The
OHIO STATE UNIVERSITY
BULLETIN

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APPLIED OPTICS

1924-1925

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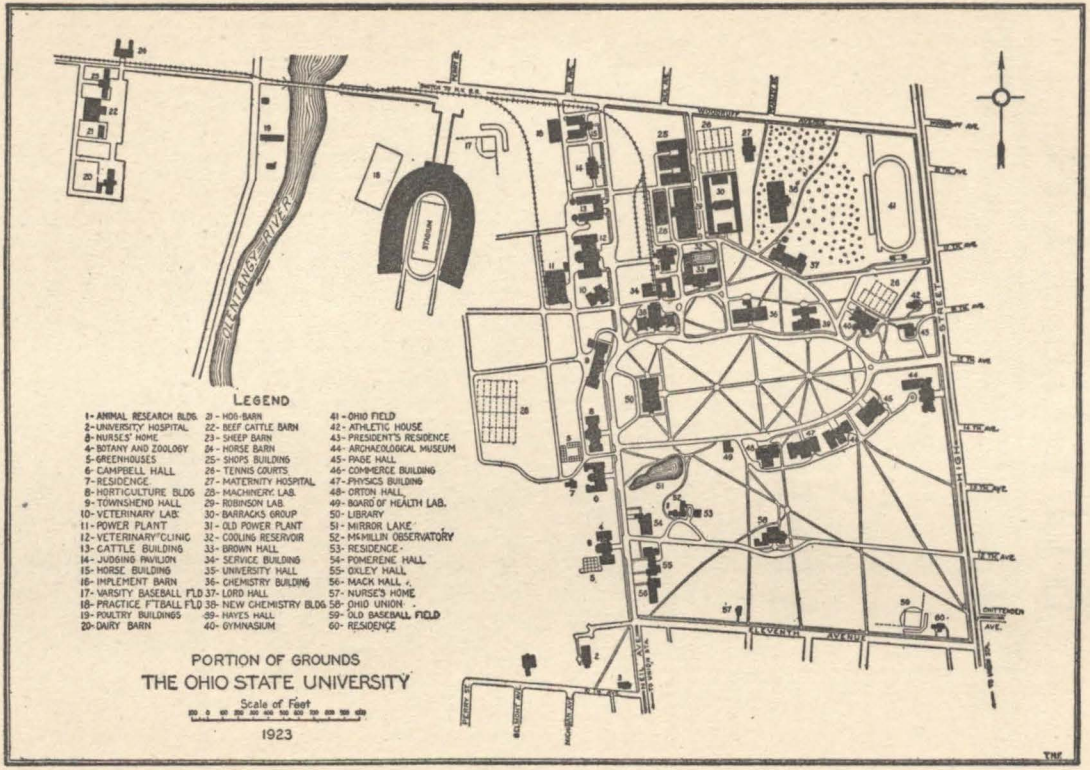

LEGEND

1- ANIMAL RESEARCH BLDG.
2- UNIVERSITY HOSPITAL
3- NURSES' HOME
4- BOTANY AND ZOOLOGY
5- GREENHOUSES
6- CAMPBELL HALL
7- RESIDENCE
8- HORTICULTURE BLDG.
9- TOWNSHEND HALL
10- VETERINARY LAB.
11- POWER PLANT
12- VETERINARY CLINIC
13- CATTLE BUILDING
14- JUDGING PAVILION
15- HORSE BUILDING
16- IMPLEMENT BARN
17- VARSITY BASEBALL FLD
18- PRACTICE FTBALL FLD
19- POULTRY BUILDINGS
20- DAIRY BARN
21- HOG BARN
22- BEEF CATTLE BARN
23- SHEEP BARN
24- HORSE BARN
25- SHOPS BUILDING
26- TENNIS COURTS
27- MATERNITY HOSPITAL
28- MACHINERY LAB.
29- ROBINSON LAB.
30- BARRACKS GROUP
31- OLD POWER PLANT
32- COOLING RESERVOIR
33- BROWN HALL
34- SERVICE BUILDING
35- UNIVERSITY HALL
36- CHEMISTRY BUILDING
37- LORD HALL
38- NEW CHEMISTRY BLDG.
39- HAYES HALL
40- GYMNASIUM
41- OHIO FIELD
42- ATHLETIC HOUSE
43- PRESIDENT'S RESIDENCE
44- ARCHAEOLOGICAL MUSEUM
45- PAGE HALL
46- COMMERCE BUILDING
47- PHYSICS BUILDING
48- ORTON HALL
49- BOARD OF HEALTH LAB.
50- LIBRARY
51- MIRROR LAKE
52- McMILLIN OBSERVATORY
53- RESIDENCE
54- POMERENE HALL
55- OXLEY HALL
56- MACK HALL
57- NURSE'S HOME
58- OHIO UNION
59- OLD BASEBALL FIELD
60- RESIDENCE

