

CIUJ: UG0411 Engineering Mathematics 2

SUT:HMS214 Engineering Mathematics 2

Credit Points: 12.5

Contact Hours: 5 Hours per Week

Duration: 1 Semester

Campus:CIUJ

Prerequisites: UG0122

Corequisites: Nil

Teaching Method: Lectures (36 Hours), Tutorials/Practice Classes (24 Hours)

Assessment: Assignments, Examinations, Tests

Aims & Objectives

To provide students with the mathematical knowledge and skills to support their concurrent and subsequent engineering studies.

Content

Matrix Analysis (24%): The eigenvalue problem, numerical methods, reduction to canonical form, functions of a matrix, engineering application.

Functions of a Complex Variable (24%): Complex functions and mappings, complex differentiation, complex series, singularities, zeros and residues, contour integration, engineering application.

The z Transform (12%): The z transform, properties of the z transform, the inverse z transform, discrete-time systems and, difference equations, engineering application.

Applied Probability and Statistics (40%): A selection from: Probabilities of random events, important practical distributions, estimating parameters, joint distributions, correlation and regression, goodness-of-fit tests, moment generating functions, statistical quality control, Poisson processes and the theory of queues, Bayes' theorem, engineering application.

Note: The Mathematica package will be used in this subject.

Reading Materials

Textbook

James, G. et al., Advanced Engineering Mathematics, Addison-Wesley, 2nd edn, 2000S

CIUJ:UG0112 Physics of Energy and Motion

SUT:HET124 Energy and Motion

Credit Points 12.5

Contact Hours :5 Hours per Week

Duration: 1 Semester

Campus: CIUJ

Prerequisites:Nil

Corequisites:Nil

Teaching Method:Lectures, Tutorials and Practical Work

Assessment:Examinations, Pracs, Tutorials

Aims & Objectives

This subject aims at revision of the fundamentals of energy and motion to bring all the students to a common level of understanding. Emphasizing will be on applications and importance of the topics in engineering context.

The subject help to produce students who:
Are capable in their professional areas.
Operate effectively in work and community situations.

Content

Linear and Rotational mechanics

Kinematics; Newton's laws; momentum; energy and work

Circular Motion

Fluid mechanics

Buoyancy; Pascal's law; Bernoulli's principle

Thermodynamics

Zeroth and first law of thermodynamics; heat transfer and expansion; kinetic theory

Vibrations and waves

Simple harmonic motion; resonance and damping

Reading Materials

Serway, R.A., Principles of Physics, Saunders, 3rd edn, 2002

CIUJ: UG111 Foundation Mathematics 1

SUT:HMS111 Engineering Mathematics 1

Credit Points :12.5 Credit Points

Contact Hours:5 Hours per Week

Duration:1 Semester

Campus:CIUJ

Prerequisites:Nil

Teaching Method:Classes (48 Hours), Tutorials/Practice Classes (12 Hours)

Assessment:Assignments, Examinations

Aims & Objectives

The aim of this subject is to equip students with required grounding in mathematics

Content

Number (12%): Error analysis, binary octal and hexadecimal systems, complex numbers.

Algebra (16%): Equations in one-variable: algebra, graphical solution, numerical solution; inequations in one variable: algebra, graphical solution; transformation of equations and formulae.

Functions and Graphs (24%): Review of functions and graphs, including polynomials, rational functions and a review of trigonometry, problems of domain, limits, asymptotes, partial fractions, inverse trigonometric functions, hyperbolic and inverse hyperbolic functions.

Differentiation (20%): Rates, approximations, Taylor polynomials, implicit and logarithmic differentiation, optimisation, detailed graphing including inflection, indeterminate forms, limits.

Integration (20%): Substitution, parts, general techniques, use of extensive tables, areas, centroids, volumes, arc lengths, surface areas, numerical integration.

Basic Data Analysis (8%): Graphical and numerical summaries of single variable data, bivariate plots, correlation, least squares regression lines.

Note: Either graphics calculator or computer facilities will be used extensively in this subject.

Reading Materials

Course notes will be made available, to enhance the prescribed text book .

CIUJ:UG0123

SUT:HET182 Electronic Systems

Credit Points:12.5

Contact Hours:5 Hours per Week

Duration:1 Semester

Campus:CIUJ

Prerequisites:Nil

Corequisites:Nil

Teaching Method:Lectures, Laboratory Work and Tutorials

Assessment

Assignments, Computer-Managed Learning, Examinations, Labs, Lab Reports, Tutorials

Aims & Objectives

This subject provides a basic introduction to analog and digital electronics (including analog DC circuit theory, digital logic and digital electronics, analog AC circuit theory, and amplification). The subject also provides a basic introduction to electromagnetism (including electric and magnetic fields, and the generation of electricity). The subject is structured around 'real-life' examples.

Content

Analog DC electronics: charge, current, voltage, Ohm's law, Kirchoffs laws series and parallel ccts., voltage divider, current divider, simplifying resistor networks, power and power transfer.

