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CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Dennis Whitson and W. Larry Freeman Phone 7-4593/4592

Department Physics

II. PROPOSAL TYPE (Check All Appropriate Lines)

X **COURSE** Inter Exp Physics I
Suggested 20 character title

_____ New Course* _____
Course Number and Full Title

X Course Revision PHYS 350 Intermediate Experimental Physics I
Course Number and Full Title

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_____ Liberal Studies Approval+ for new or existing course _____
Course Number and Full Title

_____ Course Deletion _____
Course Number and Full Title

_____ Number and/or Title Change _____
Old Number and/or Full Old Title

_____
New Number and/or Full New Title

_____ Course or Catalog Description Change _____
Course Number and Full Title

PROGRAM: _____ Major _____ Minor _____ Track

_____ New Program* _____
Program Name

_____ Program Revision* _____
Program Name

_____ Program Deletion* _____
Program Name

_____ Title Change _____
Old Program Name

_____
New Program Name

III. Approvals (signatures and date)

Kenneth E. Hershman 11/16/00
Department Curriculum Committee

Richard D. Roberto 11/16/00
Department Chair

_____
College Curriculum Committee

_____
College Dean

_____
+Director of Liberal Studies (where applicable)

_____
*Provost (where applicable)

1993

Syllabus of Record for PHYS 350

I. Catalog Description

PHYS 350 Intermediate Experimental Physics I

0 lecture hours
6 lab hours
3 credits
(0c-6l-3sh)

Prerequisites: PHYS 331; PHYS 242 or EOPT 120

The student will perform required fundamental experiments in areas of mechanics, optics, modern physics, and heat. Speaking before other classmates and faculty and competence in writing scientific papers and reports will be emphasized. Effectiveness in the taking of data is important. Computers will often be utilized to perform data collection and analysis.

II. Course Objectives

Upon completion of this course, the student will be able to

1. Perform and analyze a broad range of experiments including several that are critical to the understanding and advancement of the era of modern physics.

2. Plan and perform experimental operations involving resource acquisition and set-up, data taking, analysis, and reporting.

3. Utilize computers to perform data taking and analysis.

4. Exhibit confidence and ability in public speeches about technical issues.

5. Demonstrate competence in writing scientific papers and reports.

6. Efficiently collect and record data and listen critically.

III. Course Outline

This course is a non-traditional laboratory course in that many of the experiments have no set procedure and tend to be open-ended. This allows the students to independently explore different procedural matters and various details of the hypotheses in order to meet the overall goals of the exercise. Furthermore, the laboratory content of the course varies from year to year as new exercises are added and old ones are, temporarily, removed. As a result of this flexibility, students get a broad range of experience with a depth of knowledge, which tends to be ingrained because they discover much of it on their own.

1. Students are expected to complete a minimum of nine out of sixteen possible experiments. Students may also find other interesting experiments pertinent to contemporary physics that may be substituted.

2. Students are expected to be prepared to present a brief lecture at the beginning of

each laboratory meeting on their work from the previous laboratory exercise. They should be prepared to defend their results with sound scientific reasoning. There will be one or two students selected for this endeavor each laboratory period starting after the third laboratory meeting.

3. The instructor(s) shall elaborate on specific topics, when necessary, to individual laboratory groups.

IV. Evaluation Methods

Grading scale: Grades shall be assigned according to the following scale:

A	90%-100%
B	80%-89%
C	70% 79%
D	60%-69%
F	less than 60%

Attendance Policy: The attendance policy shall conform to the standards set forth by the university.

