THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Welding Metallurgy I

WELDENG 7101

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Application of physical metallurgy principles to nonequilibrium thermo-mechanical conditions associated with welding in structural alloys and focus on carbon steels.

Prerequisites and Co-requisites:
Prereq: Grad standing, or permission of instructor.

Course Goals / Objectives:
- Understand fundamental concepts of welding/joining metallurgy
- Understanding of regions of fusion and solid-state welds, weld solidification, HAZ phenomena, weld defects, and weldability testing
- Basic understanding of the nature of iron and its allotropic form
- Understanding the effects of alloying elements on the solid state transformation of iron alloys (steels)
- Understanding of heat treatment of carbon and low-alloy steels and the effect of welding thermal cycles on structure and properties of steels in the heat-affected-zone and weld metal
- Understanding of welding procedures, steel and filler metal classification systems, and post-weld heat treatments
- Understanding of weldability and weldability testing

Course Topics:

- Introduction to Welding Metallurgy
- Regions of a Weld in Fusion and Solid-State Weld
- Weld Solidification Principles
- Fusion Zone
- Unmixed-Zone and Partially Melted Zone
- Heat-Affected-Zone
- Classification of Defects and Discontinuities
- Weldability
- Weldability Testing
- Introduction to Steels
- Steel Making and Processing
- Physical Metallurgy of Steels
- Weld Microstructure Evolution
- Consumables and Selection
- Welding Fume
- Weldability of Steels (General)
- Hydrogen Cracking
- Post-weld Heat Treatment and High-Temperature Properties of Steel Welds
- Fracture and Fatigue Behavior

Designation:

Elective