



Experimental methods

The course information





Experimental methods

Annotation:

The course is focused on knowledge improvement in the area of industrial products testing and experimental work.

- Experiment methodology
- Basic elements of the experimental device and their significance
- Experiment setup
- Properties and parameters of measuring devices
- Measurement device calibration and measurement errors
- Sensors of basic physical quantities





Lesson

▪ Lectures

- monday at 8.50
- building E, 1st floor, classroom E213

▪ Practical exercise

- monday at 10.20
- building E, 1st floor, classroom E213
- building L, -1st floor, Laboratory of applied mechanics

Teachers

▪ Martin Mazač

- martin.mazac@tul.cz

▪ Aleš Lufinka

- ales.lufinka@tul.cz



Study materials

■ E-learning TUL

- <https://elearning.tul.cz>
- course EXM for students in the classical form of study
- course EXPM for the erasmus program students

What you need:

■ PC, notebook, etc.

- MS Office Excel or Open Office Calc
- Dewesoft software (free version)
for data processing
- MS Office Word or Open Office Writer
for creating test reports

- Some camera or camcorder (mobile phone, tablet)
for experiment documentation – only if you want

List of lectures

1. Basic input information

2. lesson 1: Experiment in technical practice
3. lesson 2: Exciters
4. lesson 3: Measuring and recording device
5. lesson 4: Measurement device and electromagnetic interference
6. lesson 5: Properties of a measurement device - analog part
7. lesson 6: Properties of a measurement device - digital part
8. lesson 7: Sensors for measuring of distance or displacement
9. lesson 8: Measurement of deformation - strain gauges
10. lesson 9: Force sensors, pressure sensors, torque sensors, accelerometers
11. lesson 10: Temperature sensors
- 12., 13., 14. Students' work presentation, final test from the theoretical part, credit, exam

List of practical lessons

1. **work safety prescription, excursion to the lab**
2. **Task 1: Measurement of a rubber part stiffness**
3. **Task 2: Tensile testing of a steel specimen**
4. **Task 3: Measurement of a liquid damper characteristics**
5. **Task 4: Vibration Frequency Analysis**
6. **Task 5: Measurement of amplitude frequency transmission characteristic**
7. **Task 6: Measurement of the resonance frequency using the Dirac pulse method**
8. **Task 7: The measurement device settings, measurement of the calibration curve**
9. **Task 8: Measurement of a part mechanical stress during operation**
10. **Task 9: Measurement of the scooter's beam deflection during riding**
11. **Task 10: Crash test**
- 12., 13., 14. **Students' work presentation, final test from the theoretical part, credit, exam**

Practical lesson organization

1) In the classroom

- Discussion of the results of the previous experiment
- New experiment description
- Instructions for data processing
- Instructions for homework

2) In the lab

- Experiment realization and data measurement

3) Homework

- Basic data processing
 - simple graph from measured data

Conditions for passing the EXM (EXPM)

■ Credit

- simple data processing from all experiments
 - continuously during the semester

■ Exam

- **two short presentations of two selected experiments**
 - you can choose 2 arbitrary tasks and make two presentations
 - 5 – 10 minutes for one
- **final test from the theoretical part**
 - 10 questions
 - one randomly selected question from each theoretical lesson
 - a list of questions will always be given at the end of each lesson