

I. CATALOG INFORMATION

- A. Discipline: PHYSICS
- B. Subject Code and Number: PHYS M20BL
- C. Course Title: Thermodynamics, Electricity and Magnetism Laboratory

D. Credit Course units:

Units: 1

Lecture Hours per week: 0

Lab Hours per week : 3

Variable Units : No

E. Student Learning Hours:

Lecture Hours:

Classroom hours: 0 - 0

Laboratory/Activity Hours:

Laboratory/Activity Hours 52.5 - 52.5**Total Combined Hours** in a 17.5 week term: 52.5 - 52.5

F. Non-Credit Course hours per week _____

G. May be taken a total of: 1 2 3 4 time(s) for creditH. Is the course co-designated (same as) another course: No Yes
If YES, designate course Subject Code & Number: _____

I. Course Description:

Examines the basic phenomena in thermodynamics and electromagnetism. Uses real-world modern instruments such as digital and analog voltmeters, ammeters, the oscilloscope. Teaches the principles of data taking, reduction, synthesis, and analysis, in addition to the writing of scientific reports.

J. Entrance Skills

*Prerequisite: No Yes Course(s)
PHYS M20AL and PHYS M20B or concurrent enrollment

*Corequisite: No Yes Course(s)

Limitation on Enrollment: No Yes

Recommended Preparation: No Yes Course(s)

Other: No Yes

K. Other Catalog Information:

II. COURSE OBJECTIVES

Upon successful completion of the course, a student will be able to:

		Methods of evaluation will be consistent with, but not limited by, the following types or examples.
1	assemble and perform experiments in thermodynamics and electromagnetism following instructions in the laboratory manual.	Written tests or quizzes before and/or after the experiment Completion of informal or formal laboratory reports
2	measure and record the data, including estimated uncertainty, using appropriate units and significant figures.	Written tests or quizzes before and/or after the experiment Completion of informal or formal laboratory reports
3	reduce and analyze real-world experimental data, calculate uncertainties, produce and analyze graphs, and summarize the experiment and its results using an appropriate technical writing style.	Written tests or quizzes before and/or after the experiment Completion of informal or formal laboratory reports
4	critically evaluate the experimental results and procedures using accepted values and other relevant information and draw conclusions regarding the efficacy of the experimental procedure related to the lecture portion of the class.	Written tests or quizzes before and/or after the experiment Completion of informal or formal laboratory reports
5	suggest changes to the experimental procedure which, if implemented, could reduce the experimental uncertainty and/or error.	Written tests or quizzes before and/or after the experiment Completion of informal or formal laboratory reports
6	suggest practical applications for the values measured, conclusions reached, or methods utilized in the experiment.	Written tests or quizzes before and/or after the experiment Completion of informal or formal laboratory reports

III. COURSE CONTENT

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Estimated %	Topic	Learning Outcomes
Lecture (must total 100%)		
Lab (must total 100%)		
8.00%	Specific Heat of Solids	1, 2, 3, 4, 5, 6
8.00%	Thermal Expansion in Metal Rods	1, 2, 3, 4, 5, 6
8.00%	Newton's Law of Cooling	1, 2, 3, 4, 5, 6
7.00%	Equipotential and Electric Field Plotting	1, 2, 3, 4, 5, 6
7.00%	Ohm's Law	1, 2, 3, 4, 5, 6
7.00%	The Parallel Plate Capacitor	1, 2, 3, 4, 5, 6
7.00%	Direct Current (D.C.) Circuits	1, 2, 3, 4, 5, 6
8.00%	The Oscilloscope and Simple Amplifier Circuits	1, 2, 3, 4, 5, 6
8.00%	Measuring	1, 2, 3, 4, 5, 6
8.00%	Magnetic Fields and the Hall Effect	1, 2, 3, 4, 5, 6
8.00%	The Electron Charge to Mass Ratio	1, 2, 3, 4, 5, 6
8.00%	The Series Inductor Resistor Capacitor (LRC) Alternating Current (A.C.) Circuit and Resonance	1, 2, 3, 4, 5, 6
8.00%	Basic Digital Logic Circuits	1, 2, 3, 4, 5, 6

IV. TYPICAL ASSIGNMENTS

A. Writing assignments

Writing assignments are required. Possible assignments may include, but are not limited to:	
1	summarize the experimental objectives, method, and results in a concise abstract.
2	respond to questions that require an essay or a brief answer.
3	write conclusions and analyses in informal laboratory reports using appropriate technical language style.
4	prepare formal laboratory reports which conform to the style specified in the laboratory manual on topics such as thermodynamics, electromagnetic fields, and circuit analysis.