PORTION OF GROUNDS
THE OHIO STATE UNIVERSITY

Scale of Feet

1923

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UNIVERSITY CALENDAR

SUMMER QUARTER	1924
June 13 to 21	Physical Examination for all new students.
June 16 to 20	Entrance Examinations.
June 16	Latest day for registration and payment of fees without penalty.
June 17	Classes begin, 7:30 A. M.
June 21	Intelligence Test for all new students (Saturday A. M.).
June 23	Latest day for registration.
July 4	Independence Day. No classes.
July 21, 22, 23	Final Examinations, first term.
July 23	First term ends, 5:30 P. M.
July 24	Second term begins, 7:30 A. M.
August 27,28, 29	Final Examinations, second term.
August 29	Autumn Convocation, 4:00 P. M.
August 30	Summer Quarter ends, 12 M.
AUTUMN QUARTER	
September 22 to 26	Entrance Examinations.
September 25 to October 3	Physical Examination for all new students.
September 29	Latest day for registration and payment of fees without penalty.
September 30	Classes begin, 8:00 A. M.
October 1	President's Annual Address, 11:00 A. M.
October 4	Intelligence Test for all new students.
October 6	Latest day for registration.
November 11	Armistice Day. Ceremonial Exercises, 10 A. M. to 12 M.
November 27	Thanksgiving Day. No classes.
December 17, 18, 19, 20	Final Examinations.
December 19	Winter Convocation, 4:00 P. M.
December 20	Autumn Quarter ends, 6:00 P. M.
WINTER QUARTER	**1925**
January 2 to 9	Physical Examination for all new students.
January 3	Latest day for registration and payment of fees without penalty.
January 5	Classes begin, 8:00 A. M.
January 10	Intelligence Test for all new students (P. M.).
January 12	Latest day for registration.
February 22	University Day (Sunday).
March 18, 19, 20, 21	Final Examinations.
March 20	Spring Convocation, 4:00 P. M.
March 21	Winter Quarter ends, 6:00 P. M.
SPRING QUARTER	
March 28	Latest day for registration and payment of fees without penalty.
March 30	Classes begin, 8:00 A. M.
March 30 to April 3	Physical Examination for all new students.
April 4	Intelligence Test for all new students (P. M.).
April 6	Latest day for registration.
May 16	Competitive Drill, Cadet Regiments.
May 30	Memorial Day. No classes.
June 10, 11, 12, 13	Final Examinations.
June 13	Alumni Day.
June 14	Baccalaureate Sermon.
June 15	Class Day.
June 16	Summer Convocation, 10:00 A. M.
June 16	Spring Quarter ends, 12 M.
June 22 to September 2	Summer Quarter.
September 28 to December 19	Autumn Quarter.

CALENDAR FOR 1924

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JOHN KAISER.....Marietta
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Office and Residence: Ohio Union—99359, one ring; N. 3270

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Residence: 388 West Sixth Avenue—N. 7482-W

Instructor.....MORGAN C. DAVIES
Residence: 340 Webber Road

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CHARLES WILLARD JARVIS, M.A.....158 East Northwood Avenue
Instructor in Physics

MORGAN C. DAVIES, B.Sc. in App. Optics.....340 Webber Road
Instructor in Applied Optics

THE OHIO STATE UNIVERSITY

The Ohio State University is supported by appropriations from the State and Federal governments. It is the largest university in Ohio. It ranks seventh in size in the United States, and fifth among the state universities.

The Campus and farm cover 950 acres. The Campus proper contains 115 acres. There are 65 buildings on the University grounds, 48 of which are devoted to instruction. The total value of land, buildings, and equipment is $8,948,335.24. The enrollment in the University, November 1, 1923, was 9,725, and the number of instructors and administrative officers, 723.

LOCATION

The University is situated within the corporate limits of the city of Columbus, and is reached by means of the High Street or Neil Avenue electric cars.

The offices of the President of the University, the Entrance Board, the Registrar, and the Bursar are located in University Hall.

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
College of Arts, Philosophy, and Science
College of Commerce and Journalism
College of Dentistry
College of Education
College of Engineering
College of Law
College of Medicine
College of Pharmacy
College of Veterinary Medicine

APPLIED OPTICS

This bulletin is devoted exclusively to the work offered in Applied Optics for the academic year, 1924-1925.

NOTE—University bulletins may be obtained by addressing the University Examiner, The Ohio State University, Columbus, Ohio, and stating the college in which the writer is interested.

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 phorometers, a Wolff skioptometer 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 dioptrometer, interpupillary gauge, vertex dioptrometer, trial cases, Hertel keratometer, Stevens tropometer, Stevens clinoscope 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 during the present year.

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 five and six hundred 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.

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, Ohio.

ENTRANCE BY DIPLOMA OR EQUIVALENTS

The following persons are eligible to admission without examinations or conditions:

(1) The holder of a diploma from a first-class high school in the State of Ohio.

(2) The holder of a properly endorsed certificate from such secondary schools as have been accredited or recognized by the University.

(3) The holder of a 60 count Regents' Certificate of the State of New York.

(4) The holder of 15 credit units as determined by the Entrance Board.

