

ME 675 Advanced Welding Processes (3-0-0-6)

Introduction to advanced welding processes; microjoining and nanojoining, wire bonding; fundamentals and types of laser welding including hybrid processes, Laser properties; Stud welding and mechanical fasteners; Magnetically impelled arc welding; advanced gas tungsten arc welding; flux cored arc welding; electron beam welding; pressure welding; ultrasonic welding; explosive welding; diffusion bonding; friction stir welding; electromagnetic pulse welding; high velocity projectile impact welding; fundamentals of welding automation, welding sensors and data acquisition; welding process modeling and optimization; computational welding mechanics for thermo mechanical and microstructural phenomenon; principles of robotic welding; weld distortion and defects - causes and remedies; residual stresses; inspection and testing of weldments.

Textbooks/References:

- [1] American Welding Society, Welding Handbook - Welding Processes Part 2, Vol. 3, AWS, 2004.
- [2] Y. N. Zhou, Microjoining and Nanojoining , Woodhead publishing, 2008.
- [3] W Steen, Laser Material Processing, Springer-Verlag, 1991.
- [4] ASM International Handbook Committee, Welding, Brazing and Soldering, ASM handbook, Vol 6, 1993.
- [5] L. Liu, Welding and Joining of Magnesium Alloys, Woodhead Publishing, 2010.
- [6] J. Norrish, Advanced welding Processes, Woodhead publishing, 2006.
- [7] L. E Lindgren, Computational welding mechanics, Woodhead Publishing Limited 2007.
- [8] J. A. Goldak, Computational welding mechanics, Springer, 2005