Welding Metallurgy II

WELDENG 4102

Credit Hours:
4.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture
Lab

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

Prerequisites and Co-requisites:
Prereq: 4101, and enrollment as WeldEng-BS major; 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
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 and Weldability of Ni-base alloys
- Welding Metallurgy and Weldability of Al-Alloys
- Welding Metallurgy and Weldability of Ti-alloys and Mg-alloys
- Welding Metallurgy and Weldability of other nonferrous alloys
- Characterization and failure analysis
- Computational modeling of microstructure evolution in welds

Designation:
Required