



*The*  
OHIO STATE UNIVERSITY  
BULLETIN

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DECEMBER 20, 1934

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APPLIED OPTICS

1935 - 1936

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# APPLIED OPTICS

1935-1936

THE OHIO STATE UNIVERSITY  
COLUMBUS



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# UNIVERSITY CALENDAR

1935

## SUMMER QUARTER

May 31 to June 1  
June 15 to 22  
June 17

Entrance Examinations.  
Physical Examinations for all new students.  
Latest day for registration and payment of fees without penalty. (See page 12.)  
Classes begin, 7:30 A.M.  
Intelligence Test for all new students (Saturday P.M.).  
Independence Day. No classes.  
Final Examinations, first term (at regular class hours).  
Physical Examinations for all new students.  
First term ends, 8:30 P.M.  
Second term begins, 7:30 A.M.  
Intelligence Test for all new students (Saturday P.M.).  
Final Examinations (at regular class hours).  
Summer Convocation (Commencement), 2:00 P.M.  
Summer Quarter ends, 6:00 P.M.

June 18  
June 22  
July 4  
July 22, 23, 24  
July 19, 20  
July 24  
July 25  
July 27  
August 28, 29, 30  
August 30  
August 30

## AUTUMN QUARTER

September 6 to 8  
September 25 to 30  
September 30  
September 30

Entrance Examinations.  
Freshman Week.  
Physical Examinations for students other than Freshmen.  
Latest day for registration and payment of fees without penalty. (See page 12.)  
Classes begin, 8:00 A.M.  
Intelligence Test for all new students other than Freshmen (Saturday A.M.).  
Armistice Day. No classes after 12 M.  
Thanksgiving Recess.  
Final Examinations.  
Autumn Convocation (Commencement), 2:00 P.M.  
Autumn Quarter ends, 6:00 P.M.

October 1  
October 5  
November 11  
November 28, 29, 30  
December 18, 19, 20, 21  
December 20  
December 21

1936

## WINTER QUARTER

January 6 to 9  
January 6  
January 7  
January 11  
February 22  
March 18, 19, 20, 21  
March 20  
March 21

Physical Examinations for all new students.  
Latest day for registration and payment of fees without penalty. (See page 12.)  
Classes begin, 8:00 A.M.  
Intelligence Test for all new students (Saturday A.M.).  
University Day. No classes.  
Final Examinations.  
Winter Convocation (Commencement), 2:00 P.M.  
Winter Quarter ends, 6:00 P.M.

## SPRING QUARTER

March 30  
March 31  
March 30 to April 1  
April 4  
May 29  
May 30  
June 10, 11, 12, 13  
June 13  
June 14  
June 15  
June 15  
June 15  
June 22  
September 4  
September 29

Latest day for registration and payment of fees without penalty. (See page 12.)  
Classes begin, 8:00 A.M.  
Physical Examinations for all new students.  
Intelligence Test for all new students (Saturday A.M.).  
R. O. T. C. Review and Presentation of Commissions.  
Memorial Day. No classes.  
Final Examinations.  
Alumni Day.  
Baccalaureate Sermon.  
Class Day.  
Spring Convocation (Commencement).  
Spring Quarter ends.  
Summer Quarter (1936) begins.  
Summer Quarter (1936) ends.  
Autumn Quarter (1936) classes begin.



## ADMINISTRATION

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Office: Administration Building—UN-3148; Campus 332	
Residence: 198 W. 11th Ave.—UN-4732	
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Office: Administration Building—UN-3148; Campus 628	
Residence: 469 W. 8th Ave.—UN-9427	
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Residence: 2023 Collingswood Rd., Upper Arlington—KI-1343	
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Office: Administration Building—UN-3148; Campus 314, 459	
Residence: 1680 Guilford Rd., Upper Arlington—KI-2726	
University Examiner.....	BLAND L. STRADLEY
Office: Administration Building—UN-3148; Campus 412	
Residence: Canal Winchester—Canal Winchester Ex. 71	
Executive Clerk.....	KATHERINE A. VOGEL
Office: Administration Building—UN-3148; Campus 312	
Residence: 1040 Elmwood Ave.—KI-5883	
Comptroller.....	CHARLES A. KUNTZ
Office: Administration Building—UN-3148; Campus 332	
Residence: 123 Jeffrey Pl.—LA-3606	
Cashier.....	FLORIS D. HANE
Office: Administration Building—UN-3148; Campus 372	
Residence: 373 18th Ave.—WA-1054	
Dean of Men.....	JOSEPH A. PARK
Office: Administration Building—UN-3148; Campus 283	
Residence: 1474 Doone Rd., Upper Arlington—KI-1702	
Dean of Women.....	ESTHER ALLEN GAW
Office: Pomerene Hall—UN-3148; Campus 480, 238, 226	
Residence: 60 Jefferson Ave.	
House Superintendent, Residence Halls.....	EMMA E. PROUT
Office: Oxley Hall—UN-3148; Campus 346	
Residence: Mack Hall—UN-3148; Campus 264	

# APPLIED OPTICS

*Assistant Professor, Chairman, and Director of Eye Clinic.*.. CLARENCE R. ELLIS

Offices : 203 Mendenhall Laboratory—UN-3148 ; Campus 426

8391 N. High St.—LA-8415

Residence : 446 Piedmont Rd.—LA-1423

## TEACHING STAFF

1934-1935

GEORGE W. RIGHTMIRE, M.A., LL.D.	<i>President of the University</i>
CLARENCE R. ELLIS, B.Sc. in App. Optics, D.Opt.Sc., <i>Director of Eye Clinic, Assistant Professor of Applied Optics, and Chairman of the Department</i>	
GEORGE FREDERICK ARPS, A.M., Ph.D.	<i>Professor of Psychology</i>
WILLIAM M. BARROWS, S.M., S.D.	<i>Professor of Zoology and Entomology</i>
ROLLO C. BAKER, M.A., Ph.D.	<i>Professor of Anatomy</i>
JESSE ERWIN DAY, M.A., Ph.D.	<i>Professor of Chemistry</i>
FLOYD C. DOCKERAY, M.A., Ph.D.	<i>Professor of Psychology</i>
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ROBERT E. MONROE, A.B., M.A.	<i>Professor of Romance Languages</i>
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LEONARD B. NICE, Ph.D.	<i>Professor of Physiology</i>
RAYMOND C. OSBURN, M.Sc., Ph.D.	<i>Professor of Zoology and Entomology</i>
SAMUEL EUGENE RASOR, M.A., S.M.	<i>Professor of Mathematics</i>
SAMUEL RENSHAW, M.A., Ph.D.	<i>Professor of Experimental Psychology</i>
RAYMOND JESSE SEYMOUR, M.S., M.D.	<i>Professor of Physiology</i>
ALPHEUS W. SMITH, A.M., Ph.D.	<i>Professor of Physics</i>
CARL L. SPOHR, M.D., G.Ph.	<i>Professor of Pathology</i>
LYNN W. ST. JOHN, Ph.B.	<i>Professor of Physical Education</i>
GROSVENER L. TOWNSEND, COLONEL, INF., U.S.A.	<i>Professor of Military Science and Tactics</i>
LINDEN F. EDWARDS, M.Sc., Ph.D.	<i>Associate Professor of Anatomy</i>
JAMES F. FULLINGTON, M.A., Ph.D.	<i>Associate Professor of English</i>
DAVID F. MILLER, M.A., Ph.D., <i>Associate Professor of Zoology and Entomology</i>	
JOHN W. PRICE, M.Sc., Ph.D. <i>Associate Professor of Zoology and Entomology</i>	
ALVA W. SMITH, M.A., Ph.D.	<i>Associate Professor of Physics</i>
G. BRYANT BACHMAN, A.B., Ph.D.	<i>Assistant Professor of Chemistry</i>
W. CONARD FERNELIUS, A.M., Ph.D.	<i>Assistant Professor of Chemistry</i>
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PRESTON M. HARRIS, M.A., Ph.D.	<i>Instructor in Chemistry</i>
PAUL B. YATES, A.B.	<i>Instructor in Anatomy</i>
WILLIAM A. SHERARD	<i>Assistant in Applied Optics</i>

## CLINICAL ASSISTANTS

HOWARD F. HAINES, B.Sc. in Bus. Adm., B.Sc. in App. Optics  
ELLSWORTH E. REESE, B.Sc. in App. Optics

## SUPERINTENDENT OF OPTICAL DISPENSARY

SAMUEL M. STEELE

# THE OHIO STATE UNIVERSITY

## LOCATION

The Ohio State University is situated within the corporate limits of the city of Columbus. It is supported by appropriations from the State and Federal governments. The University has almost 1,400 acres of land with nearly 400 acres in the campus. The total value of land, buildings, and equipment is \$22,415,383.00.

