Solid-State Welding/Joining

WELDENG 4021

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
The welding and joining of materials in the solid state with emphasis on physical processes and metallurgical principles.

Prerequisites and Co-requisites:
Prereq: 4002, and enrollment in the WeldEng-BS or MatScEn-BS major; or permission of instructor.

Course Goals / Objectives:
• To expand the students understanding of solid state welding process through exploration of processes and scientific and engineering principles that govern the processes, as well as, fundamental mechanisms
Course Topics:
- Mechanisms of Solid State Welding I
- Thermo-mechanical Processing of Metals and Alloys (Low to High Strain Rates)
- Cold and Pressure Welding
- Roll Bonding
- Flash Butt Welding
- Friction Welding
- Friction Stir Welding
- Ultrasonic Welding
- Explosive (Impact) Welding
- Magnetic Pulse (Impact) Welding
- Deformation / Resistance Welding
- Material Changes during Solid-State Joining and Its Impact
- Diffusion Based Joining Processes (includes transient liquid phase bonding)
- Meso-, Micro- and Nano-Scale Welding
- Computational Tools for Solid-State Joining

Designation:
Elective