

## Annex to the Study and Examination Regulations for the Autonomous Vehicle Engineering Bachelor's Programme at Technische Hochschule Ingolstadt dated 17.02.2020

### Overview of the modules and credit certificates

#### 1. First study phase

1	2	3	4	5	6	7	8	9
No.	Modules	SWS hrs	Type of course	Examinations		Course-related credit certificates	Weighting for the final examination grade	Credit points (ECTS points)
				Type and duration in minutes	Admission requirements			
<b>1</b>	<b>Mathematics 1</b>						1	8
1.1	Mathematics 1	5	SU	schrP, 90-120				
1.1	Exercise Course Mathematics 1	2	Ü					
<b>2</b>	<b>Foundations of Computer Science</b>						0.5	7
2.1	Foundations of Computer Science	4	SU/Ü	schrP, 90-120	LN of the current No. 2.2			
2.2	Practical Course Foundations of Computer Science	2	PR			LN 1) 2)		
<b>3</b>	<b>Programming 1</b>						0.5	7
3.1	Programming 1	4	SU/Ü	schrP, 90-120	LN of the current No. 3.2			
3.2	Practical Course Programming 1	2	PR			LN 1) 2)		
<b>4</b>	<b>Foundations of Engineering Sciences</b>						0.5	8
4.1	Foundations of Engineering Sciences	5	SU	schrP, 90-120				
4.2	Exercise Course Foundations of Engineering Sciences	2	Ü					

1	2	3	4	5	6	7	8	9
No.	Modules	SWS hrs	Type of course	Examinations		Course-related credit certificates	Weighting for the final examination grade	Credit points (ECTS points)
				Type and duration in minutes	Admission requirements			
<b>5</b>	<b>Mathematics 2</b>						0.5	6
5.1	Mathematics 2	4	SU	schrP, 90-120				
5.2	Exercise Course Mathematics 2	1	Ü					
<b>6</b>	<b>Statistics</b>						0.5	5
6.1	Statistics	3	SU	schrP, 90-120				
6.2	Exercise Course Statistics	1	Ü					
<b>7</b>	<b>Algorithms and Data Structures</b>	4	SU/Ü	schrP, 90-120			0.5	5
<b>8</b>	<b>Programming 2</b>						0.5	7
8.1	Programming 2	4	SU/Ü	schrP, 90-120	LN of the current No. 8.2			
8.2	Practical Course Programming 2	2	PR			LN 1) 2)		
<b>9</b>	<b>Electronics, Signals and Measurement</b>						0.5	7
9.1	Electronics, Signals and Measurement	4	SU/Ü	schrP, 90-120	LN of the current No. 9.2			
9.2	Practical Course Electronics, Signals and Measurement	2	PR			LN 1) 2)		
	<b>Total</b>	<b>51</b>					<b>5</b>	<b>60</b>

## 2. Second study phase

## 2.1. Theoretical semester

1	2	3	4	5	6	7	8	9
No.	Modules	SWS hrs	Type of course	Examinations		Course-related credit certificates	Weighting for the final examination grade	Credit points (ECTS points)
				Type and duration in minutes	Admission requirements			
<b>10</b>	<b>Model-based Software Engineering</b>						1	6
10.1	Model-based Software Engineering	4	SU/Ü	schrP, 90-120	LN of the current No. 10.2			
10.2	Practical Course Model-based Software Engineering	2	PR			LN 1) 2)		
<b>11</b>	<b>Vehicle Dynamics</b>	4	SU/Ü	schrP, 90-120			1	5
<b>12</b>	<b>Modelling and Simulation</b>						1	7
12.1	Modelling and Simulation	4	SU/Ü	schrP, 90-120	LN of current No.12.2			
12.2	Practical Course Modelling and Simulation	2	PR			LN 1) 2)		
<b>13</b>	<b>Digital Signal Processing</b>						1	7
13.1	Digital Signal Processing	4	SU/Ü	schrP, 90-120	LN of the current No. 13.2			
13.2	Practical Course Digital Signal Processing	2	PR			LN 1) 2)		
<b>14</b>	<b>General Elective (elective compulsory general science module)</b>	4	SU/Ü			LN 3) 5)	1	5
<b>15</b>	<b>Software Development Processes</b>	4	SU/Ü	mdlP, 15-30			1	5

1	2	3	4	5	6	7	8	9
No.	Modules	SWS hrs	Type of course	Examinations		Course-related credit certificates	Weighting for the final examination grade	Credit points (ECTS points)
				Type and duration in minutes	Admission requirements			
<b>16</b>	<b>Foundations of Machine Learning</b>						1	7
16.1	Foundations of Machine Learning	4	SU/Ü	schrP, 90-120	LN of the current No. 16.2			
16.2	Practical Course Foundations of Computer Science	2	PR			LN 1) 2)		
<b>17</b>	<b>Vehicle Electronics and Vehicle Communication Networks</b>						1	7
17.1	Vehicle Electronics and Vehicle Communication Networks	4	SU/Ü	schrP, 90-120	LN of the current No. 17.2			
17.2	Practical Course Vehicle Electronics and Vehicle Communication Networks	2	PR			LN 1) 2)		
<b>18</b>	<b>Control Engineering</b>						1	8
18.1	Control Engineering	4	SU/Ü	schrP, 90-120	LN of the current No. 18.2			
18.2	Practical Course Control Engineering	2	PR			LN 1) 2)		
<b>19</b>	<b>Scientific Seminar</b>	2	S			SA	1	3
<b>20</b>	<b>Vehicle-to-X Communication</b>	4	SU/Ü	schrP, 90-120			1	5
<b>21</b>	<b>Team Project</b>	4	PRJ			PRJ	1	8