DISTRIBUTION OF UNITS

Of these fifteen units, not less than three shall be in English; one in American history and civics; one in algebra; one in geometry; four in foreign language; one in physics or chemistry; one in botany, zoology, or physiology; and three shall be elective.

ENTRANCE BY EXAMINATION

Deficiencies in requirements for entrance may be removed by examinations given by the University during the months of September and June.

Students over twenty-one years of age may be admitted upon satisfactory evidence that they can successfully pursue the work elected. No degree will be granted unless the full entrance requirements have been fulfilled.

For further information, see the **Bulletin of General Information**, which may be obtained on application to the University Examiner.

It is urged that students who desire to enter the University put themselves in communication with the University Examiner at as early a date as possible.

REGISTRATION

REGISTRATION.—Under the Quarter plan each student will present his program of studies for only one Quarter at a time. During each Quarter certain days will be announced during which every student in residence will be required to file his program of studies for the following Quarter.

TIME OF REGISTRATION.—All undergraduate students are expected to register and pay their fees *before* the day designated for classes to begin and to report promptly to their classes on the first day that classes are announced.

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 shall be given a schedule diminished by one full course below the normal requirement for that student.

PROCEDURE FOR REGISTRATION

NEW STUDENTS.—Registration consists of the following steps in the order indicated:

(1) The student must secure

(a) An admission card from the University Examiner. (For necessary entrance credentials see Requirements for Admission, page 8.)

(b) An election-card or study-program card from the Registrar's Office. This card must be approved by the Professor of Applied Optics and also by the Schedule Committee.

(c) A fee-card from the Registrar's Office. On this card the student will be assessed with all incidental, tuition, and laboratory fees. The fee-card must be presented to the Bursar when the student pays his fees. All fees must be paid before the student will be admitted to classes.

(2) Every entering student must report for a physical examination upon the dates appointed. (See University Calendar, page 1.)

Men should report to the Director of Physical Education for Men, at the University Gymnasium.

Women should report to the Director of Physical Education for Women, at Pomerene Hall.

(3) Every entering student must report to the Department of Psychology for an intelligence test, upon the dates appointed. (See University Calendar, page 1.)

Unless the student has followed the above instructions in every detail his matriculation in the University is not complete.

STUDENTS IN CONTINUOUS RESIDENCE.—Students who have been in continuous residence in the University will proceed as follows: They must secure

(1) An election-card or study-program card, which should be approved by the Professor of Applied Optics and also by the Schedule Committee. This card may be obtained at the Registrar's Office.

(2) A fee-card, on which will be assessed all incidental, tuition, and laboratory fees. This card must be presented to the Bursar and all fees paid before the student will be admitted to classes. This card may be obtained from the Registrar's Office.

FORMER STUDENTS.—A former student who has not been in continuous residence during the preceding year or was not in residence during the preceding Quarter should go at once to the Professor of Applied Optics for approval of his re-admission. He then follows the same procedure as a student in continuous residence.

STUDENTS TRANSFERRING TO ANOTHER COLLEGE IN THE UNIVERSITY.—A student who desires to transfer from the Department of Applied Optics to any college of this University must make his application for such transfer to the University Examiner. This transfer must be approved by the University Examiner before he will be permitted to proceed with his registration in the college which he is proposing to enter.

THE MARKING SYSTEM AND POINT SYSTEM

The grade marks given in the several colleges of the University are: A—Excellent or superior; B—Good; C—Average; D—Poor but passing; E—Failure (no credit). A value in "Points" is assigned to each of these grades as follows:

For each credit hour of "A" grade, 4 credit points shall be allowed
For each credit hour of "B" grade, 3 credit points shall be allowed
For each credit hour of "C" grade, 2 credit points shall be allowed
For each credit hour of "D" grade, 1 credit point shall be allowed
The grade of "E" shall receive no credit either in hours or points

The number of credit points required for graduation shall amount to not less than 1.8 times the number of credit hours taken.

STUDENTS ON PROBATION

Any student who fails during any Quarter to earn credit points equal to at least the number of credit hours of courses assigned him for the Quarter, shall be put on probation for the succeeding Quarter of his residence at the University with restricted work, to be determined by the Executive Committee. The executive committee of a college may put a student on probation at any time.

Notice of such probation shall be sent by the Dean to the student and to his parent or guardian.

STUDENTS DROPPED FROM THE UNIVERSITY

During the period of probation, a student who fails to earn credit points at least equal in number to the credit hours of courses assigned him for the Quarter, shall automatically cease to be a member of the University and shall be so notified by the Dean of the College. A notice shall also be sent by the Dean to the parent or guardian of the student.

If, for any cause, the preparation, progress, or success of any student in the work assigned him be found unsatisfactory, the President may remove him from a class or dismiss him from the University.

Any student, having been in attendance at the University during nine Quarters, who shall not have earned credit points equal to at least 1.8 times the number of credit hours taken, shall automatically cease to be a member of the University.

