

DE 498/598 Introduction to computing tools in engineering

Credit: **3 (3-0-6)**
Prerequisite: **None**

Semester: **2** Year: **2017**

Instructors: **Krisada Chaiyasarn**

Fri 13.30-16.30

Objectives: Students are expected to

- ◆ understand important functionalities in Excel are necessary for engineers and be able to apply them in engineering problems
- ◆ be able to use simple a scripting language to model and solve engineering problems
- ◆ apply the course knowledge in their professional careers

Course Description: Introduction in using computer software to solve engineering problems, including modelling and data analysis by regression. Introduction to information design and various types of graphical representations. Introduction to commonly-used software functionalities in business. Introduction to advanced features and solving complex problems.

Course Materials www.krisadachaiyasarn.org/teaching/de-498

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SESSION

TOPIC

Introduction

- 1 Introduction to concepts of modelling and solving problems using excel and Matlab and outline course syllabus.

Introduction to Matlab

- 2 Matlab Anatomy, built-in functions, Matlab Environment, arrays and vectors, basic plot

Introduction to Matlab 2

- 3 Matlab script, control statements and classroom exercise (comparison between e^x and x^e)

Introduction to Matlab 3

- 4 Matlab function and classroom exercise (estimate the value of pi)

Introduction to Matlab 4

- 5 Matrix and vectors, introduction to a group project on beam analysis and classroom exercise (unit steps and unit ramp function)

Introduction to Matlab 5

- 6 Linear algebra, advanced plotting, class exercise (Matlab script to solve forces in truss)

Class assignment

- 7 Matlab script to solve the force in a cantilever structure

Advanced Matlab features

- 8 Symbolic toolbox, classes, string, subfunction, cell arrays, structure arrays, debugging, class exercise (solve linear algebra equation for 3D parabola)

Introduction to Excel

- 9 Shortcut keys, mathematical operators, error values, formula tools

Excel functions

- 10 basic and advanced excel functions, decision function

Class assignment

- 11 Format excel worksheet for the template which calculates forces in columns

Data mining and graph plotting

- 12 Introduction to data mining in Excel, Regression, graph plotting, information design

Class exercise

- 13 Pivot table

Class exercise

- 14 Graph plotting for experiments

Introduction to Excel VBA

- 15 Introduction to macro and VBA in Excel

COURSEWORK

Write matlab scripts and functions to solve indeterminate structures for a beam

MAIN TEXTBOOK:

Mike Girvin, *Ctrl+Shift+Enter: A Book About Building Efficient Formulas, Advanced Formulas, and Array Formulas for Data Analysis and Calculating Problems*

Brian R. Hunt, *A Guide to MATLAB: For Beginners and Experienced Users*

REFERENCES:

- ◆ <http://www.informationisbeautiful.net/>
- ◆ <http://chandoo.org/>
- ◆ http://www.mathworks.com/academia/student_center/tutorials/launchpad.html

GRADING POLICY:

Class attendance	5 %
Assignments	20 %
Mid-tem examination (1-8)	25 %

Final examination (9 - 15)	25 %
Coursework	25%