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CALENDAR

1922-23

First Term

1922

Sept. 12,	Tuesday,	Entrance examinations begin.
Sept. 20,	Wednesday,	{ Registration and assignment of new students.
Sept. 21,	Thursday,	
Sept. 22,	Friday,	Registration and assignment of old students.
Sept. 23,	Saturday,	Assignments concluded.
Sept. 25,	Monday,	Instruction begins at 8 a. m.
Oct. 13,	Friday,	Last day for payment of tuition fee for the first term.
Nov. 30,	Thursday,	Thanksgiving Day: <i>a holiday</i> .
Dec. 21,	Thursday,	Instruction ends at 1 p. m.

Christmas Recess until Thursday, Jan. 4, 1923, at 1 p. m.

1923

Jan. 4,	Thursday,	Instruction resumed at 1 p. m.
Jan. 11,	Thursday,	FOUNDER'S DAY: <i>Convocation</i> .
Jan. 27,	Saturday,	Instruction ends.
Jan. 29,	Monday,	Term examinations begin.
Feb. 7,	Wednesday,	Term ends.
Feb. 8,	Thursday,	<i>A holiday</i> .

Second Term

Feb. 9,	Friday,	{ Registration of all students.
Feb. 10,	Saturday,	
Feb. 12,	Monday,	Instruction begins at 8 a. m.
March 2,	Friday,	Last day for payment of tuition fee for the second term.
April 4,	Wednesday,	Instruction ends at 1 p. m.

Spring Recess until Wednesday, April 11, at 1 p. m.

April 11,	Wednesday,	Instruction resumed at 1 p. m.
June 15,	Tuesday,	Term examinations begin.
June 13,	Wednesday,	End of term examinations.
June 20,	Wednesday,	COMMENCEMENT.

COLLEGE OF ARTS AND SCIENCES

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ALBERT HENRI CURY, Baccalauréat ès Lettres, Licencié ès Lettres, Instructor in the Romance Languages.

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EDGAR BLAUVELT JOHNSON, B.Chem., Assistant in Chemistry.
WILLIAM CLIFFORD MARTIN, M.A., Assistant in Medieval History.
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COLLEGE OF ARTS AND SCIENCES

Regarding admission to the College of Arts and Sciences, the *General Circular of Information* should be consulted.

Two courses are offered in the College of Arts and Sciences, one leading to the degree of Bachelor of Arts, the other leading to the degree of Bachelor of Chemistry.

THE DEGREE OF BACHELOR OF ARTS

I. Requirements for Graduation

1. Residence for eight terms. The period of residential study is four years of two terms each in the College, except as provided for in Section II (Special Provisions Regarding Credits toward Graduation).

2. Credit for one hundred and twenty hours, of which at least ninety hours must be for courses given in the College of Arts and Sciences. (See also paragraph 21.)

3. A grade of C or better in at least sixty of the required one hundred and twenty hours. See Section IV (Marks).

4. Election of courses in accordance with Section III (Courses of Study).

5. Completion of the work in Hygiene and Preventive Medicine and in Military Drill or in Physical Training prescribed by the University Faculty. (See page 68).

II. Special Provisions Regarding Credits toward Graduation

6. **By Examination at Admission.** In case a student has gained twelve hours of college credit by passing admission examinations set for that purpose, he will be considered as having completed one term of residence. If the college credit gained at entrance amounts to six hours, he may complete a term of residence by securing credit for at least six hours in a summer session of the University.

7. **In Summer Sessions.** To obtain credit by means of work done in summer sessions, a student must have previously satisfied the entrance requirements of the College and must obtain in advance the Dean's approval of his selection of courses. He may then obtain in any Cornell summer session credit for the number of hours he passes. To obtain credit for a term of residence, he must pass a total of at least twelve hours in two or more summer sessions, with a minimum of four or a maximum of eight in each session. Credit for two terms of residence, but no more, may be secured in this way.

Credit will be allowed under the same restrictions for work done in summer sessions of other universities belonging to the Association of American Universities by a student regularly registered in this College, but permission to offer such credit must be obtained in advance from the Dean of this College.

For the combination of credit obtained in summer sessions with college credit gained at entrance, see paragraph 6 above.

8. **Admission to Advanced Standing.** A student admitted to the College of Arts and Sciences from another college of Cornell University or from any other institution of collegiate rank will receive credit toward the degree of Bachelor of Arts for the number of terms and of hours to which his records may, in the judgment of the Faculty, entitle him. In order, however, to obtain the degree of Bachelor of Arts he must, as a candidate for that degree, have been in residence at least two terms in the College of Arts and Sciences and in that college only.

9. **Registration in Two Colleges of the University.** A student who has completed in the College of Arts and Sciences at least six terms of residence (no one of them under the provisions of paragraph 6 above) may, with the permission of the Faculties concerned, be registered both in the College of Arts and Sciences and also in any other college of Cornell University.

10. **Registration in the College and in the Graduate School.** A student who has satisfied all the requirements for graduation except in respect of residence may, with the permission of the Graduate School, register both in the College of Arts and Sciences and in the Graduate School.

11. **Residence During the Last Two Terms.** The degree will not be conferred upon any student unless he has been in residence at Cornell University during the last two of the required eight terms.

III. Course of Study

12. **Number of Hours.** A student must register in each term for at least twelve hours of work. No student may register for more than eighteen hours in any term except by permission of the Dean. A student who has not attained in any academic year a grade of C or better in a total of fifteen hours of work will not be permitted to elect more than fifteen hours of work in either term of the subsequent academic year. For registration in a course not in the College of Arts and Sciences the permission of the Dean of this College and of the Professor in charge of the course must be obtained. (See also paragraph ii under 14c below.)

13. **Prescribed Studies.** Prior to graduation a student must complete six hours in each of the following seven groups:

1. English and Public Speaking.
2. Foreign Languages.
3. History.
4. Chemistry, Mathematics, and Physics.
5. Anatomy, Eiology, Potany, Entomology, Geology, Histology and Embryology, Physiology and Biochemistry, and Zoology.
6. Philosophy and Psychology, including Educational Psychology.
7. Economics and Government.

Students entering the College for the first time subsequent to June 1922 will be required to complete these prescribed studies. Students who entered the College prior to that time must satisfy the requirements for graduation in force at the time of their entrance.

14. Underclassmen.

a. **Underclass Requirements.** Before the end of the sophomore year each student is required to complete the first two groups mentioned in paragraph 13 above and at least eighteen of the required number of hours

in the remaining five groups. Of these hours the student is required to take at least twelve and advised to take more, in his freshman year. Each six hours may be entirely in one division (for example, English six hours), or partly in one and partly in another (for example, English three hours and Public Speaking three hours). The following courses in foreign languages may not be applied in satisfaction of the foreign language requirement: Greek 1; Latin A, B; German 1, 1a, 3, 3a; French 1, 1a, 2, 3, 3a; Spanish 1, 1a, 3; Italian, 1. College credit gained under paragraph 6 may not be applied in satisfaction of any of these underclass requirements.

These requirements must be completed before a student may begin counting hours in an upperclass group. (See paragraph 15 below.)

b. **Underclass Advisers.** Freshmen and sophomores are under the jurisdiction of the Advisory Board for Underclassmen. Each freshman will be assigned to a member of the faculty who will act as his adviser during his freshman and sophomore years. The function of the adviser is to assist the student in his choice of studies, to advise him during the term regarding his work, and generally to give him friendly counsel. The approval of the study card and the signature of the adviser must be obtained before the study card is filed at the office of the Dean.

c. **Courses Open to Freshmen.**

- i. The following are the courses in the College of Arts and Sciences open to freshmen, except that, a student may not register for any of these courses for which he has not satisfied the prerequisites, if any are specified (see announcement under each course).

A student may not register for any of these courses for which he has presented an acceptable equivalent at entrance.

Bibliography 1, 2	History 1, 31
Biology 1	Italian 1, 4
Botany 1	Latin A, B, 1, 3
Chemistry 101, 205, 220, 805	Mathematics 1, 2, 3, 4, 5, 6, 7 (1), 7 (2), 15
English 1	Music 1, by examination, (See page 45)
Entomology 4, 5	()
French 1, 2, 3, 4a, 4b, 5a, 5b, 16	Physics 2, 3, 4a, 4b, 7, 10
Geology 1, 1a, 2, 11, 21	Physiology 3, 6
German 1, 1a, 3, 3a, 4, 5, 8	Spanish 1, 3, 4a, 4b, 5a, 5b
Greek 1, 2	Zoology 1, 5, 12

ii. Subject to the permission mentioned in paragraph 12, required courses in other colleges in the regular freshman schedule of those colleges may be elected by a freshman in the College of Arts and Sciences but only after first obtaining the approval of his adviser.

iii. Under exceptional circumstances, a freshman may by petition secure permission from the Advisory Board for Underclassmen to take courses (including freshman electives in other colleges) in addition to those allowed under i and ii.

15. **Upperclassmen.**

a. **Upperclass Requirements.** At the beginning of his junior year each student shall select an upperclass group. During his junior and his senior year he must

complete at least twenty hours of work in the group selected, but courses marked with an asterisk (*) may not be counted toward this requirement. With the sanction of his adviser and of the Dean, a student may choose, instead of one of the upperclass groups listed below, a combination of two related groups. A senior in this College who is registered also in some other college of Cornell University is excused from ten of these twenty hours. (See paragraph 9.)

b. **Upperclass Advisers.** In choosing these twenty hours the student must obtain the advice and approval of some professor or assistant professor within the group who will sign the study card.

c. **Upperclass Groups.**

- | | |
|-----------------------------------|--|
| 1. Ancient Languages | 10. Mathematics |
| 2. Botany | 11. Philosophy and Education |
| 3. Chemistry | 12. Philosophy and Psychology |
| 4. Economics | 13. Physics |
| 5. English and Public Speaking | 14. Animal Biology (Physiology and Biochemistry, Anatomy, Histology and Embryology, Zoology, and Entomology) |
| 6. French and Italian | 15. Psychology and Education (including Physical Education) |
| 7. Geology and Physical Geography | 16. Spanish and Italian |
| 8. German | |
| 9. History and Government | |

d. **Theses.** Any senior candidate for the degree of Bachelor of Arts may, with the permission of the Dean, arrange with the Department in which he is taking his principal work to write a thesis which, if accepted, shall entitle him to not more than three hours of credit a term.

16. **Filing of Study Cards.** Students will file their study cards at the office of the Dean in accordance with instructions issued at the time of registration.

17. **Changes in Study Cards.** With the consent of the Dean and the approval of the adviser, a student may alter his list of courses in the first term during the first six days of instruction, and in the second term during the first day of instruction.

