UNIVERSITY OF CALGARY
DEPARTMENT OF PHYSICS and ASTRONOMY
COURSE OUTLINE

1. **Phys381, Computational Physics**

Lecture(s)/Time: T   1300-1400, ST 026
                                              TR 1200-1400, ST 026

 Instructor: Dr. R. Ouyed, Office: Science B 537, **Phone:** 210-8418, **email:** rouyed@ucalgary.ca, **Office Hours:** Tu 9:30 – 10:30, TR 9:30 – 10:30 or ***call 210-8418 for an appointment***

 Course Website: http://www.pjl.ucalgary.ca/reference.html

BLACKBOARD IS NOT USED FOR THIS COURSE

2. **PREREQUISITES:** Computer Science 217 or 231. **Prerequisite or Corequisite:** Physics 343

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/labs (approximately 6) 40%
    Midterm Test   20%   (2 hours: Feb. 24th, in-class)
    Final Examination   40%   (3 hours: Apr. 14th, in-class lab exam)

    Students who fail the Final Examination should not expect to receive a course grade higher than "D+".

    The conversion between course percentage and letter grade is given in the syllabus below.

    NOTE – No individual component of the course will have its grade scaled or "curved". However, the ***final*** grade for the course may be scaled or "curved" upwards at the discretion of the instructor. Final grades will never be scaled lower.

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**: *"Computational Physics 1st ed"*, Ouyed & Dobler (2010)
                              The textbook is accessible online at http://www.pjl.ucalgary.ca/reference.html.
                               Students should bear in mind that many chapters in the full edition will not be used (see attached Syllabus).

7. **EXAMINATION POLICY**: [Statement regarding aids allowed on tests and examinations (e.g., calculator, open book, etc.).]
        Students are encouraged to read the Calendar, Section G, on Examinations:
        http://www.ucalgary.ca/pubs/calendar/current/g.html.

Department Approval_____   **Date**_____

11. 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@ucagary.ca.
SU Faculty Rep. **Phone:** 220-3913 **Email:** sciencerep@su.ucalgary.ca Website **http://www.su.ucalgary.ca/home/contact.html**.
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

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/reference.html):

■ Introduction to Linux
                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]*

Conversion between course percentage and letter grades:

95 - 100%   A+
90 - 94.9%   A
85 - 89.9%   A-
80 - 84.9%   B+
75 - 79.9%   B
70 - 74.9%   B-
65 - 69.9%   C+
60 - 64.9%   C
55 - 59.9%   C-
50 - 54.9%   D+
45 - 49.9%   D
0 - 44.9%   F