

Engineering Mathematics for Advanced Studies

Syllabus: Module Vector Calculus

Reference Texts:

Kreyszig – Advanced Engg. Mathematics

Michael Corral – Vector Calculus

Vector operations

Operations on vector -Addition, subtraction, multiplication by scalar

Dot product, Angle between vectors, Orthogonality, triple scalar product, triple vector product

Vector representation

Representation of line - vector format, parametric format, symmetric representation

Plane defined by 3 non-linear points, Distance between a point and a line, Distance between a point and a plane, Line of intersection of two planes,

Curves

Simple and non-simple curves, Parametric representation of curves, Tangent curve, arc length, curvature, torsion, velocity and acceleration for varying position vector,

Functions in vector space

Scalar valued and vector value functions

Derivatives of Functions in vector space

Derivative of a scalar valued function, Derivative of a vector valued function, equation of tangent plane to a 3D surface

Gradient and directional derivatives, Divergence, Curl, Properties of curl, Laplacian

Integrals of functions in vector space

Multiple integrals, line integrals (vector as well as scalar functions along given curve), Path independence, surface integrals, Green's Theorem, Gauss Divergence theorem, Stoke's Theorem

Not covered in class or assignments

(not within the syllabus for exam. FYI for those with additional interest)

change of variable, Jacobian, center of mass, properties of line integrals)