1. Title of Course: MME 4303, Metals Processing

2. Catalog Description: Metals Processing (3-0) Analysis of the unit operations involved in metals and mineral production using the principles of material and energy balance, fluid flow, heat transfer, reaction kinetics, and thermodynamics. Survey of processing operations for specific metals such as copper, iron, aluminum, magnesium, titanium, and uranium. Prerequisite:

3. Prerequisites: BE 2375, MME 3306, and MME 3308, each with a grade of "C" or better, and junior standing.

4. Textbook: Various, including ASM Handbooks and Welding Engineering textbooks provided by instructor.

5. Course Objectives: This course is designed to introduce students to the application of engineering and science in practice in materials production environments, specifically: foundry production and solidification, welding engineering, and composites. Students shall gain practical experience in operations, design considerations and experimental practice for each of these materials processes. Students will get skills, both theoretical and experimental, enabling them to have knowledge competitive with that found in industrial environments.

6. Topics: Casting, solidification rates, geometry, degasification techniques, materials joining including GMAW (MIG), GTAW (TIG), FSW, EAW (STICK) and properties of joined materials, including tensile strength, tensile modulus, flexural strength, interlaminar strength and shear strength. Hardness testers, SEM, tensile testing, crucible furnaces, welding equipment, polishing equipment, metallographs.

7. Class Schedule: The course meets twice per week for 50 minutes per class and 3 to 6 hours per week for laboratories, usually on MWF evenings.

8. Contribution to the Professional Component: This course is taught only to Metallurgical and Materials Engineering students and contributes mostly to outcomes A, via case studies, and outcome B via test laboratories and practical experiment.

9. Relationship to Program Objectives: Course enables students to see the applications of fundamental concepts introduced in previous classes and assists development toward professional practice. Therefore this course contributes to educational objectives 1 and 2.