WITHDRAWAL FROM THE UNIVERSITY

A student who desires to withdraw from the University must make application to the Dean for permission to withdraw in good standing. If the student leaves the University at any time during the Quarter, without communicating with the Dean, he will be marked as having failed in all of his courses for the Quarter and this will make it difficult for him to re-enter this University or gain admission to any other one. If a personal interview is impossible, the Dean should be notified by mail.

ABSENCE BEFORE OR AFTER A MID-QUARTER VACATION

A student absent without excuse from a scheduled hour of work on a day immediately preceding or following a mid-quarter vacation shall have a penalty of three hours added to the requirement for his graduation. This shall be entered on his official record. It shall be the duty of each instructor to report within five days all absences on such days to the Dean of the College. The authority for excusing students shall be the Dean. He may excuse a student for legitimate absence, and shall certify to the Registrar the penalty imposed upon unexcused students.

A STUDENT'S LOCAL ADDRESS

At the beginning of the year, each student shall give in writing his or her local address to the Registrar, and shall promptly report all subsequent changes of address.

FEES AND EXPENSES

GENERAL CHARGES

All University fees must be paid at the opening of each Quarter as a condition of admission to classes. All registration fees, including laboratory deposits, are assessed in the office of the Registrar and are paid in the office of the Bursar. 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, no person should come to the University for registration without money sufficient to cover all of his fees and deposits.

Matriculation Fee. Every student upon his first admission to the University is required to pay a matriculation fee of $10.00. This fee is paid but once, and is in addition to other University fees, and entitles the student to the privileges of membership in the University.

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 $35.00 each 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; 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.

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.

The residence of wives shall follow that of husbands.

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

TUITION

First and Second Years. The tuition fee is $15.00 each Quarter.

Third and Fourth Years. The tuition fee is $35.00 each Quarter. The total tuition fees for the four years aggregate $300.00.

Special Students or others who take the courses of the third and fourth years, or any portion thereof, shall pay a fee of $35.00 each Quarter.

Fee for Duplicate Fee Receipt. A duplicate receipt for fees will be issued only upon presentation of satisfactory evidence of the loss or destruction of the original. A fee of $1.00 will be charged for each duplicate receipt.

Penalty for Late Registration. All fees are due and payable by the close of the day preceding the first day of recitations. Failure to comply with this rule involves a penalty of $5.00 for every succeeding day or fraction thereof. In the case of a graduate student, or a student granted late registration, fees must be paid within twenty-four hours of the date of registration as certified by the college dean or secretary.

OTHER EXPENSES

The Ohio Union. A fee of $1.00 a Quarter is paid by all students at registration. This entitles the student to all the privileges of the Union consistent with the Constitution and House Rules governing it.

Laboratory Deposits. Students are required to pay for all materials consumed in laboratory work during the first and second years. A cash deposit is required in each course requiring such materials; the unexpended balance is returned at the end of the Quarter.

Graduation Fee. A special graduation fee is required of each person receiving a degree from the University. This fee must be paid *before* the student files his application with the secretary of his college as a candidate for a degree. This application must be filed within two weeks of the opening of the Quarter in which the degree is sought.

The fee for a bachelor's degree is $5.00.

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

Rooms and Board. Furnished rooms can be obtained at prices varying from $10.00 to $15.00 a month. Board at the restaurants and boarding clubs near the University costs from $6.50 to $8.00 a week. Board, with furnished rooms, can be obtained in private families at rates varying around $10.00 a week.

Board can be secured at the Ohio Union Commons at reasonable rates.

Return of Fees. Fees are not returnable except in case of sickness and causes entirely beyond the control of the student. No portion of the fees shall be returned for voluntary withdrawal of the student or enforced withdrawal thirty days after registration. Students withdrawing under discipline forfeit all rights to the return of any portion of the fees. In no case shall more than one-half of the fee be refunded.

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, we have listed below an estimate of the average payments required by the University for the Freshman year, and have estimated the cost of room and boarding 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.

Matriculation Fee	$ 10 00
Incidental Fee	45 00
Ohio Union	3 00
Deposits to cover laboratory materials and breakage	30 00
Books	30 00
Board—36 weeks at $8.00 a week	288 00
Room Rent, at $15.00 a month	135 00
General Expenses	100 00
	$641 00

The item of *general expenses* is always subject to the personal habits of the individual and varies according to the degree of economy exercised.

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 expend from $100.00 to $125.00 during the first ten days of a Quarter. After that period his board and room rent will constitute the major part of his expenses.

INFORMATION

For further information as to entrance requirements, etc., address the University Examiner. Correspondence is also invited by Howard D. Minchin, Professor of Applied Optics, who will be in his office (Physics Building, room 206) from 9 to 11 a. m., after September 25th.

