School of Mathematics

Module MA1132 — Advanced calculus   2011-12
(JF Mathematics, JF Theoretical Physics & JF Two-subject Moderatorship
SF Mathematics, SF Two-subject Moderatorship)

Lecturer: Professor Richard Timoney

Requirements/prerequisites: MA1123 (Analysis on the real line I), MA1111 (Linear Algebra I)

Duration: Hilary term, 11 weeks

Number of lectures per week: 2 lectures and 1 tutorial per week

Assessment: Regular aassignments and tutorial work. In class exams Friday February 24 and (to be confirmed) Monday April 2nd.

ECTS credits: 5

End-of-year Examination: Continuous assessment. Supplemental examination only.

Description: Sequences (definition and basic results on convergence). Series (definition of the sum, series of positive terms, absolute convergence, tests for convergence). Power series and (use of) Taylor's theorem.

Differentiation of curves, tangent lines in 2 or 3 dimensions. Graphical represenation of functions of 2 or 3 variables. Partial derivatives, gradients, directional derivatives, tangent planes to graphs and level surfaces. Linear approximation for functions of 2 or 3 variables, chain rule.

Linear and exact differential equations.

Double and triple integrals, computation via iterated integrals (Fubini theorem). Double integrals in polar coordinates.

Refer to `http://www.maths.tcd.ie/~richardt/MA1132` for more information.

Learning Outcomes: On sucessful completion of this module, students will be able to:

- apply the basic theory of convergence of sequences and series to a range of examples;

- calculate partial derivatives involving algebraic and transcendental functions (including trigonometric functions, exponential, logarithm, hyperbolic functions and inverses);

- apply the standard results and concepts concerning differentiation in a number of appropriate contexts (such as graphical or geometric interpretations of tangents, critical points, linear approximation, solving simple linear differential equations);

- compute double and triple integrals by application of Fubini's theorem or use change of variables;

- use integrals to find quantities defined via integration in a number of context (such as average, area, volume, mass).

April 1, 2012