

Course description

Course abbreviation:	KTO/DM	Page:	1 / 3
Course name:	Metrology		
Academic Year:	2023/2024	Printed:	03.06.2024 07:44

Department/Unit /	KTO / DM			Academic Year	2023/2024
Title	Metrology			Type of completion	Exam
Accredited/Credits	Yes, 6 Cred.			Type of completion	Combined
Number of hours	Lecture 3 [Hours/Week] Tutorial 3 [Hours/Week]			Course credit prior to	YES
Occ/max	Status A	Status B	Status C	Counted into average	YES
Summer semester	0 / -	0 / -	0 / -	Min. (B+C) students	10
Winter semester	10 / -	0 / -	2 / -	Repeated registration	NO
Timetable	Yes			Semester taught	Winter, Summer
Language of instruction	Czech, English			Internship duration	0
Optional course	Yes			Ev. sc. – cred.	S N
Evaluation scale	1 2 3 4				
No. of hours of on-premise					
Auto acc. of credit	Yes in the case of a previous evaluation 4 nebo nic.				
Periodicity	K				
Substituted course	None				
Preclusive courses	N/A				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	KTO/ZSZT3, KTO/ZSZT4, KTO/ZSZT5				

Course objectives:

Achieving expertise in engineering metrology company, including primary legislation, basic principles and areas of measurement: length, angle, shape and position variations, surface textures and threads.

Requirements on student

Conditions for obtaining credit and exam:

- 1) Development of protocols from a randomly selected measurement
- 2) Passing a written test
- 3) Written exam
- 4) Oral exam

Content

- 1) Metrology, structure metrology, legal metrology, Act No. 505/90 Coll. metrology, metrology related to quality management
- 2) Basic concepts of metrology, an introduction to the theory of measurement, causes and measurement errors, measurement accuracy and factors causing measurement inaccuracy
- 3) Length measurements, units of measurement - development, methods of measurement. Gauges and instruments for measuring length
- 4) Measurement of angles, angles metrology unit, an overview of gauges for measuring angles, measuring methods, measuring very small angles, cones and perpendicularity
- 5) Measurement deviations of shape and position, straightness and flatness, measurement and control profile, roundness, cylindrical, throw, play
- 6) Measurement of threading, fitting, and functional elements of the kinds of threads, thread control complex, elementary measurement coils, the specifics of control ball screw
- 7) Measurement of gears, gear types, kinematics of the tooth and the impact on the measurement requirements
- 8) Measurement of surface roughness, surface finish classification, comparing control processing, instruments for measuring surface roughness, roughness parameters, curve Abbottova support section, New Directions in roughness
- 9) Geometric precision engineering equipment, protocols, precision inspection equipment such as a complex activity and safety features, performance and job testing and documentation

- 10) Laser measuring technology, theory and possibilities Laserinterferometers laser technology, laser holography in metrologiie
- 11) Automation of measurement, automation devices, sensors - principles and types, applying physical principles and methods for design automation of measurement strategies
- 12) Measurements in non-production stages, the requirements for placement machine foundation stiffness of machine tools, the development of new measurement methods, measurement of R & D
- 13) Requirements for engineering metrology, standards of EN 45000, accreditation měrových centers, business centers in metrology, metrology organizations in the enterprise, time control gauges. Using unconventional materials metrology, requirements for qualification metrology, the role of education

<http://books.fs.vsb.cz/StrojMetro/strojirenska-metrologie.pdf>

Fields of study

Guarantors and lecturers

- **Guarantors:** Doc. Ing. Martin Melichar, Ph.D. (100%)
- **Lecturer:** Doc. Ing. Martin Melichar, Ph.D. (50%)
- **Tutorial lecturer:** Ing. Jan Kutlwašer, Ph.D. (100%), Doc. Ing. Martin Melichar, Ph.D. (50%)

Literature

- **Basic:** Metrologie v kostce III. (ÚNMZ) - http://www.unmz.cz/sborniky_th/sb2009/MvK_7_vidit_hypervazby_small.pdf
- **Extending:** Olga Tůmová. *Metrologie a hodnocení procesů*. Praha, 2010. ISBN 978-80-7300-2.
- **Recommended:** Jaroslav Boháček. *Metrology*. Praha, 2013. ISBN 978-80-0105-351-.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Contact hours	78
Undergraduate study programme term essay (20-40)	40
Preparation for an examination (30-60)	40
Preparation for laboratory testing; outcome analysis (1-8)	8
Total:	166

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

- Oral exam
- Written exam

Skills - skills achieved by taking this course are verified by the following means:

- Seminar work
- Skills demonstration during practicum

Competences - competence achieved by taking this course are verified by the following means:

- Oral exam

prerequisite

Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:

- Describe theory of measurements with common communal gauges (length, angle)
- Describe the theory of basic measurement errors
- Describe basic metrological legislative requirements (according rule 505/1990)

Skills - students are expected to possess the following skills before the course commences to finish it successfully:

- Solve metrological applications on basic gauges (length, angle)
- Control the basic length and angle gauges
- Read basic length and angle gauges

Competences - students are expected to possess the following competences before the course commences to finish it successfully:

N/A

teaching methods**Knowledge - the following training methods are used to achieve the required knowledge:**

- Lecture
- Practicum
- Laboratory work
- Self-study of literature

Skills - the following training methods are used to achieve the required skills:

- Practicum

Competences - the following training methods are used to achieve the required competences:

- Lecture supplemented with a discussion

learning outcomes**Knowledge - knowledge resulting from the course:**

- describe metrological activities in the company
- interpretation measurement results (length, angle, GOM)
- requirements for measurement processes and measurement equipment (length, angle, GOM)

Skills - skills resulting from the course:

- to carry out measurements of the dimensional and qualitative characteristics of the components (length, angle, GOM)
- use gauges to carry out measurement tasks (length, angle, GOM)
- Adjust gauges before use (length, angle, GOM)

Competences - competences resulting from the course:

N/A

N/A

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Engineering	Bachelor	Full-time	Quality Control	1	2020	2023	Compulsory courses	A	2	LS
Machining, Additive Technology and Quality Assurance	Postgraduate Master	Full-time	Machining, Additive Technology and Quality Assurance	1	2020	2023	Compulsory courses	A	1	ZS
Certifikátové programy	Postgraduate Master	Full-time	Quality Control	1	1	2023	Core elective courses	B		ZS