CURRICULUM

FIRST YEAR

AUTUMN QUARTER	WINTER QUARTER	SPRING QUARTER
Chemistry.....(401 or 411) 5 Elementary or General	Chemistry.....(402 or 412) 5 Elementary or General	Chemistry.....(403 or 413) 5 Qualitative Analysis
Anatomy.....(431) 4 Human Anatomy	Anatomy.....(432) 4 Human Anatomy	Anatomy.....(433) 5 Human Anatomy
Anatomy.....(434) 3 Histology	Anatomy.....(435) 3 Histology	Anatomy.....(436) 4 Histology
English.....,(401) 5	Engr. Drawing.....(418) 3 Mechanical Drawing	Engr. Drawing.....(419) 4 Graphical Processes

SECOND YEAR

Physics.....(401 or 403) 5 General	Physics.....(402 or 404) 5 General	Bacteriology.....(450) 5
Physiology.....(403) 5	Physiology.....(404) 5	Psychology.....(401) 5 Elementary
Mathematics.....(421) 5 Elementary Analysis	Mathematics.....(422) 5 Elementary Analysis	Elective..... 4
Pathology.....(450) 3	Pathology.....(451) 3	

THIRD YEAR

Psychology.....(402) 5 Elementary	Anatomy.....(437) 4 The Eye	Physiology.....(440) 3 Physiology of the Eye
Applied Optics.....(401) 5 Theoretical Optics	Applied Optics.....(402) 5 Theoretical Optics	Applied Optics.....(403) 5 Theoretical Optics
Applied Optics.....(411) 4 Vision Optics	Applied Optics.....(412) 4 Vision Optics	Applied Optics.....(413) 4 Vision Optics
Elective..... 4	Elective..... 2	Elective..... 2

FOURTH YEAR

Applied Optics.....(441) 5 Clinical Laboratory Practice	Applied Optics.....(442) 5 Clinical Laboratory Practice	Applied Optics.....(443) 5 Clinical Laboratory Practice
Applied Optics.....(421) 3 Theoretical Applied Optics	Applied Optics.....(422) 3 Theoretical Applied Optics	Applied Optics.....(423) 3 Theoretical Applied Optics
Applied Optics.....(431) 2 Mechanical Optics	Applied Optics.....(432) 2 Mechanical Optics	Applied Optics.....(433) 2 Mechanical Optics
Pathology.....(460) 3 Pathology of the Eye	Pathology.....(461) 3 Pathology of the Eye	Elective..... 5
Elective..... 3	Elective..... 3	

All electives shall be subject to the approval of the Professor of Applied Optics.

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, Hamilton Hall

PROFESSOR LANDACRE, ASSISTANT PROFESSORS BUCK, BAKER, AND KNOUFF, AND DEPARTMENT ASSISTANTS

431. Human Anatomy. Four credit hours. Autumn Quarter. One recitation and nine laboratory hours each week. Applied Optics, first year. Mr. Buck, Mr. Baker, and assistants.

The gross anatomy of the abdomen and leg including the osteology of these parts.

This course is not open to students who have credit for Anatomy 125.

432. Human Anatomy. Four credit hours. Winter Quarter. One recitation and nine laboratory hours each week. Applied Optics, first year. Prerequisite, Anatomy 431. Mr. Buck, Mr. Baker, and assistants.

The gross anatomy of the thorax and arm including the osteology of these parts.

This course is not open to students who have credit for Anatomy 125 and 126.

433. Human Anatomy. Five credit hours. Spring Quarter. Two recitations and ten laboratory hours each week. Applied Optics, first year. Prerequisite, Anatomy 432. Mr. Buck, Mr. Baker, and assistants.

The gross anatomy of the head and neck including the osteology of these parts and the applied anatomy.

This course is not open to students who have credit for Anatomy 126 and 131.

434. Histology. Three credit hours. Autumn Quarter. One recitation and four laboratory hours each week. Applied Optics, first year. Mr. Landacre, Mr. Knouff, and assistants.

The general histology of the tissues and the special histology of the skeletal and vascular systems.

This course is not open to students who have credit for Anatomy 139.

435. Histology. Three credit hours. Winter Quarter. One recitation and four laboratory hours each week. Applied Optics, first year. Prerequisite, Anatomy 434. Mr. Landacre, Mr. Knouff, and assistants.

The special histology of the digestive, respiratory, urinary, and nervous systems.

This course is not open to students who have credit for Anatomy 139 and 140.

436. **Histology and Embryology.** Four credit hours. Spring Quarter. Two recitations and four laboratory hours each week. Applied Optics, first year. Prerequisite, Anatomy 435. Mr. Landacre, Mr. Knouff, and assistants.

The histology of the reproductive system, the general embryology of the vertebrate body with special reference to the development of teeth and pharyngeal derivatives.

This course is not open to students who have credit for Anatomy 140 and 141.

437. **The Eye.** Four credit hours. Spring Quarter. One recitation and six laboratory hours each week. Applied Optics, third year. Prerequisite, Anatomy 431-432-433 and 434-435-436.

The gross anatomy of the orbit and eye in the shark, sheep, and man with a review of the embryology and histology of the organ of vision.

This course is not open to students who have credit for Anatomy 145.

APPLIED OPTICS

Office, 206 Physics Building

PROFESSOR MINCHIN, MR. DAVIES

401. **Theoretical Optics.** Five credit hours. Autumn Quarter. Four hours lecture and quiz and one laboratory period each week. Applied Optics, third year. Prerequisites, Physics 401-402 or 403-404 and Mathematics 421-422. Mr. Minchin.

