ME 468 : Casting and Welding Engineering

Semester: Any

**Catalog Data**


*Prerequisite: ME 206*

**Textbook**


**References**

None

**Objectives**

The course is designed to provide students with the metallurgical and engineering principles of casting and welding processes. The influence of process variables on casting and weld quality is emphasized.

**Pre/Co-Requisites by Topic**

1) Principles of manufacturing processes
2) Heat transfer
3) Thermodynamics I
4) Engineering drawing principles
Course Outline

1) Melting, refining and control of liquid metal composition .............................................. 4 Classes
2) Mechanism and rate of solidification of metals and alloys .......................................... 4 Classes
3) Design and production of casting molds ........................................................................... 6 Classes
4) Mold materials ................................................................................................................. 2 Classes
5) Testing and evaluation of casting defects ....................................................................... 2 Classes
6) Overview of liquid state welding processes ................................................................... 2 Classes
7) Welding metallurgy ......................................................................................................... 2 Classes
8) Testing and evaluation of welding defects ...................................................................... 2 Classes
9) Welding process selection, codes, and specifications ..................................................... 4 Classes
10) Automation in foundry and welding processes .............................................................. 2 Classes

Design Activities/Projects (Laboratory)

1) Green sand quality testing and evaluation.
2) Mold and pattern design.
3) Testing and evaluation of casting.
4) Welding design and process selection project.
5) Pre- and post-process heat treatment of welds.
6) Testing and evaluation of weldments.
7) Application of welding codes and specifications.
   Equipment involves green sand molding, pattern making, Plasma, TIG and MIG welding. Optical and Electron microscopes, etc.

Computer Usage

Casting pattern design and welding standards software.

Evaluation Methods

1) The student will be tested over classroom lectures, handouts, and textbook materials.
2) The student will be evaluated by grading the lab work.
3) The student will be routinely evaluated on an individual basis by the instructor at the end of each completed term project.

**Student Learning Outcome**

1) The student will learn basics of casting and welding metallurgy. [1, 2, 3]
2) The student will learn the problems and common defects in casting and welding processes. [1, 2, 3]
3) The student will learn and practice the principles of designing casting pattern and mold. [1, 2, 3]
4) The student will learn the methods of testing and evaluation of weldment. [1, 3]
5) The student will learn welding design and process selection project. [1, 2, 3]
6) Welding codes and specifications. [1]

**ABET Category**

<table>
<thead>
<tr>
<th>Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Science</td>
<td>1.5</td>
</tr>
<tr>
<td>Engineering Design</td>
<td>1.5</td>
</tr>
</tbody>
</table>