Thereafter, no student will be permitted to cancel his registration for any course in which he is registered, unless he shall previously have obtained from the Dean authorization to do so on the ground of ill health or for other reasons beyond the student's control.

IV. Marks

18. A, B, C, D are passing grades; E represents a condition; F a failure; Z dropping a course without official cancellation.

19. A student who in any course has received a term mark of E (a condition) or a mark of incomplete or of absent, may, with the consent of the Dean, and upon payment of the fee required by the University, be permitted to remove the mark by examination or otherwise as the Department concerned may direct. A mark of conditioned or of incomplete or of absent may not be removed later than registration day of the third term of attendance in the University after the course was taken in class and not more than one attempt at removal will be allowed.

20. A student who has received a mark of F or Z in any course must reregister for it if he desires to secure credit for the course.

V. Continuance in the College.

21. A student failing in any given term to pass twelve hours may not continue his work in the College except under such conditions and at such time as the Faculty may designate.

22. A student failing in the last term of his senior year to pass twelve hours—or, if in a summer session, four hours—may not be recommended for his degree except under such conditions and at such time as the Faculty may designate.

23. A student's general record may be so unsatisfactory that the Faculty will refuse him permission to continue in the College even though he has passed twelve hours in the preceding term.

BACHELOR OF ARTS WITH HONORS

1. Any student in the College of Arts and Sciences who has completed four terms of residence with at least half of his work above C may apply for admission to candidacy for Honors in his upperclass group. A student who has maintained an exceptionally high standard of work during his third year of residence may be added to the list of candidates for Honors not later than the beginning of his seventh term of residence. A student may be dropped from the list of candidates for Honors for failure to maintain a satisfactory standard of work.

2. At the beginning of the first term of his candidacy, an applicant for admission to candidacy for Honors must file at the Dean's office, together with his study card, the written approval of at least two members of his upperclass group. In succeeding terms the candidate's course of study must also be approved by at least two members of his upperclass group.

3. A candidate for Honors may receive credit (in hours) in his upperclass group for additional work of a high order, which may or may not be in connection with regular courses of instruction.

4. General requirements:

(a) The ordinary requirements for the degree of Bachelor of Arts must be satisfied.

(b) The candidate must pass with grades of A or B a minimum of twenty hours in his upperclass group.

(c) The candidate for Bachelor of Arts with Honors must pass a comprehensive final examination in his chosen subject.

(d) The degree of Bachelor of Arts with Honors will be awarded only when recommended by not less than two members of the group in which the student is majoring.

5. Specific prerequisites for admission to candidacy and requirements for graduation with the degree of Bachelor of Arts with Honors have been set by the following departments or groups to members of which application should be made for more detailed information.

Ancient Languages

Greek. Prerequisite, Greek 1 and 2. Requirements: Twenty hours in Greek during the junior and senior years, a part of which may by agreement be satisfied by a thesis. Proficiency in some other foreign language or languages is expected.

Latin. Twenty hours of advanced work in Latin with grades of A or B. Proficiency in some other foreign language or languages is expected.

Classics. A minimum of fifteen hours of advanced work in Greek and fifteen hours of advanced work in Latin, with grades of A or B.

Semitics. General linguistic training. At least one year of Greek and one year of Latin taken in the University. Reading knowledge of German and French (or Italian). During the junior and senior years twenty hours are to be devoted to two or three of the Semitic languages including Arabic, and at least two hours a term to Oriental history.

Economics

Prerequisite course 51. Requirements: A reading knowledge of one modern language by the beginning of the senior year.

Education

Prerequisite, A or B in Psychology I and Education I and approval of the instructor in these subjects. Students of Education preparing to teach special subjects must have approval of the instructors concerned. A student's main work is to be done under personal oversight of a member of the department.

English

Requirements: (1) Twenty hours of upperclass courses in the Department of English. (2) A knowledge of the general field of English literature and of certain selected masterpieces of ancient and modern literatures, in translation if necessary. (3) The thorough study of one author, either in course or under the supervision of a member of the Department. The choice of author must be approved by the Committee on Honors. (4) Recommendation of three of the candidate's instructors in upperclass courses in English. Candidates for Honors in English are advised not to carry more than fifteen hours a term during their upperclass years. They may not at the same time be candidates for Honors in another subject.

Entomology

Frequent personal conferences. Original investigation is not extended, but is enough to give real contact with some unsolved problem.

Geology

Prerequisite, Chemistry I and Physics I, or the equivalent. Geology I and one other elementary course in Geology. Reading knowledge of one foreign language. Requirements: Elementary courses not already covered in Mineralogy, Historic Geology, Economic Geology, and Physical Geography. Twenty-four hours in Geology in upperclass years with grades of A and B.

German

Prerequisite courses I to 10; Latin (minimum course A): reading knowledge of one other modern foreign language, preferably French. Requirements: A special field or topic must be selected for detailed study.

Government

For prerequisite consult Department. Requirements: A reading knowledge of one modern foreign language by the beginning of the senior year.

History

Prerequisite, eight hours in History. Requirements: One modern foreign language by the senior year. General plan of work under the direction of the department.

Mathematics

Prerequisite courses 1 to 8 or the equivalent. Requirements: Schedule of courses planned by department for each student.

Philosophy

Prerequisite at least one foreign language; six hours of Philosophy. Requirements: Thesis. Superior attainments in all subjects elected. Consult Department for detailed outline of required work.

Physics

Thirty hours in Physics of which twenty hours shall be such as to satisfy the requirements for a Major in Physics.

Physiology, Biochemistry, Anatomy, Histology and Embryology

Prerequisite one or more courses in the Department with a grade of A. Requirements: High standard to be maintained in such advanced work as may be determined by the Department.

Psychology

Average grade of not less than B in courses 3 and 4 and in at least two of the courses 5, 6, 5a, and 6a. Satisfactory completion of an experimental investigation of a minor problem in Psychology.

Public Speaking

Requirements: Completion with distinction of eight or more courses (forty hours) approved by the Department, four in the Department and four chosen from auxiliary subjects. For six hours of this requirement special work in the history, literature, rhetoric, and psychology of Public Speaking may be substituted. Thesis.

Romance Languages

French. Prerequisite courses 1 and 5. Requirements: Reading knowledge of Latin and German. Facility of expression in French. Minimum of twenty hours in advanced work in French and seventeen hours plus three hours of advanced work in an allied subject. When Honors are taken simultaneously in Italian or Spanish eight hours of French must be taken. All courses must be passed with grades of A or B. A special field or topic must be selected for detailed study.

Italian. Prerequisite course 1. Requirements: Same as French.

Spanish. Same as French.

Zoology

Upperclass Major in Zoology together with elementary courses in the allied subjects of Histology, Embryology, Physiology, and General Entomology.

THE DEGREE OF BACHELOR OF CHEMISTRY

The degree of Bachelor of Chemistry will be awarded to those who have satisfactorily completed the following curriculum and the requirements prescribed

by the University in Hygiene and Preventive Medicine and in Military Drill or in Physical Training.

Students who have not presented three units of German and two units of French upon entering the course in Chemistry, will be required to make up the shortages in these languages before the beginning of the senior year.

CURRICULUM

First Year

		No. of Course	First Term	Second Term
Introductory Inorganic Chemistry.....	Chemistry	101	6	—
Qualitative Analysis.....	Chemistry	205	6 or 0	0 or 6
Analytical Geometry, Differential Calculus				
Integral Calculus.....	Mathematics	7	5	5
Introductory Experimental Physics.....	Physics	2	—	5
Drawing.....	Sibley College	D3	3	—
English.....	English	1	3	3

Second Year

Quantitative Analysis.....	Chemistry	220	0 or 6	6 or 0
Gas Analysis.....	Chemistry	250	4 or 0	0 or 4
Introductory Chemical Spectroscopy.....	Chemistry	505	3 or 0	0 or 3
Introductory Organic Chemistry.....	Chemistry	305	3	3
Organic Chemistry Laboratory.....	Chemistry	310	3	3
Heat and Light.....	Physics	8	2	—
Physical Experiments.....	Physics	14	—	2
Introductory Mineralogy.....	Geology	11	0 or 3	3 or 0
Elective.....		—	—	3

Third Year

Advanced Quantitative Analysis.....	Chemistry	230	2	2
Quantitative Analysis, Lectures.....	Chemistry	235	—	2
Introductory Physical Chemistry.....	Chemistry	405	3	3
Physical Chemistry Laboratory.....	Chemistry	410	3	3
Introductory Chemical Microscopy.....	Chemistry	530	0 or 2	2 or 0
Magnetism and Electricity.....	Physics	9	2	—
Physical Experiments.....	Physics	14	2	—
Mechanics.....	Sibley College	M 8	5	—
Mechanical Laboratory.....	Sibley College	X12	—	4
Elective.....				3

Fourth Year

Introductory Industrial Chemistry.....	Chemistry	705	3	3
Seminary.....	Chemistry	905	—	1
Electrical Engineering Laboratory.....	Sibley College	E12	4	—
Electives.....		(at least)	5	5
Research for Seniors.....	Chemistry	—	4	4

Candidates for the degree of Bachelor of Chemistry are required to take at least eight hours in research during the senior year in a division of the Department to be selected by the student. These divisions are : Inorganic Chemistry (Course 195); Analytical Chemistry (Course 295); Organic Chemistry (Course 395); Physical Chemistry (Course 495); Optical Chemistry (Course 595); Sanitary Chemistry (Course 695); Industrial Chemistry (Course 795); Agricultural Chemistry (Course 895).

The elective courses required in the curriculum may be chosen by the student, in each case with the approval of the Department of Chemistry, from the advanced courses in Chemistry, or from certain courses in other departments of the College of Arts and Sciences or in other colleges of the University.

Students in the Course in Chemistry may register for 20 hours a term. To register for more than 20 hours, the student must first secure the consent of the Department.

COURSES OF INSTRUCTION

ANATOMY

***21 Structure of the Human Body.** Second term. Credit three hours. Professors KERR and PAPEZ. Lecture demonstrations, M W F, 11. *Stimson.*

An elementary course for students in the biologic sciences and for others wishing to obtain a knowledge of the structure of their own bodies. Normal structure of the body together with its variations and evolution based on development in the individual and the race. Illustrated by specimens, lantern slides, and diagrams. Previous courses in biology and physiology are recommended.

22. Anatomical Methods. First term. Credit three hours. Prerequisite, Zoology 1. Previous work in comparative anatomy is also recommended. Professors KERR and PAPEZ, and instructors. Laboratory, any morning except Saturday.