Subject matter: The fundamental principles of light, refractive indices, prisms, thin lenses, and cylindrical lenses.

This course is not open to students who have credit for Applied Optics 107 and 108.

402. **Theoretical Optics.** Five credit hours. Winter Quarter. Four hours lecture and quiz and one laboratory period each week. Applied Optics, third year. Prerequisite, Applied Optics 401. Mr. Minchin.

Subject matter: Combinations of thin lenses and thin lens systems. Thick lenses, effectivity and back focal length, vertex refraction.

403. **Theoretical Optics.** Five credit hours. Spring Quarter. Four hours lecture and quiz and one laboratory period each week. Applied Optics, third year. Prerequisite, Applied Optics 402. Mr. Minchin.

Subject matter: Lens systems, optical instruments, chromatic aberration, spherical aberration, diffraction, interference, polarization, and spectra.

411. **Vision Optics.** Four credit hours. Autumn Quarter. Lectures and quiz. Applied Optics, third year. Prerequisites, Anatomy 431, 432, 433, 434, 435, 436, 437, Pathology 435, Physics 401-402 or 403-404, and Mathematics 421-422. Mr. Davies.

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.

This course is not open to students who have credit for Applied Optics 115 and 116.

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

Lectures and demonstrations of clinical methods of refraction, their theory and practical application. The conjugate foci theory of mirror 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. Mr. Davies.

Lectures and demonstrations on accommodation, 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. Prerequisites, Applied Optics 401-402-403 and 411-412-413. Mr. Minchin.

Lectures, demonstrations, and quiz on the optical constants of the eye. Mathematical and physical methods of calculations applied to the correction of anomalies of the eye. Monocular and binocular vision.

This course is not open to students who have credit for Applied Optics 133-134.

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

Subject matter: Functions of the retina, light sense, form sense, and color sense. Perception of depth, optical illusions.

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

Subject matter: Optical instruments—their design, construction, and application. Study of spectra and vision.

In courses 421-422-423 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. Prerequisites, Applied Optics 401-402-403 and 411-412-413. Mr. Davies.

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

This course is not open to students who have credit for Applied Optics 110 and 129.

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

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. Mr. Davies.

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 five two-hour laboratory periods each week. Applied Optics, fourth year. Prerequisites, Applied Optics 401-402-403 and 411-412-413. Mr. Davies.

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.

This course is not open to students who have credit for Applied Optics 147-148.

442. **Clinical Laboratory Practice.** Five credit hours. Winter Quarter. One conference and five two-hour laboratory periods each week. Applied Optics, fourth year. Prerequisite, Applied Optics 441. Mr. Davies.

A continuation of Applied Optics 441.

443. **Clinical Laboratory Practice.** Five credit hours. Spring Quarter. One conference and five two-hour laboratory periods each week. Applied Optics, fourth year. Prerequisite, Applied Optics 442. Mr. Davies.

A continuation of Applied Optics 442.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

601. **Advanced Applied Optics.** Four credit hours. Autumn Quarter. Lectures and laboratory work. Prerequisites, Applied Optics 401-402-403 and Mathematics 441-442-443. Mr. Minchin.

Theory and application of optical instruments used in practice. A discussion of thick lenses involved in such instruments.

Illumination and vision and color and color vision. The principles of physiological optics.

This course is not open to students who have credit for Applied Optics 151-152.

602. **Advanced Applied Optics.** Four credit hours. Winter Quarter. Lectures and laboratory work. Prerequisite, Applied Optics 601. Mr. Minchin.

A continuation of Applied Optics 601.

603. **Advanced Applied Optics.** Four credit hours. Spring Quarter. Lectures and laboratory work. Prerequisite, Applied Optics 602. Mr. Minchin.

A continuation of Applied Optics 602.

BACTERIOLOGY

Office, 202 Veterinary Laboratory Building

PROFESSOR MORREY, ASSISTANT PROFESSOR SPEER, AND DEPARTMENT ASSISTANTS

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

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.

This course is not open to students who have credit for Bacteriology 150.

CHEMISTRY

Office, 100 Chemistry Building

PROFESSORS McPHERSON AND EVANS, MR. LOOKER, AND DEPARTMENT ASSISTANTS

401. **Elementary Chemistry.** Five credit hours. One Quarter. Autumn and Winter. One lecture, one recitation, and six laboratory hours each week. This course or 411 required in Applied Optics, first year. Mr. Evans and department assistants.

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

This course is not open to students who have entrance credit for chemistry or credit for Chemistry 105.

402. **Elementary Chemistry.** Five credit hours. One Quarter. Winter and Spring. One lecture, one recitation, and six laboratory hours each week. This course or 412 required in Applied Optics, first year. Prerequisite, Chemistry 401. Mr. Evans and department assistants.

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

This course is not open to students who have entrance credit for chemistry or credit for Chemistry 105-106.

403. Qualitative Analysis. Five credit hours. Spring Quarter. 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. Looker, and department assistants.

