

P2820 Computational Mechanics Winter 2016

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Course website: <http://www.physics.mun.ca/~saika/P2820>

Overview: Students will use computers to solve physics problems, with a focus on classical mechanics problems of increasing complexity. The course will cover some numerical techniques and working with data. The programming language will be Mathematica.

PR: PHYS1051, PR/CO: MATH2000.

Lecture Topics: (estimated number of lectures in parentheses)

Introduction to Mathematica (1)

Reexamining some physics problems from first year mechanics (3)

Projectile motion (2)

Central forces (2)

Numerical differentiation and integration (2)

Numerical solution of ODE's; Euler, midpoint, Runge-Kutta (2)

Oscillators: SHO, damped and driven oscillators, pendulum, coupled oscillators (3)

Wave Equation (2)

Curve fitting; working with data (2)

Some lecture periods will be devoted to in-class exercises and time to work on assignments.

Classes: Tuesday and Thursday 2:00-3:15 pm, room C2045

Labs: Thursday 3:30-5:00 pm, room C2039

Required Software: The software required for the course, Mathematica, is available for free from the Department of Physics and Physical Oceanography. Please contact Fred Perry, Systems Administrator, for software download and license: office: C3016, phone: (709) 864-4572, email: fred@mun.ca.

Mathematica licences are also available from the Computer Purchasing Centre
http://www.mun.ca/cpc/licenses_stu/

Once you have Mathematica installed on your computer, you can get a head start on using it through <https://www.wolfram.com/broadcast/screencasts/handsonstart/>

Recommended Textbook: Boccara, Nino (2007), Essentials of Mathematica with applications to mathematics and physics, Springer. This book is available as an ebook through the library.

Evaluation:

- 20% Assignments (Seven)
- 10% Laboratories (Ten)
- 10% Midterm Exam I (Tuesday, February 9)
- 10% Midterm Exam II (Tuesday, March 22)
- 50% Final Examination

See course webpage or university calendar for information regarding medical notes.