

Module title		SM Code
Electrical Measurement Technology 1		MT1
Module lecturer	Faculty	
N.N. (Prof. Dr. Heiko Unold?)	Electrical Engineering and Information Technology	
Module language	Number of SWS / WSH	ETCS credits
English	2 SWS / WSH	3
Teaching format		
Inverted classroom with preparatory tasks		

Semester according to the study plan	
3 rd semester	
Attendance/classroom hours	Additional independent study
28 hours	Preparation and follow-up work: 62 hours
Type of examination / Requirements for the award of the credit points	
Written exam: 90 minutes	

Teaching content
<ul style="list-style-type: none"> • Fundamentals of measurement (units, logarithmic measurements, sensitivity) • Dealing with measurement uncertainties (normal distribution, error propagation) • Digital multimeters (AD converters, measurement range extension, four-wire measurement) • Oscilloscope (principle, parameters, operation, and interpretation of measurements with a digital storage oscilloscope) • Digital frequency and period duration measurement • Operational amplifiers (principle of ideal OPV, amplifier, calculator, and comparator circuits)

Learning objective: Professional competence**After successfully completing this module, students will be able to**

- Interpret and apply measurement units and dimensions (including logarithmic dimensions) (3)
- Interpret and apply basic measurement technology terms (accuracy, resolution, sensitivity, etc.) (3)
- Use basic concepts of measurement uncertainty, statistics, and error calculation (2)
- Explain the operating principle of a multimeter (3)
- To explain the operating principle of an oscilloscope (3) and to operate an oscilloscope (2)
- Interpret and apply basic concepts of time and frequency measurement (3)
- Describe the basic function of an operational amplifier (1) and on this basis Handle basic operational amplifier applications (e.g., measuring amplifiers) (2) and calculate them (2)
- Calculate simple measurement circuits, including measurement uncertainties (2)
- Analyze simple operational amplifier circuits (3) and calculate them (2)
- Analyze (3) and solve (3) simple metrological problems using engineering methods

Literature**Recommended reading**

- Hoffmann, Jörg: Pocketbook of Measurement Technology, Hanser-Verlag 2007
- Lerch, R.: Electrical Measurement Technology, Springer-Verlag 2012
- Schrüfer, E.: Electrical Measurement Technology, Hanser-Verlag 2012

The numbers in brackets indicate the levels to be achieved: (1)-know | (2)-can | (3)-understand and apply