

## § 47 Bachelor's Study Program Physical Engineering

### (1) Structure of the Study Program

The Physical Engineering program is divided into two study phases. The first study phase represents the basic studies and concludes with the intermediate examination according to § 7 Section 2 of the General Part of the Study and Examination Regulations. Courses in the first three semesters are offered in English if the course begins in the summer semester, and in German if the course begins in the winter semester. The second study phase is the main study period, which includes compulsory subjects and individual electives as well as the compulsory practical study semester and the Bachelor's examination. The standard period of study is seven semesters. The successful completion of the program requires 210 ECTS credits. The program is completed with the Bachelor's examination.

### (2) Courses and examinations

The courses of the two study phases as well as the associated examination achievements result from the following tables 1 to 3. The following abbreviations are used:

Type of course	Type of exam	Scope of exam
V Lecture	B Bachelor's thesis	SWS Semester hours
PR Project	R Seminar Paper and presentation	ECTS ECTS points in compliance with the European Credit Transfer System
S Seminar	PF Portfolio	E Medium of instruction is English
P Practical, exercises	K(xx) Written examination duration of xx minutes	D Medium of instruction is German
	M Oral examination	
	PA Practical work (lab, term or seminar paper or project work)	
	RPA Practical work documented by a seminar paper and presentation (PF: 50% PA graded and 50% R graded)	

### (3) Elective Modules

Individual elective modules are available to students for profile formation. Only those modules can be selected as elective modules which are not identical in content to compulsory subjects or have only a slight overlap in content. In addition, the examination board of the study program can recognize achievements made elsewhere (e.g. tutoring, voluntary work, etc.) upon application by the student in individual cases. The recognition may not exceed five ECTS.

#### (4) Compulsory practical study semester

The sixth semester is a practical study semester. It can only be taken up if the intermediate examination according to § 7 Section 2 of the General Part of the Study and Examination Regulations has been passed.

The compulsory practical study semester comprises a practical activity in a company, the contents of which must be designed in accordance with the job profile of the course of study. The competencies acquired during the course of study are to be applied and deepened by working on suitable projects in the company. The students should get to know the technical requirements, the working methods and the operational environment in practice and work on applied projects as independently as possible as well as jointly responsible, taking into account the operational conditions.

During the mandatory internship semester, students are supervised by the Internship Office. In order to receive credit for the mandatory internship semester, students must perform various tasks. The Internship Office determines these achievements (e.g. preparation of an interim and a final report) and specifies when and in what form they must be completed. The students are informed about this on the intranet and in an information event.

At the end of the obligatory internship semester, internship days are held in which the obligatory internship semester is followed up and a final presentation is to be given. Participation in the internship days is mandatory.

In exceptional cases, after special approval by the head of the Internship Office, a final presentation set to sound can be made instead of participation in the Internship Days, which can be shown on the Internship Days. The student must arrange for approval of the final presentation by the company.

After completion of the practical work in the company, a record of the work done in the company must be submitted to the Internship Office. On the basis of the services rendered and the proof of activity, the head of the Internship Office decides whether the student has successfully completed the obligatory internship semester.

#### (5) **Bachelor's** Thesis

The bachelor's thesis can only be started if all study achievements of the first four semesters and the practical study semester have been successfully completed. The topic, task and scope of the Bachelor's thesis are to be limited by the task-setter in such a way that the thesis can be completed in approx. 360 working hours, corresponding to 12 ECTS. The thesis must be submitted to the examination office of Ravensburg-Weingarten University no later than 6 months after the date of issue. Immediately before or after submission of the Bachelor thesis, a colloquium will take place. This serves the presentation of the contents and the central results to the supervisors of the thesis.

The bachelor seminar serves to reflect on the contents of the bachelor thesis in connection with the course contents of the degree program and is conducted by the supervisor of the thesis.

Table 1: Bachelor's Study Program Physical Engineering  
First block of studies when starting in winter or summer semester st study stage

