



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Measurement systems programming

Course

Field of study

Mechatronics

Area of study (specialization)

Automation and supervision of systems

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Dawid Kucharski, PhD Eng.

Responsible for the course/lecturer:

Division of Metrology and Measurement
Systems,

Institute of Mechanical Technology,

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Prerequisites



Basic knowledge of: technical metrology, optics, physics, measurement systems, programming, technical drawings and machine parts.

Course objective

Getting to know about novel software for geometrical quantities metrology applications and possibilities of practical applications.

Course-related learning outcomes

Knowledge

A student can characterize novel software for measurement systems. A student can characterize a field of applications of the novel measurement softwares.

Skills

A student can:

choose the right software for a measurement task;

prepare measurement code;

analyse a measurement data;

found error sources and ev. reduce their influence.

Social competences

A student can collaborate in a group. A student knows importance of novel, advanced measurement systems in the modern economy.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Summative assessment:

Lectures: course final exam, written (5 questions)

Laboratory: written/oral answer + lab reports; passing rules: positive assessments for all lab exercises

Programme content

Lectures:

1. Definition, structure and tasks of advanced, modern measurement systems.
2. Advanced measurement systems for geometric quantities metrology.
3. Operating systems used for measurement devices control.
4. Overview of available programs used in modern measurement systems.
5. Common programming languages.



6. Measurement systems control algorithms and measurement data analysis software.
7. Software for optical measurement systems sensors and feedback case.
8. Data analysis algorithms, data codes overview.
9. Measurements of geometric quantities by using optical measurement systems. Information decoding.
10. Data analysis algorithms optimialisation with parallel computing.
11. Softwreare standarisation in metrology.

Lab courses:

1. Programming of the special machine for shape deviation measurements.
2. Coordinate measuring machine (CMM) measurements.
3. Algorithms for 3D optical scanner data analysis.
4. NDT shearography measurements.
5. Interferometric surface texture measurements. Control algorithms, data analysis.
6. Software for vision measurement systems.

Teaching methods

Lectures: oral presentation with illustrated examples on a blackboard, discussions and tasks analysis.

Laboratory: practical excercises, team working, tasks solving, discussions

Bibliography

Basic

1. Specyfikacje geometrii wyrobów (GPS), Humienny Z. i inni, Wydawnictwa Naukowo-Techniczne, Warszawa, 2004
2. Metrologia wielkości geometrycznych, Jakubiec W., Malinowski J., WNT, Warszawa, 2006
3. Optical Measurement of Surface Topography, Leach R., Springer Science & Business Media, Berlin, Heidelberg, 2011.

Additional

1. Współczesna metrologia, zagadnienia wybrane, Barzykowski J. i inni, Wydawnictwa Naukowo-Techniczne, Warszawa, 2004
2. An introduction to engineering measurements, Graham A. R., Englewood cliffs, Prentice-Hall, 1975
3. Chapter 6. Validation of software used in metrology, in: Metrology and Theory of Measurement, Slaev V.A., Chunovkina A.G., Mironovsky L.A., DE GRUYTER, Berlin, Boston.



4. An introduction to interferometry, Tolansky S., Longmans, Green, 1955.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	20	1,0

¹ delete or add other activities as appropriate