***[24. Art Anatomy.** Throughout the year. Credit three hours a term. One lecture and five hours of laboratory work a week. For students of drawing and art.] Not given in 1922-23.

ASTRONOMY

181. General Astronomy. Throughout the year. Credit three hours a term. Prerequisite, Physics 3, or a satisfactory equivalent. Lecture, M, 12. Section A, recitation, W, 12, *Lincoln* 31; laboratory, Th, 7:30 p.m. *Observatory.* Section B, recitation, F, 12, *Lincoln* 31; laboratory, W, 7:30 p.m. *Observatory.* Professor BOOTHROYD.

A study of the facts and principles of the science of astronomy, accompanied by laboratory exercises in which the student is guided to a knowledge of the scientific method and its use in discovering some of the laws of nature, from observations of the orderly phenomena of the heavens.

182. The History of Astronomy. Second term. Credit three hours. M W F, 8. *Lincoln.* Prerequisite, six acceptable hours in history, and must be preceded or accompanied by Astronomy 181. Professor BOOTHROYD.

A study of the historical development of the oldest of the sciences from the dawn of history to the present. Since the development of the science of astronomy is an especially good illustration of the scientific method, much emphasis is laid upon this idea.

For particulars concerning advanced courses in astronomy consult the *Announcement of the College of Engineering* and the *Announcement of the Graduate School.*

BIBLIOGRAPHY

1. Bibliography. First term. Credit two hours. Librarian AUSTEN. T Th, 12. *Library, Political Science Seminary Room.*

A study of classification, cataloguing, indexing, illustrating, binding, preparation of manuscripts, etc.

*May not be counted for upperclass group.

2. **Bibliography.** Second term. Credit two hours. Librarian AUSTEN, T Th, 12. *Library, Political Science Seminary Room.*

Writing and bookmaking in ancient times. Printing and bookmaking in the Middle Ages. Lectures and reference reading. Open to freshmen who have had Course 1.

BIOLOGY

*1. **General Biology.** Throughout the year. Credit three hours a term. First term prerequisite to the second. Professor NEEDHAM, Assistant Professor CLAASSEN, Mr. COWLES, and assistants. Lectures, M W, 9 or 11. *Roberts 131.* One practice period a week, T F, 8-10:30, or daily except S, 2-4:30. *Roberts 302.* Additional sections will be provided if necessary. All students must get their laboratory assignments in the Biology office, *Roberts Hall 322*, before instruction begins.

An elementary course designed to acquaint the general student with the main ideas of biology through selected practical studies of the phenomena on which biological principles are based.

The work of this course begins with a study of the interdependence of organisms. This is followed by a study of the structure, physiology, and general behavior of a series of plants and animals ranging from the simple to the more highly developed forms. The study of the simpler plants is closely associated with that of the simpler animals, to show common features in the development of plant and animal life. The plants which are next studied include the mosses, liverworts, ferns, and seed plants, and the animals include hydra, earthworm, and frog. This is followed by the consideration of organization and phylogeny, heredity and variation, natural selection and adaptation, segregation and mutation, the life cycle, metamorphosis and regeneration, and the responsive life of organisms. Laboratory fee, \$2.50 a term.

[7. **Biology of the Human Species.** First term. Credit two hours. Lectures and classroom exercises. Not open to freshmen. Should follow Biology 1 or equivalent. Professor NEEDHAM and Assistant Professor CLAASSEN.] Not given in 1922-23.

CHEMISTRY

INORGANIC CHEMISTRY

*101. **Introductory Inorganic Chemistry.** Lectures, recitations, and laboratory practice. Repeated in second term. Credit six hours.

Lectures, first term, three sections, M W F, 9, 10, 11; second term, one section, M W F, 10. *Rockefeller A.* Professor BROWNE, Mr. MCKINNEY, and assistant.

Recitations, one hour a week, to be arranged.

Laboratory, two periods a week; M F, 2-4:30; T Th, 2-4:30; W, 2-4:30 and S, 8-10:30. Professor BROWNE, Mr. MCKINNEY, and assistants.

Entrance credit in chemistry does not carry with it university credit in course 101. If a student entering the University from a preparatory school desires credit in course 101 he must pass an examination set by the Department of Chemistry. This examination is held both in New York City and in Ithaca on the same day.

*May not be counted for upperclass group.

in September as the entrance examination. University credit in course 101 that is obtained by passing this examination does not carry with it entrance credit in chemistry.

Examinations for those who were unavoidably absent from the final examination in course 101 will be held at 2 p. m. on the day before instruction begins in the fall.

120. Introductory Inorganic Chemistry. For Engineers. Lectures and recitations. First term. Credit four hours. Professor BROWNE, Mr. McKINNEY, and assistants.

Lectures, M W F, 9, 10, or 11. *Rockefeller A.* Recitations, one hour a week, to be arranged.

125. Introductory Inorganic Chemistry. For Engineers. Recitations and laboratory practice. Second term. Credit four hours. Prerequisite course 120. Professor BROWNE, Mr. McKINNEY, and assistants.

Recitations, two hours a week, to be arranged. Laboratory, two periods a week: M F, 2-4:30; T Th, 2-4:30; W, 2-4:30 and S, 8-10:30.

130. Advanced Inorganic Chemistry. Lectures. Throughout the year. Credit two hours a term. Prerequisite courses 305 and 310, and open to those who have completed or are taking courses 405 and 410. T Th, 11. *Morse 119.* Professor DENNIS and assistant.

Discussion of the chemical elements in the order in which they occur in the Periodic Table of Mendelèeff, with special attention to the group properties of the elements and to the relations of the groups to one another. The rare elements and the rare earths are treated in as great detail as are the more common elements.

135. Advanced Inorganic Chemistry. Laboratory practice. Either term. Credit, two, three, or four hours. Prerequisite courses 305 and 310. Professors DENNIS and BROWNE, and assistants.

The study of the preparation, purification, properties, and reactions of inorganic compounds, including those of the rarer elements. Instruction is also given in the elements of glass blowing.

Course 135 is designed to accompany course 130, but either course may be taken separately.

140. Selected Topics in Advanced Inorganic Chemistry. Lectures. Second term. Credit two hours. Prerequisite courses 305 and 310. Courses 405 and 410 should precede or accompany this course. T Th, 10. Professor BROWNE.

The lectures deal chiefly with the elements in Group V and Group VI of the Periodic Table.

195. Research for Seniors. Throughout the year. See page xx. Professors DENNIS and BROWNE.

ANALYTICAL CHEMISTRY

205. Introductory Qualitative Analysis. Lectures and laboratory practice. Repeated in second term. Credit six hours. Prerequisite course 101. Lectures, T Th S, 8. *Rockefeller B.* Laboratory: first term, M W F, 2-4:30; second term, T Th, 1:30-5:15. Mr RIDER and assistants.

The properties and reactions of the common elements, and of the common inorganic and organic acids; the qualitative analysis of a number of solutions and solid compounds.

Students in science are advised and candidates for the degree of Bachelor of Chemistry are required to take this course instead of course 210.

210. Introductory Qualitative Analysis. Shorter Course. Lectures and laboratory practice. Repeated in second term. Credit three hours. Prerequisite course 101. Lecture, T 12, *Rockefeller B.* Laboratory, T Th, 8-11; T Th, 9-12; M W, 2-5. Mr RIDER and assistants.

The properties and reactions of the common elements and acids and their detection in various liquid and solid mixtures.

(**215. Advanced Qualitative Analysis.** Laboratory practice. Repeated in second term. Credit one, two, or three hours. Prerequisite courses 205, 220, 305, and 310. Mr. RIDER.) Not given in 1922-23.

220. Introductory Quantitative Analysis. Lectures, recitations, and laboratory practice. Repeated in second term. Credit six hours. Prerequisite course 205. Lectures, T Th, 9. *Morse 119.*

Laboratory sections: First term, M T W, 2-5:30; T Th, 10-1; S, 8-1; second term, W Th F, 2-5:30; T Th, 10-1; S, 8-1. Recitations, one hour a week, to be arranged. Mr. NICHOLS, Mr. BRANDES, and assistants.

The preparation and standardization of various volumetric solutions and their use in analyzing a variety of substances; gravimetric methods; stoichiometry.

The students in science are advised and candidates for the degree of Bachelor of Chemistry are required to take this course instead of course 225.

225. Introductory Quantitative Analysis. Shorter course. Lectures and laboratory practice. Repeated in the second term. Credit three hours. Prerequisite course 101. Course 225 must be preceded or accompanied by course 210. Lecture, Th, 12. *Rockefeller A.* Laboratory: first term, Th F, 2-5:30; second term, M T, 2-5:30. Mr. NICHOLS and assistants.

The preparation and use of volumetric solutions and work in elementary gravimetric analysis.

230. Advanced Quantitative Analysis. Recitations and laboratory practice. Repeated in the second term. Credit two to four hours. Prerequisite course 220. Laboratory sections: first term, M T W, 2-5:30; T Th, 9-1; S, 8-1; second term, W Th F, 2-5:30; T Th, 9-1; S, 8-1. Recitation at hours to be arranged. Mr. NICHOLS, Mr. BRANDES, and assistants.

Gravimetric, volumetric, and electrolytic methods of analysis, and methods of combustion analysis; analysis of iron and steel, alloys, special steels, slags, coal and coke, cement and cement materials, and ores of copper, lead, zinc, mercury, manganese, tin, tungsten, chromium, etc.

235. Advanced Quantitative Analysis. Lectures. Second term. Credit two hours. Prerequisite, first term of course 405. M W, 8. *Morse 119.* Mr. BRANDES.

Selected topics in advanced quantitative analysis; stoichiometry.

240. Electrochemical Analysis. Laboratory practice. Repeated in second term. Credit one or two hours. Prerequisite course 220. Laboratory sections at hours to be arranged. Mr. BRANDES.

A study of the most approved electrochemical methods for the determination of silver, lead, copper, tin, nickel, cobalt, zinc. Practice will be given in the analysis of alloys and ores.

245. Assaying. Lectures and laboratory practice. First term. Credit three hours. Prerequisite courses 210 and 225, or 205 and 220, and if possible a course in mineralogy. Lectures, F, 10. *Morse C.* Laboratory, M W, 2-5. Mr. **BRANDES** and assistant.

Lectures on the theory and practice of the scorification and crucible assay, and on the metallurgy of copper, lead, zinc, silver, and gold. In the laboratory, practice is given in the assay of zinc, lead, copper, gold and silver ores, mattes, and bullion. Designed for students specializing in chemistry and geology and as an elective for students in Mechanical and Civil Engineering.