Analog AC electronics: alternating current and voltage, frequency, period, phase, amplitude: P-P, Peak, RMS; capacitor circuit and reactance, inductor circuit and reactance, RC, RL circuits (series and parallel), phasor notation; impedance, admittance frequency response of LandC, resonance; ideal transformers.

Amplification: ideal opamp, model, Open loop gain; inverting and non-inverting configuration.

Digital electronics: introduction, digital logic, number systems; boolean operators and truth tables; design and simplification of circuits; boolean laws and identities, S of P representation; K maps; combinatorial logic.

Electromagnetism: electric and magnetic fields, static and changing, magnets, magnetic induction AC generators.

Reading Materials

Hambley, AR, Electrical Engineering, Principles & Applications, Prentice-Hall, 1997.
Serway, RA, Principles of Physics, Saunders College Press, 2nd edn, 1994.

CIUJ: UG0122 Foundation Mathematics2

SUT: HMS112 Engineering Mathematics 2

Credit Points:12.5

Contact Hours:5 Hours per Week

Duration:1 Semester

Campus:CIUJ

Prerequisites: UG0111

Corequisites:Nil

Teaching Method:Lectures (48 Hours), Tutorials/Practice Classes (12 Hours)

Assessment:Assignments, Examinations

Aims & Objectives

- * To balance students' knowledge in mathematics, related to in engineering situations.
- * To provide students with the mathematical knowledge and skills that are needed to support their concurrent and subsequent engineering studies.
- * To lay a foundation for further studies in engineering mathematics.

Content

Discrete Mathematics (20%): Boolean algebra, switching and logic circuits, simple network analysis, graph theory.

Linear Algebra (20%): Matrices, determinants, solution of systems of linear equations, matrix inverse, Gaussian and complete elimination.

Vectors (15%): Basic operations in 2D, introduction to 3D space, basic vectors in 3D, products, projections, lines and planes in 3D.

Curves (15%): 2D polar co-ordinates, 2D parametric curves, parametric differentiation and antidifferentiation, 3D curves, parametric differentiation and antidifferentiation.

Surfaces and Partial Differentiation (15%): Standard surfaces as $z = f(x,y)$; relations, parametric forms, 3D polar co-ordinates, drawing 3D pictures of surfaces and 3D curves, partial derivatives, approximations, optimisation.

Differential Equations (15%): First order separable, exact, linear, orthogonal trajectories, second order linear with constant coefficients and simple right hand sides.

Note: A graphics calculator or computer soft wares will be used extensively in this subject.

Reading Materials

Course notes will be made available to complement the prescribed text book.

CIUJ:UG0213 Engineering Mathematics 3

SUT:HMS213 Engineering Mathematics 3B

Credit Points: 12.5

Contact Hours: 5 Hours per Week

Duration: 1 Semester

Campus: CIUJ

Prerequisites: UG0122

Corequisites: Nil

Teaching Method: Lectures (36 Hours), Tutorials/Practice Classes (24 Hours)

Assessment: Assignments, Examinations, Tests

Aims & Objectives

* To introduce students to the computer package Mathematica.

* To provide students with the mathematical knowledge and skills to support their engineering studies.

Content

Introduction to Mathematica (8%)

Fourier Series (24%): Fourier series expansion, functions defined over a finite interval, differentiation and integration of Fourier series, complex form of Fourier series, engineering application.

Fourier Transforms (16%): The Fourier transform, properties of the Fourier transform, the frequency response, transforms of the step and impulse functions, engineering application.

Laplace Transforms (20%): The Laplace transform, properties of the Laplace transform, solution of differential equations, step and impulse functions, transfer-functions, engineering application.

Vector Calculus (32%): Derivatives of a scalar point function, derivatives of a vector point function, line integrals, double integrals, surface integrals, volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stokes' theorem, engineering application.

Reading Materials

James, G et al., Advanced Engineering Mathematics, 2nd edn, Addison-Wesley, 2000.

CIUJ: UG0211 foundation Mathematic 3

SUT: HMS215 Engineering Mathematics 3C

Credit Points: 12.5

Contact Hours: 5 Hours per Week

Duration: 1 Semester

Campus: CIUJ

Prerequisites: UG0122

Teaching Method

Lectures (36 Hours), Tutorials/Laboratories (24 Hours)

Assessment: Assignments, Examination, Tests

Aims & Objectives

To provide students with mathematical and statistical knowledge and skills to support their concurrent and subsequent engineering studies.

Content

Numerical solution of differential equations (26%): Ordinary differential equations: Initial value and boundary value problems, finite difference methods, engineering application.

Matrix analysis (24%): The eigenvalue problem, numerical methods, reduction to canonical form, engineering application.

Applied probability and statistics (50%): Data collection, analysis and presentation Probabilities of random events, important practical distributions, sampling distributions, estimating parameters, correlation and regression, contingency tables, goodness of fit tests, extreme value distributions with application to hydrology.

Reading Materials

References

James, G et al., Advanced Engineering Mathematics, Addison-Wesley, 1999.

Ostle, B et al., Engineering Statistics, Duxbury, 1996.

Printed notes will be made available to complement the material from the Swinburne Bookshop.