The offices of the President of the University, the University Examiner, the Registrar, and the Bursar are located in the Administration Building.

## ORGANIZATION

For convenience of administration the departments of the University are grouped into organizations called Colleges. The Ohio State University comprises ten Colleges and a Graduate School, each under the administration of a Dean and College Faculty, as follows:

Graduate School, College of Agriculture (including the School of Home Economics), College of Arts and Sciences, College of Commerce and Administration (including the Schools of Journalism and Social Administration), College of Dentistry, College of Education, College of Engineering (including the School of Mineral Industries), College of Law, College of Medicine (including the School of Nursing), College of Pharmacy, College of Veterinary Medicine.

## APPLIED OPTICS

The work in Applied Optics is under the administration of the Dean of the College of Engineering.

The office of the Professor of Applied Optics is located in Mendenhall Laboratory on the University Campus, near the Fifteenth Avenue and High Street entrance.

This *Bulletin* is devoted exclusively to the work offered in Applied Optics for the academic year, 1935-1936.

NOTE: Bulletins describing the work of the several Colleges may be obtained by addressing the University Examiner, The Ohio State University, Columbus, and stating the College in which the writer is interested. (For list of bulletins, see the last page.)

## APPLIED OPTICS

### GENERAL INFORMATION

The Department of Applied Optics offers courses designed to prepare students to enter the field of optics. This field includes visual optics; a study of mirrors, lenses, lens design, lens calculation, and design of optical instruments; spectroscopy.

The courses in visual optics are outlined from the standpoint that the visual properties of the eye are intimately related to all branches of applied optics and also with the view of preparing students to detect and correct the errors of the eye by the use of lenses.

Provision is made for clinical practice in both the refractive and the pathological fields and for practice in the mechanical laboratory.

The courses in general science and mathematics form a basis for the study of theoretical optics and the application of optical principles.



## EQUIPMENT

The courses are thoroughly equipped with the modern and best forms of optical apparatus. The clinic is provided with schematic eyes with pathological slides, C. & I. ophthalmometer, Universal ophthalmometer, Hardy ophthalmometer with corneal microscope, several DeZeng photometers, a Wolff skiometer with batteries of spheres and cylinders, various pieces of muscle-testing apparatus, several self-luminous retinoscopes and ophthalmoscopes, a Geneva combined retinoscope and ophthalmoscope, a perimeter, a Rogers dioptrimeter, interpupillary gauge, vertex dioptrimeter, trial cases, Hertel keratometer, Stevens tropometer, Stevens cliniscope, a complete Genophthalmis Unit; a complete American Optical Company Unit; Gullstrand Ophthalmoscope; Keratometer; Campimeter; Campograph; Myologic Unit; Wells head and charts; Stereoscopes; Streak retiniscopes; Cameron Diagnostic set; and all the best forms of modern ophthalmic apparatus suitable for refractive and ophthalmic lens purposes. The mechanical laboratory is fully equipped to grind, surface, edge, and mount lenses.

## CLINICAL FACILITIES

The clinical laboratory has been enlarged and new equipment added. Clinics are open to the students and members of the instructional force in particular and to outsiders upon application. They are conducted every afternoon during the week. These clinics furnish an endless variety of ocular conditions for the inspection and investigation of the students in these courses. Students make the examinations under the supervision of the director of the clinic. These clinics have served between two and three thousand persons each year during the period of their existence. Difficult cases form the basis for a subsequent discussion of methods of examination employed and the interpretation of the data obtained.

## UNIVERSITY HEALTH SERVICE

### Hayes Hall

**Medical Staff:** Dr. John W. Wilce, Director; Dr. M. F. Osburn, Dr. J. M. Foley, Dr. James A. Beer, Dr. Shirley Armstrong, Dr. Charlotte Winnemore.

**Office Hours:** When the University is in session, daily 8:30 to 12:00 and 1:00 to 4:30; Saturday, 8:30 to 12:00. Phone: Campus 461.

The object of the University Health Service is to render first aid and casual treatment to students on the campus. When in the judgment of the University Health Service physicians, hospitalization for observation and diagnosis is necessary, such is provided without charge. Seniors are given a complete health examination on application at the University Health Service in Hayes Hall.

## STUDENT AUTOMOBILES

The University does not bar the use of automobiles by students. However, students can be given only very limited parking space on the campus, and the use of autos is discouraged. Unless the student drives a long distance to and from his home each day or is physically incapacitated, he does not need a car while attending the University. The cooperation of parents in this matter is earnestly desired.

## MILITARY SCIENCE

In accordance with the Morrill Act, passed in 1862, under which the University was established, military instruction must be included in the curricula. The Board of Trustees therefore requires all male students, both special and regular, unless excused by the Department of Military Science and Tactics, to

receive military instruction during the first two years in Infantry, Field Artillery, or Signal Corps, the choice at the option of the student.

The Reserve Officers' Training Corps was established under the National Defense Act of June 8, 1916, and June 4, 1920, the required two years' work being included in its four-year course, the third and fourth years being elective. Instruction is given in Infantry, Field Artillery, and Signal Corps.

Uniform is furnished Freshmen upon deposit of approximately \$25.00 being made with the Contractor. The University has adopted its own style of uniform, which is required to last two years. Last year the Basic Course students were paid commutation of uniform amounting to \$9.00 each for the academic year. This allowance is prorated monthly to students who do not remain in attendance during the entire academic year, but is paid by the Bursar in whole or in part only at the close of the Spring Quarter of each academic year.

Students taking Advanced Courses in Military Science receive commutation of rations which last year amounted to twenty-six cents a day and is payable quarterly, and commutation of uniform which last year amounted to \$29.00 for the First Year Advanced men (Juniors), and to \$7.00 for the Second Year Advanced men (Seniors).

The total credit in this department allowed toward a degree is 18 Quarter-hours, exclusive of Infantry 401-402-403, 404-405-406, Field Artillery 421-422-423, 424-425-426, or Signal Corps 441-442-443, 444-445-446, required of all male students in the first and second years, for which 6 credit hours are granted.

## PHYSICAL EDUCATION

Courses in Physical Education and Health Education are conducted by the Department of Physical Education.

Regular class-exercise, two hours each week, is required during the first year of a male student's residence at the University or until he has successfully completed one year of Physical Education. Women students are required to complete two years' work. Hygiene, one hour each week, is required of both men and women during one Quarter of the first year. A thorough physical examination is required of all undergraduate students entering the University for the first time. Physical defects, abnormalities, and weaknesses are noted, and exercise is prescribed to fit the student's individual needs.

## ADMISSION

### METHOD OF ADMISSION

The admission of students is in charge of the University Entrance Board, which determines the credits that shall be issued on all entrance examinations and certificates. Correspondence relative to admission should be addressed to the University Examiner, The Ohio State University, Columbus.

### REQUIREMENTS FOR ADMISSION

A graduate of a high school of the first grade in the State of Ohio will be admitted to the Department of Applied Optics upon presentation of his certified course of study to the University Examiner. Blank forms will be furnished on application. Graduates of high schools in states other than Ohio will be considered for admission if their certificates are accepted by the leading colleges of their own state. Graduates of approved preparatory schools and normal schools will be considered for admission by certificate. Any candidate may be admitted upon examination covering 15 units of college entrance subjects. Detailed information may be secured by addressing the University Examiner.

### DISTRIBUTION OF UNITS

The following distribution of high school units is strongly recommended to those entering the Department of Applied Optics: English, three units; American history and civics, one unit; algebra, one unit; geometry, one unit; foreign language, four units; physics or chemistry, one unit; botany, zoology, or physiology, one unit; elective, three units.

### ENTRANCE BY EXAMINATION

Deficiencies in requirements for entrance may be removed by examinations given by the University during the months of September and June. The Entrance Board should be notified of the student's intention of taking the examination at least one week before examination dates.

### SPECIAL STUDENTS OF MATURE YEARS

A person of mature years who is unable to meet the entrance requirements in all respects, under certain circumstances may be permitted to matriculate for specified courses for which he can demonstrate adequate qualifications. An applicant under twenty-one years of age will not be considered. Inquiry concerning such admission should be addressed to the University Examiner. A personal interview with an applicant for admission as a special student is desired.

