MATH 2012 MATHEMATICS FOR ENGINEERS 3

Credit Points 10

Legacy Code 200242

Coordinator Volker Gebhardt (https://directory.westernsydney.edu.au/search/name/Volker Gebhardt/)

Description Students enrolled in Bachelor of Engineering who are yet to successfully complete 200242 Mathematics for Engineers 3, are to seek advice from Dr Jamal Rizk to enable them to complete the course. This subject is a core subject in the Computer, Electrical, or Telecommunications key programmes of the Bachelor of Engineering course. It builds on the first two mathematics subjects in that course and provides mathematical tools and techniques needed for the above key programmes. The subject covers topics from advanced calculus including vector calculus, complex analysis, Fourier series, heat and wave equations, Fourier integrals and transforms; discrete mathematics including logic and set theory; random variables and random processes including mean, correlation and covariance functions, ergodicity, ensemble averages, and Gaussian processes.

School Computer, Data & Math Sciences

Discipline Mathematics

Student Contribution Band HECS Band 1 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Pre-requisite(s) MATH 1008 OR
MATH 1019

Equivalent Subjects MATH 2005 - Engineering Mathematics 3

Restrictions

This subject is designed to meet the requirements of students enrolled in an engineering degree. There are other mathematics subjects more suitable for students from other disciplines.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. decide the truth of logical statements involving connectives, and simplify logical expressions using the laws of logic and truth tables; find and use normal forms of Boolean expressions, and simplify a digital circuit using Boolean expressions;
2. perform simple operations on sets, find Cartesian products of sets, use Venn diagrams to illustrate relationships between sets, and solve simple counting problems;
3. calculate mean, variance and related statistical descriptors of random variables and random processes;
4. recognise stationary and ergodic processes, and the significance of these;
5. solve problems in vector calculus, including the calculation of line integrals and surface integrals;
6. solve problems involving complex functions and evaluate a complex integral;
7. calculate the Fourier representation for a given function and apply it to the solution of heat and wave equations;

Subject Content

Discrete Mathematics: Logic; set theory; counting.
Random Variables: Notion of a random variable; statistical descriptors such as mean and variance of a random variable.
Random Processes: Notion of a random process; stationary random processes; description of the random process in terms of mean, correlation and covariance functions; ergodicity; ensemble averages; Gaussian processes.
Vector Calculus: Parametric representation of curves in 3D; line integrals; work; circulation; flux; conservative fields; Green's theorem in the plane; surface integrals; Stokes' theorem; divergence theorem.
Complex Analysis: Functions; limits; differentiation; analytic functions; Cauchy-Riemann equations; line integrals in the complex plane; Cauchy integral theorem and Cauchy integral formula.
Fourier Analysis: Fourier Series; Fourier Integrals; Fourier Transforms.
Partial Differential Equations: Basic concepts; wave, heat and Laplace equations.

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task
Quiz	2 x 15 minutes, each 7.5%	15	N	Not Known
Intra-session Exam	55 minutes	30	N	Not Known
Final Exam	2 hours	50	N	Not Known
Participation	n/a	5	N	Group

Teaching Periods