Physics 3220: Classical Mechanics I – Fall 2016
Monday, Wednesday and Friday 9:00 – 9:50am, Room C2045

Calendar description:
CO: PHYS 2820 and Mathematics 2260
PR: PHYS 2820 and Mathematics 2260

Course description on department web page:
http://www.mun.ca/physics/undergraduates/syllabus/p3220.php

Instructor: Dr. Ivan Saika-Voivod, Room C3026. Phone 864-8886 saika@mun.ca.

Office Hours: Tuesdays and Thursdays, 2:00-3:00pm.

Course web page: See D2L

Textbook: Classical Mechanics by John R. Taylor
(Available as an eBook at www.redshelf.com.)

Evaluation:
Assignments 30% (5 Assignments, roughly every two weeks)
Midterm test I 15% (October 5, 2016)
Midterm test II 15% (November 7, 2016)
Final Exam 40%

No supplementary exam.

Missed work.
Students who cannot complete assignments or midterm tests need to consult the University Calendar, Section 6.7.5 Exemptions from Parts of the Evaluation, and speak to the instructor.

Marks for midterms tests missed for valid reasons will be reallocated to the final exam (there will be no makeup tests).

Outline (approximate number of lectures in parentheses)

1) Review of Vector geometry and Newton’s Law of Motion (8)
   - Units
   - Scalars and Vectors
   - Vector Operations
   - Coordinate Transformations
   - Derivative of Vectors
   - Fundamental Concepts of Physics
   - Newton’s Laws of Motion
   - Momentum
   - Differential Equations
   - Alternative Coordinate Systems
2) **Projectile Motion and Resistance (2)**
   - Air Resistance
   - Linear Air Resistance – Horizontal and Vertical Motion
   - Quadratic Air Resistance – Horizontal and Vertical Motion
   - Terminal Velocity

3) **Momentum and Angular Momentum (6)**
   - Conservation of Momentum
   - Rockets
   - Center of Mass Systems
   - Angular Momentum
   - Moment of Inertia

4) **Energy (5)**
   - Kinetic Energy and Work
   - Potential Energy and Conservative Forces
   - Forces as the Gradient of Potential Energy
   - Time Dependent Potential Energy
   - Energy for One-Dimensional Systems
   - Curvilinear One-Dimensional Systems
   - Central Forces
   - Energy of Interacting Particles
   - Energy of a Multiparticle System

5) **Oscillations (6)**
   - Hooke’s Law
   - Simple Harmonic Motion
   - Two-Dimensional Oscillators
   - Damped Oscillations
   - Driven Damped Oscillations
   - Resonance
   - Fourier Series
   - Fourier Series Solutions for the Driven Oscillator.

6) **Calculus of Variations (2)**
   - Euler-Lagrange Equation
   - Applications of the Euler-Lagrange Equations
   - More than two variable systems

7) **Lagrange’s Equation (3)**
   - Lagrange’s Equation for Unconstrained Motion
   - Constrained Systems
   - Examples of Lagrange’s Equations
   - Generalized Momenta and Ignorable Coordinates
   - Conservative Laws

8) **Two Body Central Force Problems (2)**
   - Center of Mass and Relative Coordinates; Reduce Mass
   - The Equations of Motion
   - The Equivalent One-Dimensional Problem
   - The Equation of the Orbit
   - The Kepler Orbit
   - The Unbounded Kepler Orbit
Use of Recording Devices in Classrooms
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Important general information from the University.

It is the student’s responsibility to acquaint themselves with these items. Please read.

http://www.mun.ca/student/conduct/

6.8.2 Exemptions From Final Examinations
http://www.mun.ca/regoff/calendar/sectionNo=REGS-0628

6.12 Academic Misconduct
http://www.mun.ca/regoff/calendar/sectionNo=REGS-0748

Accommodations for Students with Disabilities
http://www.mun.ca/blundon/accommodations/