TECHNISCHE HOCHSCHULE LÜBECK

Module: Analog Electronics

Level	Bachelor	**Short Name**	AE II
Responsible Lecturers	Milady, Saeed, Prof.-Dr.-Ing.		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	Elektrotechnik - Energiesysteme und Automation, Bachelor		
Compulsory/elective	Compulsory	**ECTS Credit Points**	5
Semester of Studies	5	**Semester Hours per Week**	5
Length (semesters)	1	**Workload (hours)**	150
Frequency	WiSe	**Presence Hours**	65
Teaching Language	English	**Self-Study Hours**	85
The following section is filled only if there is **exactly one** module-concluding exam.			
Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	
Learning Outcomes			
Participation Prerequisites			
The previous section is filled only if there is **exactly one** module-concluding exam.			
Consideration of Gender and Diversity Issues	✔ Use of gender-neutral language (THL standard) ✔ Target group specific adjustment of didactic methods ✔ Making subject diversity visible (female researchers, cultures etc.)		
Applicability			
Remarks			

Lehrveranstaltung: Analog Electronics (Lecture)

(zu Modul: Analog Electronics)

Lehrveranstaltungsart		**Lernform**	
LV-Name englisch			
Anwesenheitspflicht	nein	**ECTS-Leistungspunkte**	3
Teilnahmebeschränkung		**Semesterwochenstunden**	3
Gruppengröße		**Arbeitsaufwand in Stunden**	90
Lehrsprache	English	**Präsenzstunden**	45
Studienleistung		**Selbststudiumsstunden**	45
Dauer SL in Minuten		**Bewertungssystem SL**	One-third Grades
Der folgende Abschnitt ist nur ausgefüllt, wenn es eine lehrveranstaltungsspezifische Prüfung gibt.			
Prüfungsleistung	Portfolio Exam	**Prüfsprache**	
Dauer PL in Minuten		**Bewertungssystem PL**	
Lernergebnisse	• The students understand basic circuits of analog electronics and can analyze and design them as well as select and dimension the circuit components. • The students are familiar with the real characteristics of operational amplifiers and can take these into account when designing the circuit and selecting components. • The students are familiar with the difference between positive and negative feedback and basic circuits that can be built using operational amplifiers • The students are familiar with basic concepts of active filters. They are familiar with the design methods for filter transfer functions and can realize them using opamps and passive devices. • The students know different basic oscillator circuits and can select and dimension the appropriate basic circuits for different applications. • The students know the basics of AD / DA conversion, their parameters and system-theoretical parameters. They know the different converter types. • The students are familiar with other typical analogue circuits and their applications. • The students can verify their own circuit designs using circuit simulation.		

	• The students are familiar with different basic circuits for the voltage supply and can select and dimension the suitable basic circuit for different applications.
Teilnahmevoraussetzungen	

Der vorige Abschnitt ist nur ausgefüllt, wenn es eine lehrveranstaltungsspezifische Prüfung gibt.

Lehrinhalte	• Basic analog amplifiers • Voltage regulators • Real properties of operational amplifiers (OpAmps) • Oscillator circuits • Active filters • Analog to digital and digital to analog circuits converters • Other typical analog circuits
Literatur	Sedra, A., et. Al., “Microelectronic Circuits”, Oxford. Razavi, B., “Fundamentals of Microelectronics”, John Wiley & Sons Inc.
Bemerkungen	

Module Course: Analog Electronics (Practical Training)

(of Module: Analog Electronics)

Course Type	Practical Training	**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	2
Participation Limit		**Semester Hours per Week**	2
Group Size	12	**Workload (hours)**	60
Teaching Language	English	**Presence Hours**	20
Study Achievements ("Studienleistung", SL)	Practical Training	**Self-Study Hours**	40
SL Length (minutes)		**SL Grading System**	

The following section is filled only if there is a course-specific exam.

Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents	1. Current mirrors and differential amplifiers 2. Operational amplifiers 3. Boost-converter with MOSFET 4. Active filters 5. ADC & DAC circuits
Literature	Sedra, A., et. Al., “Microelectronic Circuits”, Oxford. Razavi, B., “Fundamentals of Microelectronics”, John Wiley & Sons Inc. Internal task descriptions
Remarks	