



Semnan University  
Faculty of Materials and Metallurgical Engineering

## In the name of God

### Course Outline

2<sup>nd</sup> semester 2018/2019

updated on 01/23/2019

<b>Course: Solidification and Casting</b>		No. of units:2	Level: Undergraduate
Lecturer: Dr. Habibollahzadeh		Pre-request: Heat Transfer	
Internal Phone No: 3383			
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Hours per week: 2		Class No:	
Scope: Casting furnaces, qualitative liquid metal treatment, molding practice, nucleation and grow during metal solidification,			
Assessment	Class activities	Quiz	Final exam
Percent	5% + unlimited promoting credit via extra class activities	15	80
References:			
Fundamental of Metal casting- Flinn			
Solidification Processing- Flemings			

### Headlines

Educational week	Topics	Notes
1	Casting furnaces; crucible and flame furnaces	
2	Casting furnaces; electrical furnaces	
3	Qualitative treatment of molten metal; fluxing and degassing	
4	Qualitative treatment of molten metal; grain refining, modification of Si, inoculation and spheroidizing of graphite	Quiz
5	Molding practice; sand molding and its constituents	
6	Molding practice; sand molding	
7	Molding practice; sand and permanent molding	
8	Introduction to fluid dynamic; design of gating system	
9	Design of gating system, heat treatment during solidification	Quiz
10	Feeding and its calculations	
11	Feeding calculations	
12	Liquid structure and properties, comparison with solids and gasses	
13	A brief review on thermodynamical conditions of nucleation from liquid metals, homogeneous and heterogeneous nucleation	
14	Solidification varieties during single-phase solidification, non-equilibrium solidification, segregation, convection effect	Quiz
15	non-equilibrium solidification; planar growth criterion, constitutional supercooling, microscopic growth; cellular and dendritic	
16	Macroscopic growth; grain and its types, grain refining	