MA231 Vector Analysis

Schedule:

Lecture
Monday, 3-4pm, MS.02
Tuesday, 3-4pm, MS.02
Thursday, 2-3pm, MS.02

Support class
Monday, 12-13 h, MA_B3.02 week 2-9, and B2.01 (SciConc) in week 10 (support class for Maths/Physics, first class week 2)

Prerequisites: MA134 Geometry and Motion or PX129 (Maths/Physics) worksheets.

Contents: The first part of the module provides an introduction to vector calculus which is an essential toolkit for differential geometry and for mathematical modelling. After a brief review of line and surface integrals, div, grad and curl are introduced and followed by the two main results, namely, Gauss' Divergence Theorem and Stokes' Theorem. The usefulness of these results in applications to flow problems and to the representation of vector fields with special properties by means of potentials will be emphasised and will be illustrated with many examples. This part will be finished in week 5. For maths students the first one or two weeks might be some revision from Geometry and motion module.
The second part of the module introduces the rudiments of complex analysis leading up to the calculus of residues. The link with the first part of the module is achieved by considering a complex valued function of one complex variable as a vector field in the plane. Complex differentiability leads to the Cauchy-Riemann equations which are interpreted as conditions for the vector field to have both zero divergence and zero curl. Cauchy's theorem for complex differentiable functions is then established by means of the main integral theorems of vector calculus.

Support Class: Support for the Maths students is given by the supervisors. For the Maths/Physics students there will be a separate support class given by Sohail Iqbal (email `S.Iqbal@warwick.ac.uk`).

Assessment: One two-hour final examination counting for 85%. The remaining 15% will be assessed through four assignments (weeks 4, 6, 8, and 10).

Lecture Notes: Printed lecture notes are available (end of this week) on the MathStuff homepage or on my departmental homepage
http://www2.warwick.ac.uk/fac/sci/maths/people/staff/stefan_adams/vectoranalysis_2010/
However, these notes will be updated on a regular basis during the whole term. An important part in vector analysis are figures and pictures. These will not be contained in the notes. For any figure which appears on the blackboard in my lectures, I leave some empty space with a reference number which coincides with the number I am using in the lectures. You can fill the diagrams and figures by yourself.

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