## REGISTRATION

### FRESHMAN WEEK

All Freshmen are required to be present at the University for a special Freshman Program which precedes the opening of the University. This program will begin on Wednesday, September 25, at 3:00 P. M. and will continue through the following Monday, September 30. This session is known as Freshman Week.

During this period Freshmen will become familiar with the Campus. They will be given needed information on the history and traditions of the University, as well as definite information on student activities and eligibility requirements. There will be lectures and discussions of vital importance to any student beginning his college career. Faculty advisers will conduct personal interviews with students to discuss their plans for a university education.

Intelligence tests, physical examinations, and placement tests are also a part of the Freshman Week Program.

The program of Freshman Week is planned to give students, new to the Campus, an opportunity to adjust themselves to new conditions before the regular routine of class-room work begins.

In connection with the Freshman Week program, a conference for parents will be held on the opening day, Wednesday, September 25. Opportunity will be presented for parents to meet the President and other university officers. A formal presentation will be made of the university's personnel program with freshman students.

*Freshmen must be present on the opening date, September 25, for the first meeting, scheduled at 3:00 p. m. A penalty of \$5.00 for each day of absence will be imposed. This is the usual penalty for late registration. The exercises of Freshman Week will be of the greatest benefit to the Freshmen and attendance upon them is required. All cases of failure to appear on this day or to be present at any of the exercises of Freshman Week will be reported to the President for action.*



All Freshmen are urged to complete their registration and pay their fees before September 25, in order that they may be free to participate in the program of Freshman Week.

### REGISTRATION

Under the Quarter plan each student will present his program of studies for only one Quarter at a time. Election cards for registration are obtained from the Registrar and are ready for distribution approximately two months prior to the opening of the Quarter. The exact date will be published in the Official Daily Bulletin and definite days will be announced during which every student in residence will be required to file his program of studies for the following Quarter. Persons who are not in residence may register in person or by mail at any time after the election cards are available for the following Quarter. Fees may be paid as soon as fee cards have been received by the student from the Registrar. *Students are expected to pay their fees before the day designated in the University Calendar for classes to begin and to report promptly to their classes on the first day that classes are scheduled.* Students who have registered sufficiently early usually receive fee cards approximately three weeks prior to the opening of the Quarter. *It is to the advantage of all students to register as early as possible.*

Applicants presenting themselves after the opening of the Quarter can be admitted only for exceptional reasons and by action of the Executive Committee. In general, a student who is permitted to enter after the close of the first week of a Quarter will be given a schedule diminished by one full course below the normal requirement for that student.

### FEES AND EXPENSES

*Registration is not complete until all fees have been paid. No student will have any privileges in the classes or laboratories until all fees and deposits are paid.*

*Since all fees are due and payable as a part of the student's registration, before the day designated in the University Calendar for classes to begin, no person should come to the University for registration without money sufficient to cover all of his fees and deposits.*

*A penalty of \$5.00 for each succeeding day or fraction thereof will be assessed for failure to comply with this rule except in the case of a new student granted permission by the Dean of his College to register after the opening of the University.*

1. Matriculation fee (non-returnable)
  - Required of every student on first admission to the University .....\$15.00
2. Incidental fees
  - Incidental fees do not vary with the number of courses taken
  - First and Second Years
    - Quarter fee for a resident of Ohio..... 20.00
    - \*Quarter fee for a non-resident of Ohio..... 70.00
  - Third and Fourth Years
    - Quarter fee for a resident of Ohio..... 35.00
    - \*Quarter fee for a non-resident of Ohio..... 85.00
  - Special Students or others who take the courses of the third and fourth years, or any portion thereof
    - Quarter fee for a resident of Ohio..... 35.00
    - \*Quarter fee for a non-resident of Ohio..... 85.00

\* Non-resident fee. See page 13.

3. Special fees

- (a) Ohio Union (Men) (Each Quarter)..... 1.00  
 Women's Union (Women) (Each Quarter)..... 1.00  
 The Union fees entitle the students to all the privileges of the Unions
- (b) Student Activities and Medical Service Laboratory fee.. 2.00  
 Required of all students each Quarter; to be used in support of Student Government Activities and the Student Medical Service
- (c) Library Laboratory fee..... 1.00  
 Required of all students each Quarter
- (d) Physical Education fee..... 2.00  
 Required each Quarter of all students taking gymnasium work. It includes locker and towel service
- (e) Laboratory Breakeag deposit—Amount varies with course.....from 1.00 to 20.00  
 Students are required to pay for all materials consumed in laboratory work. The laboratory deposit must be made at the time of registration before the student may enter the laboratory. All laboratory supplies are sold to students at the Laboratory Supply Store, Chemistry Building, and charged against the deposits (See page 14). Instructors shall not permit students to engage in laboratory work unless the student has shown a receipt from the Bursar for deposit paid
- (f) Deposit for military uniform (for Freshmen)  
 ..... (approximately) 25.00

NON-RESIDENT FEE

Every student who is not a legal resident of the State of Ohio is required to pay a non-resident fee of \$50.00 each Quarter (or \$25.00 each term of the Summer Quarter) of his residence in the University in addition to other University fees. The burden of registering under proper residence is placed upon the student. If there is any possible question of his right to legal residence the matter should be brought to the attention of the Registrar and passed upon, previous to registration or the payment of fees. Any student who registers improperly under this rule shall be required to pay not only the non-resident fee but shall be assessed a penalty of \$10.00. Students who do not pay this fee within thirty days after they have been notified that the non-resident fee has been assessed against them, will have their registration in the University cancelled.

No person shall be considered eligible to register in the University as a resident of the State of Ohio unless he has been a *bona fide* resident in the State twelve consecutive months next preceding the date of his original enrollment, and no person shall be considered to have gained or lost a residence in this State for the purpose of registering in the University by any conduct of his own, while he is a student in the University, unless after attendance at the University for one year it can be clearly established by the student that his previous legal residence has been abandoned and a new one established in Ohio for purposes other than merely attending the University; but persons whose legal residence follows that of other persons as hereinafter provided, shall be considered to have gained or lost legal residence in this State for such purpose while students in the University according to changes of legal residence of such other persons, except that such legal residence shall not be considered to be so

gained until twelve months after such other person becomes a legal resident of this State.

**MINORS:** The residence of minors shall follow that of the legal guardian, regardless of emancipation; but in case a resident of Ohio is appointed guardian of a non-resident minor, the legal residence of such minor for the purpose of this rule shall not be considered to be established in the State of Ohio until the expiration of twelve months after such appointment.

**WIVES:** The residence of wives shall follow that of husbands.

**ALIENS:** Aliens who have taken out their first citizenship papers and who have been residents of Ohio for twelve months next preceding the date of their original enrollment in the University, shall be regarded as eligible for registration as residents of Ohio.

#### TEXTBOOKS

Textbooks. Students should not purchase textbooks until they are advised by the instructors of their respective classes.

#### ROOM AND BOARD

Room and Board. (See Living Arrangements, page 16.)

#### RETURN OF FEES ON WITHDRAWAL

Fees are returnable in case a student withdraws on account of sickness or for other causes entirely beyond his control, if such withdrawal is made during the first thirty days of the Quarter. Students withdrawing under request from the University are not entitled to any return of fees. Permission to withdraw, given in writing by the Dean of the College, must be presented to the Bursar within this thirty-day period. Ordinarily no more than one-half of the fees paid will be refunded; if the case has exceptional circumstances it should be referred to the President for his judgment.

No fees will be returned in case of withdrawal of students until thirty days have elapsed from the date of withdrawal.

If fees are paid under mistake of law or fact they are returnable in full. Fees are not returnable except as provided in this rule.

**On Laboratory Deposits.** If a student is forced to withdraw from a laboratory course during a Quarter, he must first secure permission from his Dean.

No portion of a laboratory deposit of \$5.00 or less shall be returned, unless the course is officially dropped by the student and request for refund presented within thirty days after the payment of deposit.

On a laboratory deposit of \$6.00 or more the unexpended part of the deposit is returnable if called for on or before the close of the Spring Quarter of the fiscal year in which the deposit has been made.

An order for refund for the unexpended portion of the deposit may be obtained by applying at the Laboratory Supply Store, Chemistry Building. The unexpended part of the deposit will be paid at the Bursar's Office on presentation of the order for refund.

