7001 Physical Principles in Welding Processes I  G 3: Study of the application of physical principles in engineering of arc welding processes and equipment. Prereq: Grad standing, or permission of instructor. Not open to students with credit for 4001 (500) or 600.

7002 Physical Principles of Welding Processes II  G 3: Study of the application of physical principles in engineering of non-arc welding processes and equipment. Prereq: 7001 or 4001, and Grad standing; or permission of instructor. Not open to students with credit for 4002 (600) or 601.

7003 Principles of Welding Process Control  G 3: Study of principles and practical application of control systems and control elements of welding processes. Prereq: 7001 or 4001, and Grad standing; or permission of instructor. Not open to students with credit for 4003 (605) or 655.

7012 Resistance Welding Processes  G 2: Addresses the fundamentals, theory, and application of Resistance Welding processes, with emphasis on processes, equipment, materials, and quality control. Prereq: 7002 or 4002, and Grad standing; or permission of instructor. Not open to students with credit for 4012 (602) or 702.

7021 Solid-State Welding/Joining  G 3: The welding and joining of materials in the solid state with emphasis on physical processes and metallurgical principles. Prereq: 7001, 7002, 7101, 7102, 4001, 4002, 4101, or 4102, and Grad standing; or permission of instructor. Not open to students with credit for 4021 (701).

7023 Brazing and Soldering  G 3: Brazing and soldering processes with emphasis on physical and metallurgical principles, materials, design and application considerations. Prereq: 7101 or 4101, and 7102 or 4102, and Grad standing; or permission of instructor. Not open to students with credit for 4023 (703).

7024 High Energy Density Welding Processes  G 3: Theory and practice of laser, electron beam, and other high energy density welding processes. Prereq: 7001 or 4001, and Grad standing; or permission of instructor. Not open to students with credit for 4024 (704).

7102 Welding Metallurgy II  G 3: Addresses the welding metallurgy and weldability principles associated with stainless steels, and nickel-base, aluminum-base, and titanium-base alloys. Prereq: 7101 or 4101, and Grad standing; or permission of instructor. Not open to students with max credit for 4102 (612).

7112 Weldability  G 3: Teaches the basic concepts of weldability and focuses on failure mechanisms in welded construction. Failure phenomena that occur during fabrication, repair, and during service are discussed. Prereq: 7101 or 4101, and Grad standing; or permission of instructor. Not open to students with credit for 4112 (714) or 715.
7113 Joining of Specialty Materials G 2: Welding metallurgy and weldability of specialty structural materials, including reactive and refractory materials, composites, and nanostructured materials. Prereq: 7101 or 4101, and Grad standing; or permission of instructor. Not open to students with credit for 4113 (713).

7115 Special Topics in Welding Engineering G 2: Fundamental understanding of microstructure and property evolutions in welds using an integrated computational modeling approach. Prereq: 7002 or 4002, and Grad standing; or permission of instructor. Not open to students with credit for 4115 (715).

7201 Engineering Analysis for Design and Simulation G 4: Fundamentals of engineering analysis of heat flow, thermal and residual stresses, and fracture and fatigue with applications to design and simulation in welding and manufacturing. Prereq: Grad standing, or permission of instructor. Not open to students with credit for 4201 (620) or 621.

7202 Welding Design G 3: Fundamentals of design and application of codes and standards for welded structures. Prereq: Grad standing, or permission of instructor. Not open to students with credit for 4202 (641) or 621.

7240 Fitness-for-Service of Welded Structures G 2: The interrelationship of design, fabrication, nondestructive evaluation, fracture mechanics, and reliability concepts in establishing the overall fitness-for-purpose of welded structures. Prereq: 4201 (620), and Grad standing; or permission of instructor. Not open to students with credit for 4240 (740).

7301 Nondestructive Evaluation G 3: Main concepts of Nondestructive Evaluation of materials as apply to inspections of joints and structures; principles of conventional methods, their capabilities and limitations. Prereq: Grad standing, or permission of instructor. Not open to students with credit for 4301 (631).

7406 Welding of Plastics and Composites G 3: Theory and practice in welding of plastics and polymeric composites, including theory and analysis of welding processes, part and joint design, and process selection. Prereq: 4201 (620), or permission of instructor. Not open to students with credit for 4406 (706).

7407 Adhesive Bonding and Mechanical Joining of Plastics G 2: Fundamentals of adhesive bonding science and technology and methods for mechanical joining of plastics including fasteners, snap-fits, press-fits, swaging, and staking. Prereq: 4201 (620) or 7201, and Grad standing; or permission of instructor. Not open to students with credit for 4407 (707).