

Preliminary schedule for NFE2105

2022/23

WEEK 1:

Review of Algebra (index laws, terminology, simplification of expressions, changing the subject of a formula, etc).

Quadratics; general formula for solving the quadratic equation; the squared form of a quadratic.

Mathematical functions (definition, independent & dependent variables, function composition, etc).

WEEK 2:

Polynomials; polynomial division; rational functions; partial fraction decomposition.

The exponential and the logarithmic functions; equations involving these functions.

Trig functions (sin, cos, tan, cotan). The fundamental identity of trigonometry.

WEEK 3:

Inverse trigonometric functions. The solutions of basic trig equations.

Definition of the derivative of a function; operations with derivatives; the product and the quotient rules; the chain rule.

WEEK 4:

Minima and maxima of functions of one variable. Stationary (or critical) points & their classification. Practical applications.

Indefinite integrals; integration by substitution; integration by parts.

WEEK 5:

Area below the graph of a function; definite integrals. Fundamental Theorem of Calculus. Evaluation of definite integrals (by parts & substitution). Applications of partial fractions to integration.

WEEK 6:

Taylor and Maclaurin and series.

Vectors; operations with vectors; scalar and vector products. Applications to mechanics (work done by a force and the moment of a force about a point).

WEEK 7:

Complex numbers; complex conjugate; Cartesian and polar form; operations with complex numbers. De Moivre's formula. Roots of unity.

WEEK 8:

Matrices; addition, subtraction, and multiplication of matrices. The inverse of a square matrix.

The concept of *determinant* for a square matrix. Evaluation of determinants (the Cofactor Expansion Theorem). Linear systems of equations and Cramer's rule.

WEEK 9:

Introduction to ordinary differential equations (ODEs). First order ODEs; separable equations; integrating factors. Second-order ODEs; applications to simple harmonic motion.

WEEK 10:

Laplace transforms (LT).

Applications of LT to the solutions of initial-value problems.

WEEK 11:

Basic concepts from probability theory and statistics.

WEEK 12:**REVISION**