#### SPECIAL FEES—PENALTIES

##### PENALTY FOR ABSENCE DURING FRESHMAN WEEK

*Freshmen must be present on the opening date, September 25, for the first meeting, scheduled at 3:00 p. m. A penalty of \$5.00 for each day of absence will be imposed. This is the usual penalty for late registration. The exercises of Freshman Week will be of the greatest benefit to the Freshmen and attendance upon them is required. All cases of failure to appear on this day or to be present at any of the exercises of Freshman Week will be reported to the President for action.*



**PENALTY FOR FAILURE TO REGISTER WITH THE DEAN OF WOMEN**

Every woman student must register with the Dean of Women at her office in Pomerene Hall at the beginning of each Quarter. Registration closes on Thursday following the opening of the Quarter. Students who are residents of Columbus are requested to register on the day preceding the opening of classes. A penalty of \$5.00 will be assessed for failure to comply with this rule.

**PENALTY FOR FAILURE TO KEEP APPOINTMENT FOR PHYSICAL EXAMINATION**

A penalty of \$1.00 will be assessed for failure to keep appointment for Physical Examination or for change in date of Physical Examination.

**PENALTY FOR RE-REGISTRATION**

When checks given for payment of fees are not paid on presentation at bank, registration will be cancelled and receipts given considered null and void. A penalty of \$5.00 will be assessed for re-registration.

**FEE FOR CHANGES IN APPROVED ELECTION CARDS**

Changes in approved election cards will be made only upon the approval of the Dean and the payment of \$1.00 for each change involved unless such payment is waived by the Dean approving the change.

**FEE FOR CHANGES IN APPROVED SCHEDULE ASSIGNMENTS**

Changes in approved schedule assignments will be made only upon the approval of the Registrar and the payment of \$1.00 for each change involved unless such payment is waived by the Registrar.

**COST OF A YEAR'S WORK**

One of the most perplexing questions that confronts a prospective student is what the course is going to cost him a year.

In order to furnish information, there is listed below an estimate of the average payments required by the University for the Freshman year and the estimated cost for room and board at a safe price. These two items are sometimes reduced slightly where two students occupy the same room and where boarding clubs are economically managed. Fees to the University are paid at the beginning of each Quarter.

**ESTIMATE OF EXPENSES**

Matriculation Fee (non-returnable) .....	\$ 15.00
Incidental Fee.....	60.00
Ohio Union.....	3.00
Activities and Medical Service Laboratory Fee.....	6.00
Library Laboratory Fee .....	3.00
Physical Education Laboratory Fee.....	6.00
Deposit to cover military uniform..... (approximately)	25.00
Deposits to cover laboratory materials and breakage.....	30.00
Books and Instruments.....	50.00
Board—36 weeks at \$4.50 a week.....	162.00
Room rent at \$10.00 a month.....	90.00
<b>Total.....</b>	<b>\$450.00</b>

NOTE: In order to meet all the necessary expenses of registration, books, and other expenditures incident to securing a room and board, a student should come prepared to spend from \$75 to \$100 during the first ten days of a Quarter. After that period, his board and room rent will constitute the major part of his expenses.

## LIVING ARRANGEMENTS

The President of the University has the authority to supervise living arrangements of students not residents of the city of Columbus and to order the immediate withdrawal of any student from any boarding or lodging house in which the surroundings are undesirable.

### ROOMS AND BOARD FOR MEN

The University possesses only two dormitories for men, the Tower Club and the Buckeye Club. Furnished rooms can be obtained at prices varying from \$7.00 to \$15.00 a month (single) and \$10.00 to \$20.00 (double). The cost of the table board in the clubs and restaurants near the University is from \$4.00 to \$6.00 a week. Board can be secured at the Ohio Union, as well as at Pomerene Hall, at reasonable prices.

Board with furnished rooms can be obtained in private families within convenient distance from the University at rates varying around \$7.00 a week.

#### MEN'S DORMITORIES

The Tower Club and the Buckeye Club were organized for men who are in great need of financial assistance.

Applicants with unusually good records in the high school and advanced students who have made unusually good records in college are eligible for consideration.

The Clubs are run on a cooperative dormitory plan with very simple accommodations. The Club fee is \$1.00 a Quarter for each man. Board is available at approximately \$2.90 a week.

Applications should be sent to B. L. Stradley, University Examiner.

#### MEN'S HOUSING BUREAU

The absence of dormitories for men at The Ohio State University, with the exception of the Tower Club and the Buckeye Club, causes the men students to reside in private rooming houses in the University district. In order to assist the students (especially those entering for the first time) in finding desirable rooms at the greatest saving, the University has created the Men's Housing Bureau, located in the office of the Dean of Men, first floor, Administration Building.

Classified lists of rooms available for every student and for any number of students are always available at this office. Boarding houses are likewise listed.

If the student signs the "Rooming House Agreement" he shall be expected to be responsible for the rental price of the room as specified in the agreement, unless he can present satisfactory reasons to the Men's Housing Bureau for moving out before the expiration of that period, or, unless he can secure a satisfactory substitute. If he moves out before the expiration of the Quarter without presenting a satisfactory excuse he shall forfeit one month's rent. The signing of such agreement is optional.

*The University warns students not to rent rooms which have not been placed on the approved list by the Men's Housing Bureau. Any one renting a room which is not on the approved list does so at his own risk.*

### WOMEN STUDENTS

Every woman student, whether undergraduate or graduate, must register with the Dean of Women at her office in Pomerene Hall during the first four days of each Quarter. The exact dates of registration will be fully announced each Quarter.

NOTE: A penalty of \$5.00 will be assessed for failure to comply with this rule.

## LIVING ARRANGEMENTS FOR WOMEN

All living arrangements for women are under the supervision of the Dean of Women, and must be submitted to her before completion.

Applications for residence in halls or private houses should be made directly to the Dean of Women, who will send information and regulations governing the housing of women students.

## RULES AND REGULATIONS

For rules and regulations concerning student responsibility and procedure, see the *University Rules and Regulations for Students*, a copy of which may be obtained from the Registrar.

## THE MARKING SYSTEM AND POINT SYSTEM

The grade marks given in the several Colleges of the University are: A—Excellent; B—Good; C—Average; D—Poor; E—Failed.

K (Credit) shall be used for work credited from other institutions and by the University Examiner only.

Em (Examination) credit shall be used to indicate that the credit given is for work not done in residence.

A value in "Points" is assigned to each of these grades as follows:

For each hour of A grade, 4 credit points shall be allowed.

For each hour of B grade, 3 credit points shall be allowed.

For each hour of C grade, 2 credit points shall be allowed.

For each hour of D grade, 1 credit point shall be allowed.

For each hour of K credit, no credit points shall be allowed.

For each hour of Em credit, no credit points shall be allowed.

The grade of E receives no credit either in hours or points.

The mark of E cannot be removed by re-examination. (For removal of failures see page 18.)

## POINTS REQUIRED FOR GRADUATION

(See page 18.)

## LOW STANDING

## DISMISSAL AND PROBATION FOR LOW STANDING

At the end of each Quarter, any student who has failed to earn a point-hour ratio of at least .65 on the number of credit hours for which he was scheduled shall be dismissed from the University. Any student, not dismissed under the above rule, who has failed to earn a point-hour ratio of at least 1.30 on the number of credit hours for which he was scheduled that Quarter shall be placed on probation.

The period of probation shall extend through one Quarter of residence. If a student has been twice placed on probation, he shall not be placed on probation again but instead shall be dismissed from the University.

The Dean or the Executive Committee of a College shall have power to place a student on probation at any time for a definite period when in their judgment his scholastic standing is unsatisfactory. In every case of probation the Dean of the College shall notify both the student and his parents or guardian.

These rules do not apply to students registered in the Colleges of Dentistry, Law, and Medicine. The faculties of these colleges are empowered to enact appropriate rules regulating this matter.



**DISMISSAL OF STUDENTS ON PROBATION**

At the end of any Quarter, any student who is on probation shall be dismissed from the University if he has failed to earn a point hour ratio of at least 1.30 on the number of credit hours for which he was scheduled. Notice of such dismissal shall be sent by the Dean both to the student and to his parents or guardian.

**DISMISSAL FOR DEFICIENCY IN POINTS**

Any student who has been registered in this University for six Quarters and has not earned a cumulative point hour ratio of at least 1.7 on the number of credit hours for which he has been scheduled shall be dismissed from the University. Moreover, a cumulative point-hour ratio of at least 1.7 on the student's entire record shall be maintained throughout subsequent Quarters unless there is a transfer to another college.

A student entering this University from another institution, as far as the applicability of this rule is concerned, will be considered as if his entire residence had been at this University, but his point hour ratio will be computed upon the work done at this University. No such student, however, shall be dismissed under this rule until he has completed two Quarters of residence.

These rules shall not apply to students registered in the Colleges of Dentistry, Law, and Medicine. The faculties of these colleges are empowered to enact appropriate rules regulating this matter.