B. Critical thinking assignments

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Critical thinking assignments are required. Possible assignments may include, but are not limited to:	
1	solve assigned problems.
2	analyze the experiment and define its goals.
3	compare and contrast the various ways an experiment could be conducted.
4	evaluate the significance and relevance of the experimental results.
5	suggest changes in the experimental procedure which could lower the experimental uncertainty of the results.
6	analyze equipotential surface by plotting voltages.

V. METHODS OF INSTRUCTION

Methods of instruction may include, but are not limited to:

- Distance Education – When any portion of class contact hours is replaced by distance education delivery mode (Complete DE Addendum, Section XV)
- Lecture/Discussion
- Laboratory/Activity
- Other (Specify) Demonstrations conducted by the instructor.
- Optional Field Trips
- Required Field Trips

VI. METHODS OF EVALUATION

Methods of evaluation may include, but are not limited to:

- | | | |
|----------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------|
| <input checked="" type="checkbox"/> Essay Exam | <input checked="" type="checkbox"/> Classroom Discussion | <input checked="" type="checkbox"/> Skill Demonstration |
| <input checked="" type="checkbox"/> Problem Solving Exam | <input checked="" type="checkbox"/> Reports/Papers/Journals | <input checked="" type="checkbox"/> Participation |
| <input checked="" type="checkbox"/> Objective Exams | <input checked="" type="checkbox"/> Projects | <input checked="" type="checkbox"/> Other (specify) |

Students are required to complete a report for each lab exercise. These reports require the mathematical and verbal analyses of the experimental results, and responses to specific questions about the lab.

VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS

Harper, Clinton D. Physics M20B Lab Manual. Ver 2.1 ed. Sunshine Publishing, 2003.

Loyd, David. Physics Laboratory Manual. 4th ed. Brooks Cole, 2014.

Becht, Balazs. Physics M20B Laboratory Manual. [Instructor generated manual], 2013.

Wilson, Jerry, and Cecilia Hernandez-Hall. Physics Laboratory Experiments. 8th ed. Brooks Cole, 2014.

VIII. STUDENT MATERIALS FEES

No Yes

IX. PARALLEL COURSES

College	Course Number	Course Title	Units
Cal Poly Pomona	PHY 133L	General Physics Lab	1
San Diego State Univ.,	PHYS 126L	Principles of Physics Laboratory	1
San Francisco State University	PHYS 232	General Physics with Calculus II Lab	1
UC San Barbara	PHYS 3L	Physics Laboratory	1
UC Santa Cruz	PHYS 5N	Introduction to Physics Laboratory	1
CSU Northridge	PHYS 220BL	Electricity and Magnetism Laboratory	1

X. MINIMUM QUALIFICATIONS

Courses Requiring a Masters Degree:

Master's in physics, astronomy, or astrophysics OR Bachelor's in physics or astronomy AND Master's in engineering, mathematics, meteorology, or geophysics OR the equivalent.

XI. ARTICULATION INFORMATION

A. Title V Course Classification:

1. This course is designed to be taken either:

- Pass/No Pass only (no letter grade possible); or
 Letter grade (P/NP possible at student option)

2. Degree status:

Either Associate Degree Applicable; or Non-associate Degree Applicable

B. Moorpark College General Education:

1. Do you recommend this course for inclusion on the Associate Degree General Education list?

Yes: No: If YES, what section(s)?

- A1 - Natural Sciences - Biological Science
 A2 - Natural Sciences - Physical Science
 B1 - Social and Behavioral Sciences - American History/Institutions
 B2 - Social and Behavioral Sciences - Other Social Behavioral Science
 C1 - Humanities - Fine or Performing Arts
 C2 - Humanities - Other Humanities
 D1 - Language and Rationality - English Composition
 D2 - Language and Rationality - Communication and Analytical Thinking

- E1 - Health/Physical Education
- E2 - PE or Dance
- F - Ethnic/Gender Studies

C. California State University(CSU) Articulation:

1. Do you recommend this course for transfer credit to CSU? Yes: No:

2. If YES do you recommend this course for inclusion on the CSU General Education list?

Yes: No: If YES, which area(s)?

A1 A2 A3 B1 B2 B3 B4

C1 C2 D1 D2 D3 D4 D5

D6 D7 D8 D9 D10 E

D. University of California (UC) Articulation:

1. Do you recommend this course for transfer to the UC? Yes: No:

2. If YES do you recommend this course for the Intersegmental General Education Transfer Curriculum (IGETC)? Yes: No:

IGETC Area 1: English Communication

- English Composition
- Critical Thinking-English Composition
- Oral Communication

IGETC Area 2: Mathematical Concepts and Quantitative Reasoning

- Mathematical Concepts

IGETC Area 3: Arts and Humanities

- Arts
- Humanities

IGETC Area 4: Social and Behavioral Sciences

- Anthropology and Archaeology
- Economics
- Ethnic Studies
- Gender Studies
- Geography
- History
- Interdisciplinary, Social & Behavioral Sciences
- Political Science, Government & Legal Institutions
- Psychology

