

ME 487 COURSE PROFILE**DEGREE PROGRAM:** Mechanical Engineering

COURSE NUMBER: ME 487	COURSE TITLE: Welding
REQUIRED COURSE OR ELECTIVE COURSE: Elective	TERMS OFFERED: Fall
TEXTBOOK / REQUIRED MATERIAL: Welding Science and Technology, Welding Handbook, Vol. 1, 9th Edition, 2001.	PRE / CO-REQUISITES: MECHENG 382. I (3 credits)
COGNIZANT FACULTY: E. Kannatey-Asibu, Jr.	COURSE TOPICS: <ol style="list-style-type: none"> 1. Background of Welding Processes 2. Fundamental Aspects of Fusion Welding 3. Heat Flow in Weldments 4. Fluid Flow in Weld Pool 5. Welding Metallurgy 6. Residual Stresses and Distortion in Weldments 7. Design of Weldments 8. Resistance Welding 9. Laser Welding 10. Process Monitoring and Control
BULLETIN DESCRIPTION: Study of the mechanism of surface bonding, welding metallurgy, effect of rate of heat input on resulting microstructures, residual stresses and distortion, economics and capabilities of the various processes.	
COURSE STRUCTURE/SCHEDULE: Lecture; 2 per week at 3 hours	

<p>COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets.</p>	<ol style="list-style-type: none"> 1. To teach the process-level dependence of welding systems. [1, 2] 2. To expose the students to a variety of welding processes including their typical use and capabilities. [1] 3. To teach the important effects that welding processes may have on the material properties of the joined part with a focus on the most common welding processes such as arc, resistance, and laser welding. [1] 4. To teach the analysis and impact of heat flow in both fusion and non-fusion welding processes. [1] 5. To teach the analysis and impact of stress and strain in both fusion and non-fusion welding processes. [1] 6. To provide a technical understanding of common welding processes to aid in appropriate process selection for the material. [1, 2] 7. To provide a technical understanding of common processes to aid in appropriate joint design. [1, 2]
<p>COURSE OUTCOMES: for each course outcome, links to the Course Objectives are identified in brackets.</p>	<ol style="list-style-type: none"> 1. Given components to be joined, identify candidate welding processes that are capable of creating the joint to specification. [1, 2] 2. Weigh tradeoffs between similar processes based on general pros and cons in terms of heuristic guidelines. [2] 3. Compute temperatures, cooling rates, and peak temperatures of interest that are associated with different welding processes. [3, 4] 4. Compute residual stresses and strains for different welding processes. [3, 5] 5. Evaluate welding process selections for a predetermined material. [3, 4, 5] 6. Evaluate material selections for a predetermined process. [3, 6, 7]
<p>ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified</p>	<ol style="list-style-type: none"> 1. Weekly problem sets 2. One in-class midterm exam 3. One two-hour in-class final exam

PREPARED BY: E. Kannatey-Asibu, Jr.

LAST UPDATED: 06/19/2017