**Course number and name: MTSE 3080: Materials Processing**

**Credits and contact hours:** 3 Credits. Tuesdays 9:30-11am

**Instructor’s or course coordinator’s name:** Dr. Rick Reidy

**Text book, title, author, and year**

Course handouts will be provided

1. *Other supplemental materials*

None

**Specific Course Information**

1. *Brief description of the content of the course (catalog description)*

This course emphasis is on the basic principles and strategies for processing of metallic, ceramic, electronic, and polymer materials. Processing topics will include refining of materials as well as methods to impart specific properties and shapes to a material.

1. *Prerequisites or co-requisites*

MTSE 3040

1. *Indicate whether a required, elective, or selected elective course in the program*

Required

**Specific goals for the course**

1. *Specific outcomes of instruction*

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| **Specific Course Learning Outcome** |
| 1. Select materials for specific applications based on their inherent properties and the necessary processing techniques. |
| 1. Apply thermodynamics and diffusion to process metals |
| 1. Understand high temperature processing of metals and ceramics |
| 1. With basic knowledge about different polymer classes (thermoplastics, thermosets, elastomers), to predict and design processing procedures for each. |
| 1. Be able to describe the basic processes in integrated circuit device manufacturing |

1. *Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*

This course addresses ABET Student Outcome 2

**Brief list of topics to be covered**

I Metal Processing

Metal separation, hydrometallurgy (gold, Mg), pyrometallurgy (iron, steel, copper), powder metal processing, high temperature metal processing, metal heat treatment, phase transformations, metal hardening and strengthening

II Ceramic Processing

Slip casting, powder synthesis, sol-gel synthesis, tape casting, ceramics high temperature processing, glass processing, ceramic densification

III Electronic Materials

Silicon, IC construction, thin films-- film deposition (metal, dielectrics), oxidation and diffusion in silicon, ion implantation, wet processes, plasma processing

IV Processing

polymer synthesis, thermoplastics, thermosets, polymer melt processing, extrusion, composites