KURSPLAN
Stelningsprocesser, 3 högskolepoäng

Solidification Processing, 3 credits

Kurskod:	TSPS22	**Utbildningsnivå:**	Avancerad nivå
Fastställd av:	VD 2022-03-01	**Utbildningsområde:**	Tekniska området
Gäller fr.o.m.:	2022-08-01	**Ämnesgrupp:**	MA2
Version:	1	**Fördjupning:**	A1F
		Huvudområde:	Produktutveckling

Lärandemål

After a successful course, the student shall:

Kunskap och förståelse
- Fundamental understanding of microstructure development during solidification
- Knowledge about the effects of composition and cooling rate on microstructure
- Knowledge about how microstructure can be controlled and altered by trace level additions such as inoculation

Färdighet och förmåga
- Ability to calculate and discuss in details the formation of various solidification microstructures in relation to the phase diagram

Värderingsförmåga och förhållningssätt
- Ability to suggest methods to improve the microstructure and performance of cast metals

Innehåll

The formation of microstructure during solidification, mechanisms and impact of altered solidification conditions. The fundamental mechanisms of solidification including nucleation, primary phase growth, eutectics and peritectics. Furthermore, the mushy zone and its properties are discussed in relation to the formation of casting defects. Real-life examples of inoculation/grain refinement and modification of aluminium alloys and cast irons are described in detail.

The course includes the following elements:
1. Homogeneous and heterogeneous nucleation
2. Interface stability
3. Constitutional undercooling
4. Primary phase growth
5. Eutectics
6. Peritectics
7. Mushy zone characteristics and its importance for casting defects

8. Grain refinement and modification of aluminium
9. Cast iron - solidification characteristics, microstructures and control

Undervisningsformer

Recorded lectures. Discussion sessions and tutorials for the quizzes and examination.

Undervisningen bedrivs på engelska.

Förkunskapskrav

Passed courses at least 90 credits within the major subject Mechanical Engineering, 15 credits Mathematics, and completed course in Microstructural Engineering, 7,5 credits and Thermodynamics, 7,5 credits, proof of English proficiency is required (or the equivalent).

Examination och betyg

Kursen bedöms med betygen 5, 4, 3 eller Underkänd.

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Quizzes	1 hp	U/G
Examination[I]	2 hp	5/4/3/U

[I] Bestämmer kursens slutbetyg vilket utfärdas först när samtliga moment godkänts.

Kurslitteratur

Litteratur

The literature listfor the course willl be provided eight weeks before the course starts.

Kurz and Fischer, Fundamentals of Solidification, Trans-Tech Publications
Selected publications will be made available during the course, or retrieved from the library.