

UNIVERSITY OF CALGARY
DEPARTMENT OF PHYSICS and ASTRONOMY
COURSE OUTLINE

1. Course: **Physics 497, Applied Physics Laboratory II**

L01: MW 1100-1150 ST057 Dr. RB Hicks Office: SB 634, Telephone: 403-220-3443
Office Hours: MoWe 1200-1250, SB 634
Email: hicks@ucalgary.ca

Lab Instructor: Mr. P.J. Irwin, Physics Senior Laboratory, ES02, 403-220-6864. pjirwin@phas.ucalgary.ca

Course BLACKBOARD site **PHYS 497 L01 - (WINTER 2012) - APPLIED PHYSICS LABORATORY II**

Physics departmental Office: SB 605, Tel. 220-5385. Web Site: <http://www.phas.ucalgary.ca/>

2. **PREREQUISITES:** Physics 397 Applied Physics Laboratory I

Note The Faculty of Science policy on pre- and co-requisite checking is outlined in the Section 3.5C of the Faculty of Science entry in the online University 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.

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:

Laboratory (13 weeks, 2 sessions per week)	60%
Examinations (2 term tests in class)	20%
Assignments (4)	<u>20%</u>
	100%

Percentage grades will be given for all elements of term work and examinations in Physics 497. 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 published on the Phys 497 Blackboard site 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>.

6. **TEXTBOOK:** *Physics 497 Course Notes*, R.B. Hicks. To be posted on Blackboard.

Useful reference books: *Basic Circuit Analysis*, 2nd ed. John O'Malley. Schaum's Outlines. McGraw-Hill.
Electronic Devices and Circuits, 2nd ed. Jimmie J. Cathey. Schaum's Outlines. McGraw-Hill.
The Art of Electronics, 2nd ed. Paul Horowitz and Winfield Hill, Cambridge University Press
The Fast Fourier Transform and Applications, E. Oran Brigham, Prentice-Hall

7. **EXAMINATION POLICY:** The two term tests in Phys 497 are closed book 50-minute tests held in class time on **Wednesdays, Feb 16 and Apr 6**, each worth 10% of course grade. Calculators are permitted. **There will be no final examination in this course.** Students should go to <http://www.ucalgary.ca/pubs/calendar/current/g.html> and Section G of the Calendar on Examinations:

Department Approval for no final exam in Physics 497 _____

Date: Jan 2, 12

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 (FOIPPA). 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>
 Student Ombudsman: <http://www.ucalgary.ca/provost/students/ombuds>
- (g) **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.

Physics 497, Winter 2012
Detailed Lecture outline

Week	Dates	Topics
1	Jan 9, 11	Lab orientation tour. AC circuits I: AC sources, waveforms
2	Jan 16, 18	AC circuits II: Phasor analysis; complex impedance. Impedances in series
3	Jan 23, 25	AC circuits III: RC series circuit; RLC series circuit. Resonance, quality factor. RLC filters
4	Jan 30, F 1	AC circuits IV: Parallel circuits. Thévenin and Norton equivalents.
5	Feb 6, 8	AC Circuits V: Power dissipation in AC circuits. Impedance matching.
6	Feb 13, 15	Operational amplifiers (op-amps). <u>Wednesday Feb 15: In-class test 1 on AC circuit theory.</u>
	Feb 19-26	Reading Week. No lectures. University closed Monday Feb 20 for Family Day Holiday.
7	Feb 27, 29	Operational amplifier applications. Linear two-ports and transfer functions.
8	Mar 5, 7	RLC series circuit revisited. The Fourier transform.
9	Mar 12, 14	Linear two-ports as filters. The convolution integral. Convolution theorem.
10	Mar 19, 21	Impulse response function of a linear two-port. Examples of convolutions.
11	Mar 26, 28	The time and frequency domains. Digitization. Aliasing. Sampling theorems.
12	Apr 2, 4	D/A converters. A/D converters. <u>Wednesday Apr 4: In-class test 2 on weeks 6-11.</u>
13	Apr 9, 11	Semiconductors, Diodes, Transistors, applications, logic circuits.

Note: the lab part of the course involves six hours per week in the Laboratory (ES02). Each lab exercise involves preliminary work and a detailed in-lab presentation by the lab instructor, Mr. Pat Irwin. These will provide the specific background needed for each exercise. The two lecture hours per week are intended to provide a more in-depth theoretical treatment of AC circuit theory and linear and non-linear applications to complement the practical lab experience. You will find that, as the term proceeds, the topics of the practical lab exercises will quickly begin to outstrip the lectures.

Physics majors and concentrators should find that the practical and theoretical basis provided in this course will expand their understanding of the subject of experimental electronics, and in addition will have applicability to other areas of physics.