

Introduction to Engineering Analysis

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Course Details

Description

Introduction to MATLAB and its use in engineering. Implementation, verification, and analysis of various engineering algorithms used in signal and image processing, robotics, communications engineering.

Prerequisites

- Prerequisite:
 - Calculus I (Logarithmic and exponential functions, trigonometric functions, inverse functions. Limits, continuity, and derivatives. Techniques of differentiation, including logarithmic and implicit differentiation. The Mean Value Theorem. Applications of Differentiation including extrema, curve sketching, related rates, Newton's method. Antiderivatives and applications. Conic sections, polar coordinates, parametric curves).
- Corequisites:
 - Calculus II (Riemann sum, Fundamental Theorem of Calculus, definite, indefinite and improper integrals, approximate integration, integration techniques, applications of integration. First-order separable differential equations. Sequences and series, series tests, power series, convergence and applications of power series).
 - Applied Linear Algebra (Linear equations, matrices, determinants. Introduction to vector spaces and linear transformations and bases. Complex numbers. Eigenvalues and eigenvectors; diagonalization. Inner products and orthogonality; least squares problems. An emphasis on applications involving matrix and vector calculations).

Original Course Documents

[Source file URL](#)

Course Contents

Lecture 1: Introduction to MATLAB

- [Lecture 1 Slides](#)

Lecture 2: Scripts, Flow Control, and Data Structures

- [Lecture 2 Slides](#)

Lecture 3: Plotting

- [Lecture 3 Slides](#)

Lecture 4: Strings and File I/O

- [Lecture 4 Slides](#)

Lecture 5: Complex Numbers

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Lecture 6: Combinatorics

- [Lecture 6 Slides](#)

Lecture 7: System of Linear Equations and Linear Algebra

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Lecture 8: Engineering Statistics and Data Analysis

- [Lecture 8 Slides](#)

Lecture 9: Polynomial Approximation and Curve Fitting

- [Lecture 9 Slides](#)

Lecture 10: Root Finding and Differentiation

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Lecture 11: Numerical Integration

- [Lecture 11 Slides](#)

Lecture 12: MEX Files

- [Lecture 12 Slides](#)

Assignments

Assignment 1: Basic Syntax and Vectorization

- [Assignment 1](#)
- Supplementary Files
 - [Basic_syntax.m](#)
 - [data.mat](#)
 - [student_grades.mat](#)
- Solution 1 Files
 - [Basic_Syntax_Solutions.m](#)
 - [getValues.m](#)

Assignment 2: The Hound of the Baskervilles

- [Assignment 2](#)
- Supplementary Files
 - [baskervilles.txt](#)
 - [PermsRep.m](#)
 - [sample.txt](#)
 - [simulateIndep.m](#)
 - [simulateMarkov.m](#)
- Solution 2 Files
 - [1.fig](#)
 - [2.fig](#)
 - [letterStatistics.m](#)
 - [letterStatisticsDemo.m](#)
 - [output.txt](#)
 - [plot1.jpg](#)
 - [plot2.jpg](#)
 - [writeString.m](#)

Assignment 3: Texas Hold'em

- [Assignment 3](#)
- Supplementary Files
 - [Texas_HoldEm.m](#)
- Solution 3 Files
 - [Texas_HoldEm_solution.m](#)

Assignment 4: Image Interpolation

- [Assignment 4](#)

- Solution 4 Files
 - [assignment4_solution.m](#)

Assignment 5: Root Finding

- [Assignment 5](#)
- Solution 5 Files
 - [assignment5_solution.m](#)

Assignment 6: Root Finding (continued)

- [Assignment 6](#)
- Supplementary Files
 - [f.p](#)
- Solution 6 Files
 - [adaptiveSimpsons.m](#)
 - [adaptiveTrap.m](#)
 - [demoSimpsons.m](#)
 - [demoTrap.m](#)
 - [f.m](#)
 - [integralSimpsons.m](#)
 - [integralTrap.m](#)
 - [Solution.docx](#)

Assignment 7: Adaptive Quadrature

- [Assignment 7](#)
- Supplementary Files
 - [applyThreshold_slow.m](#)
 - [demoThreshold_slow.m](#)
 - [threshold_compile.m](#)
- Solution 7 Files
 - [applyThreshold_mex.mexw64](#)
 - [demoThreshold_mex.m](#)
 - [applyThreshold_mex.cpp](#)
 - [threshold.cpp](#)
 - [threshold.h](#)



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