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
Required
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.

Recommended references
3) CMOS Cookbook, D. Lancaster, Howard W. Sams and Co., 1997
4) Lancaster’s Active Filter Cookbook, D. Lancaster, Butterworth-Heinemann, 1996.

Laboratory Notebooks
Each student should obtain a bound laboratory notebook in which all 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**

<table>
<thead>
<tr>
<th>Week</th>
<th>31-Aug</th>
<th>Overview / passives</th>
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<tbody>
<tr>
<td>7-Sep</td>
<td>Passives and how LRC permeates all physical systems</td>
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<tr>
<td>14-Sep</td>
<td>Diodes</td>
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<tr>
<td>21-Sep</td>
<td>Transistors</td>
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</tr>
<tr>
<td>28-Sep</td>
<td>FETS, MOSFETS, IGBTs</td>
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<tr>
<td>5-Oct</td>
<td>Op amps</td>
<td></td>
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<tr>
<td>Date</td>
<td>Topic</td>
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<tr>
<td>12-Oct</td>
<td>Soldering, smoke and mirrors, how things fail (when the smoke comes out)</td>
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<tr>
<td>19-Oct</td>
<td>Houston we have a problem (debugging strategies)</td>
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<tr>
<td>26-Oct</td>
<td>Grounds</td>
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<tr>
<td>2-Nov</td>
<td>Discrete logic</td>
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<tr>
<td>9-Nov</td>
<td>Arduino</td>
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<tr>
<td>16-Nov</td>
<td>Sensors</td>
<td>temperature, magnetic field</td>
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<tr>
<td>23-Nov</td>
<td>Sensors and photonics</td>
<td>optical, particle</td>
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<tr>
<td>30-Nov</td>
<td>Actuators</td>
<td>solenoids, motors</td>
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<tr>
<td>7-Dec</td>
<td>Actuators</td>
<td>Magnetic, pneumatic</td>
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<tr>
<td>14-Dec</td>
<td>No Final</td>
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