A brief course in the systematic detection and separation of the metals and acids.

This course is not open to students who have entrance credit for chemistry or credit for Chemistry 110.

411. General Chemistry. Five credit hours. One Quarter. Autumn and Winter. One lecture, one recitation, and six laboratory hours each week. This course or 401 required in Applied Optics, first year. Prerequisite, an acceptable course in high-school chemistry. Mr. Evans and department assistants.

A general course on the chemistry of the non-metals. It is more advanced than Chemistry 401. Students taking this course will follow it with Chemistry 412.

This course is not open to students who have credit for Chemistry 109.

412. General Chemistry. Five credit hours. One Quarter. Winter and Spring. One lecture, one recitation, and six laboratory hours each week. This course or 402 required in Applied Optics, first year. Prerequisite, Chemistry 411. Mr. Evans, Mr. Looker, and department assistants.

A continuation of Chemistry 411, followed by a treatment of the chemistry of the metals. This course should be followed by Chemistry 413.

This course is not open to students who have credit for Chemistry 109-110.

413. Qualitative Analysis. Five credit hours. Spring Quarter. 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 and department assistants.

A general course in qualitative analysis, dealing with the systematic separation and identification of the metals and acids. This course deals with the applications of the ionization theory, mass action law, and the principles of chemical equilibrium to qualitative analysis.

ENGINEERING DRAWING

Office, 205 Brown Hall

PROFESSORS FRENCH AND MEIKLEJOHN, AND DEPARTMENT ASSISTANTS

418. Mechanical Drawing. Three credit hours. Winter Quarter. One lecture and six laboratory hours each week. Applied Optics, first year. Mr. Meiklejohn.

Geometrical drawing, orthographic projection, lettering.

419. Graphical Processes. Four credit hours. Spring Quarter. One lecture and nine laboratory hours each week. Applied Optics, first year. Prerequisite, Engineering Drawing 418. Mr. Meiklejohn.

Applied geometry, technical sketching and drawing, design of lenses, optical instruments and optical appliances.

ENGLISH

Office, 103 Physics Building

PROFESSORS DENNEY AND BECK, DEPARTMENT INSTRUCTORS AND ASSISTANTS

401. Composition and Reading. Five credit hours. Autumn Quarter. Five hours of recitation, quiz, reading, and practice. Applied Optics, first year. No prerequisite. Mr. Beck and instructors.

This course is not open to students who have credit for English 101-104.

MATHEMATICS

Office, 314 University Hall

PROFESSORS RASOR AND ARNOLD

421. Elementary Analysis. Five credit hours. Autumn Quarter. Five recitations each week. Applied Optics, second year. Mr. Arnold.

This course is not open to students who have credit for Mathematics 121-122.

422. Elementary Analysis. Five credit hours. Winter Quarter. Five recitations each week. Applied Optics, second year. Prerequisite, Mathematics 421. Mr. Arnold.

423. Elementary Analysis. Five credit hours. Spring Quarter. Five recitations each week. Elective. Prerequisite, Mathematics 422. Mr. Arnold.

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.

PATHOLOGY

Office, Hamilton Hall

PROFESSOR SCOTT, MR. VAN BUSKIRK

450. Pathology. Three credit hours. Autumn Quarter. One lecture and six laboratory hours each week. Applied Optics, second year. Prerequisites, Anatomy 431, 432, 433 and 434, 435, 436. Mr. Scott, Mr. Van Buskirk.

General pathology, including the etiology of diseases, disturbances of nutrition, inflammation and tumors.

This course is not open to students who have credit for Pathology 135.

451. Pathology. Three credit hours. Winter Quarter. One lecture and six laboratory hours each week. Applied Optics, second year. Prerequisite, Pathology 450. Mr. Scott, Mr. Van Buskirk.

A continuation of Pathology 450.

460. Pathology of the Eye. Three credit hours. Autumn Quarter. Lectures and recitations. Applied Optics, fourth year. Prerequisites, Pathology 450, 451. Mr. Scott, Mr. Van Buskirk.

The gross and histological lesions involving the eye.

This course is not open to students who have credit for Pathology 141-142.

461. Pathology of the Eye. Three credit hours. Winter Quarter. Lectures, recitations, and laboratory. Applied Optics, fourth year. Prerequisite, Pathology 460. Mr. Scott, Mr. Van Buskirk.

A continuation of Pathology 460.

PHYSICS

Office, 107 Physics Building

PROFESSORS COLE AND EARHART, ASSISTANT PROFESSORS HEIL AND ALVA W. SMITH, MR. WOODBURY, MR. JARVIS, MR. WARD, MR. HOUSTON, MR. SNYDER

401. General Physics. Five credit hours. One Quarter. Autumn and Spring. Four recitations and one two-hour laboratory period each week. This course or 403 required in Applied Optics, second year. Prerequisite, two units of high-school mathematics.

An introductory course in general physics.

This course is not open to students who have entrance credit for physics or credit for Physics 103.