Module	Course	Curricular semester assigned				Ungraded examination	Graded examination
		Type	1	2	3		
			ECTS/ SWS	ECTS/ SWS	ECTS/ SWS		
Analysis 1	Analysis 1	VP	5/4				K60 or K90
Linear algebra	Linear Algebra	VP	5/4				K60 or K90
Analysis 2	Analysis 2	VP		5/4			K60 or K90
Numerical Analysis	Numerical Analysis	VP			5/4		K60 or K90
Physics 1	Mechanics and thermodynamics	VP	5/4				K90 or MBK 120
Physics 2	Electrodynamics	VP		5/4			K90 or MBK 120
Physics 3	Optics and Waves	VP			5/4		K90 or MBK90 <sup>1)</sup>
Physics 4	Quanta	VP			5/4		PF or MBK90 <sup>1)</sup>
	Physics lab	P					
Chemistry	Chemistry	VP	5/4				K90
Foreign languages	Professional English or German B2 <sup>2)</sup>	V			5/4		PF
Materials	Materials	VP		5/4			K60
Construction 1	CAD	P		5/4			PF
	Technical mechanics	VP					
Construction 2	Machine design	VP			5/4		K90
Electrical engineering	Electrical engineering	VP	5/4				K90 or PF
Electronics 1	Electronics 1	VP		5/4			K90 or PF
	Electrical Engineering / Electronics lab	P					
Electronics 2	Electronics 2	VP			5/4		K90
Informatic	Computer science basics	VP	5/4				K60 or PF
	Computer science lab	P					
Software engineering	Software engineering	VP		5/4			PA
	Software engineering practical course	P					
Summary ECTS / SWS			30/24	30/24	30/24		

1) can be examined together with the course "Optics and Waves"

2) German-speaking students choose Professional English, English-speaking students choose German

Table 2: Bachelor's Study Program Physical Engineering  
Second block of studies at the beginning of the winter semester and study stage

Module	Course	Curricular semester assigned				Ungraded exam.	Graded exam.
		Type	4 ECTS/ SWS	5 ECTS/ SWS	6 ECTS/ SWS		
Metrology	Instrumentation and Metrology	VP	5/4				K90
Control Engineering	Control Engineering	VP	5/4				K90
Scientific Working	Scientific Writing	VP		5/4			D or PF
	Patents (intellectual property)						
Development Methods	Technical Project Management	VP	5/4				PF
	Technical Documentation						
Business Administration	Business Administration	VP		5/4			K90
Modeling and Simulation	Modeling and Simulation	VP		5/4			K90
Digital Engineering	Digital Engineering	VP	5/4				K90
Photonics 1	Technical Optics	VP	5/4				K90 or PF
Photonics 2	Machine Vision	VP		5/4			K90 or PF
	Machine Vision lab	P					
Physical Computing	Microcontroller and Sensors	VP		5/4			PF
	Microcontroller lab	P					
Cyber-Physical Systems	Cyber-Physical Systems	VP	5/4				PF or K90
Robotics	Robotics	VP		5/4			PF or K90
Elective module technology	Individual opportunity to deepen studies					5/4	
Elective module Studium Generale	Acquisition of competencies in non-technical areas					5/4	
Project Seminar	Accompanying seminar	S				5/4	PA
	Project	PRO					
Internship Semester	Internship seminar	PRO			30/1		PB
Bachelor's thesis and Bachelor's seminar	Bachelor's seminar	S				3/2	D
	Bachelor's thesis	B				12	B
Summary ECTS/SWS			30/24	30/24	30/1	30/14	

Table 3: Bachelor's Study Program Physical Engineering  
Second block of studies at the beginning of the summer semester

Module	Course	Curricular semester assigned					Ungraded exam.	Graded exam.
			4	5	6	7		
		Type	ECTS/SWS	ECTS/SWS	ECTS/SWS	ECTS/SWS		
Metrology	Instrumentation and Metrology	VP		5/4				K90 or PF
Control Engineering	Control Engineering	VP		5/4				K90
Scientific Working	Scientific Writing	VP	5/4					D or PF
	Patents (intellectual property)							
Development Methods	Technical Project Management	VP		5/4				PF
	Technical Documentation							
Business Administration	Business Administration	VP	5/4					K90
Modeling and Simulation	Modeling and Simulation	VP	5/4					K90
Digital Engineering	Digital Engineering	VP		5/4				K90
Photonics 1	Technical Optics	VP		5/4				K90 or PF
Photonics 2	Machine Vision	VP	5/4					K90 or PF
	Machine Vision lab	P						
Physical Computing	Microcontroller and Sensors	VP	5/4					PF
	Microcontroller lab	P						
Cyber-Physical Systems	Cyber-Physical Systems	VP		5/4				PF or K90
Robotics	Robotics	VP	5/4					PF or K90
Elective module technology	Individual opportunity to deepen studies					5/4		
Elective module Studium Generale	Acquisition of competencies in non-technical areas					5/4		
Project Seminar	Accompanying seminar	S				5/4		PA
	Project	PRO						
Internship Semester	Internship seminar	PRO			30/1			PB
Bachelor's thesis and Bachelor's seminar	Bachelor's seminar	S				3/2	D	
	Bachelor's thesis	B				12		B
Summary ECTS/SWS				30/24	30/24	30/1	30/14	