MSE 280 – Introduction to Computer Methods in Materials Science and Engineering

Credits and contact hours: 2 credits and 30 contact hours

Indicate: math, basic science, engineering topic or other
Engineering topic

Instructor’s or course coordinator’s name: Dr. Zheshen Zhang

Textbook, title, author and year: None. Lecture slides are posted on d2l. References include Mathworks website and other online materials

Other Supplemental materials: “Introduction to MATLAB for Engineers” (3rd Edition) by William Palm; “MATLAB” (5th Edition) by Amos Gilat

2017-2018 catalog description:
- An introduction to the fundamentals of scientific programming using MATLAB.
- Utilize MATLAB for solving problems in materials science and engineering.

Prerequisites: Math 223, Math 254

Co-requisites: None

Required, Elective, or Selected Elective: Required

Instruction Outcomes:
1. To understand the broad fundamentals of the construction of computer software, including basic flow control, loops, functions
2. To obtain proficiency in inputting and outputting data to and from numerical software in a variety of useful forms
3. To obtain proficiency displaying data in graphical form
4. To obtain proficiency using a computer to solve a wide range of problems in materials science and engineering by applying concepts of engineering design

Student Outcomes – To produce graduates who can:
**Listed in Criterion 3 or any other outcomes are addressed by the course:**

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

3. an ability to communicate effectively with a range of audiences

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

**Topics covered:**

1. **Fundamentals**
   - Basics of programming: Flow control; Loops; Input/Output; Arrays; Plotting
   - Matrix operations
   - Root-finding
   - Curve fitting
   - Solutions of ordinary differential equations
   - Numerical integration techniques
   - Fourier transforms
   - Techniques to solve the dynamics of linear systems

2. **MSE case studies**
   - Oscillators
   - Pulse propagation in optical fiber