



COURSE SYLLABUS **Component Casting, 6 credits**

Komponentgjutning, 6 högskolepoäng

Course Code: TKGK11	Education Cycle: First-cycle level
Confirmed by: Dean Mar 1, 2021	Disciplinary domain: Technology
Revised by: Director of Education Jan 20, 2022	Subject group: MT1
Valid From: Aug 1, 2022	Specialised in: GIF
Version: 3	Main field of study: Product Development

Intended Learning Outcomes (ILO)

On completion of the course, the student should

Knowledge and understanding

- display knowledge of how different casting processes and equipment work
- display knowledge of the molded material microstructure in detail
- demonstrate comprehension of shape and form materials
- demonstrate comprehension of design and defects in casting

Skills and abilities

- demonstrate the ability to explain and analyze how different the cast components are manufactured and how material properties depend on manufacturing process
- demonstrate the ability to formulate heat balances for molds and setting materials
- demonstrate the ability to calculate the mold filling
- demonstrate skills of applying heat balances for mathematical relationship between heat flow and microstructure

Judgement and approach

- demonstrate the ability to compare and select the appropriate alloy / materials, proper design / design and casting process to get the right properties
- demonstrate the ability to evaluate different solutions through process simulation

Contents

The course aims to give the student basic knowledge and deepening of component production of the casting of metallic materials, including design, material properties and manufacturing processes. In each step, a scientific approach to technology both in terms of systematic approaches and mathematical language to be able to analyze and evaluate process solutions and the problems that are associated.

The course includes the following topics:

- Manufacturing of components by casting.

- Applications of heat transfer, including conduction, convection, radiation to calculate the solidification and feeding.
- Applications of fluid flow, Bernoulli's equation, the continuity equation, lamellar and turbulent flow
- Cast materials, solidification and microstructure and properties. Phase diagrams. The relation casting process, microstructure and properties of cast alloys. Shrinkage and gas porosity.
- Design for casting and cast materials
- Introduction to computer simulation of the casting process. The integration of CAD / CAM

Type of instruction

Recorded lectures, computer based laboratory exercises and assignments. Teaching can be done both on campus as well as distance learning.

The teaching is conducted in English.

Prerequisites

General entry requirements, Physics 2, Chemistry 1, Mathematics 3c, and completed courses in Solid Mechanics, 6 credits and Basic Thermodynamics and Transport Phenomena, 3 credits (or the equivalent) and proof of English proficiency is required.

Examination and grades

The course is graded 5,4,3 or Fail.

The final grade will only be issued after satisfactory completion of all assessments.

Registration of examination:

Name of the Test	Value	Grading
Examination ¹	3 credits	5/4/3/U
Laboratory work and Assignments	3 credits	U/G

¹ Determines the final grade of the course, which is issued only when all course units have been passed.

Course literature

Literature

The literature list for the course will be provided 8 weeks before the course starts.

Component Casting with Simulation, School of Engineering, Jönköping och Webbased material.

Complementary texts: J., Campbell, "Complete Casting Handbook", D. M. Stefanescu, "Science and Engineering of Casting Solidification", H. Fredriksson & U., Åkerlind, "Materials Processing During Casting