University: *University of Žilina*	
Faculty: *Faculty of Mechanical Engineering*	
Course code: *2Y029*	**Course name:** *Investment casting technology II*
Profile course: *no*	
Type, scope and method of educational activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars, or clinical practice	*2 - 2 - 1 (lectures-exercises-laboratory exercises) lessons per semester*
Teaching method	*Onsite education*
Methods by which the educational outcomes are achieved	**Lectures:** *the course is taught in the form of lectures, which have the character of an explanation of the advanced principles and theory of the investment casting method, but also lost foam casting method, lectures are interactive with an empathy on a discussion and strong focus on multimedia support;* **Exercises:** *demonstration methods and practical training of lectures are used*; **Laboratory exercises:** *motivational demonstration; teaching of specific problematics.*
Number of credits: *6*	
Student workload: *The total time required for the course is 156 hours per semester, of which 65 hours per semester is direct teaching (2*13h + 2x13h +1*13h) and 91 hours per semester are independent study and independent creative activity of the student.*	
Recommended semester / trimester study: *3*	
Degree of study: *3*	
Prerequisites: **Co-requisites**:	
Conditions for passing the course: *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.* **Ongoing evaluation:** *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.* **Final subject classification:** *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).* *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
semestral work	*30%*	*Expertise, working with information, independence*
student portfolio	*10%*	*Expertise, working with various information sources, the ability to discuss and teamwork*
exam in the form of a test	*60%*	*Obtained knowledge*

Course outcomes:
After learning course of Investment casting technology II students will be able to:

- *describe in detail the whole investment casting process step by step in context;*
- *identify the specific materials used in casting industry for aviation and automotive industry;*
- *recognize the advantages and disadvantages of vacuum investment casting method;*
- *clearly explain the basics for lost foam casting method;*
- *clearly explain high pressure/low pressure die casting process;*
- *detect and analyze the defects common for the lost foam, high pressure/low pressure die casting process;*
- *explain the possibilities for the use in practice of the lost foam, high pressure/low pressure die casting process*

Course contents:

- *Advanced knowledge about investment casting process;*
- *complex informations about shell making, focused on materials used during the process;*
- *specific materials use castings focused on aviaiton and automotive: Inconels etc...;*
- *vacuum casting process explanation, possibilities of use in practice;*
- *lost foam process explanation, possibilities of use in practice;*
- *high pressure die casting process explanation, possibilities of use in practice;*
- *low pressure die casting process explanation, possibilities of use in practice.*

Excercises:

- *stereolitography, selective laser sintering;*
- *fused deposition modeling, laminated object manufacturing, 3DP;*
- *jetted photopolymer, perfactory, model maker;*
- *creating numerical simulations;*
- *solid ground curing, waxjet, rapid prototyping application in casting industry.*

Laboratory excercises:

- *squeeze casting practice.*

Recommended literature:

1. CAMPBELL, J. 2004. Castings Practice: The Ten Rules of Castings. Oxford, United Kingdom: Butterworth Heinemann, isbn 07506 4791 4. PP 204.
2. 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.
3. CAMPBELL, J. 2003. Casting. Oxford: Butterworth-Heinemann - Elsevier Science Ltd. ISBN 0 7506 4790 6.
4. COLLINS, N. 2012. Ultimate guide to lost wax casting. Authorhouse. ISBN-9781469156958. pp. 192.
5. SIAS, F. 2006. Lost-Wax Casting. Woodsmere Press. ISBN 9780967960005. pp. 216.

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

Notes:

Course evaluation
Assessed students in total: 7

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 exercises

Date of last change: 14.12.2021

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