250. Introductory Gas Analysis. Lectures and laboratory practice. Repeated in the second term. Credit four hours. Prerequisite courses 205 and Physics 2. Course 250 must be preceded or accompanied by course 220. Lectures, M W, 11. *Morse 119.* Laboratory sections, M T, 2-4:30; W Th, 2-4:30; T Th, 10-12:30; S, 8-1. Mr. **NICHOLS** and assistants.

The analysis of gas mixtures with various forms of apparatus; the complete analysis of flue gas, coal gas, Pintsch gas, Blau gas, natural gas, producer gas, acetylene, and air; the determination of the heating power of gaseous, liquid, and solid fuels; the analysis of various substances by gas analytical methods involving the use of the different types of gas evolution apparatus. Problems are assigned which afford practice in the calculation and interpretation of results. Within certain limits the work may be selected to suit the requirements of the individual student.

255. Advanced Gas Analysis. Laboratory practice. Second term. Credit one or more hours. Prerequisite course 250. Mr. **NICHOLS**.] Not given in 1922-23.

295. Research for Seniors. Throughout the year. See page xx. Mr. **NICHOLS** and Mr. **BRANDES**.

ORGANIC CHEMISTRY

305. Introductory Organic Chemistry. Lectures and written reviews. Throughout the year. Credit three hours a term. Prerequisite courses 210 and 225 (or 205 and 220). Open to those who are taking course 220. M W F, 9. *Morse 119.* Professor **ORNDORFF**, Mr. **CORNWELL**, and assistants.

The lectures discuss systematically the more important compounds of carbon, their occurrence, methods of preparation, reactions, relations, and uses.

310. Introductory Organic Chemistry. Laboratory practice and oral reviews. Throughout the year. Credit three hours a term. Open to those who have had or who are taking course 305. Laboratory sections, M T, 1-5:30; F, 1-5:30, S, 8-12:30. Professor **ORNDORFF**, Mr. **CORNWELL**, and assistants.

The student prepares a large number of typical compounds of carbon and familiarizes himself with their properties, reactions, and relations. The detection of inorganic elements in organic compounds and the recognition of various groups of radicals is included in the laboratory work.

315. Special Chapters in Organic Chemistry. Lectures. Throughout the year. Credit two hours a term. Prerequisite courses 305 and 310. T Th, 9. W. Sibley 1. Professor **ORNDORFF** and Mr. **CORNWELL**.

A presentation of certain important chapters of organic chemistry and discussion of selected classical researches in this field.

320. **Advanced Organic Chemistry.** Laboratory practice. Throughout the year. Credit two to six hours a term. Open to those who have had or are taking course 315. Hours to be arranged. The laboratory is open daily. Professor ORNDORFF, Mr. CORNWELL, and assistants.

An advanced course in the preparation of organic compounds. The original literature is consulted, and before taking up original work in this field, the student is required to repeat some extended and important piece of work, and to compare his results with those published.

325. **The Coal Tar Dyestuffs.** Lectures. First term. Credit one hour. Open to those who have had courses 305 and 310 and have had or are taking course 315. F, 11; place to be arranged. Professor ORNDORFF.

Discussion of methods of manufacture of intermediates and dyestuffs and of their properties, constitution, and relationships. The treatment is scientific rather than technical.

330. **The Coal Tar Dyestuffs.** Laboratory practice. Throughout the year. Credit two to four hours a term. Open to those who have had or are taking course 315. Hours to be arranged. Professor ORNDORFF and Mr. CORNWELL.

Preparation of various intermediate products used in the preparation of dyes, and of representatives of the different groups of dyestuffs.

335. **Stereochemistry.** Lectures. Second term. Credit one hour. Prerequisite course 305. F, 11. Place to be arranged. Professor ORNDORFF.

The stereochemistry of the compounds of carbon and nitrogen. The necessity of considering the space relations of the atoms in certain classes of isomers is shown and the close agreement of facts and theory is brought out.

340. **Methods of Organic Analysis.** Laboratory practice. Throughout the year. Credit two to six hours a term. Prerequisite courses 305 and 310. Hours to be arranged. The laboratory is open daily. Professor ORNDORFF and Mr. CORNWELL.

Practice in the qualitative and quantitative analyses of commercial organic products such as alcohols, ethers, organic acids, glycerin, formalin, acetates, coal tar distillates, petroleum products, soaps, acetanilid, etc.

375. **Elementary Organic Chemistry.** Lectures, written reviews, and laboratory practice. First term. Credit five to six hours; lectures and written reviews only, four hours. Students who are preparing for the study of medicine must take the whole six hours. Prerequisite courses 210 and 225 (or 205 and 220). Open to those who are taking course 220. Lectures and written reviews, M W F, 12, *Franklin* 10; S 12, *Sibley Dome*. Laboratory practice and oral reviews. M T, 2-5. Mr. CORNWELL and assistants.

395. **Research for Seniors.** Throughout the year. See page xx. Professor ORNDORFF.

PHYSICAL CHEMISTRY

405. **Introductory Physical Chemistry.** Lectures. Throughout the year. Credit three hours. Prerequisite course 305 or 375 and Physics 2 and 8c. M W F, 9. *Rockefeller B.* Assistant Professor BRIGGS and assistants.

A systematic presentation of modern chemical theory in which special attention is paid to the following topics: Gases, liquids, and solids; the theory of solu-

tion; reaction velocity, catalysis, and chemical equilibrium; the Phase Rule; colloid chemistry; thermochemistry, and elementary electrochemistry.

It is advisable, but not obligatory, that course 410 accompany this course.

410. Introductory Physical Chemistry. Laboratory practice. Throughout the year. Credit three hours a term. Open only to those who have taken or are taking course 405. Laboratory sections, M T, 2-4:30; Th F, 2-4:30; S, 8-1. Assistant Professor BRIGGS and assistants.

Qualitative and quantitative experiments illustrating the principles of physical chemistry and including practice in performing physical chemical measurements. An important feature of this course is the presentation of detailed reports based upon the data obtained in the laboratory.

415. Advanced Physical Chemistry. Lectures. Throughout the year. Credit two hours a term. Prerequisite course 405. Professor BANCROFT.

An exposition of the law of mass action in its application to chemical equilibrium and reaction velocities.

430. Applied Colloid Chemistry. Lectures. Throughout the year. Credit two hours a term. T Th, 10. *Morse* 119. Professor BANCROFT.

The theory of colloid chemistry and its application in the arts. Open to candidates for the degree of Bachelor of Chemistry if they have taken course 405; to others only by special permission.

450. Applied Electrochemistry. Lectures. Throughout the year. Credit two hours a term. Prerequisite course 405. W F, 12. *Morse* 119. Assistant Professor BRIGGS and assistant.

The theory of electrolysis and electromotive force; electrolytic extraction and refining of metals; electrolytic manufacture of organic and inorganic compounds; theory and practice of storage cells; preparation of compounds in the electric furnace.

455. Applied Electrochemistry. Laboratory practice. Throughout the year. Credit two hours a term. Open to those who have taken courses 405 and 410 and have taken or are taking course 450. Hours to be arranged. Assistant Professor BRIGGS and assistant.

Qualitative and quantitative study of electrolysis; determination of electrical conductivity; potentiometric measurements; hydrogen ion concentration; determination of current and energy efficiencies in electrolytic and electrothermic work; electrolytic preparation of organic and inorganic compounds; tests of storage cells; preparation of compounds in the electric furnace; measurement of high temperatures.

[**460. Theoretical Electrochemistry.** Lectures. Throughout the year. Credit two hours a term. Prerequisite course 405. Professor BANCROFT.] No given in 1922-23.

465. Advanced Physical Chemistry. Laboratory practice. Either term or throughout the year. Credit not to exceed six hours a term. Prerequisite courses determined in each case by the professor in charge. Hours and work to be arranged. Professor BANCROFT, Assistant Professor BRIGGS, and assistant.

Students may elect in mass law, reaction velocity, or efficiency measurements with special reference to course 415; in photochemistry, photography, or colloid chemistry with special reference to course 430; in conductivity or electromet

determinations with special reference to course 460; in electrolytic or electric furnace products with special reference to course 450; in the application of physical chemistry methods to organic chemistry.

495. **Research for Seniors.** Throughout the year. See page xx. Professor BANCROFT and Assistant Professor BRIGGS.

OPTICAL CHEMISTRY

505. **Introductory Chemical Spectroscopy.** Lectures, written reviews, and laboratory practice. Repeated in the second term. Credit three hours. Prerequisite courses 210 and 225 (or 205 and 220), and Physics 2. Open only to those who have taken or are taking Physics 8. Lectures and written reviews, T Th, 8. *Morse* 119. Laboratory sections, M T W Th F, 2-4:30; S, 8-10:30. Dr. PAPISH and assistants.

The construction and use in chemical analysis of the spectroscope, polariscope, refractometer, colorimeter, and nephelometer. The laboratory instruction is devoted to the training of the student in the use of these instruments in the solving of chemical problems.

510. **Advanced Chemical Spectroscopy.** Laboratory practice. First term. Credit two or more hours. Prerequisite course 505. Hours to be arranged. Dr. PAPISH and assistants.

The study of arc, spark, and absorption spectra and the application of spectroscopic methods to the identification of dyestuffs. Practice in one or more of the subjects mentioned may be selected by the student.

515. **Advanced Chemical Polarimetry and Refractometry.** Laboratory practice. Second term. Credit two or more hours. Prerequisite course 505. Hours to be arranged. Dr. PAPISH and assistant.

The practical application of polarimeters, refractometers, colorimeters, and nephelometers to the solution of problems arising in the chemical laboratory, special emphasis being laid upon the advantages of different types of instruments.

520. **Spectrographic Methods.** Laboratory practice. Either term. Credit one or more hours. Prerequisite course 505. Hours to be arranged. Dr. PAPISH.

The application of photographic methods to arc, spark, and absorption spectroscopy. Practice is also given in the applications of ultra-violet spectroscopy in chemical analysis.

530. **Introductory Chemical Microscopy.** Lecture and laboratory practice. Repeated second term. Credit two hours. Prerequisite courses 210 and 225 (or 205 and 220). Lecture, M, 12. *Morse* 119. Laboratory sections, M T, 2-4; T Th, 10-12; Th, 2-4, F, 10-12. Professor CHAMOT, Mr. MASON, and assistants.

The use of the microscope and its accessories; microscopic methods as applied to chemical investigations. The examination of crystalline compounds, recognition of textile and paper-making fibers, etc. The application of microscopic methods to quantitative analysis. The methods of microscopic investigation useful in metallurgical and chemical industries.