1	2	3	4	5	6	7	8	9
No.	Modules	SWS hrs	Type of course	Examinations		Course-related credit certificates	Weighting for the final examination grade	Credit points (ECTS points)
				Type and duration in minutes	Admission requirements			
22	<b>Sensor Data Processing and Sensor Data Fusion</b>						1	7
22.1	Sensor Data Processing and Sensor Data Fusion	4	SU/Ü	schrP, 90-120	LN of the current No. 22.2			
22.2	Practical Course Sensor Data Processing and Sensor Data Fusion	2	PR			LN 1) 2)		
23	<b>Planning and Decision-Making Algorithms</b>	4	SU/Ü	schrP, 90-120			1	5
24	<b>Vehicle Actuators</b>	4	SU/Ü	schrP, 90-120			1	5
25	<b>Science Elective (compulsory specialised elective module)</b>	12	SU/Ü/PR			3 LN 3) 4) 5)	Total 3	15
26	<b>Bachelor's thesis</b>						3	
26.1	Seminar bachelor's thesis	2	S	SA <sup>1</sup>				3
26.2	Bachelor's thesis			BA				12
	<b>Total</b>	<b>886</b>					<b>21</b>	<b>120</b>

2.2. Internship semester

1	2	3	4	5	6	7	8	9
No.	Modules	SWS hrs	Type of course	Examinations		Course-related credit certificates	Weighting for the final examination grade	Credit points (ECTS points)
				Type and duration in minutes	Admission requirements			
27	Internship		PR			PrB 1)		24
28	Internship Seminar	1	S			LN 1)		2
29	Business Management	2	SU/Ü	schrP, 90-120			1	4
	<b>Total</b>	<b>3</b>					<b>1</b>	<b>30</b>

## 3. Overview

1	2	3	4	5	6	7	8	9
No.	Modules	SWS hrs	Type of course	Examinations		Course-related credit certificates	Weighting for the final examination grade	Credit points (ECTS points)
				Type and duration in minutes	Admission requirements			
	First study phase	51					5	60
	Theoretical semesters in the second study phase	86					21	120
	Internship semester	3					1	30
	<b>Total</b>	<b>140</b>					<b>27</b>	<b>210</b>

**Comments:**

- 1) Assessment: "passed" or "failed". The credit certificate must have been passed.
- 2) Practical work or carrying out experiments in the laboratory or conducting programming tasks in the laboratory or PC pool. Further details are defined by the Faculty Council in the study plan.
- 3) The credit certificate is alternatively a written examination (90-120 minutes), a research project or a presentation (15-30 minutes) with a written paper of 10-15 pages (to be completed during the course of the semester).
- 4) Each credit certificate must have been passed.
- 5) Subject-related and general scientific elective compulsory modules are to be covered with modules of 4 SWS hours per week or can be covered by modules of 2 SWS hours per week. If elective compulsory modules with 2 SWS hours are covered, the number of credit certificates to be submitted increases accordingly. Each individual credit certificate must be passed with at least a sufficient grade for passing the bachelor's examination.

**Type of course**

PR	Internship
Prj	Project
S	Seminar
SU	Seminaristic instruction
Ü	Exercise
SU/Ü	Seminaristic instruction with practice

**Type of examination**

<b>schrP</b>	Written examination	The written examination is a 90-minute written examination unless explicitly stated otherwise.
<b>mdIP</b>	Oral examination	The oral exam is a 15-minute interview per person unless explicitly stated otherwise.
<b>prP</b>	Practical examination	Based on the student's "real actions", the student should demonstrate that he has mastered the practical application of the knowledge that he has acquired. The practical examination is 30 minutes long unless explicitly stated otherwise.
<b>StA</b>	Graded creative assign.	This assignment is a research paper without any oral presentation. According to the General Examination Regulations (APO), the research paper should consist of between 3000 to 6000 words and approx. 10 to 20 pages. The research paper is to be written using word processing software.
<b>SA</b>	Seminar research paper	The seminar research paper is a research paper involving no oral presentation. According to the General Examination Regulations (APO), the research paper should consist of between 3000 to 6000 words and approx. 10 to 20 pages. The research paper is to be written using word processing software. The oral presentation is 30 to 45 minutes long in total and can also be given during the course of the semester.
<b>Prj</b>	Research project	A research project involves group work in which several students work on a common task in a team. Each student has to contribute individually to the common task, submit a project report and, if necessary, present the results orally. According to the General Examination Regulations (APO), the project report should be between 1500 words to 7500 words or approx. 5 to 25 pages, the length of oral presentation is between 15 and 45 minutes according to the General Examination Regulations (APO). The project report is to be written using word processing software.
<b>PrB</b>	Internship report	The internship report should provide information about the activities carried out during the internship. The report should be 8 to 25 pages long (without cover pages and indexes). Further details are specified in the study plan. The report is to be written using word processing software.



Annex SPO Bachelor "Autonomous Vehicle Engineering"

<b>Koll</b>	Colloquium	The colloquium is an oral examination lasting 15-45 minutes, during which the student defends the results of the paper.
<b>BA</b>	Bachelor's thesis	Written thesis of the bachelor's programme, 40-60 pages (without cover sheets, lists and appendices).