

Minnesota State University Moorhead

PHYS 350: Computational Methods for Physical Science

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 1

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites:

- PHYS 200 - General Physics I

Corequisites: None

MnTC Goals: None

This course introduces students in the physical sciences to basic techniques of data analysis, numerical modeling, and symbolic computation. All topics are covered in relation to specific problems in physics or chemistry. Includes the topics of matrix manipulation, least squares fitting, general curve fitting, numeric integration and differentiation, data smoothing, numeric solution of differential equations, and computer symbolic processes for algebra and calculus.

B. COURSE EFFECTIVE DATES: 04/05/2005 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Symbolic computation with appropriate software
2. Series including Taylor's series
3. Complex numbers and special functions
4. Ordinary differential equations, solved both symbolically and numerically
5. Matrix representation of linear systems of equations
6. Linear transforms
7. Fourier Analysis and Convolutions, with an emphasis on image processing applications
8. Image analysis

D. LEARNING OUTCOMES (General)

1. Use a computer to solve physics problem numerically.
2. Recognize the limitations of numerical solutions.
3. Choose an appropriate computational technique for a particular problem.
4. Make use of appropriate software and understand an algorithmic approach to physics problems.
5. Develop the skills of a physicist: checking units, limiting cases, developing conceptual and mathematical skills.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted