MATH 1016 MATHEMATICS FOR ENGINEERS 1

Credit Points 10

Legacy Code 200237

Coordinator Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/)

Description This subject is the first of two mathematics subjects to be completed by all students enrolled in an engineering degree during their first year of study. The content covers a number of topics that underpin the later-stage engineering mathematics subjects. The subject matter includes: differential and integral calculus of a single variable, complex numbers, aspects of matrix algebra, vectors, and some elementary statistics and probability theory. The aim of this subject is to introduce a number of key mathematical concepts needed in the study of Engineering, and to provide a solid foundation for the follow-on subject Mathematics for Engineers 2.

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 1 subject

Pre-requisite(s) Students enrolled in 3740 Bachelor of Engineering (Honours) or 3689 Bachelor of Engineering must have passed MATH 1021 Mathematics for Engineers Preliminary otherwise permission is required

Equivalent Subjects MATH 1007 Engineering Mathematics 1 LGYA 4425 Mathematical Methods A LGYA 4426 Mathematical Methods B MATH 1018 Mathematics for Engineers 1 (WSTC) MATH 1017 Mathematics for Engineers 1 (WSTC Assoc Deg)

Incompatible Subjects LGYA 4295 Mathematics for Business LGYA 4423 Concepts of Mathematics MATH 1014 Mathematics 1A MATH 1015 Mathematics 1B

Assumed Knowledge

HSC Mathematics achieved at Band 5 or 6. This is the minimum requirement.

Learning Outcomes

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

1. Find solutions to problems involving logarithmic, exponential, inverse trigonometric, hyperbolic and inverse hyperbolic functions.
2. Apply correctly the techniques of both differential and integral calculus to solve problems that may involve transcendental functions.
3. Solve problems involving matrices and determinants.
4. Perform operations on vectors, both in 2-D and 3-D.
5. Define i and operate with complex numbers.
6. Define a random variable and find its probability distribution and calculate probabilities based on the Binomial distribution, the Poisson distribution and the Normal distribution.
7. Appreciate the relevance of mathematics in an engineering context.
8. Communicate mathematical ideas using common conventions.

Subject Content

1. Functions and Inverse Functions: Revision - inverse functions, logs, exponentials; trig and inverse trig functions; hyperbolic and inverse hyperbolic functions.
2. Differential Calculus: Revision- limits; continuity; definition of the first derivative, differentiation rules; implicit differentiation including inverse trig functions and inverse hyperbolic functions.
3. Applications of Differential Calculus: L'Hopital's Rule; properties of curves; differentials; related rates.
4. Matrix Algebra: Determinants; matrices; solution of simultaneous equations using matrices and determinants; Gaussian elimination; eigenvalues and eigenvectors.
5. Vectors: definition; basic operations; dot product; cross product; angle between two vectors; equations of lines and planes.
6. Complex Numbers: Basic operations; polar coordinates; Euler's formula; powers and roots of complex numbers.
7. Integration: Indefinite/definite integrals, standard integrals.
8. Techniques of Integration: Method of substitution; method of partial fractions; integration by parts, reduction formula; trig functions; inverse trig and inverse hyperbolic functions; completing the square.
9. Applications of Integration: Revision - areas and volumes; length of curves; mass and moments; power series.
10. Descriptive statistics: Revision - Measures of central tendency and dispersion, mean, mode, median, standard deviation, variance.
11. Random Variables and Probability Distributions: Random variables, discrete random variable distributions, the binomial distribution, the Poisson distribution; definition of a continuous random variable, probability distribution of a continuous random variable, and the Normal distribution.

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	30 minutes	10	N	Individual
Numerical Problem Solving	50 minutes	10	N	Individual
Numerical Problem Solving	50 minutes	10	N	Individual
Numerical Problem Solving	50 minutes	10	N	Individual
Numerical Problem Solving	50 minutes	10	N	Individual
Numerical Problem Solving	2 hours	50	Y	Individual

Prescribed Texts

- James, G 2015, Modern engineering mathematics, 5th edn, Pearson Education Limited, Harlow, United Kingdom.

Teaching Periods

Summer A (2022)

Parramatta - Victoria Rd

Day

Subject Contact Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1016_22-SUA_PS_D#subjects)

Autumn (2022)

Penrith (Kingswood)

Day

Subject Contact Charles Zworestine (https://directory.westernsydney.edu.au/search/name/Charles Zworestine/)

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Parramatta - Victoria Rd

Day

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Sydney City Campus - Term 1 (2022)

Sydney City

Day

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Sydney City Campus - Term 2 (2022)

Sydney City

Day

Subject Contact Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1016_22-SC2_SC_D#subjects)

Spring (2022)

Penrith (Kingswood)

Day

Subject Contact Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/)

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Parramatta - Victoria Rd

Day

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Sydney City Campus - Term 3 (2022)

Sydney City

Day

Subject Contact Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/)

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Summer (2022)

Parramatta City - Macquarie St

On-site

Subject Contact Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1016_22-SUM_PC_1#subjects)

Autumn (2023)

Penrith (Kingswood)

On-site

Subject Contact Shatha Aziz (https://directory.westernsydney.edu.au/search/name/Shatha Aziz/)

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Parramatta - Victoria Rd

On-site

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Sydney City Campus - Term 1 (2023)

Sydney City

On-site

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Sydney City Campus - Term 2 (2023)

Sydney City

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