535. **Advanced Chemical Microscopy.** Laboratory practice. Either term. Credit two or more hours. Prerequisite course 530. Laboratory sections, M T, 2-4:30; T Th, 10-1; Th, 2-4:30, F, 10-1. Professor CHAMOT and assistants

CHEMISTRY

Practice in the examination and analysis of inorganic substances containing the more common elements with special reference to rapid qualitative methods and to the analysis of minute amounts of material.

[540. **Advanced Chemical Microscopy.** Laboratory practice. Either term. Credit two hours. Prerequisite course 530. Professor CHAMOT and assistants.] Not given in 1922-23.

545. **Microscopy of Commercial Alloys.** Laboratory practice. Second term. Credit two hours. Prerequisite course 530. Laboratory sections to be arranged. Professor CHAMOT and assistants.

An introduction to the methods employed in microscopic examination of metals, alloys, and other metallurgical products. Practice in grinding, polishing, and etching specimens for microscopic study. Metallographic microscopes and their use.

This course may be extended to include other materials of construction.

550. **Microscopy of Foods and Beverages.** Laboratory practice. First term. Credit two hours. Prerequisite course 530. Laboratory sections to be arranged. Professor CHAMOT and assistants.

The application of microscopic methods to the examination of foods and beverages for the purpose of ascertaining their purity and for the detection of deteriorations, adulterations, and admixtures.

595. **Research for Seniors.** Throughout the year. See page xx. Professor CHAMOT.

SANITARY CHEMISTRY

605. **Introductory Sanitary Chemistry (Foods).** Lectures. First term. Credit two hours. Prerequisite course 305 or 375. T Th, 12. Morse 119. Mr. GEORGIA and assistant.

Methods employed in the analysis of foods, beverages, and food accessories with special reference to the detection and determination of adulteration and spoilage; the relation of the chemical composition of materials used in the household to the public health.

It is advisable, but not obligatory, that course 610 accompany this course.

610. **Introductory Sanitary Chemistry (Foods).** Laboratory practice. First term. Credit two hours. Open to those who have taken or are taking course 605. Laboratory sections, M T, 2-4:30. Mr GEORGIA and assistant.

Laboratory exercises designed to illustrate the material presented in course 605.

615. **Introductory Sanitary Chemistry (Water).** Lectures. Second term. Credit two hours. Prerequisite course 305 or 375. T Th, 12. Morse 119. Mr. GEORGIA and assistant.

Sources of potable water; pollution of water supplies; physical, chemical, bacteriological, and microscopical examination of water for household and municipal purposes; examination of sewage, and sewage effluents; methods and control of water purification, water softening, sewage disposal, and garbage disposal. Interpretation of analytical results and the preparation of sanitary surveys.

It is advisable but not obligatory that course 620 accompany this course.

620. **Introductory Sanitary Chemistry (Water).** Laboratory practice. Second term. Credit two hours. Open to those who have had or are taking course 615. Laboratory sections, M T, 2-4:30; Th F, 2-4:30. Mr. GEORGIA and assistant.

▲ Laboratory exercises designed to illustrate the material presented in course 615.

630. **Advanced Sanitary Chemistry.** Lectures and conferences. First term. Credit two hours. Prerequisite course 615. T Th, 9. Mr. GEORGIA.

The course is designed to meet the needs of those students who desire to specialize in the field of water purification and sewage disposal.

Laboratory work to accompany this course may be elected under course 635.

635. **Advanced Sanitary Chemistry.** Laboratory practice. Either term. Credit two or more hours. Prerequisite course 610 or 620. Hours to be arranged. Mr. GEORGIA and assistant.

Students who have had adequate preparation may elect work in any branch of sanitary chemistry, or in the examination of water for special industrial purposes.

640. **Sanitary Chemistry. (Disinfectants).** Lectures. Second term. Credit two hours. Prerequisite course 305 or 375. T Th, 9. Place to be announced. Mr. GEORGIA.

Standardization, chemical properties, methods of application and proper choice of disinfectants and other agents used in combating the spread of disease.

650. **Chemistry of Foods and Food Products.** Lectures. Second term. Credit two hours. Prerequisite course 305 or 375. T Th, 11. Place to be arranged. Professor CAVANAUGH.

The chemical composition, chemical properties, and methods of manufacture of the principal foods and food products. Methods for the determination of the normal constituents of foods. Special attention is given to the chemistry of milk and milk products, cereal products, sugars, fruits, and fruit products.

A two-hour laboratory course designed to accompany this lecture course is offered. See *Announcement of the College of Agriculture*, Agricultural Chemistry, course 825.

695. **Research for Seniors.** Throughout the year. See page xx. Mr. GEORGIA.

INDUSTRIAL CHEMISTRY

705. **Industrial Chemistry.** Lectures. Throughout the year. Credit three hours a term. Prerequisite course 405. Seniors who are taking course 405 will be admitted to this course. M W F, 10. Morse 119. Professor RHODES.

A discussion of various typical processes of chemical manufacturing from the standpoint of: (a) available materials, their properties and limitations; (b) standard forms of apparatus used in chemical manufacturing; (c) properties and specifications of commercial chemicals; (d) computation of costs and profits in chemical manufacturing.

710. **Industrial Chemistry.** Laboratory practice. Either term. Credit two, three, or four hours. Prerequisite course 405. Professor RHODES and assistant.

The study in the laboratory of the processes and materials that are used in the chemical industries.

715. Selected Topics in Industrial Chemistry. Lectures. Second term. Credit one hour. Open to students who have completed or are taking course 705. F, 11. *Morse C.* Professor RHODES.

A discussion of special topics in industrial chemistry. The lectures for 1922-23 will deal with the theory of fractional distillation and with the applications of fractional distillation to industrial processes.

720. Bitumens. Lectures. Second term. Credit two hours. Open to students who have completed or are taking course 705. M W, 11. *Morse C.* Professor RHODES.

(Under the term "bitumen" as here used are included petroleum, native asphalts, and asphaltites, oil shales, and coal tar and other tars).

The refining of petroleum; the manufacture of road tars, pitches, oils, and naphthas; the preparation of refined naphthas, tar acids, naphthalene, and other refined coal-tar products; the distillation of oil shales; and the preparation and utilization of asphalts and asphalt products.

725. The Chemistry of Fuels. Lectures. First term. Credit two hours. Open to students who have completed or are taking course 705. M W, 11. *Morse B.* Professor RHODES.

The chemistry of coal, coke, and the fuel gases. Particular stress is laid upon the chemistry of the carbonization of coal and upon the applications of physical chemistry to the reactions involved in the manufacture and purification of the fuel gases.

775. Engineering Chemistry. Lectures. Repeated in second term. Credit two hours. Prerequisite course 101. M W, 8. *Goldwin Smith A.* Professor RHODES.

Chemistry in its relations to engineering.

795. Research for Seniors. Throughout the year. See page xx. Professor RHODES.

AGRICULTURAL CHEMISTRY

805. Agricultural Chemistry. General Course. Lectures and recitation, Second term. Credit four hours. Prerequisite course 101. It is recommended, but not required, that this course be preceded by Organic Chemistry. M W F, 11. *Rockefeller B.* One recitation, to be arranged. Professor CAVANAUGH.

The relation of chemistry to agriculture, and an introduction to the study of the composition and chemical properties of plants, fertilizers, feedstuffs, insecticides, and fungicides.

A two-hour laboratory course, designed to accompany this lecture course, is offered. See *Announcement of the College of Agriculture*, Agricultural Chemistry course 806.

810. Chemistry of Fertilizers and Insecticides. Lectures. First term. Credit three hours. Prerequisite course 805. It is recommended but not required, that this course be preceded by course 806 and accompanied by course 808. M W F, 10. *Morse.* Professor CAVANAUGH.

A more detailed study of the chemistry of fertilizers and insecticides than is covered in course 805. The preparation, manufacture, and properties of old and new fertilizers and insecticides. Methods of sampling and analysis used by the Association of Official Agricultural Chemists.

(For courses 806 and 808, see the *Announcement of the College of Agriculture*.)

815. **Chemistry of Insecticides and Fungicides, Advanced Laboratory Course.** Either term. Credit two or more hours. Prerequisite courses 810 and 808. Hours to be arranged. Professor CAVANAUGH.

895. **Research for Seniors.** Throughout the year. See page xx. Professor CAVANAUGH.

SEMINARY

905. **Seminary.** Credit one hour. For seniors who are candidates for the degree of Bachelor of Chemistry. Morse 119.

ECONOMICS

Upperclass Group. Course 51 or its equivalent must be completed before any credit may be obtained toward the upperclass requirement. No upperclass credit will be allowed for either course in the following pairs unless credit for both courses is offered: 55a, 55b; 58a, 58b; 67a, 67b; 76a, 76b.

*51. **Elementary Economics.** Repeated in second term. Credit five hours. Daily except S, 8, 9, 10, 11, 12, 2.

A survey of the existing economic order, its more salient and basic characteristics, its operation, and some of the major problems—tariff, public utility, trust, labor, land, taxation—arising under it.

In the first term the registration will be limited to four hundred. Assignment to sections will be made on the registration days at *Goldwin Smith* 260.

55a. **Elementary Social Science.** First term. Credit three hours. Professor WILLCOX. T Th S, 9. *Goldwin Smith* 256.

An introductory course upon social science or sociology, its field and methods.

55b. **Elementary Social Science.** Second term. Credit three hours. Course 51 should accompany or precede this course. Open by special permission to students who have not taken course 55a. Professor WILLCOX. T Th S, 9. *Goldwin Smith* 256.

A continuation of the preceding course but with especial reference to the family as a primary social group, to race and immigration questions, and to the dependent, defective, and delinquent classes.

56b. **Social Theory.** Second term. Credit two hours. Prerequisite course 55a or its equivalent. Professor WILLCOX. Th, 4-6. *Goldwin Smith* 259.

Critical reading and discussion of two or three of the leading books on Social Theory or Sociology; collateral reading and reports.

58. **Accounting.** Second term. Credit five hours. Prerequisite course 51 or its equivalent. Professor ENGLISH. Daily except S, 10. *Goldwin Smith* 256. One or two three-hour practice periods a week. *Goldwin Smith* 271.

The subject matter of courses 58a and 58b in a single course.

58a. **Elements of Accounting.** First term. Credit three hours. Prerequisite course 51 or its equivalent. Professor ENGLISH. M W F, 8. *Goldwin Smith C.* One three-hour practice period a week. *Goldwin Smith* 271.

*May not be counted for upperclass group.

