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