Welding Metallurgy II

WELDENG 7102

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Addresses the welding metallurgy and weldability principles associated with stainless steels, and nickel-base, aluminum-base, and titanium-base alloys.

Prerequisites and Co-requisites:
Prereq: 7101 or 4101, and Grad standing; or permission of instructor.

Course Goals / Objectives:
- Provide a basic understanding of the physical and welding metallurgy of stainless steels, including the use of phase diagrams and constitution diagrams
- Describe the weldability aspects of stainless steels, including susceptibility to various forms of cracking that occur during fabrication and service
- Provide a basic understanding of the physical and welding metallurgy of important nonferrous alloy systems, including nickel-, titanium-, and aluminum-base alloys
- Provide guidelines for selection of these alloy systems based on their welding metallurgy and weldability characteristics
- Review basic concepts regarding characterization and failure analysis
- Allow students to conduct detailed review/critique of technical papers and provide a review to the class
Course Topics:
- Introduction and History of Stainless Steels
- Effect of alloying additions to stainless steel, and use of phase diagrams and constitution diagrams
- Physical metallurgy, welding metallurgy, and weldability of the major classes of stainless steels
- Dissimilar welding of stainless steels
- Welding Metallurgy of Ni-base alloys
- Welding Metallurgy of Al-Alloys
- Welding Metallurgy of Ti-alloys and Mg-alloys
- Welding Metallurgy of other nonferrous alloys
- Characterization and failure analysis
- Computational modeling of microstructure evolution

Designation:
Elective