Sociology & Criminology

IGETC Area 5: Physical and Biological Sciences (mark all that apply)

- Physical Science Lab or Physical Science Lab only (non-sequence)
- Physical Science Lecture only (non-sequence)
- Biological Science
- Physical Science Courses
- Physical Science Lab or Biological Science Lab Only (non-sequence)
- Biological Science Courses
- Biological Science Lab course
- First Science course in a Special sequence
- Second Science course in a Special Sequence
- Laboratory Activity
- Physical Sciences

IGETC Area 6: Language other than English

- Languages other than English (UC Requirement Only)
- U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)
- U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)

XII. REVIEW OF LIBRARY RESOURCES

- A. What planned assignment(s) will require library resources and use?

The following assignments require library resources:

Using the Library's on-line or print resources to research background material regarding the theory behind thermodynamics, electricity and magnetism, and circuits.

- B. Are the currently held library resources sufficient to support the course assignment?

YES: NO:

If NO, please list additional library resources needed to support this course.

XIII. PREREQUISITE AND/OR COREQUISITE JUSTIFICATION

Requisite Justification for PHYS M20AL

- A. Sequential course within a discipline.

1. reduce and analyze data, calculate experimental uncertainties, produce and analyze graphs, and summarize the experiment and its results using an appropriate technical writing style.

2. critically evaluate the experimental results and procedures using accepted values and other relevant information and draw conclusions regarding the efficacy of the experimental procedure.

3. suggest changes to the experimental procedure which, if implemented, could reduce the experimental uncertainty and/or error.

4. suggest practical applications for the values measured, conclusions reached, or methods utilized in the experiment.

5. assemble and perform experiments in the basic laws of the mechanics of solid and fluids.

6. measure and record the data, including estimated uncertainty, using appropriate units.

- B. Standard Prerequisite or Corequisite required by universities.
- C. Corequisite is linked to companion lecture course.
- D. Prerequisite or Corequisite is authorized by legal statute or regulation.
Code Section: _____
- E. Prerequisite or Corequisite is necessary to protect the students' health and safety.
- F. Computation or communication skill is needed.
- G. Performance courses: Audition, portfolio, tryouts, etc. needed.

and

Requisite Justification for PHYS M20B or concurrent enrollment

- A. Sequential course within a discipline.
- B. Standard Prerequisite or Corequisite required by universities.
CSUN; UCLA; UCSB
- C. Corequisite is linked to companion lecture course.
- D. Prerequisite or Corequisite is authorized by legal statute or regulation.
Code Section: _____
- E. Prerequisite or Corequisite is necessary to protect the students' health and safety.

F. Computation or communication skill is needed.

G. Performance courses: Audition, portfolio, tryouts, etc. needed.

XIV. WORKPLACE PREPARATION

PHYS M20BL: Not Applicable

XV. DISTANCE LEARNING COURSE OUTLINE ADDENDUM

PHYS M20BL: Not Applicable

XVI. GENERAL EDUCATION COURSE OUTLINE ADDENDUM

General Education Division of Learning [check all applicable boxes]:

Natural Sciences

Biological Science

Physical Science

Social and Behavioral Sciences

American History/Institutions

Other Social Science

Humanities

Fine or Performing Arts

Other Humanities

Language and Rationality

English Composition

Communication and Analytical Thinking

Health/Physical Education

Ethnic/Women's Studies

Check either Option 1 or Option 2

OPTION #1: Moorpark College has already received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. Note: This option applies only to technical revisions and updated courses.

OPTION #2: Moorpark College has not received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. This option applies to all new and substantively revised courses.

XVII. STUDENT MATERIALS FEE ADDENDUM

PHYS M20BL: Not Applicable

XVIII. REPEATABILITY JUSTIFICATION TITLE 5, SECTION 55041

PHYS M20BL: Not Applicable

XIX. CURRICULUM APPROVAL

Course Information:

Discipline: PHYSICS

Discipline Code and Number: PHYS M20BL

Course Revision Category: Technical Course Revision

Course Proposed By:

Originating Faculty Erik Reese 03/12/2016

Faculty Peer: Ronald Wallingford 03/13/2016

Curriculum Rep: Scarlet Relle 03/17/2016

Department Chair: Ronald Wallingford 03/13/2016

Division Dean: Julius Sokenu 03/18/2016

Approved By:

Curriculum Chair: Jerry Mansfield 05/07/2016

Executive Vice President: _____

Articulation Officer: Letrisha Mai 05/11/2016

Librarian: Mary LaBarge 04/04/2016

Implementation Term and Year: Fall 2016

Approval Dates:

Approved by Moorpark College Curriculum Committee: 05/03/2016

Approved by Board of Trustees (if applicable): _____

Approved by State (if applicable): 05/16/2016