Theory of debit and credit; the journal and ledger; the development of books of original entry; analysis of income sheets and balance sheets.

58b. **Principles of Accounting.** Second term. Credit three hours. Prerequisite course 58a. Professor ENGLISH. M W F, 8. *Goldwin Smith* 256. One three-hour practice period a week. *Goldwin Smith* 271.

The issue and transfer of capital stock; bonds and their valuation; depreciation; reserves and reserve funds; sinking funds; analysis of income sheets and balance sheets.

59a. **Cost Accounting.** First term. Credit two hours. Prerequisite course 58b. Professor ENGLISH. T Th, 8. *Goldwin Smith* 256.

A study of the principal types of cost accounting systems and of the relation of cost accounts to financial accounts.

59b. **Accounting Problems.** Second term. Credit two hours. Prerequisite course 58b or its equivalent. Professor ENGLISH. T Th, 8. *Goldwin Smith* 256.

A study of the accounting problems which arise in the organization, reorganization, consolidation, and liquidation of business enterprises.

*60. **Business Law.** Repeated in second term. Credit three hours. Open only to upperclassmen. Professor ENGLISH and Mr. ——— T Th S, 8. *Goldwin Smith* 264; M W F, 8, 12, *Goldwin Smith* 264.

A brief survey of that portion of private law which deals especially with contracts, negotiable instruments, agency, and sales.

Credit for this course may not be counted by students who take the course in Contracts in the College of Law or Specification and Contracts in the College of Engineering.

61. **Financial Statements.** First term. Credit two hours. Prerequisite course 58 or 58b. Professor ENGLISH. T Th, 9. *Goldwin Smith* 269.

A detailed study of the methods of analysis and interpretation of the financial reports of corporations.

63a. **Corporation Finance.** First term. Credit three hours. Prerequisite course 58a or course 64. Acting Professor ROGERS. T Th S, 11, *Goldwin Smith* 256.

A study of the business corporation, its economic significance and effects. An analysis of the financial operations of railroads, public utilities, and industrial corporations.

[63b. **Investments and Speculation.** Second term. Credit three hours. Prerequisite course 58a or course 64. Acting Professor ROGERS. T Th S, 11. *Goldwin Smith* 256.

A study of the general theory of investment, a discussion of the chief types of investment securities, and a description of investment banking houses and of the speculative exchanges, with special emphasis in their economic significance.] Not given in 1922-23.

64. **Money and Banking.** Throughout the year. Credit six hours on completion of the course. Prerequisite course 51. Acting Professor ROGERS. First term; Section 1, T Th S, 9; Section 2, T Th S, 10. *Goldwin Smith* 264. Second term; one section, T Th S, 10. *Goldwin Smith* 142.

*May not be counted for upperclass group.

A discussion of the more important phases of the theory of money and credit followed by a study of the American and European banking systems, foreign exchange, and currency reform.

65. Trusts and Modern Capitalism. Second term. Credit three hours. Prerequisite course 58a or 64. Consult the instructor before registering. Dr. COPELAND. M W F, 10. *Goldwin Smith* 245.

A study of monopolistic combinations and trade organizations in selected industries. The work will consist of individual research and class discussion.

66. Foreign Exchange and International Finance. Second term. Credit three hours. Prerequisite course 64. Acting Professor ROGERS. T Th S, 11. *Goldwin Smith* 256.

A study of foreign exchange, foreign trade, and actual and proposed methods of international finance.

67a. Trade Unionism and Related Problems. First term. Credit three hours. Prerequisite course 51. Assistant Professor SLICHTER. M W F, 11. *Goldwin Smith* 256.

Trade union development, types, government, policies, methods, and significant current tendencies, with the fundamental purpose of appraising trade unionism's contribution to the solution of the problems of industrial relations.

67b. The State in Relation to Labor. Second term. Credit three hours. Consult the instructor before registering. Assistant Professor SLICHTER. M W F, 11. *Goldwin Smith* 256.

State intervention in industrial relations. Conciliation, arbitration, industrial courts, the legal minimum wage, workmen's compensation, labor exchanges, social insurance, administrative machinery and problems.

68. Labor Administration. Second term. Credit three hours. Open only by special permission to seniors who have had course 67a. Assistant Professor SLICHTER. M W F, 9. *Goldwin Smith* 264.

Organization, policies, and methods in the plant administration of labor, considered especially from the standpoint of the employer's contribution to the solution of the labor problem.

69. Industrial Government. First term. Credit three hours. Consult instructor before registering. Assistant Professor SLICHTER. M W F, 9. *Goldwin Smith* 242.

An intensive examination of problems arising from the participation of labor in the government of industry. Evolution of trade agreements and experience under representative trade agreements will be studied in some detail and an examination will be made of some of the more important untried proposals.

76a. Elementary Statistics. First term. Credit three hours. Professor WILLCOX. M W F, 9. *Goldwin Smith* 256. Laboratory, W, 2-4. *Goldwin Smith* 259.

An introduction to census statistics with especial reference to the federal census, and to registration statistics with especial reference to those of New York State and its cities. The course gives an introduction to the methods and results of statistics in these, its best developed, branches.

76b. Economic Statistics. Second term. Credit three hours. Prerequisite courses 51 and 76a. Professor WILLCOX. M W F, 9. *Goldwin Smith* 256. Laboratory, W, 2-4. *Goldwin Smith* 259.

A continuation of course 76a, dealing mainly with the agricultural and industrial statistics of the United States. Mature students who have not already had course 76a or its equivalent may be admitted by special permission. The course is an introduction to statistics in its application to more difficult fields, such as production, wages, prices, and index numbers.

86. Principles of Economics. First term. Credit five hours. Consult instructor. Professor DAVENPORT. Daily except S, 11. *Goldwin Smith* 264.

Intermediate theory, primarily for students majoring in economics who have had, preferably, one to two years of work in advance of 51; or for graduate students or for the more mature students desiring an introductory course more searching and difficult than 51.

87. Public Revenues. Second term. Credit five hours. Primarily for advanced students. Professor DAVENPORT. Daily except S, 11. *Goldwin Smith* 264.

The limits of state activity; justice in taxation; proportion vs. progression; problems of incidence; administrative aspects of income taxation; franchise and corporate taxation; the articulation of the various taxes.

88. Value and Distribution. Throughout the year. Credit six hours on completion of the course. Primarily for graduates. Professor DAVENPORT. Hours to be arranged.

A study of the chief problems of current economic theory. The works of the leading economic writers will be critically studied with a view to disclosing the basis of existing divergencies.

91. Demography of the United States. First term. Credit two hours. Prerequisite course 76a or its equivalent. Professor WILLCOX. Th, 4-6. *Goldwin Smith* 259.

An advanced course studying American statistics of birth, death, marriage, divorce, immigration, crime, etc.

92. Research in Finance. Throughout the year. Credit two hours. Consult the instructor before registering. Acting Professor ROGERS. Hours to be arranged.

The topic for the first term, 1922-23, will be Business Cycles.

The topic for the second term, 1922-23, will be Financial Theory and Currency Problems—a study of prices and interest rates with special reference to their relations with modern Banking.

93. Research in Accounting. Throughout the year. Credit one hour a term. Consult the instructor before registering. Professor ENGLISH. Hours to be arranged.

94. Research in Industrial Relations. Throughout the year. Credit two hours a term. Consult the instructor before registering. Assistant Professor SLICHTER. Hours to be arranged.

Discussions and individual investigations of current and theoretical problems in the field of industrial relations.

Agricultural Economics. (See Agricultural Economics and Farm Management in the *Announcement of the College of Agriculture*.)

By special permission certain courses in Agricultural Economics may be counted in satisfaction of the upperclass requirement in economics.

Attention is called to the following courses given in the College of Law: Contracts, Restraints on Business and Industry, Taxation.

EDUCATION

Psychology 1, 1a, or 1b, is prerequisite to all courses in Education.

1. **Educational Psychology.** Repeated in second term. Credit three hours. Lectures and recitations. First term, M W F, 11. *Goldwin Smith 242.* Mr. WAKEMAN. Second term, M W F, 10. *Goldwin Smith 142.* Professor OGDEN.

A study of functional psychology with special reference to the learning process and its application to educational theory and practice.

2. **Principles of Education.** First term. Credit three hours. Prerequisite course 1. Professor OGDEN. M W F, 2. *Goldwin Smith 234.*

The nature and significance of education; biological and psychological foundations; the school as a social institution; educational ideals and values; the curriculum; administration and general methods.

3. **History of Education.** Second term. Mr. WAKEMAN. Credit three hours. Prerequisite course 1. Section A, T Th S, 10; Section B, T Th S, 12. *Goldwin Smith 234.*

A general historical account of the development of educational aims, contents, and methods in relation to ethnological, psychological, and sociological factors.

Students who elect Education 3 must apply at *Goldwin Smith 248* for assignment to sections.

4. **High School Teaching and Method.** First term. Credit three hours. Professor JORDAN. M W F, 3. *Goldwin Smith 242.* For seniors only.

Aims to train students who expect to teach in secondary schools; relation and duties of high school teachers to their students, the community and the state; methods of class management and types of recitation. Observation of actual high school classes required.

5. **Philosophy of Education.** Second term. Credit three hours. Prerequisite course 1, and at least one course in philosophy. Professor OGDEN. T Th S, 11. *Goldwin Smith 248.*

A study of education as interpreted by the more important philosophical conceptions and theories, with special application to the spirit and demands of modern society.

6. **Experimental Education.** Second term. Credit two hours. Prerequisite course 1 and Psychology 3. Mr. WAKEMAN. Hours to be arranged. *Goldwin Smith 248.*

The chief problems of experimental education; the application of psychological and statistical methods to problems of educational measurement; chief results and practical bearings.

7. **Mental Measurements.** First term. [Credit three hours. Prerequisite course 1 and Psychology 3. Mr. WAKEMAN. Lectures T Th, 11. *Goldwin Smith 236.* Laboratory, Section A, T, 2-4.30; Section B, Th, 2-4.30. *Goldwin Smith 248.*

The single tests and test systems; logical and mathematical treatment of experimental data; the bearing of tests upon problems of psychological theory

(nature and distribution of intelligence, the correlation of abilities, etc.). The laboratory work is intended to give practice in administering tests, both to individuals and to groups.

8. Experimental Investigation. Repeated in second term. Credit and hours to be arranged. Prerequisite course 6 or 7. Professor OGDEN and Mr. WAKEMAN. *Goldwin Smith* 251.

Experimental study of a special problem in educational psychology or in mental measurements.

9. Reading of German Educational Psychology. First term. Credit two hours. Prerequisite course 1. Professor OGDEN. F, 4-6. *Goldwin Smith* 248.

