STATE UNIVERSITY OF NEW YORK
New Paltz, New York.

Computational Physics
Course No. PHY305 (3 credits)
Fall 2017

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Text

The following will be the primary text for the course and it will be available to students in electronic form from Blackboard.

Computing for Physics: A Beginner's Workbook, by T. Biswas.

References

- *Numerical Recipes in C*, by Press, Teukolsky, Vetterling and Flannery (Oxford).

- *Physics*, by Resnick, Halliday and Walker (John Wiley).

Course Description

Numerical techniques using computers are becoming more and more essential for survival in the world of physics. So students need to see such techniques as early as possible in their program of study. Physics students are expected to learn a programming language (preferably C or Java) in their very first year in college. So as soon as they do the two introductory physics courses and differential equations, they are ready to see applications of computing in physics. This course provides the basic numerical techniques and then applies them to several physical simulation examples. These examples are expected to be warm-up exercises for subsequent routine use of numerical techniques for problem solving.

Grading

70% of grades will be based on regular computer assignments (one assignment every one or two weeks). 30% of grades will be from a computer project. Each student must pick a project topic early on (within first month) in the semester. The instructor will help in the selection of the topic. Final exams are not very practical for a computer based course like this. Hence, the final exam time will be used for student presentations of their computer projects.

Topics to be covered

- Real roots of algebraic equations.
- Numerical differentiation.
- Numerical integration.
- Matrix manipulations and linear algebraic equations.
- Differential equations.
- Large oscillations of a simple pendulum (with friction).
- Electric field computation.

Administrative Addenda

Student Learning Outcomes

To acquire basic skills in numerical methods used in physics related computing.

Academic Integrity Policy

http://www.newpaltz.edu/ugc/policies/policies_integrity.html

Disability Resources

https://www.newpaltz.edu/drc/policy_procedure_manual.html

Veterans Resources

http://www.newpaltz.edu/veterans

Computer and Network Policies

https://sites.newpaltz.edu/csc/policies/acceptable-uses-and-privacy-policy/

Deadlines

http://www.newpaltz.edu/events/academic.php