UMCP PHYS 485 and 685 Syllabus Fall 2016 v1

Professor
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Teaching Assistant
TBA
Office Hours: TBD, but you will see him in the lab!
E-Mail: TBD

Course Emphasis
Physics 485/685 are courses in modern electronics with an emphasis on hands-
on laboratory work and topics that are useful as career skills.
Lecture meets Monday and Friday 2-2:50 p.m. in Room CHE 2136
There is one laboratory section each week on Wednesday in Room PHYS 3321
nominally from 1-4:50 p.m. A student ID card swipe is necessary for access to
the laboratory area.

Manuals
<u>Required</u>

1) Physics 485/685 Laboratory Manuals, Department of Physics, University of
Maryland at College Park. Sent to class one week in advance of each lab.

<u>Recommended references</u>
1) The Art of Electronics, Second Edition, Horowitz and Hill, Cambridge, 1989.
*2) Building Scientific Apparatus, Forth Edition, Moore, Davis and Coplan, Cambridge
University Press, 2009.*
3) CMOS Cookbook, D. Lancaster, Howard W. Sams and Co., 1997
4) Lancaster's Active Filter Cookbook, D. Lancaster, Butterworth-Heinemann, 1996.
5) IC Op-Amp Cookbook, W. G. Jung, McMillan Computer Publications, 1986.
6) A Practical Introduction to Electronic Circuits, Second Edition, M. H. Jones,
Cambridge, 1985.
*7) Scientists Must Write, A guide to better writing for scientists, engineers, and
students*, Second Edition, Robert Barrass, Routledge, 2003

Laboratory Notebooks
Each student should obtain a bound laboratory notebook in which <u>all</u> data and
descriptive information about each experiment is to be recorded in pen not
pencil. The laboratory notebook should have a table of contents on the first page
(added to over time) to aid in locating the different experiments. It should be
possible to reconstruct the experiment from the information in the laboratory
notebook. Errors should be crossed out with a single line rather than erased or
obliterated. Often an incorrect calculation or circuit will contain information that

can be useful later on. The laboratory experiments for Wednesday will routinely be discussed in class on Monday, and it is recommended that the laboratory notebook be brought to lecture. The laboratory experiments are flexible by design allowing students latitude in pursuing individual interests. Descriptions of the experiments are given in the Laboratory Manual along with data sheets for the devices used in the experiments. Operation manuals for all the laboratory equipment are available in the laboratory.

PHYS 485/685 Laboratory Reports
Format will be discussed in lecture.

Grades
The semester grade for the course will be determined in the following way:
PHYS 485

Lab reports	60%
Participation in lecture	10%
Homework	15%
Project	15%

PHYS 685

Lab reports	55%
Participation in lecture	10%
Homework	10%
Project (by design more advanced)	15%
Linkedin page content	10%

LIST OF LABORATORY PROJECTS (spread out over 15 weeks)

1) RC Circuits
2) Diodes
3) Bipolar Junction Transistor
4) Metal Oxide Semiconductor Transistors (MOSFETs)
5) Feedback and Operational Amplifiers
6) IR LED and photodiode sensor
7) Logic gates and ring oscillators
8) Actuators: transistor powered motor
9) Measurement of magnetic field and temperature
10) Arduino Mayhem!

PRELIMINARY LECTURE SCHEDULE
PHYS 485/685 tentative schedule
Week

31-Aug	Overview / passives
7-Sep	Passives and how LRC permeates all physical systems
14-Sep	Diodes
21-Sep	Transistors
28-Sep	FETS, MOSFETS, IGBTs
5-Oct	Op amps

12-Oct	Soldering, smoke and mirrors, how things fail (when the smoke comes out)	
19-Oct	Houston we have a problem (debugging strategies)	
26-Oct	Grounds	
2-Nov	Discrete logic	
9-Nov	Arduino	
16-Nov	Sensors	temperature, magnetic field
23-Nov	Sensors and photonics	optical, particle
30-Nov	Actuators	solenoids, motors
7-Dec	Actuators	Magnetic, pneumatic
14-Dec	No Final	