



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Foundry II [S1IMat1>Odl1]

Course

Field of study

Materials Engineering

Year/Semester

2/4

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

Number of credit points

3,00

Coordinators

dr hab. inż. Piotr Mikołajczak

piotr.mikolajczak@put.poznan.pl

Lecturers

Prerequisites

Basics of : metallurgy, foundry, material science, machine construction, engineering graphics. Acquisition of information from corresponding literature and from internet; student is able to acquire knowledge in the design of cast products by various methods and technologies. Understanding the need to learn, gain new knowledge and teamwork.

Course objective

Understand the principles of cast products designing, chosen bases and examples of application of casting technologies and computer aided design as support in foundry.

Course-related learning outcomes

Knowledge:

1. student is able to describe casting methods, he has basic knowledge related to the influence of various types of liquid alloy inoculation and casting technologies on structure and structure influence on mechanical properties of castings. [k_w12]
2. student is able to identify the factors influenced the quality of the produced castings [k_w12]
3. student is able to choose the casting methods according to the set customer requirements [k_w11]

4. student is able to describe the use of computer aided design in foundry [k_w15, k_w04]

Skills:

1. student is able to develop the concept of casting technology depending on the requirements [k_u16, k_u12, k_u21]
2. the student knows how to interpret the results of computer-aided foundry [k_u17, k_u08]

Social competences:

1. student understands the need for continuing education in order to improve professional qualifications (courses, training, openness to teamwork)
2. student is able to set priorities for the process of product design
3. student can think and act in an entrepreneurial way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Lecture:

Assessment at the end of the semester (assessment at least 50.1% correct answers). Below 50.0% - grade 2, from 50.1% to 60.0%? - grade 3, from 60.1% to 70.0% - grade 3,5, from 70.1 to 80 - grade 4, from 80,1% to 90,0% - 4+, above 90,1% - grade 5.

Project/design:

- the project is done correctly, there are minor computational errors and in the drawings, the student is able to answer questions about the contents of the project (50%) - evaluation grade 3,
- the project is done correctly, the student can answer questions about the content of the project, can describe the process of mold filling, casting feeding and structure transitions (70-90%) - evaluation grade 4,
- the project is done correctly, the student can answer questions about the content contained in the project, can describe the process of mold filling, casting feeding and structure transitions (over 90%) - evaluation grade 5.

Programme content

Casting technologies, solidification of castings, processability of casting construction, feeding of castings, computer simulations in foundry, structure of produced castings.

Course topics

Lecture

1. Impact of the casting method, cast material and mold material on the geometric shape of the casting, surface quality and casting structure.
2. Effect of the cooling rate on the shape of the separated phases in the microstructure and shrinkage defects in the castings. Changing of geometrical shape of the phases in the microstructure of the casting due to chemical, mechanical and heat treatment.
3. Solidification phenomena and cooling of castings in the molds.
4. Relations of technology and castings construction. Principles and formula of the mold cavity filling and feeding.
5. Feeding of the castings according to the type of alloy.
6. Examples of practical applications for casting production (gradient materials, identification of local properties with property map of the whole product).
7. Methods of cast products testing (destructive and non-destructive).
8. Important basics and examples of computer assisted design in casting technology (CAD/CAE).

Project/Design

Elaboration of a casting technology with a specific configuration - shape (project content: construction drawing of the part, drawing of the raw cast, calculation of the solidification module (-s) of the casting, number of risers, minimum riser module (-s) and thermal solidification module, calculating of pouring time and cross-sectional area of the pouring system, casting concept drawing, mold drawing, structure description and process to obtain a specific structure in the casting.

Teaching methods

1. Lecture: multimedia presentation illustrated with movies and examples shown on blackboard
2. Project: project development, discussion, team work.

Bibliography

Basic

1. Perzyk M., Waszkiewicz S., Kaczorowski M., Jopkiewicz A.: *Odlewnictwo*. WNT Warszawa 2004
2. Z. Ignaszak, *Podstawy modelowania CAD/CAE. Wybrane zagadnienia, e-skrypt*, Poznań, 2008
3. Fraś. E., *Krystalizacja metali*. WNT, Warszawa 2003
4. M. Perzyk i inni, *Odlewnictwo*. WNT, Warszawa 2004.
5. M. Perzyk i inni, *Materiały do projektowania procesów odlewniczych*. PWN Warszawa 1990.

Additional

1. Fraś E., *Krzepnięcie metali i stopów*. WNT Warszawa 1992
2. Tabor A., *Odlewnictwo*. Wyd. Politechnika Krakowska, Kraków 2007
3. S. Karpiński, T. Karpiński, *Podstawy odlewnictwa*. Wyd. Politechniki Koszalińskiej, Koszalin 2009.
4. Ignaszak Z., *Publikacje na temat badań nieniszczących wyrobów metalowych (odlewnych i odkuwek). Proceedings z seminariów szkoleniowych w Zakopanem 2000-2010*. Dostępne również w Internecie.
5. *Paca zbiorowa pod redakcją Jopkiewicz A., Odlewnictwo laboratorium*, Wyd. Politechnika Łódzka, Łódź 2001.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	40	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	1,00