



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS AND ASTRONOMY
COURSE OUTLINE

1. Course: Phys 381, Computational Physics Winter 2016

Instructor: Dr. R. Ouyed | SB 515 | 403.210.8418 | rouyed@ucalgary.ca | Office Hours: Tu 15:00 – 16:00, TR 15:00 – 16:00 or call 210-8418 for an appointment

Lecture Sections: LEC 1 | TR 16:00-16:50 | ST 026

Course Website: <http://www.pjl.ucalgary.ca/courses/physics381.html>

Departmental Office: SB 605, 403-220-5385, phasugrd@ucalgary.ca

2. Prerequisites: Physics 341

Note: The Faculty of Science policy on pre- and co-requisite checking is outlined in the 2015-2016 Calendar. A student may not register in a course unless a grade at least “C-” has been obtained in each pre-requisite course; it is the responsibility of students to ensure that their registrations are in order. See <http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html> for details.

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 (3)/labs (6)	40%	(20% Labs. & 20% Assgns.)
Midterm Term	20%	(2 hours: Feb. 25th, in-class)
Final (Laboratory) Examination	40%	(3 hours: Apr. 12th, in-class)

Percentage grades will be given for all elements of term work and examinations. A weighted course percentage will be calculated for each student after the final exam is written. Percentage to letter grade conversion scale:

>= 95 %	A +	>= 84 %	B +	>= 69 %	C +	>= 54 %	D +
>= 90 %	A	>= 75 %	B	>= 60 %	C	>= 45 %	D
>= 85 %	A -	>= 70 %	B -	>= 55 %	C -	< 45 %	F

A grade of 45% or less in the final exam will result in a final course letter grade no higher than D+.

The University policy on grading and related matters is also found in the UofC Calendar. Details can be found at; <http://www.ucalgary.ca/pubs/calendar/current/f.html>

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](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.6](#) of the University Calendar.

5. **Course Materials:** *"Computational Physics 1st ed"*, Ouyed & Dobler (2010). Accessible at: <http://www.pjl.ucalgary.ca/courses/physics381.html>

6. **Examination Policy:** Exams will be open notes.

7. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Academic Misconduct:** 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 [Section K](#). Student Misconduct 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 on [assembly points](#).
- (c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Physics and Astronomy, Dr. Michael Wieser, by email (mwieser@ucalgary.ca) or by phone (403.220.3641).
- (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 is 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: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. 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.
- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Syllabus

Phys 381 deals with the basics of computing: algorithms, precision, efficiency, and verification. The student is introduced to some necessary numerical analysis and its associated approximation and round-off error. Physical applications are used in simple context. The students learn Linux, Latex, how to make figures using Gnuplot (and its scripts), and how to program in Fortran 95 (including the use of the Make utility). The goal is to get students to write their own Fortran routines, making Gnuplot figures using their own scripts, and present assignments and exams in postscript or PDF format using Latex.

The following syllabus is based on Ouyed&Dobler textbook notes (<http://www.pjl.ucalgary.ca/courses/physics381.html>):

- Introduction to Linux & Emacs
 - Basic Commands
 - Utilities
- Introduction to Latex (report preparation and formatting) [Appendix E in Ouyed&Dobler]
- Introduction to Gnuplot (Graphics and Datafiles handling) [Appendix C in Ouyed&Dobler]
 - Gnuplot basics
 - Gnuplot scripts
- Basic programming (Fortran 95, Makefiles) [Appendix A in Ouyed&Dobler]
 - Programming guidelines and Philosophy
 - Design and construction of a working code
 - Makefiles [Appendix B in Ouyed&Dobler]
- Introductory Concepts [Chapter 1 in Ouyed&Dobler]
 - Taylor's theorem
 - Absolute and relative error
- Numbers (errors and loss of accuracy) [Chapter 1 in Ouyed&Dobler]
- Linear Systems (matrix operations) [Chapter 2 in Ouyed&Dobler]
- Evaluation of Functions [Chapter 3 in Ouyed&Dobler]

TOOLS/LANGUAGE/SYSTEM: *EMACS, GNUPLOT, LATEX, FORTRAN-95, LINUX, Mathematica*

Department Approval _____ Date _____