**DISMISSAL BY SPECIAL ACTION**

In cases not covered by the foregoing rules, if at any time the preparation, progress, or success of a student in his assigned work is deemed unsatisfactory, the Executive Committee of the College shall have power to dismiss him from the University.

**REMOVAL OF FAILURES****FAILURE IN A REQUIRED COURSE**

At his first opportunity a student must repeat in class a required course in which he has failed, unless the Executive Committee of the College authorizes a substitute course.

**GRADUATION****POINTS REQUIRED FOR GRADUATION**

The number of credit points required for graduation shall amount to not less than 1.8 times the number of credit hours undertaken at this institution. (For Point System see page 17.)

**COMMENCEMENT—CONVOCATION**

A special Convocation or Commencement shall be scheduled at the close of each Quarter for the conferring of degrees upon candidates who have fulfilled all the requirements of their respective courses.

**ATTENDANCE AT CONVOCATION EXERCISES**

All candidates for degrees are required to be present at their graduation convocation unless excused by the President.

**INFORMATION**

For further information as to entrance requirements, etc., address the University Examiner. Correspondence is also invited by Clarence R. Ellis, Chairman of the Department of Applied Optics, who will be in his office (Mendenhall Laboratory, Room 203) from 1 to 4 P. M. daily.

# APPLIED OPTICS

## CURRICULUM

### FIRST YEAR

Autumn Quarter		Winter Quarter		Spring Quarter	
Chemistry (401 or 411)	5	Chemistry (402 or 412)	5	Chemistry (403 or 413)	5
Elementary or General Zoology	(401) 5	Elementary or General Zoology	(402) 5	Qualitative Analysis	(401) 5
Mathematics	(421) 5	Mathematics	(422) 5	Psychology	(401) 5
College Algebra		Plane Trigonometry		English	(401) 5
Military Science	1	Military Science	1	Military Science	1
Physical Education	(400) 1	Physical Education	1	Physical Education	1
Physical Education	1				

### SECOND YEAR

Physics (411)	5	Physics (412)	5	Physics (413)	5
General Physiology	(403) 5	General Physiology	(404) 5	General Bacteriology	(450) 5
Psychology	(402) 5	Elective	9	Elective	5
*Elective	3	Military Science	1	Military Science	1
Military Science	1	Physical Edu. (Women)	1	Physical Edu. (Women)	1
Physical Edu. (Women)	1				

### THIRD YEAR

Physics (501)	5	Physics (502)	5	Physics (503)	5
Geometrical and Physical Optics		Geometrical and Physical Optics		Geometrical and Physical Optics	
Applied Optics	(411) 4	Anatomy	(414) 5	Applied Optics	(418) 4
Visual Optics		Applied Optics	(412) 4	Vision Optics	
Elective	8	Vision Optics		Anatomy	(437) 5
				The Eye	
				Elective	4

### FOURTH YEAR

Applied Optics (441)	5	Applied Optics (442)	5	Applied Optics (443)	5
Clinical Laboratory Practice		Clinical Laboratory Practice		Clinical Laboratory Practice	
Applied Optics	(421) 3	Applied Optics	(422) 3	Applied Optics	(423) 3
Theoretical Applied Optics		Theoretical Applied Optics		Theoretical Applied Optics	
Applied Optics	(431) 2	Applied Optics	(432) 2	Applied Optics	(433) 2
Mechanical Optics		Mechanical Optics		Mechanical Optics	
Pathology	(650) 3	Pathology	(651) 3	Elective	5
Elective	3	Elective	3		

\* All electives shall be subject to the approval of the Professor of Applied Optics. Ten hours of elective work shall be in foreign language.

## DEGREE

Upon the satisfactory completion of the curriculum as outlined above, or what is deemed to be its equivalent, the student will be recommended for the degree of Bachelor of Science in Applied Optics.

## DEPARTMENTS OF INSTRUCTION

### ANATOMY

Office, 410 Hamilton Hall

PROFESSOR BAKER, ASSOCIATE PROFESSOR EDWARDS, MR. YATES

**414. Comparative Anatomy of the Vertebrates.** Five credit hours. Winter Quarter. Two lectures and six laboratory hours each week. Applied Optics, third year. Prerequisite, Zoology 401. Mr. Edwards.

The anatomy of one or more of the higher vertebrates.

Not open to students who have credit for Anatomy 402.

**437. The Eye.** Five credit hours. Spring Quarter. Two recitations and six laboratory hours each week. Applied Optics, third year. Prerequisite, Zoology 401-402, and Anatomy 414 or equivalent. Mr. Yates.

The gross anatomy of the orbit and eye in the shark, sheep, and man and general human histology with the embryology and special histology of the organ of vision.

### APPLIED OPTICS

Office, 203 Mendenhall Laboratory

DR. ELLIS AND ASSISTANTS

**411. Vision Optics.** Four credit hours. Autumn Quarter. Lectures and quiz. Applied Optics, third year. Prerequisite, Zoology 401-402, Physics 411-412-413, and Mathematics 421-422. Dr. Ellis.

Recitations, lectures, and demonstrations dealing with the principles of refraction in the human eye based on the laws of conjugate foci; hyperopia, myopia, and astigmatism; ophthalmoscopy and the fundamentals of vision.

**412. Vision Optics.** Four credit hours. Winter Quarter. Lectures and quiz. Applied Optics, third year. Prerequisite, Applied Optics 411. Dr. Ellis.

Lectures and demonstrations of clinical methods of refraction, their theory and practical application. The conjugate foci theory of minor fundus reflexes. Keratometry and other methods of objective and subjective eye examination.

**413. Vision Optics.** Four credit hours. Spring Quarter. Lectures and quiz. Applied Optics, third year. Prerequisite, Applied Optics 412. Dr. Ellis.

Lectures and demonstrations on accommodations, convergence, coordination of the visual functions, retinal images and ocular calculations. Visual field work, ocular calisthenics, heterophoria and squint. Differential determination of ocular abnormalities.

**421. Theoretical Applied Optics.** Three credit hours. Autumn Quarter. Lectures and quiz. Applied Optics, fourth year. Prerequisite, Applied Optics 411-412-413. Dr. Ellis and assistants.

The etiology, symptoms, and treatment of squint of all varieties. Both concomitant and paralytic squints will be discussed, together with a summary of extra-ocular imbalances.



**422. Theoretical Applied Optics.** Three credit hours. Winter Quarter. Lectures and quiz. Applied Optics, fourth year. Prerequisite, Applied Optics 421. Mr. Sherard.

Functions of the retina, theories of color vision, stereoscopic vision, optical illusions.

**423. Theoretical Applied Optics.** Three credit hours. Spring Quarter. Lectures and quiz. Applied Optics, fourth year. Prerequisite, Applied Optics 422. Mr. Sherard.

The eye as an optical instrument. Theories of vision, field studies, and abnormalities of vision.

In courses 422-423 the fundamental principles of physiological optics will be thoroughly covered.

**431. Mechanical Optics.** Two credit hours. Autumn Quarter. One lecture and two laboratory hours each week. Applied Optics, fourth year. Prerequisite, Applied Optics 411-412-413 and Physics 501-502-503. Dr. Ellis and assistants.

Lens centering, axis marking, use of lens measure. Surface grinding and polishing. Marking rough and semifinished bifocals.

**432. Mechanical Optics.** Two credit hours. Winter Quarter. One lecture and two laboratory hours each week. Applied Optics, fourth year. Prerequisite, Applied Optics 431. Dr. Ellis and assistants.

Lens sizing, cutting, edging, both hand and automatic. A study of systems of spectacle and eye glass mountings. Soldering.

**433. Mechanical Optics.** Two credit hours. Spring Quarter. One lecture and two laboratory hours each week. Applied Optics, fourth year. Prerequisite, Applied Optics 432. Dr. Ellis and assistants.

Face measurements, mounting and adjusting frames. Truing, bridge bending. Prescription writing and reading. Fitting of bifocal lenses.

**441. Clinical Laboratory Practice.** Five credit hours. Autumn Quarter. One conference and four two-hour laboratory periods each week. Applied Optics, fourth year. Prerequisite, Physics 501-502-503 and Applied Optics 411-412-413. Dr. Ellis and assistants.

The conference hour will be given to a discussion and study of cases coming up in the practice. Four laboratory periods will be given to making examinations in the clinic laboratory, and one laboratory period to work in the hospital.

**442. Clinical Laboratory Practice.** Five credit hours. Winter Quarter. One conference and four two-hour laboratory periods each week. Applied Optics, fourth year. Prerequisite, Applied Optics 441. Dr. Ellis and assistants. A continuation of Applied Optics 441.