The final grade for the course will be determined by the following criteria:

55% Written Laboratory Exercises
These shall be graded on format, writing ability, content, and the quality of the analysis. The format for the written laboratory exercises is as follows:

a. COVER SHEET:
Should have Course and Section #, your name, partner's name, title of experiment and date (or dates) of experiment.

b. PURPOSE
A brief statement describing the objectives of the laboratory exercise.

c. EQUIPMENT:
A list of all equipment (with identification numbers) and supplies used in the experiment.

d. PROCEDURE:
A description of the experimental technique to be used. Be sure that this has been thought through carefully because it needs to be brief and clear.

e. THEORY:
A description of the theoretical background associated with the problem at hand. **Do not provide a detailed mathematical description.** The mathematics should be as brief as possible. We are interested in the physics! Remember to cite all references including your laboratory manual.

f. DATA:

This section shall contain a clear indication of all data taken with their associated uncertainties. This shall include all physical constants that are used in the experiment. It is preferable that the data be presented in tabular form with all units clearly evident.

g. CALCULATIONS:
This section shall include a sample theoretical and comparison calculation including percent differences and discrepancies as well as uncertainty propagation. There shall be a subheading for each different type of calculation. There is no need to show the details of the calculations, just set the problem up and show the results with proper units. The calculation section shall have a **summary** subsection that summarizes in tabular form all calculation results including percent differences and discrepancies as well as predicted uncertainties in the final results. This summary shall also include any experimental results for ease of visual comparison.

h. ANALYSIS AND CONCLUSIONS:
In this section you will strive to correlate the theoretical and experimental results in any way you can. This is where you explain why discrepancies occur. Remember to cite all references.

20% Students shall write two, formal publication quality papers by the end of the semester. Two problems of interest shall be chosen and approved of by the instructor(s) by the fifth week of the semester. These may be either laboratory exercises or totally new topics of interest in contemporary physics. These shall be graded on the abstract, format consistency with accepted standards, writing ability, content, and the quality of the summary statement.

25% Subjective Evaluation
This shall be determined by the instructor(s) and will be based upon general observations of the student throughout the course. Evaluation criteria shall include but not be limited to formal presentations, inquisitiveness, and professionalism.

V. Required Textbook

Intermediate Experimental Physics I Manual- provided by Instructor(s)

VI. Special resource requirements

None

VII. Bibliography

:

Baird, D.C., *Experimentation, an Introduction to Measurement Theory and Experiment Design*, 3rd Ed., Prentice Hall, 1995.

Dunlap, R.A., *Experimental Physics, Modern Methods,* Oxford University Press, 1988.

Leo, W., *Techniques for Nuclear and Particle Physics Experiments, A How-to Approach*, 2nd Ed., Springer-Verlag, New York, 1994

Moore, J.H.; Davis, C.; Coplan, M.A., *Building Scientific Apparatus, a Practical Guide to Design and Construction*, Addison-Wesley Publishing Co., 1983.

Pine, J.; King, J.; Morrison, P.; Morrison, P; *ZAP! Experiments in Electrical Currents And Fields*, Jones and Bartlett Publishers, Sudbury, Mass., 1996

Simpson, R.E., *Introductory Electronics for Scientists and Engineers*, Allyn and Bacon, Inc., 1987.

Summary of Proposed Revisions

The only change is in the prerequisites for PHYS 350, Intermediate Experimental Physics I, where EOPT 120 is added to the list. The change is from

Prerequisites: PHYS 242 and PHYS 331
to
Prerequisites: PHYS 331; PHYS 242 or EOPT 120

Justification/rationale for the revision

The proposed Electro-Optics program is the reason for this change. In this program two new courses are proposed, EOPT 110, Geometric Optics, and EOPT 120, Wave Optics. If a student transfers to the main campus after finishing the Associate in Science in Electro-Optics degree he/she can then work on the Applied Physics degree with an Electro-Optics track. PHYS 350, Intermediate Experimental Physics I, is required in this track and the relevant prerequisites are EOPT 110 and EOPT 120, which take the place of PHYS 242, Optics. Note: EOPT 120 has EOPT 110 as a prerequisite.

The old syllabus of record:

COURSE SYLLABUS

I. Catalog Description

PHYS 350 Intermediate Experimental Physics I — 3 credits
Prerequisites: PHYS 242 and PHYS 331 — 6 lab hours

Required fundamental experiments in areas of mechanics, optics, modern physics and heat.

II. Course Objectives

1. Students are to perform a broad range of experiments including several that are critical to the understanding and advancement of the era of modern physics.

