



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
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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
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Designation:

Elective