PH4390: Computational Methods in Physics
2 Hours Credit (2-0-0)

COURSE SYLLABUS
Fall 2003

General Information

Office: Fisher 124A
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Home Page: http://www.phy.mtu.edu/~kjmorgan
Office Hours: TBA (Other hours by appointment)

Course Description

Catalog description: This course develops the use of Unix/FORTRAN/C for problem solving through direct experience with problems in mechanics, electromagnetism, and quantum mechanics. Additionally, assigned problems lead to an understanding of why an "error-free" program does not guarantee meaningful results.

This term there is a shift in platform emphasis. Students are encouraged to use C++ in a Windows environment. To this end, the department has installed Microsoft Visual C++ on the PCs in the lab. Students are also encouraged to use Mathematica for plotting program output and checking results. However, students can still use FORTRAN in a Unix environment to develop programs for this course. If a student does use FORTRAN, he **MUST** use FORTRAN 90 and **MUST NOT** use the GOTO statement.

Possible Topics:
- Zeros of functions
- Numerical integration
- Ordinary differential equations
- Fourier analysis
- Partial differential equations

Current Text

Other Books of Interest


Press, William H. *Numerical Recipes in C++: The Art of Scientific Computing*. Cambridge University Press, 2002. *Numerical Recipes* is generally considered the standard source in this field. It is now available in a C++ edition. See www.nr.com for information about this book the code found in it. From the Cambridge University Press Web site (us.cambridge.org): "The product of a unique collaboration among four leading scientists in academic research and industry, Numerical Recipes is a comprehensive text and reference work on scientific computing. Thoroughly self-contained, it proceeds from mathematical and theoretical considerations to actual, practical computer routines. This new version incorporates completely new C++ versions of the more than 300 Numerical Recipes Second Edition routines widely recognized as the most accessible and practical basis for scientific computing, in addition to including the full mathematical and explanatory contents of Numerical Recipes in C."

Grading Policy

Weighting Factors

Programming assignments: 80%
Project and presentation: 20%

Policies

This course is not designed to be intensive, and there are no exams. However, the due dates for the programming assignments are strictly enforced.

One time: Full credit
One week late: Half credit
More than one week late: No credit

Letter grades are assigned on the basis of the following scale:

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General Policies

Programming Assignments

All programming assignments and the project are to be completed on an individual basis. Students may consult other published books but may not copy or consult any program code on the Web or from other students. However, students may discuss concepts with other students or faculty. Any violation of this policy is considered cheating.

Cheating

1. Honesty and academic integrity are strictly enforced.

2. All cases of cheating are submitted to the Dean of Students for adjudication. *NO EXCEPTIONS.*

MTU Legal Statement

"MTU complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Acts of 1990 (ADA). If you have a disability and need a reasonable accommodation for equal access to education or services at MTU, please call Dr. Gloria Melton, Associate Dean of Students (2212). For other concerns about discrimination, you may contact your advisor, department head, or the Affirmative Action Office (3310)."