

**EXPERIMENTAL PHYSICS:  
A COURSE FOR FRESHMEN:  
BEING A REVISION OF  
ALEXANDER MANUAL**

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Experimental Physics: A Course for Freshmen: Being a Revision of Alexander Manual by  
George K. Burgess

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**GEORGE K. BURGESS**

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# EXPERIMENTAL PHYSICS

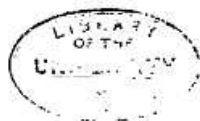
A COURSE FOR FRESHMEN

*Being a Revision of Alexander's Manual*

BY

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## PREFACE.

This manual represents the latest step in the development of a course in physics for Freshmen at the University of California under the direction of Professor Slate; the modifications of previous texts are not radical, but reflect the present instructor's views of what is suitable for the freshman class at this time. There is no serious claim to originality, either in subject matter or in method of presentation, both of which are largely those of the late Professor Whiting, and of Dr. A. C. Alexander, who, until recently, gave the instruction in this course.

The course has been modified by decreasing the time of instruction in the laboratory from two three-hour periods a week to two periods of two hours, and instead of one lecture there are now two recitations a week. By this change it is hoped that the students will get a better grasp of the principles involved in the experiments.

Among the main points by which this manual differs from its predecessors are the following:—

Because the laboratory period has been reduced from three to two hours, some of the exercises have been shortened.

The details of a considerable number of exercises differ from those of previous texts, and many of the experiments have been entirely rewritten, although treating in general of the same principles as heretofore, with a few exceptions.

More emphasis is given to the graphical representation of results.

Where possible, the principle of an experiment is summarized in an equation by the student.

Optional experimental parts of an exercise have been removed, due to the shorter laboratory period, and also because in practise this has been found by the author to be of questionable benefit in large elementary classes for which the ratio of the number of students to the number of instructors is great.

In place of the optional portions are put questions or problems that the student may solve outside of the laboratory, if he finishes the experimental part only in the regular period.

Questions are occasionally appended to an exercise that require a knowledge of principles developed in the class room, or reference to some standard descriptive work.

Finally, the exercises have been arranged in four groups of eleven

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each, the exercises of each group being so written that the student, with the aid given in the recitations, may intelligently begin with any one. Although in certain instances there is an apparent lack of sequence, yet, on the whole, this system seems more efficient than the one previously in vogue, in which the students were started by eights in succession, when in a section of eighty students some were six weeks late in starting. By the new arrangement two weeks are gained in every eight, when all the students may devote their time to back work.

The author is indebted to the members of the Physical Department for helpful advice, and especially to Mr. C. A. Kraus, who has aided in many ways the preparation of these notes.

GEORGE K. BURGESS.

Berkeley, July, 1902.



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## GENERAL DIRECTIONS.

**BEGINNING WORK.**—The class will be divided into four sections, each having two laboratory periods per week of two hours, preceded by a recitation, for which each section will be divided into halves.

The laboratory work includes forty-four exercises, divided into sets of eleven. As soon as registered, each student will report at the laboratory in East Hall and will be assigned to one of the first eleven experiments. He will then perform in succession at the following exercises the cycle of eleven experiments. Example: A student assigned to the 7th experiment will perform the first eleven in the order 7, 8, 9, 10, 11, 1, 2, 3, 4, 5, 6. Two weeks will be allowed at the close of this cycle for the correction and completion of work. A new set of experiments will then be mounted, and it will then be impossible to reperform any of the first eleven experiments this year.

**IN THE LABORATORY.**—The following directions are necessitated largely by the size of the class.

Students will work in pairs and may choose their partners. Each student however will be required to take a separate set of observations for each experiment and to write up his notes independently. All data must be recorded at the time of observation in the note-book and not on scrap paper.

In general, at least three independent observations of each quantity measured are to be taken and *every* observation recorded when it is taken. Notes are to be neatly arranged (see sample note-book) and observations recorded so as to be distinct from descriptive or other written matter, and when practicable results should be tabulated.

Concise but clear answers are wanted to questions asked; all inferences should be in the words of the student, and demonstrations should be complete. Fractions are to be expressed as decimals, and calculations given in detail.