402. General Physics. Five credit hours. Winter Quarter. Four recitations and one two-hour laboratory period each week. This course or 404 required in Applied Optics, second year. Prerequisite, Physics 401.

An elementary course in general physics.

This course is not open to students who have entrance credit for physics or credit for Physics 104.

403. General Physics. Five credit hours. One Quarter. Autumn and Spring. Four recitations and lectures and one two-hour laboratory period each week. This course or 401 required in Applied Optics, second year. Prerequisite, two entrance units in mathematics and one entrance unit in physics.

A course in general physics for students who have had physics in high school.

This course is not open to students who have credit for Physics 105 or 111.

404. General Physics. Five credit hours. Winter Quarter. Four lectures and recitations and one two-hour laboratory period each week. This course or 402 required in Applied Optics, second year. Prerequisite, Physics 403.

A course in general physics for students who have had physics in high school.

This course is not open to students who have credit for Physics 106 or 125.

PHYSIOLOGY

Office, Hamilton Hall

PROFESSOR BLEILE, ASSISTANT PROFESSOR SEYMOUR, MR. DURRANT, MR. HITCHCOCK, MR. LEE, AND DEPARTMENT ASSISTANTS

403. General Physiology. Five credit hours. One Quarter. Autumn and Winter. Four didactic hours and one hour of demonstrations each week. Applied Optics, second year. Prerequisite, one Quarter of chemistry. Not open to Freshmen. Mr. Bleile, Mr. Seymour, Mr. Durrant, Mr. Hitchcock, Mr. Lee, and assistants.

A foundation course in the fundamental principles of animal physiology, including the chemical and physical structure of animal matter; the reactions involved in animals, including the human body in responding to environmental conditions; the formation, structure, and functions of blood and lymph; and the fundamental structure of the nervous system with particular emphasis on reflex actions. A survey of the conditions determining the activities of living forms.

This course is not open to students who have credit for any course in physiology.

404. General Physiology. Five credit hours. One Quarter. Winter and Spring. Four didactic hours and one hour of demonstrations each week. Applied Optics, second year. Prerequisite, Physiology 403. Mr. Bleile, Mr. Seymour, Mr. Durrant, Mr. Hitchcock, Mr. Lee, and assistants.

This is a continuation of Physiology 403. It presents the phenomena and relationships involved in circulation, respiration, foods, digestion, metabolism, excretion, and endocrine organs, with a brief survey of the nervous system, and the special senses.

This course is not open to students who have credit for Physiology 102, 119, 120, or 132.

440. Physiology of the Eye. Three credit hours. Spring Quarter. Two lectures and recitations and three hours of laboratory work each

week. Applied Optics, third year. Prerequisites, Physiology 403-404 and Anatomy 437. Mr. Hitchcock.

This course is not open to students who have credit for Physiology 161.

PSYCHOLOGY

Office, 403 University Hall

PROFESSORS ARPS, WEISS, AND BURTT, ASSISTANT PROFESSORS PRESSEY, WILLIAMS, DOLL, AND TOOPS, DEPARTMENT INSTRUCTORS AND ASSISTANTS

401. Elementary Psychology: Introductory Course. Five credit hours. One Quarter. Autumn, Winter, Spring. Five lecture hours each week. Lectures and recitations. Applied Optics, second year. All instructors.

A limited number of students may take 403 as equivalent to 401.

This course is not open to students who have credit for Psychology 101 or 103 or 105.

402. Elementary Psychology: Introductory Course. Five credit hours. One Quarter. Autumn, Winter, Spring. Five lecture hours each week. Lectures and recitations. Applied Optics, third year. Prerequisite, Psychology 401. All instructors.

This is a continuation of Psychology 401.

This course is not open to students who have credit for Psychology 102 or 104.

403. Elementary Psychology. Five credit hours. Winter Quarter. Four lectures and one laboratory period each week. Elective. The registration is limited to forty students. Mr. Weiss.

This course meets the same requirements as Psychology 401. Designed for students who wish to perform some of the simpler psychological experiments in their elementary course.

This course is not open to students who have credit for Psychology 103 or 101.

404. Elementary Psychology. Five credit hours. Spring Quarter. Four lectures and one laboratory period each week. Elective. Mr. Weiss.

This course is a continuation of Psychology 403 and meets the same requirements as Psychology 402.

This course is not open to students who have credit for Psychology 104 or 102.

601. Experimental Psychology: Introduction. Three credit hours. Autumn Quarter. One lecture and two laboratory periods each week. Elective. Prerequisite, Psychology 402 or 404. Mr. Weiss.

A systematic training course in the psychological methods as applied to the sense fields. Topics: vision; audition; the cutaneous, olfactory, gustatory, kinesthetic, and organic senses.

This course is not open to students who have credit for Psychology 111.

602. Experimental Psychology: Intermediate. Three credit hours. Winter Quarter. One lecture and two laboratory periods each week. Elective. Prerequisite, Psychology 601. Mr. Weiss.

This course is a continuation of Psychology 601 and deals with more complex forms of behavior.

This course is not open to students who have credit for Psychology 112.