**443. Clinical Laboratory Practice.** Five credit hours. Spring Quarter. One conference and four two-hour laboratory periods each week. Applied Optics, fourth year. Prerequisite, Applied Optics 442. Dr. Ellis and assistants. A continuation of Applied Optics 442.

## BACTERIOLOGY

Office, Pharmacy and Bacteriology Building  
PROFESSOR MORREY AND ASSISTANT

**450. Bacteriology.** Five credit hours. Spring Quarter. Two class periods and three three-hour laboratory periods each week. Applied Optics, second year. Mr. Holtman.

The study of bacteria with reference to morphology, staining growth on culture media, effect of physical and chemical environment, action on their food material. Principles of disinfection and sterilization. Some of the pathogenic organisms of the mouth cavity and of the eye are studied.

## CHEMISTRY

Office, 115 Chemistry Building  
 General Chemistry Office, 112 Chemistry Building

PROFESSORS EVANS AND DAY, ASSISTANT PROFESSORS FERNELIUS AND BACHMAN,  
 MR. HARRIS, AND ASSISTANTS

**401. Elementary Chemistry.** Five credit hours. One Quarter. Autumn and Winter. One lecture, two recitations, and two two-hour laboratory periods each week. This course or 411 required in Applied Optics, first year. Mr. Evans, Mr. Day, Mr. Fernelius, Mr. Bachman, Mr. Harris, and assistants.

A general course in the chemistry of the non-metals. To be followed by Chemistry 402.

Not open to students who have entrance credit for chemistry.

**402. Elementary Chemistry.** Five credit hours. One Quarter. Winter and Spring. One lecture, two recitations, and two two-hour laboratory periods each week. This course or 412 required in Applied Optics, first year. Prerequisite, Chemistry 401. Mr. Evans, Mr. Day, Mr. Fernelius, Mr. Bachman, Mr. Harris, and assistants.

A continuation of the study of the non-metals and a survey of the chemistry of the metals. To be followed by Chemistry 403.

Not open to students who have entrance credit for chemistry.

**403. Qualitative Analysis.** Five credit hours. One Quarter. Autumn and Spring. One lecture, one recitation, and six laboratory hours each week. This course or 413 required in Applied Optics, first year. Prerequisite, Chemistry 402. Mr. Evans, Mr. Day, Mr. Fernelius, Mr. Bachman, Mr. Harris, and assistants.

A brief course in the systematic separation and identification of the cations and anions.

Not open to students who have entrance credit for chemistry.

**411. General Chemistry.** Five credit hours. One Quarter. Autumn and Winter. One lecture, two recitations, and two two-hour laboratory periods each week. This course or 401 required in Applied Optics, first year. Prerequisite, an acceptable course in high-school chemistry. Mr. Evans, Mr. Day, Mr. Fernelius, Mr. Bachman, Mr. Harris, and assistants.

A general course in the chemistry of the non-metals, more advanced than Chemistry 401. To be followed by Chemistry 412.

**412. General Chemistry.** Five credit hours. One Quarter. Autumn, Winter, Spring. One lecture, two recitations, and two two-hour laboratory periods each week. This course or 402 required in Applied Optics, first year. Prerequisite, Chemistry 411. Mr. Evans, Mr. Day, Mr. Fernelius, Mr. Bachman, Mr. Harris, and assistants.

A continuation of Chemistry 411, including the chemistry of the metals. To be followed by Chemistry 413.

**413. Qualitative Analysis.** Five credit hours. One Quarter. Autumn, Winter, Spring. One lecture, one recitation, and six laboratory hours each week. This course or 403 required in Applied Optics, first year. Prerequisite, Chemistry 412. Mr. Evans, Mr. Day, Mr. Fernelius, Mr. Bachman, Mr. Harris, and assistants.

A general course in qualitative analysis, dealing with the systematic separation and identification of the cations and anions. It also includes the application of the ionization theory, mass action law, and the principles of chemical equilibrium to qualitative analysis.

**ENGLISH**

Office, 121 Derby Hall

EXECUTIVE COMMITTEE: PROFESSOR PERCIVAL, ASSOCIATE PROFESSORS  
FULLINGTON AND WALLEY

ASSOCIATE PROFESSOR FULLINGTON, INSTRUCTORS AND ASSISTANTS

**REVIEW COURSE IN ENGLISH COMPOSITION**

During or preceding the first two class sessions in English 401, writing tests will be given to determine the ability of students to use the English language effectively. Students found with less than expected ability will be dropped from the regular classes and assigned to review sections in English fundamentals, without credit, for one Quarter. A fee of \$5.00 will be charged to cover the cost of tutorial instruction.

**401. Composition and Reading.** Five credit hours. One Quarter. Autumn, Winter, Spring. Applied Optics, first year. Director, Mr. Fullington.

A course in the effective reading and writing of the types of expository prose generally required in college courses. Discussion and practice.

Not open to students who have credit for English 410 and 411.

**GERMAN**

Office, 210 Derby Hall

PROFESSOR M. B. EVANS, INSTRUCTORS AND ASSISTANTS

**401. Elementary German.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Elective. All instructors.

The elements of German grammar; reading of easy prose; oral practice.

**402. Elementary German.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Elective. Prerequisite, German 401 or equivalent. All instructors.

The elements of German grammar; reading of easy prose; oral practice.

**MATHEMATICS**

Office, 307 University Hall

PROFESSORS KUHN AND RASOR, INSTRUCTORS AND ASSISTANTS

**421. College Algebra.** Five credit hours. One Quarter. Autumn, Winter, Spring. Applied Optics, first year. Prerequisite, one unit of entrance algebra and one unit of entrance geometry. All instructors.

Fundamental ideas and topics of college algebra. Designed, along with the allied courses, Mathematics 422, 429, 435, to give students in the arts and sciences a conception of the character and possibilities of modern mathematics, especially in relation to its uses in other subjects.

**422. Plane Trigonometry.** Five credit hours. One Quarter. Autumn, Winter, Spring. Applied Optics, first year. Prerequisite, one unit of entrance algebra and one unit of entrance geometry. All instructors.

Solution of right and oblique triangles, theory and use of logarithms, solution of trigonometric equations and identities, various applications to the arts and sciences.

**423. Analytic Geometry.** Five credit hours. Spring Quarter. Elective. Prerequisite, Mathematics 421 and 422, or 431 and 432. All instructors.

NOTE: Students who have one and one-half units of mathematics for entrance to the University may elect Mathematics 431-432-433 in place of 421-422-423.



## MILITARY SCIENCE AND TACTICS

Office, The Armory

COLONEL TOWNSEND; LIEUTENANT COLONEL FRENCH; MAJOR McCLURE; CAPTAINS BARRY, CAMP, HAMILTON, COCHRAN, ST. JAMES, AND GAHAN; LIEUTENANTS HINTON, MIDDLETON, WILLIAMSON, MURPHY, ADAMSON, WILLIAMS, BLAKENEY, K'DWELL, AND McFARLAND; NON-COMMISSIONED OFFICERS OF INFANTRY, FIELD ARTILLERY, AND SIGNAL CORPS

In accordance with the Morrill Act, passed in 1862, under which the University was established, military instruction must be included in the curricula. The Board of Trustees therefore requires all male students, both special and regular, unless excused by the Department of Military Science and Tactics, to receive military instruction during the first two years in Infantry, Field Artillery, or Signal Corps, the choice at the option of the student.

The Reserve Officers' Training Corps was established under the National Defense Act of June 8, 1916, and June 4, 1920, the required two years' work being included in its four-year course, the third and fourth years being elective. Instruction is given in Infantry, Field Artillery, and Signal Corps.

Uniform is furnished Freshmen upon deposit of approximately \$25.00 being made with the Contractor. The University has adopted its own style of uniform, which is required to last two years. Last year the Basic Course students were paid commutation of uniforms amounting to \$9.00 each for the academic year. This allowance is prorated monthly to students who do not remain in attendance during the entire academic year, but is paid by the Bursar in whole or in part only at the close of the Spring Quarter of each academic year.

Students taking Advanced Courses in Military Science receive commutation of rations which last year amounted to twenty-six cents a day and is payable quarterly, and commutation of uniform which last year amounted to \$29.00 for the First Year Advanced men (Juniors), and to \$7.00 for the Second Year Advanced men (Seniors).

