

Course Title	Laser-based Manufacturing Applications				
Course Code	MME 442				
Course Type	Technical Elective Course				
Level	Undergraduate				
Year / Semester	4 th year / 7 th or 8 th Semester				
Teacher's Name	Claus Rebholz				
ECTS	6	Lectures / week	3+1 hours	Laboratories / week	8 hours total
Course Purpose and Objectives	Provide an overview of new and evolving manufacturing applications where laser processing plays a significant enabling role or relating to new production techniques.				
Learning Outcomes	<ul style="list-style-type: none"> • Familiarity with different laser types and their general applications • Recognition of production processes offered by lasers • Understanding of what applications are emerging in lasers, processes and materials • Knowledge of additive manufacturing processes • Acquaintance with materials joining, surface processing/modifications and micro-manufacturing processes • Familiarity with methods above in the laboratory and practice 				
Prerequisites	MME 348	Required			
Course Content	<p>Lasers are part of everyday tasks, such as reading grocery prices and printing or copying paper documents. This course emphasizes on the innovative use of lasers in manufacturing and material processing. Topics covered include: Laser background and general applications; Additive manufacturing (selective laser melting and sintering, manufacturing of multi-materials); Laser joining (welding of metals and plastics); Laser surface processing and modifications (texturing and coating deposition, and general surface processing and modification applications); Micro-manufacturing (laser cutting, drilling and welding for automotive, medical and other applications). The lecture material will be reinforced by laboratory sessions and problem sets.</p> <p>Laboratory Exercises</p> <ul style="list-style-type: none"> • Laser marking and cutting • Laser scanning • Laser surface measurements and modifications • Laser welding 				

Teaching Methodology	<ul style="list-style-type: none"> • Lectures • Tutorials • Laboratory demos and projects in machining shop • Educational field trips to local industries • Communicative, Collaborative • During the first week of the semester, the course syllabus is given to students, which includes information on the course content, expected learning outcomes, assessment and office hours.
Bibliography	<ul style="list-style-type: none"> • <i>Advances in Laser Materials Processing</i> (2nd Edition) edited by Jonathan Lawrence. Elsevier. • Steen, W.M. and J. Mazumder, <i>Laser Material Processing</i> (4th Edition). Springer. • Kannatey Asibu, E., <i>Principles of Laser Materials Processing</i> (1st Edition). Wiley.
Assessment	<ul style="list-style-type: none"> • Homework & Labs 30% • Midterm Exam 30% • Final Exam 40%
Language	Greek