

UNIVERSITY OF CALGARY
DEPARTMENT OF PHYSICS and ASTRONOMY
COURSE OUTLINE

1. **Physics 581, Computational Physics III**

Lecture Sections: **L01**: TuTh, 17:00-18:15, ST 133

Laboratory Sections: **B01**: TuTh, 17:00-18:15, ST 026

Instructor, D.W. Hobill

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Office Hours: W Th 13:30-15:00

Departmental Office location: SB 605, telephone no.: (403)-220-5385

2. **PREREQUISITES:** Physics 443 or Chemistry 373 and Physics 381 and 455

3. **GRADING:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments	20%
Laboratory Exercises	30%
Midterm test	20% (See Syllabus for date)
Final Examination	30% (To be scheduled by the Registrar)

Percentage grades will be given for all elements of term work and examinations in Physics 369. A weighted course percentage will be calculated for each student after the final exam is written. A table of conversion from final course percentage to final course letter grade will be provided later in the term.

4. **Missed Components of Term Work.** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in section 3.6: <http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html>. It is the student's responsibility to familiarize himself/herself with these regulations.

See also <http://www.ucalgary.ca/pubs/calendar/current/e-3.html>.

5. **REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.** If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **TEXTBOOK:** *An Introduction to Computational Physics*, (2nd Edition), Tao Pang, Cambridge University Press.

7. **EXAMINATION POLICY:** Students are encouraged to read the Calendar, Section G, on Examinations: <http://www.ucalgary.ca/pubs/calendar/current/g.html>.

Department Approval _____

Date _____

8. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

(a) **ACADEMIC MISCONDUCT** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under K. Student Misconduct (<http://www.ucalgary.ca/pubs/calendar/current/k.html>) to inform yourself of definitions, processes and penalties

(b) **ASSEMBLY POINTS in case of emergency during class time.** Be sure to FAMILIARIZE YOURSELF with the information at <http://www.ucalgary.ca/emergencyplan/assemblypoints>.

(c) **ACADEMIC ACCOMMODATION POLICY.** Students with documentable disabilities are referred to the following links:
Calendar entry on students with disabilities: <http://www.ucalgary.ca/pubs/calendar/current/b-1.html>
Disability Resource Centre: <http://www.ucalgary.ca/drc/>

(d) **SAFEWALK:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

(e) **FREEDOM OF INFORMATION AND PRIVACY:** This course will be conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, **students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page.** For more information see also <http://www.ucalgary.ca/secretariat/privacy>.

(f) **STUDENT UNION INFORMATION:** VP Academic **Phone:** 220-3911 **Email:** suvpaca@ucalgary.ca.
SU Faculty Rep. **Phone:** 220-3913 **Email:** sciencerep@su.ucalgary.ca Website <http://www.su.ucalgary.ca/home>

Student Ombudsman: <http://www.su.ucalgary.ca/services/student-services/student-rights.html>

(i) **INTERNET and ELECTRONIC COMMUNICATION DEVICE Information.** You can assume that in all classes that you attend, **your cell phone should be turned off.** Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

Course Syllabus

The course will introduce the methods to analyze and compute solutions to the partial differential equations that appear in physics, e.g. the wave equation, the heat equation and Poisson's equation for field potentials. In addition, the use of random numbers will be applied to Monte Carlo simulation. Finally parallel processing methods will be introduced.

Topics to be covered are:

1. Review of partial differential equations
 - (a) Boundary value problems
 - (b) Initial value problems
2. Numerical Methods for Hyperbolic Equations
3. Numerical Methods for Parabolic Equations
4. Numerical Methods for Elliptic Equations
5. Random Number Generators and Monte Carlo Methods
6. Parallel Processing using Message Passing

There will be one (in-class) mid-terms examination in late February or early March.