



# Welding Metallurgy II

## WELDENG 4102

**Credit Hours:**

4.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Components:**

Lecture

Lab

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**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.

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**Prerequisites and Co-requisites:**

Prereq: 4101, and enrollment as WeldEng-BS major; or permission of instructor.

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**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
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**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
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**Designation:**

Required