

University: <i>University of Žilina</i>	
Faculty: <i>Faculty of Mechanical Engineering</i>	
Course ID: <i>2Y036</i>	Course name: <i>Investment casting technology I</i>
Profile course: <i>no</i>	
Type, scope and method of educational activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars, or clinical practice	<i>3 - 1 - 1 (lectures-exercises-laboratory exercises) lessons per semester</i>
Teaching method	<i>Onsite education</i>
Methods by which the educational outcomes are achieved	<p>Lectures: <i>the course is taught in the form of lectures, which have the character of an explanation of the basic principles and theory of the investment casting method, lectures are interactive with an empathy on a discussion and strong focus on multimedia support.</i></p> <p>Exercises: <i>demonstration methods and practical training of lectures are used.</i></p> <p>Laboratory exercises: <i>exercises are carried out in a specialized laboratory of the department of technological engineering focused on metal casting technologies. motivational demonstration; teaching of specific problematics.</i></p>
Number of credits: <i>6</i>	
Study workload: <i>The total time required for the course is 156 hours per semester, of which 65 hours (3h*13 + 1h*13 + 1h*13) per semester is direct teaching and 91 hours per semester are independent study and independent creative activity of the student.</i>	
Recommended semester / trimester study: <i>1</i>	
Degree of study: <i>3</i>	
Prerequisites:	
Co-requisites:	
<p>Conditions for passing the course: <i>The subject is evaluated in points. The final points are the sum of the points that the student gets during the semester (in exercises and laboratory exercises) and the points that he / she gets in the exam. It is possible to obtain max. 100 points, of which 40 points in exercises and 60 points in the exam.</i></p> <p>Ongoing evaluation: <i>During the semester, students will will prepare a paper with a maximum number of points 30. The maximum number of points that the student will be able to obtain for their work during the semester is 40. To register for the exam must student achieve at least 24 points.</i></p> <p>Final subject classification: <i>Students who have completed exercises and laboratory exercises, completed written test and have obtained a min. 24 points out of 40. The exam consists of a written (test, which includes a test of theoretical knowledge) and an oral part (answers to individual questions).</i></p>	

The points obtained in the exercises (max. 40) are added to the points obtained during the exam (max. 60) and the final evaluation of the completed subject is determined by the sum.

Final Evaluation Grid:

Grade A: 93 – 100 points

Grade B: 85 – 92 points

Grade C: 77 – 84 points

Grade D: 69 – 76 points

Grade E: 61 – 68 points

Grade FX: less than 61 points

Evaluation matrix for the achievement of learning outcomes:

Learning outcome evaluation matrix:

Forms and methods of evaluation	Weight	Area of knowledge, skills, competences
<i>Semestral work</i>	<i>30%</i>	<i>Expertise, working with information, independence</i>
<i>Student portfolio</i>	<i>10%</i>	<i>Expertise, working with various information sources, the ability to discuss and teamwork</i>
<i>Exam in the form of a presentation with discussion</i>	<i>60%</i>	<i>Obtained knowledge</i>

Course outcomes:

After learning course Investment casting I students will be able to:

- recognize the equipment, stations and departments observed in most investment casting foundries;
- identify the basic components of an investment casting mold assembly;
- describe shell mold making process;
- outline flash-firing of wax from the ceramical shell;
- explain the reason for mold preheating;
- describe the process of metal pouring and solidification;
- recognize suitable materials for investment casting process;
- point out the advantages and disadvantages of investment casting method;
- detect and analyze the defects common for the investment casting process;
- clearly explain the possibilities for investment castings use in practice.

Course contents:

- investment Casting Pattern designing;
- investment Casting Patterns assembling to a central wax bar with gates;
- shell mold creation process by dipping (investing) the cluster into a ceramic slurry;
- shell layering with a ceramic refractory grain;
- flash-firing the shell in a furnace to sinter the mold and remove the Investment Casting Pattern style the shell;
- mold preheating;
- casting process;
- ceramic shell removing from the solid metal through mechanical vibration, chemical cleaning, or water blasting depending on the particular metal used;
- original parts apretation;

- *final inspection.*

Exercices:

- *gating system calculation;*
- *numerical simulation of casting process.*

Laboratory exercises:

- *creating shell mold;*
- *pouring aluminium alloy to shell mold;*
- *analysis of casting quality.*

Recommended literature:

1. BRŮNA, M., PASTIRČÁK, R. 2018. Casting technologies with increased accuracy. Žilina:Žilinská univerzita v Žiline, 2018. pp. 125 s. ISBN 978-80-554-1467-6.
2. CAMPBELL, J. 2003. Casting. Oxford: Butterworth-Heinemann - Elsevier Science Ltd. ISBN 0 7506 4790 6.
3. COLLINS, N. 2012. Ultimate guide to lost wax casting. Authorhouse. ISBN-9781469156958. pp. 192.
4. R. SIAS, F. 2006. Lost-Wax Casting. Woodsmere Press. ISBN 9780967960005. pp. 216.
5. CAMPBELL, J. 2004. Castings Practice: The Ten Rules of Castings. Oxford, United Kingdom: Butterworth Heinemann, isbn 07506 4791 4. PP 204.

Language, knowledge of which is necessary to complete the course: English

Notes:

Course evaluation

Assessed students in total: 9

A	B	C	D	E	FX
100 %	0 %	0 %	0 %	0 %	0 %

Person securing the course (course guarantor): doc. Ing. Marek Brůna, PhD.

Lecturers:

Name and surname of the teacher, titles	Organizational form provided by the university teacher
doc. Ing. Marek Brůna, PhD.	lectures, exercises, laboratory excercises
Ing. Marek Matejka, PhD.	exercises, laboratory excercises

Date of last change: 14.12.2021

Approved by: prof. Ing. Dana Bolibruchová, PhD. (*guarantor*)