035 Solsystemets fysik	5.0	x				Valbar
RYM009 Rymplasmafysik	5.0		x			Valbar
RYM013 Atmosfärfysik	5.0		x			Valbar
RYM025 Solens fysik	5.0		x			Valbar