Physics and Astronomy 240

Winter Semester 2012

Section 1: C460 ESC on T Th at 08:00 am - 10:50 am,  
Section 2: C460 ESC on T Th at 01:00 pm - 03:50 pm

Instructor: Bryan Peterson  
Office: N-355 ESC (http://map.byu.edu/?building=ESC)  
Office Hours: M W F 1:30-2:30  
Office Phone: 801-422-7417  
Email: bryan_peterson@byu.edu

TA Information

Name: Adam Cowley (Section 2)  
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Name: Matt Groesbeck (Section 1)  
Email: gmatth2@byu.net

Name: Owen Johnson (Section 1)  
Email: doj2364@gmail.com

Name: Mariah Pielstick (Section 2)  
Email: mpandmap@aol.com

Texts & Materials

Required  

Class web page

The class web page contains all the handouts and materials for the class. It also includes many hints and resources for completing the exercises that you will likely find useful. It is found at http://www.physics.byu.edu/faculty/petersonb/Phys240/w2012.html

Optional

BUILDING SCIENTIFIC APPARATUS 4E  
By MOORE, J  
ISBN: 9780521878586

Vendor: BYU  
Price (new): $80.00  
Price (used): $60.00

Description

Physics 240 gives you the opportunity to carry out several experiments from fabricating hardware through computer interfacing and control, data acquisition, data analysis, and writing a formal report. You will work in the machine shop, use SolidWorks (computer-aided design software) and LabVIEW (experiment control and data acquisition software), build some simple electronics circuits, analyze your data and write several reports. This course requires significant involvement of every student in all aspects of the experiments. And only a few portions of the process are already designed and ready to go - most of it will require that you decide how to complete the assigned tasks.

Time in the course

This course is a 2-credit class. It is expected that you will invest approximately 6-8 hours/week in the class during a
term. Most of this time will be in the scheduled lab period. The small remainder is expected to be spent out of class
time in preparation for coming labs or completing writing assignments.

Absences and coming late

On time attendance at all scheduled class times is required. This is particularly critical in this class where you will
be working as partners. If you want special consideration for an emergency that keeps you from participating in
class, you must notify the instructor before the event, if at all possible. If you do need to miss a class period, you
will be required to repeat, out of class, the part you missed. In some cases this may not be possible and you will
miss credit. Phone or email messages are both considered adequate prior notification.

Late assignments

Any assignments given are due at the beginning of class on the day indicated on the schedule (which is subject to
modification). Late assignments will lose 5% for each day or portion of a day late.

Written assignments

Though you work as partners, all writing is to be done individually.

- Lab notebook on temperature measurement
- "2-page" report on temperature measurement
- Lab notebook on controller design
- Lab notebook on superconductor measurements
- Formal report on superconductor measurements

Handouts will be given out in class with details on these assignments.

Oral presentation

You will give a 15-minute group oral presentation about your student-designed group project. This presentation will
be given during the scheduled final exam period for your section.

Professionalism

Everyone will start out with full credit for professionalism. You can lose that credit by unprofessional behavior such
as nagging the TA over trifling grading issues or by allowing your lab partner to do all the work while you watch. It is
not expected that you just accept errors or perceived inequities in the grading or class procedures, but it is expected
that you will bring those problems up in a professional manner.

Prerequisites

The official prerequisite for Physics 240 is Physics 145. Implied in that prerequisite is Physics 140. If you have not
had Physics 140 you will likely struggle with some of the electronics required for the class.

Grading Policies

This list shows the approximate weighting for grades. It may be adjusted as the term develops:

- Attendance at all class session: 20%
- Lab projects and reports: 40%
- Formal superconductivity report: 10%
- Group student-designed project and presentation: 20%
- Professionalism: 10%
The final grades are assigned using the following scale (roughly):

- A: [93-100]
- A-: [90-93)
- B+: [87-90)
- B: [83-87)
- B-: [80-83)
- C+: [77-80)
- C: [73-77)
- C-: [70-73)
- D+: [67-70)
- D: [63-67)
- D-: [60-63)
- E: [0-60)

**Learning Outcomes**

**Design and Build**
Design, build, and interface experimental apparatus.

**Measurements**
Make involved physical measurements and analyze experimental results.

**Record Keeping**
Document in a personal lab notebook the procedures, methods, results, and analysis of laboratory exercises.

**Presentation**
Present work in writing and through oral presentations.

**Ethics**
Demonstrate understanding of professional ethics guidelines for research activities and presentation of results.