The aim of the course is to aid in facility of translation and to familiarize the student with certain monographic literature.

10. Educational Administration and Supervision. Throughout the year. Credit two hours a term. Prerequisite course 1. Professor JORDAN. M W, 9. *Goldwin Smith* 248.

Principles of administration and supervision of state and city school systems, involving problems of evaluating and improving teaching and subject matter in the public schools. The course will be adapted to the particular needs of the class.

11. The Secondary School. Second term. Credit three hours. Supplementary to Course 2. Professor JORDAN. M W F, 2. *Goldwin Smith* 234.

Principles underlying secondary education; the evolution, function, and possibilities of the secondary school as an agent of democracy; its organization and curriculum from the point of view of the administrator.

18. Educational Measurement. Second term. Credit two hours. Prerequisite course 7. Mr. WAKEMAN. T Th, 2. *Goldwin Smith* 248.

The theory of educational measurements; the use of statistical methods in the construction, standardization and evaluation of educational tests; the relation between mental and educational tests.

19. Aesthetic Education. First term. Credit two hours. Prerequisite course 1. Professor OGDEN. T Th, 10. *Goldwin Smith* 248.

A study of Greek education in music and gymnastics with modern applications. Rhythm and proportion as means to efficient action and enjoyment.

20. Seminary in Education. Throughout the year. Credit two hours a term. Professor OGDEN. M, 4-6. *Goldwin Smith* 248. Prerequisite course 1.

Topics relevant to the fundamental assumptions of educational theory will be chosen. Primarily for graduate students.

21. Seminary in Education. Second term. Credit two hours. Professor JORDAN. M, 4-6. *Goldwin Smith* 248.

Topics developing from historical and current problems of educational practice, especially as related to administration and conduct of the public school system, and of the university. Primarily for graduate students.

ENGLISH

***1. Introductory Course.** Throughout the year. Credit three hours a term. Students who have not taken the course in the first term may enter in the second

*May not be counted for upperclass group.

term in sections provided for them. Open only to underclassmen who have satisfied the entrance requirement in English. Assistant Professor SMITH, Messrs. BALDWIN, LONG, MANNING SMITH, HOTCHKISS, SANDERS, MARX, NELSON, VAN ALLEN, FRENCH, HALE, JONES, LAPE, MITCHELL, GREENE, KESSEL, JOHNSON, BLODGETT, GALLMAN, CARROLL, and HARRIS. Sections at the following hours: M W F, or T Th S, 8, 9, 10, 11, 12, 2. Rooms to be announced.

A study of composition in connection with the reading of representative works in English literature, including four plays of Shakespeare, two modern novels, selected essays, and poems of Browning and Tennyson. Registration in the course is in charge of Professor SMITH.

Students who elect English 1 must apply at *Goldwin Smith A* on Wednesday, Thursday, Friday, or Saturday of registration week for assignment to sections.

***2. Composition and Literature.** For engineering students only. Registration in charge of the College of Engineering; departmental representative, Assistant Professor FISKE.

5. Short Story Writing. Throughout the year. Credit three hours a term. Open to upperclassmen after consultation with the instructor. Intended especially for students who are looking forward to writing as a profession. Assistant Professor SMITH. T Th S, 10. *Goldwin Smith* 160.

8. English Usage and Style. Throughout the year. Credit three hours a term. Prerequisite course 20 or its equivalent. The instructor's permission must be obtained before enrollment. Professor STRUNK. T Th S, 9. *Goldwin Smith* 160.

A study of the theory of good English, with practical applications. How usage is determined; matters of dispute in vocabulary and idiom; proof-reading; essays and other exercises.

10. Play Writing. Throughout the year. Credit two hours a term. Open to seniors and graduates who show some special aptitude for the proposed work. Professor SAMPSON. T Th, 11. Room to be arranged.

12. Advanced Composition. Throughout the year. Credit two hours a term. Writing in fields determined by the students' individual preference. Open to seniors who have completed course 5, 8, or 10, and to graduates. Professor STRUNK. Hour and room to be arranged.

***20. Nineteenth Century Prose.** Throughout the year. Credit three hours a term. Prerequisite course 1. Professors PRESCOTT and NORTHUP, Assistant Professors MONROE, HEBEL, and FISKE, and Messrs. BALDWIN and LONG. M W F, 9, 10, 11, 2; T Th S, 10, 11, 12. *Goldwin Smith* 164, and other rooms to be announced.

Reading of English prose with special reference to style; practice in composition, with conferences.

Students who elect English 20 must apply at *Goldwin Smith* 164 on Wednesday or Thursday of registration week in the first term, and on Friday or Saturday in the second term, for assignment to sections.

***22. Nineteenth Century Poetry.** Throughout the year. Credit three hours a term. Prerequisite course 1. Students who have not taken the course in the first term may enter in the second term. Open to sophomores and upperclassmen.

*May not be counted for upperclass group.

Professor SAMPSON, Assistant Professors BROUGHTON and HEBEL, and Mr. BALDWIN. M W F, 9. *Goldwin Smith* 156. M W F, 11. *Goldwin Smith* A T Th S, 9. *Goldwin Smith* 156. M W F, 2. *Goldwin Smith* 156.

Wordsworth, Coleridge, Byron, Shelley, and Keats.

Students who elect English 22 must apply at *Goldwin Smith* 159 on Wednesday or Thursday of registration week in the first term, and on Friday or Saturday in the second term, for assignment to sections.

32. History of English Literature. Throughout the year. Credit three hours a term. Open to graduates, and to upperclassmen who have taken two full years of English. Professor STRUNK. T Th S, 10. *Goldwin Smith* 162.

Lectures on English literature from the time of Chaucer to the present, with reading and reports.

35. Biography. First term. Credit two hours. Open to upperclassmen who have had two years of English. Assistant Professor SMITH. T Th, 2. *Goldwin Smith* 164.

Boswell's Johnson, Gibbon, Franklin.

36. The English Bible. Throughout the year. Credit two hours a term. Open to upperclassmen only. Assistant Professor FISKE. W, 3-5. *Goldwin Smith* 162.

A study of the King James Version as an English classic.

37. Shakespeare. Throughout the year. Credit three hours a term. Open to upperclassmen only. Professor STRUNK. M W F, 10. *Goldwin Smith* 156.

First term, comedies and histories; second term, tragedies and romances. Either term's work may be elected separately.

38. Eighteenth Century Poetry. Throughout the year. Credit two hours a term. Open to upperclassmen only. First term, Assistant Professor MONROE. Second term, Professor PRESCOTT. T Th, 12. *Goldwin Smith* 156.

English poets of the Restoration and the eighteenth century; Dryden, Pope, Thomson, Gray, Collins, Goldsmith, Cowper, and Burns; the lesser English and Scotch poets; beginnings of the English romantic movement.

39. Eighteenth Century Prose. Throughout the year. Credit two hours a term. Open to upperclassmen only. Assistant Professor BROUGHTON. T Th, 9. *Goldwin Smith* 142.

Defoe, Swift, Addison, Steele, Johnson, Goldsmith, and Burke.

41. The English Drama to 1642. Throughout the year. Credit three hours a term. Open to upperclassmen only. Professor ADAMS. M W F, 11. *Goldwin Smith* 225.

First term: the origin of the drama; miracles; moralities; interludes; the first regular comedies and tragedies; the predecessors of Shakespeare. Second term: the contemporaries and successors of Shakespeare.

42. Elizabethan Prose. First term. Open to seniors and graduates only. Professor ADAMS. M W F, 9. *Goldwin Smith* 160.

A study of non-dramatic prose literature from the beginning of the Renaissance to the Restoration.

43. Elizabethan Poetry. Second term. Credit three hours. Open to seniors and graduates only. Professor ADAMS. M W F, 9. *Goldwin Smith* 160.

The main authors studied are Wyatt, Surrey, Gascoigne, Sidney, Spenser, Daniel, Drayton, Shakespeare, Davies, Donne, and Herrick.

44. **Shakespeare.** Throughout the year. Credit three hours. Open to upperclassmen only. Professor ADAMS. M W F, 3. *Goldwin Smith* 142.

Shakespeare's life; his dramatic technique; a detailed study of his chief plays.

45. **Modern Novelists.** Throughout the year. Credit two hours a term. Open only to upperclassmen who have passed twelve hours of work in English with grade of A or B. Professor SAMPSON. T Th, 3. *Goldwin Smith* 156.

A study of some of the representative works of recent novelists: Meredith, Hardy, Henry James, Conrad, and others. Lectures, recitations, and a large amount of collateral reading.

46. **Byron.** First term. Credit two hours. Open only to upperclassmen who have had course 22. Professor PRESCOTT. T Th, 2. *Goldwin Smith* 162.

A study of Byron's life, his principal works, and his influence.

47. **The Theory of Poetry and Versification.** Throughout the year. Credit two hours a term. Open to upperclassmen. Professor PRESCOTT. M W, 10. *Goldwin Smith* 162.

A study of the nature of poetry and poetic forms.

48a. **American Literature.** First term. Credit three hours. Open to seniors and graduates. Professor PRESCOTT. M W F, 12. *Goldwin Smith* 156.

American literature of the colonial and revolutionary periods; the growth of literary independence; Irving, Bryant, and Cooper.

48b. **American Literature.** Second term. Credit three hours. Open to seniors and graduates. Prerequisite course 48a. Professor PRESCOTT. M W F, 12. *Goldwin Smith* 156.

American prose and poetry of the nineteenth century.

49. **Pastoral Poetry.** Throughout the year. Credit two hours a term. Open to upperclassmen and graduates. Assistant Professor BROUGHTON. M, 3-5. *Goldwin Smith* 162.

A study of the sources, origin, and development of the appreciation of rustic life and landscape in English poetry. Among the authors considered are Theocritus, Virgil, Spenser, Shakespeare, Fletcher, Jonson, Milton, Pope, Thomson, Collins, Burns, and Wordsworth.

50. **Spenser and Milton.** Throughout the year. Credit three hours a term. Open to upperclassmen. The instructor's permission must be obtained for admission in the second term. Assistant Professor HEBEL. T Th S, 11. *Goldwin Smith* 160.

A study of the poetry of Spenser and Milton.

52. **Victorian Literature.** First term. Credit three hours. Open to upperclassmen and graduates. Professor NORTHUP. T Th S, 9. *Goldwin Smith* 162.

Lectures on the chief literary tendencies and characteristics of the period; studies of the leading poets and of some of the greater writers of prose. The work in this course is essentially different from that of courses 1 and 20.

