UNIVERSITY OF CALGARY
DEPARTMENT OF PHYSICS and ASTRONOMY
COURSE OUTLINE

1. **Phys381, Computational Physics**

Lecture(s)/Time: T 1200-1400, 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 11:00 – 12:00, TR 11:00 – 12:00 or ***call 210-8418 for an appointment***

Course Website: http://www.pjl.ucalgary.ca/ (follow phys381 link)

BLACKBOARD IS NOT USED FOR THIS COURSE

2. **PREREQUISITES:** Computer Science 217 or 231. **Prerequisite or Co-requisite:** 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 (2)/labs (approximately 6)	40%	
Midterm Test	20%	(2 hours: Feb. 26th, in-class)
Final Examination	40%	(3 hours: Apr. 16th, in-class)

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/ (follow phys 381 link).
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** Jan 4/13

PHYS 381, Winter 2013

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 & 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***

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