**Course Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Assignments</th>
</tr>
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<tbody>
<tr>
<td>Th - Jan 5</td>
<td><em>Introduction</em> Safety Training/Quiz</td>
<td>-</td>
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<tr>
<td>T - Jan 10</td>
<td>A: Machining 1 B: Machining 2</td>
<td>-</td>
</tr>
<tr>
<td>Th - Jan 12</td>
<td>CAD Training</td>
<td>-</td>
</tr>
<tr>
<td>T - Jan 17</td>
<td>A: Machining 2 B: Machining 1</td>
<td>-</td>
</tr>
<tr>
<td>Th - Jan 19</td>
<td>CAD Training</td>
<td>Show your SolidWorks drawings to the instructor or a TA for recording - it is not necessary to print them</td>
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<tr>
<td>Date</td>
<td>Activity</td>
<td>Notes</td>
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<tr>
<td>T - Jan 24</td>
<td>A: Machining 1, B: Machining 2</td>
<td>-</td>
</tr>
<tr>
<td>Th - Jan 26</td>
<td>LabVIEW Lecture</td>
<td>LabVIEW Basics Course</td>
</tr>
<tr>
<td>T - Jan 31</td>
<td>A: Machining 2, B: Machining 1</td>
<td>Show your machining projects to the instructor or a TA for recording</td>
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<tr>
<td>Th - Feb 2</td>
<td>Data Acquisition Lecture</td>
<td>LabVIEW Basics Course</td>
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<tr>
<td>T - Feb 7</td>
<td>LabVIEW Basics Course</td>
<td>Notify TA or instructor when you finish the LabVIEW course for recording</td>
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<tr>
<td>Th - Feb 9</td>
<td>Temperature Lab Lecture</td>
<td>Heater</td>
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<td>T - Feb 14</td>
<td>Temperature Lab</td>
<td>-</td>
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<tr>
<td>Th - Feb 16</td>
<td>Temperature Lab</td>
<td>-</td>
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<tr>
<td>T - Feb 21</td>
<td></td>
<td>No class</td>
</tr>
<tr>
<td>Th - Feb 23</td>
<td>Temperature Controller Lecture</td>
<td>Check temperature lab notebooks</td>
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<tr>
<td>T - Feb 28</td>
<td>Controller Contest</td>
<td>&quot;2-page&quot; paper on Temperature Measurements is due at the end of class</td>
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<tr>
<td>Th - Mar 1</td>
<td>Controller Contest</td>
<td>-</td>
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<tr>
<td>T - Mar 6</td>
<td>Superconductivity Intro.</td>
<td>Controller Contest</td>
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<td>Th - Mar 8</td>
<td>Superconductivity Measurements</td>
<td>Check controller lab notebooks</td>
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<tr>
<td>T - Mar 13</td>
<td>Superconductivity Measurements</td>
<td>-</td>
</tr>
<tr>
<td>Th - Mar 15</td>
<td>Superconductivity Measurements</td>
<td>-</td>
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<tr>
<td>T - Mar 20</td>
<td>Ethics in Science (and life)</td>
<td>-</td>
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<tr>
<td>Th - Mar 22</td>
<td>Superconductivity Paper (no class)</td>
<td>-</td>
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<tr>
<td>T - Mar 27</td>
<td>Superconductivity Paper (no class)</td>
<td>-</td>
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<tr>
<td>Th - Mar 29</td>
<td>Student-designed experiments</td>
<td>Check superconductivity lab notebooks</td>
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<td></td>
<td></td>
<td>Superconductivity bibliography due on or before this date</td>
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BYU Honor Code

In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university’s expectation, and my own expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

Preventing Sexual Discrimination and Harassment

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU’s policy against sexual harassment extends not only to employees of the university, but to students as well. If you encounter unlawful sexual harassment or gender-based discrimination, please talk to your professor; contact the Equal Employment Office at 422-5895 or 367-5689 (24-hours); or contact the Honor Code Office at 422-2847.

Students with Disabilities

Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the Services for Students with Disabilities Office (422-2767). Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. Services are coordinated with the student and instructor by the SSD Office. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures by contacting the Equal Employment Office at 422-5895, D-285 ASB.

Academic Honesty Policy

The first injunction of the BYU Honor Code is the call to be honest. Students come to the university not only to improve their minds, gain knowledge, and develop skills that will assist them in their life’s work, but also to build character. President David O. McKay taught that ‘character is the highest aim of education’ (The Aims of a BYU Education, p. 6). It is the purpose of the BYU Academic Honesty Policy to assist in fulfilling that aim. BYU students should seek to be totally honest in their dealings with others. They should complete their own work and be evaluated based upon that work. They should avoid academic dishonesty and misconduct in all its forms, including but not limited to plagiarism, fabrication or falsification, cheating, and other academic misconduct.

Plagiarism Policy
Writing submitted for credit at BYU must consist of the student's own ideas presented in sentences and paragraphs of his or her own construction. The work of other writers or speakers may be included when appropriate (as in a research paper or book review), but such material must support the student's own work (not substitute for it) and must be clearly identified by appropriate introduction and punctuation and by footnoting or other standard referencing.