2. Students are to acquire the ability to plan and perform experimental operations involving resource acquisition and set-up, data taking, analysis, and reporting.

3. Students are to gain knowledge in utilizing computers to perform data taking and analysis.

4. Students are to gain experience in public speaking.

5. Students are to become competent in writing scientific papers and reports.

6. Students are to gain experience in note-taking and critical listening.

III. Course Outline

1. Students are expected to complete a minimum of nine out of sixteen possible experiments. Students may also find other interesting experiments pertinent to contemporary physics that may be substituted.

2. Students are expected to be prepared to present a brief lecture at the beginning of each laboratory meeting on their work from the previous laboratory exercise. They should be prepared to defend their results with sound scientific reasoning. There will be one or two students selected for this endeavor each laboratory period starting after the third laboratory meeting.

3. Students shall write two, formal publication quality papers by the end of the semester. Two problems of interest shall be chosen and approved of by the instructor(s) by the fifth week of the semester. These may be either laboratory exercises or totally new topics of interest in contemporary physics.

4. The instructor(s) shall lecture on specific topics, when necessary, to individual laboratory groups.

5. The format for your written laboratory exercises is as follows:

   a. COVER SHEET:
   Should have Course and Section #, your name, partner's name, title of experiment and date (or dates) of experiment.

   b. PURPOSE
   A brief statement describing the objectives of the laboratory exercise.

   c. EQUIPMENT:
   A list of all equipment (with identification numbers) and supplies used in the experiment.

   d. PROCEDURE:
   A description of the experimental technique to be used. Be sure that this has been thought through carefully because it needs to be brief and clear.

   e. THEORY:
   A description of the theoretical background associated with the problem at hand. **Do not provide a detailed mathematical description.** The mathematics should be as brief as possible. We are interested in the physics! Remember to cite all references including your laboratory manual.

   f. DATA:
   This section shall contain a clear indication of all data taken with their associated uncertainties. This shall include all physical constants that are used in the experiment. It is preferable that the data be presented in tabular form with all units clearly evident.

   g. CALCULATIONS:
   This section shall include a sample theoretical and comparison calculation including percent differences and discrepancies as well as uncertainty propagation. There shall be a subheading for each different type of calculation. There is no need to show the details of the calculations just set the problem up and show the results with proper units. The calculation section shall have a **summary** subsection that summarizes in tabular form all calculation results including percent differences and discrepancies as well as predicted uncertainties in the final results. This summary shall also include any experimental results for ease of visual comparison.

   h. ANALYSIS AND CONCLUSIONS:
   In this section you will strive to correlate the theoretical and experimental results in any way you can. This is where you explain why discrepancies occur. Remember to cite all references.

IV. Evaluation

The final grade for the course shall consist of the following:

Written Laboratory Exercises: 55%

These shall be graded on format writing ability, content, and the quality of the analysis.

Formal Paper: 20%

These shall be graded on the abstract, format consistency with accepted standards, writing ability, content, and the quality of the summary statement.

Subjective Evaluation: 25%

This shall be determined by the instructor(s) based upon general observations of the students throughout the course. It shall include but not be limited to the following:

1. Presentations
   a) conduct
   b) poise
   c) competence

2. Inquisitiveness
   a) ability to ask questions
   b) interaction with classmates
   c) interest in subject

3. Professionalism
   a) general classroom conduct
   b) neatness
   c) promptness
   d) competence

V. Required Textbook

Intermediate Experimental Physics I - provided

Suggested References:

1. Experimentation, an Introduction to Measurement Theory and Experiment Design. D.C. Baird, Prentice Hall, 1988.

2. Experimental Physics, Modern Methods. R.A. Dunlap, Oxford University Press, 1988.

3. Building Scientific Apparatus, a Practical Guide to Design and Construction. J.H. Moore, C. Davis, M.A. Coplan, Addison-Wesley Publishing Co., 1983.

4. Introductory Electronics for Scientists and Engineers. R.E. Simpson, Allyn and Bacon, Inc., 1987.