School of Mathematics

Course 2S3 — Introduction to Numerical Computation 1999-2000
(SF Mathematics as a whole subject within Natural Science Moderatorships)

Lecturer: Dr. Sinead Ryan

Requirements/prerequisites: None

Duration: 24 weeks

Number of lectures per week: 3

Assessment: Regular programming assignments, counts 25%

End-of-year Examination: One 3-hour annual examination, counts 75%

Description:

- Computer Architecture: memory/processor model, memory organization, data formats, binary, octal, decimal, and hexadecimal arithmetic, processor organization, simple assembly language, preipherals.
- The C Compiler: declarations, input/output, assignment statements, precedence, if, while, and for statements, functions, argument passing in functions, pointers, arrays, system libraries, mathematical function libraries, memory allocation.
- Mathematica: symbolic manipulation; basic mathematica operations; differentiation; integration; series expansion; differential equations.
- Numerical Methods: Root Finding through Bracketing and Bisection, Newton Raphson method, Golden Section search in one dimension to find maxima and minima, Numerical solution of ordinary differential equations (initial value problems), Numerical Integration, Random Numbers, Matrices and vectors; Gaussian Elimination; eigenvalues and eigenvectors

Textbooks:

1. The C Programming Language, Kernighan and Ritchie (Prentice Hall)
2. Numerical Recipes in C, Press, Teukolsky, Flannery, and Vetterling (Cambridge University Press)

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