The total credit in this department allowed toward a degree is 18 Quarter-hours, exclusive of Infantry 401-402-403, 404-405-406, Field Artillery 421-422-423, 424-425-426, or Signal Corps 441-442-443, 444-445-446, required of all male students in the first and second years, for which 6 credit hours are granted.

### SUMMER CAMPS

As a part of the instruction of the Reserve Officers' Training Corps, summer camps are conducted for the Advanced Course students at the end of the junior years. These camps are of six weeks' duration and the work is entirely practical. The development of leadership and discipline are primary objects of these camps. The Government furnishes transportation to and from the camps. While in camp, clothing, subsistence, medical attention, and entertainment are provided. The students attending advanced course camps receive a salary of seventy cents a day.

### INFANTRY

**401-402-403. Basic Infantry.** One credit hour each Quarter. Autumn, Winter, Spring.

The National Defense Act. Obligations of citizenship. Military courtesy and discipline. Military organization, leadership. Hygiene and first aid. Map reading. Rifle marksmanship. Military history and policy. Current international situation.

**404-405-406. Basic Infantry.** One credit hour each Quarter. Autumn, Winter, Spring. Prerequisite, Military Science 401-402-403.

Leadership. Combat training, military history. Weapons.

**507-508-509. Advanced Infantry.** Three credit hours each Quarter. Autumn, Winter, Spring. Elective. Prerequisite, six Quarters of basic military science.

Aerial photograph reading, leadership, weapons, combat training.

**510-511-512. Advanced Infantry.** Three credit hours each Quarter. Autumn, Winter, Spring. Elective. Prerequisite, Military Science 507-508-509.

Leadership. Military law. Military history. Company administration and supply. Combat training.

## FIELD ARTILLERY

**421-422-423. Basic Field Artillery.** One credit hour each Quarter. Autumn, Winter, Spring.

National Defense Act and R.O.T.C. Obligations of citizenship. Military history and policies. Current international situation. Military courtesy and customs of the service. Military sanitation and first aid. Military organization and organization of the Field Artillery. Leadership. Elementary gunnery. Duties of cannoneers and the firing battery. Field Artillery ammunitions and materiel.

**424-425-426. Basic Field Artillery.** One credit hour each Quarter. Autumn, Winter, Spring. Prerequisite, Military Science 421-422-423.

Fire control instruments. Map and aerial photograph reading. Battery communications. Duties of the Battery Commander's Detail. Leadership. Care of animals and stable management. Equitation. Driving and draft.

**527-528-529. Advanced Field Artillery.** Three credit hours each Quarter. Autumn, Winter, Spring. Elective. Prerequisite, six Quarters of basic military science.

Reconnaissance, selection, occupation of position. Duties of Battery Officers. Use of Battery Commander's Detail. Field Artillery signal communications. Liaison with Infantry. Leadership. Elementary ballistics and dispersion. Preparation of fire. Conduct of fire. Equitation. Driving and draft.

**530-531-532. Advanced Field Artillery.** Three credit hours each Quarter. Autumn, Winter, Spring. Elective. Prerequisite, Military Science 527-528-529.

Leadership. Command and instruction of student organizations. Transport. Tactics. Military history and policy. Military law and administration. The law of military offenses. Courtsmartial. Administration.

## SIGNAL CORPS

The Signal Corps Unit is open to those students regularly enrolled in either the curriculum in Electrical Engineering or in Engineering Physics. Selected amateur radio operators may also pursue the Signal Corps courses. The Signal Corps course begins with the Freshman Year.

**441-442-443. Basic Signal Corps.** One credit hour each Quarter. Autumn, Winter, Spring.

National Defense Act and the R.O.T.C. Obligations of citizenship. Military history and policy. Current international situation. Military discipline, courtesies and customs of the service. Military sanitation and first aid. Military organization. Map reading. Leadership. Wire communication. Radio communication.

**444-445-446. Basic Signal Corps.** One credit hour each Quarter. Autumn, Winter, Spring. Prerequisite, Military Science 441-442-443.

Aerial photograph reading. Pistol. Leadership. Radio communication.

**547-548-549. Advanced Signal Corps.** Three credit hours each Quarter. Autumn, Winter, Spring. Elective. Prerequisite, six Quarters of basic military science.

Company administration and supply. Mechanization. Leadership. Wire communication. Signal communication for all arms and services. Message centers. Wire, installation, operation, and maintenance. Wire, testing, plant, and traffic. Radio communication, installation, operation and maintenance. Signal communication tactics. Combat orders and solution of problems.

**550-551-552. Advanced Signal Corps.** Three credit hours each Quarter. Autumn, Winter, Spring. Elective. Prerequisite, Military Science 547-548-549.

Military law. Supply and mess management. Organization of the Infantry division. Training management, unit training. Property, emergency procure-

ment and funds. O. R. C. regulations. Signal Company and Signal Troop combat orders. Mobilization. Military history and policy. General signal communication. Signal communication tactics. Tactical signal communication in Infantry and Cavalry Divisions. Signal staff duties.

## PATHOLOGY

PROFESSOR SPOHR, ASSISTANT PROFESSOR DAVIDSON

**650. Pathology.** Three credit hours. Autumn Quarter. Three lectures each week. Applied Optics, fourth year. Prerequisite, Zoology 401-402, Anatomy 413 or 414, 437, and 440 or 640. Mr. Spohr.

General pathology, including the etiology of diseases, disturbances of nutrition, inflammation, and tumors, with special reference to their influence upon ophthalmology.

Not open to students who have credit for Pathology 450.

**651. Pathology.** Three credit hours. Winter Quarter. Three lectures each week. Applied Optics, fourth year. Prerequisite, Pathology 650. Mr. Davidson.

A continuation of Pathology 650.

Not open to students who have credit for Pathology 451.

## PHYSICAL EDUCATION

### MEN'S DIVISION

Office, Physical Education Building

PROFESSORS ST. JOHN, CASTLEMAN, OBERTEUFFER, AND SCHMIDT, ASSOCIATE PROFESSORS METCALF, WOOD, AND HINDMAN, ASSISTANT PROFESSORS COBB, OLSEN, DUFFEE, GODFREY, SNYDER, AND STALEY, MR. MOONEY, MR. PEPPE, MR. STAHL, MR. LARKINS, MR. RIEBEL

### WOMEN'S DIVISION

Office, Pomerene Hall

PROFESSOR ARMSTRONG, ASSOCIATE PROFESSORS PALMER AND HERSEY, ASSISTANT PROFESSORS SUMPTION, GILMAN, WINNEMORE, AND WATERMAN, MISS WATSON, MISS STEIN, MISS SAUTHOFF, MISS SCHUTZ

**400. Hygiene (Men and Women).** One credit hour. One Quarter. Autumn, Winter, Spring. One lecture each week. Required of every Freshman unless Hygiene 410 is taken during the first year of residence in the University. Sections for men, all instructors; sections for women, Miss Armstrong, Miss Winnemore.

This course deals with the various factors and conditions which affect the health and efficiency of the student.

**401. Physical Education (Men).** One credit hour. Autumn Quarter. Two hours each week. Required of every Freshman. All instructors.

The work in this course is based on a thorough physical examination given at the beginning of the entering Quarter.

This course includes general body-building exercises, gymnastic and athletic games, antagonistic sports, and swimming with advanced elective activities for the physically superior groups.

**402. Physical Education (Men).** One credit hour. Winter Quarter. Two hours each week. Required of every Freshman. All instructors.

A continuation of Physical Education 401.



403. **Physical Education (Men).** One credit hour. Spring Quarter. Two hours each week. Required of every Freshman. All instructors.

A continuation of Physical Education 402.

421. **Physical Education (Women).** One credit hour. Autumn Quarter. Two hours each week. Required of every Freshman. All instructors.

The work includes hockey, soccer, volley ball, swimming, interpretative dancing, golf, horseback riding, and individual gymnastics.

422. **Physical Education (Women).** One credit hour. Winter Quarter. Two hours each week. Required of every Freshman. All instructors.

This work includes indoor baseball, basketball, golf, interpretative dancing, folk dancing, swimming, and individual work.

423. **Physical Education (Women).** One credit hour. Spring Quarter. Two hours each week. Required of every Freshman. All instructors.

This work includes horseback riding, golf, baseball, tennis, archery, swimming, and interpretative dancing.

425. **Physical Education (Women).** One credit hour. Autumn Quarter. Three hours each week. Required of all Sophomores. All instructors.

A continuation of Physical Education 421, 422, and 423.

426. **Physical Education (Women).** One credit hour. Winter Quarter. Three hours each week. Required of all Sophomores. All instructors.

A continuation of Physical Education 425.

