Minnesota State University Moorhead

PHYS 350: Computational Methods for Physical Science

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites:
This course requires the following prerequisite
   PHYS 202 - Introduction to 20th Century Physics

Corequisites: None

MnTC Goals: None

This course is an introduction to solving problems by computer using techniques pertinent to students in the physical sciences. Topics are covered in relation to specific problems in the physical sciences. Topics may include matrix manipulation, numeric integration and differentiation, and numeric solution of differential equations.

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