COURSE DESCRIPTION CARD - SYLLABUS

Course name

Tendencies in material removal manufacuring processes of products

Course

Field of study

Mechanical Engineering

Year/Semester

2/2

Area of study (specialization)

-

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

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:

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Responsible for the course/lecturer:

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Prerequisites

1) The student has basic knowledge of physics, mathematics, mechanics, the basics of material removal manufacturing processes

2) The student is able to use the acquired knowledge to analyze new manufacturing techniques and knows how to use information obtained from the library and the Internet

3) The student is independent in solving problems, acquiring and improving the acquired knowledge and skills, understanding the need to learn

Course objective

Acquainting future masters with the characteristics of the latest solutions in the field of subtraction and focusing them on acquiring knowledge in the field of new solutions and their evaluation.

Course-related learning outcomes

Knowledge

1) Knows contemporary trends and development directions in the field of material removal technologies (K_W11))

Skills

1) Can find information on new manufacturing processes in mechanical engineering, integrate the obtained information, interpret it, draw conclusions, formulate and justify opinions about them (K_U01)

2) Is able to develop an opinion on the manufacturing technology of the product (K_U12)

3) Can select modern material removal technologies for realization of production processes, increase the efficiency of production systems through integration activities (K_U15)

Social competences

1) Correctly identifies and resolves dilemmas related to the profession in the field of the subject (K_K05)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Exam in form of test (for answers to: 50 to 60% of questions - satisfactory, above 60 to 70% - satisfactory +, above 70 to 80% - good, above 80 to 90% - good +, above 90 to 100% % - very good)

Laboratory: Assessment of reports from individual exercises

Programme content

1) Introduction on the classification and essence of individual manufacturing techniques

2) High Efficiency Machining (High Cutting Speed HSM, High Efficiency HPM, High Feed HFM)

3) New cutting tools (multi-purpose, for high-performance 3D surface machining, for deburring, etc.)

4) New cutting zone cooling / lubrication techniques (minimum lubrication MQL, minimum cooling MQCL, air cooling SSP, high pressure liquid cooling HPC)

5) Complete machining (examples of structures and new machining cycles of modern turning and milling centers enabling: milling, grinding, turn-miling, machining of gears and cams, and erosive machining).

6) Micro machining (etching, lithography + etching, LIGA technique, EFAB technique, microstereolithography, micro-cutting, processing with pico and femtosecond lasers)

7) The use of lasers in manufacturing techniques (cleaning, structuring, engraving, marking, padding, hollowing, cutting, selective sintering, etc.)

8) Combined and hybrid machining (machining and electro-erosion with ultrasonic assistance UAM and EDUM, laser assisted machining by LAM, electrochemical grinding ECG and others)

Teaching methods

Lecture: e-Learning in the form of videoconferences and provided issues and materials (via eMeeting and Moodle)

Laboratory: Performing laboratory exercises and developing reports according to the instructions in the outline

Bibliography

Basic

1) Cichosz P. (red.), Obróbka skrawaniem, Wysoka produktywność (Rozdz. 5. Oczoś K., Obróbka wysoko produktywna – wiodącym trendem obróbki skrawaniem, s.31-50), Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2007

2) Jóźwicki R.: Technika laserowa i jej zastosowania, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2009

3) Oczoś K., Hybrydowe procesy obróbki ubytkowej - istota, przykładowe procesy, wyzwania rozwojowe, Mechanik, 2000 nr 5-6, s. 315-324

4) Oczoś K., Kształtowanie mikroczęści – charakterystyka sposobów mikroobróbki i ich zastosowanie, 1999 nr 5-6, s. 309-324

5) Oczoś K., Obróbka kompletna – obrabiarki, metody, narzędzia, Mechanik, 1999 nr 3, s. 123-135

6) Oczoś K., Postęp w obróbce skrawaniem II. Obróbka na sucho i ze zminimalizowanym smarowaniem, Mechanik, 1998 nr 5-6, s. 307-318

Additional

1) Davim J.P., Jackson M.J. Nano and Micromachining. John Wiley & Sons, Inc., NJ USA 2009

2) Gupta K., Jain, Neelesh K. J., Laubscher R. F., Hybrid Machining Processes: Perspectives on Machining and Finishing. Springer, 2016

3) Grzesik W., Podstawy skrawania materiałów konstrukcyjnych, WNT 2010

4) Mohamed Gad-el-Hak , The MEMS Handbook, CRC Press, 2002.

5) Oczoś K., Kształtowanie materiałów skoncentrowanymi strumieniami energii. WUPR, Rzeszów 1988.

6) Praca pod redakcją Żebrowskiego H., Techniki wytwarzania. Obróbka wiórowa, ścierna i erozyjna, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2004,

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	31	1,2
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	25	1,0

[1] delete or add other activities as appropriate