

ENAS S130 – Introduction to Computing for Engineers and Scientists (Summer 2018)
Professor Roman Kuc

Parsing the title:

- **Introduction** – Although there are no formal prerequisites, some previous programming experience is helpful but not necessary. The course starts with basic programming principles using Matlab, which is a new programming language for most students.
- **Computing** – Different from *programming*, computing is the subset of computer programming techniques that are employed for numerical calculations typically encountered for processing, analyzing, displaying, and simulating data. The course covers a subset of Matlab to form a firm foundation that can be extended for computing tasks that are peculiar to a particular engineering discipline.
- **Engineers** – Verbs that typically describe engineering activity include *design, assess, and optimize*. Computer programs will illustrate techniques for designing a system and assessing and optimizing its performance.
- **Scientists** – Verbs that typically describe scientific activity include *evaluate, simulate, and analyze*. Computer programs will illustrate discrete-math techniques for evaluating series expansions, simulating physical systems and analyzing their dynamic behavior.

Educational Objectives. Students who successfully complete ENAS130 will be able to

- Design computational algorithms to problem solving.
- Compose Matlab programs to solve computational problems.
- Effectively display the results in a convincing fashion.

Course structure. The course teaches basic programming and problem-solving techniques using Matlab, a user-friendly and complete computer language that is widely used in science and engineering. Its graphic capabilities and ease of programming are making it the standard for academic and professional use. Matlab also includes features to access real data, such as microphone speech and jpeg images, to illustrate applications to practical problems, such as signal processing and encryption. The course project applies the Matlab tools taught in the course by simulating a communication system and assessing its performance by transmitting a speech signal and an image in the presence of noise.

Grading:

- Scores on two tests and a final project, each covering a main part of the course – 30% each
- Homework– 10%

Required for class:

- A laptop running either Windows 10, or Mac OSX.
- Matlab program – a student download will be available.
- Text: Matlab is updated annually with new features, so a current text is soon outdated. The lectures teach the necessary instructions and gives examples. Homework tests your understanding and the solutions indicate my coding style. You have two choices to probe more deeply: On line tutorials or a textbook.
 - Learning Matlab using on-line resources. This approach has the advantages of being current and of being the method that you will use for writing programs in your future courses and career.
 - Some students prefer a textbook. In this case, any text that describes the basics of Matlab will get you started. Texts that have used in the course include *Matlab* by Attaway (4th Ed) or by Chapman (5th Ed). Earlier editions are adequate and can be obtained at discounted prices.

