Theory of Laser Welding

WELDENG 8004

Credit Hours:
2.00 - 2.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Theory of high energy density laser welding processes.

Prerequisites and Co-requisites:
Prereq: 4024 or 7024, and Grad standing; or permission of instructor.

Course Goals / Objectives:
- Provide in-depth knowledge of physical topics in laser-materials interaction including laser-materials interactions, rapid melting and evaporation phase changes and associated keyhole formation
- Illustrate application of the topics in laser welding and cutting models

Course Topics:
- Electric field effects on materials
- Maxwell equations
- EM wave propagation
- Gaussian beam propagation
- Classical model: light-material interaction, absorption, heating
- Review of linear heat conduction and results
- Melting and evaporation phase change kinetics
- Knudsen layer gas-kinetic analysis and recoil pressure
- Laser Drilling, Welding Process Models
Designation:
Elective