427. **Physical Education (Women).** One credit hour. Spring Quarter. Three hours each week. Required of all Sophomores. All instructors.

A continuation of Physical Education 426.

#### ELECTIVE COURSES FOR MEN DISQUALIFIED FOR MILITARY SCIENCE

525. **Physical Education.** One credit hour. Autumn Quarter. Three hours each week. Open to Freshman disqualified for elementary courses in Military Science. All instructors.

This course is similar in content to Physical Education 401.

526. **Physical Education.** One credit hour. Winter Quarter. Three hours each week. Open to Freshmen disqualified for elementary courses in Military Science. All instructors.

This course is similar in content to Physical Education 402.

527. **Physical Education.** One credit hour. Spring Quarter. Three hours each week. Open to Freshmen disqualified for elementary courses in Military Science. All instructors.

This course is similar in content to Physical Education 403.

528. **Physical Education.** One credit hour. Autumn Quarter. Three hours each week. Open to Sophomores disqualified for elementary courses in Military Science. All instructors.

This course offers advanced training and instruction in various athletic sports.

529. **Physical Education.** One credit hour. Winter Quarter. Three hours each week. Open to Sophomores disqualified for elementary courses in Military Science. All instructors.

This course offers advanced training and instruction in various athletic sports.

530. **Physical Education.** One credit hour. Spring Quarter. Three hours each week. Open to Sophomores disqualified for elementary courses in Military Science. All instructors.

This course offers advanced training and instruction in various athletic sports.

## PHYSICS AND ASTRONOMY

### PHYSICS

Office, 107 Mendenhall Laboratory

PROFESSOR ALPHEUS W. SMITH, ASSOCIATE PROFESSOR ALVA W. SMITH, ASSISTANT PROFESSORS KNAUSS, POOL, AND GREEN, AND ASSISTANTS

**411. General Physics: Mechanics, Wave Motion, and Sound.** Five credit hours. One Quarter. Autumn and Winter. Four lectures and recitations and one two-hour laboratory period each week. Applied Optics, second year. Prerequisite, two entrance units in mathematics. Mr. Alpheus Smith, Mr. Alva Smith, Mr. Knauss, Mr. Green.

Not open to students who have credit for Physics 401 or 403.

**412. General Physics: Heat, Light, Spectroscopy.** Five credit hours. Winter Quarter. Four lectures and recitations and one two-hour laboratory period each week. Applied Optics, second year. Prerequisite, Physics 411. Mr. Alpheus Smith, Mr. Alva Smith, Mr. Knauss, Mr. Green.

Not open to students who have credit for Physics 402 or 404.

**413. General Physics: Magnetism, Electricity, and Electronics.** Five credit hours. Spring Quarter. Four lectures and recitations and one two-hour laboratory period each week. Applied Optics, second year. Prerequisite, Physics 411. Mr. Alpheus Smith, Mr. Alva Smith, Mr. Knauss, Mr. Green.

**501. Geometrical and Physical Optics.** Five credit hours. Autumn Quarter. Three lectures and recitations and two two-hour laboratory periods each week. Applied Optics, third year. Prerequisite, Physics 411-412-413 and Mathematics 421-422. Mr. Pool.

This course treats of the fundamental principles and methods of geometrical optics, with special reference to refractive indices, prisms, thin lenses, cylindrical lenses, combinations of thin lenses and thin lens systems, etc.

**502. Geometrical and Physical Optics.** Five credit hours. Winter Quarter. Three lectures and recitations and two two-hour laboratory periods each week. Applied Optics, third year. Prerequisite, Physics 501. Mr. Pool.

A continuation of Physics 501. It treats of thick lenses, combinations of lenses and mirrors, optical instruments used in conjunction with the eye, magnifying power, chromatic and spherical aberration, diffraction, interference, etc.

**503. Geometrical and Physical Optics.** Five credit hours. Spring Quarter. Three lectures and recitations and two two-hour laboratory periods each week. Applied Optics, third year. Prerequisite, Physics 502. Mr. Pool.

A continuation of Physics 502. It treats of optical instruments, spectroscopy, photometry and illumination, double refraction polarization, absorption of light, color vision, etc.

## PHYSIOLOGY

Office, 209 Hamilton Hall

PROFESSORS HARTMAN, SEYMOUR AND NICE, ASSISTANT PROFESSORS HITCHCOCK AND HAMLIN, INSTRUCTORS AND ASSISTANTS

**403. Elementary Physiology.** Five credit hours. One Quarter. Autumn and Spring. Four lectures or recitations and three laboratory hours each week. Prerequisite, two Quarters of chemistry. Not open to Freshmen. Mr. Seymour and staff.

The fundamental principles governing the activity of living organisms, including the chemical and physical structure of animate matter; tissues; muscle-

nerve physiology; blood and lymph; fundamental structure and functions of the nervous system, including reflex actions; cardio-vascular system.

Not open to students who have credit for any course in physiology.

**404. Elementary Physiology.** Five credit hours. One Quarter. Autumn and Winter. Four lectures or recitations and three laboratory hours each week. Prerequisite, Physiology 403 or 407. Not open to Freshmen. Mr. Seymour and staff.

An elementary survey of respiration, foods, digestion, metabolism, excretion, endocrines, brain, and special senses.

Not open to students who have credit for Physiology 408 or 409.

## PSYCHOLOGY

Office, 325 Education Building

PROFESSORS ARPS, DOCKERAY, AND RENSHAW, INSTRUCTORS, AND ASSISTANTS

**401. Elementary Psychology.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five lecture hours or three lecture hours and two two-hour laboratory periods each week. Applied Optics, first year. All instructors.

An introductory course and fundamental to all subsequent courses in the department. This course, together with Psychology 402, undertakes to present a survey of the whole field of human psychology. This includes a study of the experimental findings in infant behavior and the subsequent development of adult modes of response, such as emotion, attention, habit, thinking and the nature and development of personality.

Students desiring the laboratory should indicate that preference and arrange their schedule so that two consecutive hours are available. (See Time Schedule.) In the laboratory sections the student will be given the opportunity to perform experiments directly related to the material presented in the lecture sections.

**402. Elementary Psychology.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five lecture hours or three lecture hours and two two-hour laboratory periods each week. Applied Optics, second year. Prerequisite, Psychology 401. All instructors.

A continuation of Psychology 401. Students desiring the laboratory should indicate that preference and arrange their schedule so that two consecutive hours are available. (See Time Schedule). In the laboratory sections the student will be given the opportunity to perform experiments directly related to the material presented in the lecture sections.

**601. Experimental Psychology.** Three credit hours. Autumn Quarter. One lecture and two laboratory periods each week. Elective. Prerequisite, Psychology 402. Mr. Renshaw.

The laboratory course in experimental psychology for advanced undergraduate and graduate students. The experiments are selected both for general cultural values and for preparation for technical research in experimental psychology.

**602. Experimental Psychology.** Three credit hours. Winter Quarter. One lecture and two laboratory periods each week. Elective. Mr. Renshaw.

A continuation of Psychology 601.



**ROMANCE LANGUAGES AND LITERATURES**

Office, 111 Derby Hall

PROFESSORS HENDRIX AND MONROE, INSTRUCTORS AND ASSISTANTS

**FRENCH**

**401. Elementary French.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Elective. Sections in this course are limited to twenty-five students. All instructors.

No student is allowed to take this course simultaneously with Spanish 401-402 or Italian 401-402.

**402. Elementary French (Continued).** Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Elective. Prerequisite, French 401. Sections in this course are limited to twenty-five students. All instructors.

No student is allowed to take this course simultaneously with Spanish 401-402 or Italian 401-402.

**ZOOLOGY AND ENTOMOLOGY**

Office, 101 Botany and Zoology Building

PROFESSORS OSBURN AND BARROWS, ASSOCIATE PROFESSORS D. F. MILLER AND PRICE, ASSISTANT PROFESSOR J. A. MILLER, INSTRUCTORS AND ASSISTANTS

**401-402. General Zoology.** Five credit hours. Two Quarters. Both 401 and 402 are given Autumn, Winter, Spring. Five lecture-laboratory periods each week. Applied Optics, first year. Mr. Barrows, Mr. D. F. Miller, Mr. Price, Mr. J. A. Miller, instructors and assistants.

A course intended to give the student a general view of the nature of animal life and to point out its relation to man's economic and social activities. The chief topics considered are as follows: nature and structure of living substance, food and its energy transformations, the essentials of reproduction; a review of the animal groups with special stress on useful and harmful qualities; animal distribution and relation to environment; heredity and evolution with particular stress upon their relation to human affairs.

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