53. **Old English.** Throughout the year. Credit three hours a term. Open to upperclassmen. Assistant Professor MONROE. M W F, 9. *Goldwin Smith* 162.

Old English grammar. Reading of selections from the Old English Chronicle, King Alfred, Ælfric, and other representative prose texts, and of the simpler poetry. Supplementary lectures and collateral reading on the growth of the language.

This course is recommended by the department to those intending to teach English. The course should be taken in the junior year.

55. Old English Literature. Second term. Credit two hours. Open to graduates and qualified seniors. Assistant Professor MONROE. M W, 3, or hours to be arranged. *Goldwin Smith* 164.

Reading of selected Old English works including Beowulf or some of the Cynewulfian poetry; studies in textual criticism and in style and meter; supplementary reading.

56. Middle English. First term. Credit two hours. Open to upperclassmen and graduates. Mr. MANNING SMITH. Room and hour to be announced.

Studies in Middle English literature.

57. The Arthurian Legends. First term. Credit two hours. Open to upperclassmen and graduates. Professor NORTHUP.

An introduction to the comparative study of literature; the development of the Arthurian legends as illustrative of literary origins; the treatment of the legends by modern European poets. This course will be given every other year.

[**58. Celtic Literature in English.** First term. Credit two hours. Open to upperclassmen and graduates. Professor NORTHUP.] Not given in 1922-23; will be given in 1923-24, alternating with Course 57.

59. Dramatic Structure. Throughout the year. Credit three hours a term. Open to seniors and graduates. Professor SAMPSON. M W F, 3. *Goldwin Smith* 156.

A study of the principles of dramatic construction, based upon Greek, Elizabethan, and classical French drama (first term), and modern drama (second term). Reading of a hundred representative plays.

69. Teachers' Course. Second term. Credit two hours. Professor NORTHUP. T Th, 12. *Goldwin Smith* 162.

Lectures, readings, and conferences on the teaching of English in the secondary schools. Open to seniors and graduates who intend to teach English.

71. English Translations of Greek and Latin Classics. Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen. Professor COOPER. T, 3, Th, 3-5. *Goldwin Smith* 236.

Rapid reading in the best translations, with emphasis upon Greek masterpieces; for example, the Iliad and the Odyssey, the tragedies of Sophocles, and several dialogues of Plato. Translations from the Latin will be chosen for the bearing of the original works upon modern literature.

72. Principles of Literary Criticism. Throughout the year. Credit three hours a term. Open to seniors and graduates. Professor COOPER. W, 3-5, and another hour to be arranged. *Goldwin Smith* 236.

A study of the chief theories of poetry, and chief kinds of literature, with illustrations drawn from writers both ancient and modern.

[**73. Dante in English.** Throughout the year. Credit two hours a term. Open to seniors and graduates. Professor COOPER.] Not given in 1922-23.

74. **English Literary Types.** Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen. Professor COOPER. M W F, 10. *Goldwin Smith* 160.

A study of typical selections from the earlier periods of English literature, and of parallel selections from modern writers, to throw light upon English and American ideals. Students may be admitted at the beginning of either term after consultation with the instructor.

75. **Methods and Materials in the Study of English.** Throughout the year. Credit two hours a term. Open to graduates. Professor COOPER. M, 3-5, or other hours to be arranged. *Goldwin Smith* 236.

A study of treatises on the method of scholarship, and of the relations between English and similar disciplines; an introduction to the bibliography of English. Candidates must be prepared to read French and German.

76. **Chaucer Seminary.** Throughout the year. For graduates only. Professor COOPER. Wednesday, 7.30 p. m. *English Seminary Room.*

A survey of books and topics that are essential to the study of Chaucer and his age; systematic reading of his works; a detailed examination of significant problems.

80. **Wordsworth and his Contemporaries.** Open to seniors and graduates. Assistant Professor BROUGHTON. F, 3-5. *Goldwin Smith* 162.

A detailed study of the works of Wordsworth and their influence on contemporary English thought and literature.

81. **The Tudor-Stuart Drama.** For graduates only. Professor ADAMS. Hours to be arranged.

A detailed study of some one dramatist, or the investigation of some question relating to the period.

82. **Pastoral Poetry.** For graduates only. Assistant Professor BROUGHTON. Hours to be arranged.

Studies in the criticism and bibliography of the subject, Elizabethan pastorals and foreign influences on the pastoral.

83. **Early Middle English.** For graduates only. Assistant Professor MONROE. Hours to be arranged.

Textual and historical study of Layamon's Brut, with special reference to its connection with the Arthurian legend.

84. **Problems and Methods in Elizabethan Research.** For graduates only. Professor ADAMS. Hours to be arranged.

A critical examination of the best recent Elizabethan scholarship, and of the more important periodicals and books of reference used in research. Each student will be assigned some problem for investigation.

86. **Nineteenth Century Fiction.** For graduates only. Throughout the year. Professor NORTHUP. Th, 4-6. Room to be announced.

A seminary course; studies in the development of the novel from Scott to Meredith.

88. **American Literature.** For graduates only. Professor PRESCOTT. Hours to be arranged.

The literary relations of England and America. Provincial and national traits in American literature.

89. **The Drama.** For graduates only. Throughout the year. Professor SAMPSON. Hours to be arranged.

A study of the technique of several of the chief Elizabethan and modern dramatists.

90. **Poetry.** For graduates only. Throughout the year. Professor SAMPSON. T, 4.

A study of the structure of lyric poetry.

91. **The Sonnets of Shakespeare.** For graduates only. Throughout the year. Professor ADAMS. Th, 3-5. Room to be announced.

ENTOMOLOGY, LIMNOLOGY, AND NATURE STUDY

The work of this department is continued during the summer. For the third summer term of twelve weeks, see the Announcement of the College of Agriculture.

INTRODUCTORY ENTOMOLOGY

2. **The Ecology of Insects.** Third term. Credit three hours. One lecture and two practical exercises. Lecture, Th, 8. *Roberts Hall* 392. Practical exercises, one Th, 2-4.30, and one by appointment. Assistant Professor CLAASSEN and Mr. SIBLEY. Laboratory fee, \$2.50.

A general course in the study of the lives of insects in relation to their environment. Practical studies will be made of the activities of insects and of the role that they play in different natural associations. Observations will be made on the relations between their structures and instincts and the situations in which they live, and on many of the ways in which they find a living and establish homes. Laboratory fee, \$2.50.

3. **General Entomology.** First term. Credit three hours. Prerequisite, Biology 1 or Zoology 1. First term, lectures, W F, 9. *Roberts Hall* 392. Professor HERRICK. Practical exercises, Th or F, 2-4.30, or S, 8-10.30. *Roberts Hall* 392. Professor HERRICK, Mr. HAYES, and Miss GRISWOLD.

This course embraces lectures on the characteristics of orders, suborders, and the more important families, and on the habits of representative species. The practical exercises include a study of the structure of insects and practice in their classification. The lectures only (2 hours) are taken by those who have had courses 4 and 5. Laboratory fee, \$2.50.

4. **Elementary Morphology of Insects.** Either term. Credit three hours. By appointment. *Roberts* 391. Professor JOHANNSEN, Mr. SMIT, and Mr.—— (See note under course 5.)

5. **Elementary Systematic Entomology.** Either term. Credit two hours. By appointment. Prerequisite course 4. *Roberts* 391. Professor BRADLEY, Mr. SMIT, and ——.

Courses 4 and 5 are introductory laboratory courses dealing with the structure and classification of insects, required of all students who plan to take advanced work in entomology. The work is individual, and both courses may be taken in one term. Laboratory fee, \$2.

6. **Elementary Insect Taxonomy.** First and second terms. Credit three hours each term. Prerequisite course 5. M W F, 2-5. *Roberts Hall* 301. Professors BRADLEY, NEEDHAM, HERRICK, JOHANNSEN, Assistant Professors CLAASSEN and Doctor FORBES.

A survey of the more important species of insects commonly met with, and the characters by which they may be recognized.

SYSTEMATIC ENTOMOLOGY

10. **Entomotaxy.** Summer term. Credit two hours. Laboratory and field work. M W, 2-5. *Roberts Hall* 301. Professor BRADLEY.

Methods of collecting insects and preserving them for study and the cabinet, together with other matters of technique. Practice in the identification of the insects of the local fauna. Two all-day field trips will be required. Laboratory fee, \$3.

11. **Advanced Systematic Entomology.** First term. Credit three or more hours. Prerequisite course 5. Three laboratory periods of three hours each, by appointment. *Roberts Hall* 301. Professor BRADLEY.

A training course in the identification and interpretation of obscure characteristics of insects. One hundred and thirty-five or more hours a term in the laboratory must be accomplished by students registered for this course. Laboratory fee, \$6.

14. **Entomological Literature and its Technics.** First term. Credit three hours. Prerequisite course 3 or 5, or Zoology 5. Lectures and recitations. M W F, 11. *Roberts Hall* 392. Professor BRADLEY.

A study of general entomological literature. Practice in the use of generic and specific indices and of bibliographies, and in the preparation of the latter; methods of preparing technical papers for publication. The rules of nomenclature, including the formation of scientific names.

This course is technical and intended to aid students, who desire to specialize in entomology or systematic zoology, in their contact with literature.

INSECT MORPHOLOGY

20. **Morphology and Development of Insects.** Throughout the year. Credit two hours a term. Prerequisite courses 4, and 3 or 5. Lectures, assigned reading, and reports. Professor JOHANNSEN. T Th, 10. *Roberts* 392.

21. **Histology of Insects.** Must be preceded or accompanied by Course 20. Professor JOHANNSEN. *Roberts Hall* 392. First term: Technique in histological methods as applied to insects. Laboratory W, p. m., and two periods by appointment. Credit three hours. Laboratory fee, \$4.50.

Second term: Comparative study of insect histology from prepared slides. Laboratory W, p. m., and one period by appointment. Credit two hours. Laboratory fee, \$1.50.

22. **The Nervous System and Sense Organs of Insects.** Credit three hours. Prerequisite courses 3, 4, and 5. One lecture and two laboratory periods. Hours to be arranged. *Roberts Hall* 392. Acting Professor HILTON.

27. **German Entomological Reading.** First term. Without credit. M W, 11. Open to advanced students in Entomology who have an elementary knowledge of German. *Roberts Hall* 392. Professor JOHANNSEN.

28. **French Entomological Reading.** Second term. Without credit. M W, 11. Open to advanced students in Entomology who have an elementary knowledge of French. *Roberts Hall* 392. Professor JOHANNSEN.

PARASITOLOGY AND MEDICAL ENTOMOLOGY

30. **Parasites and Parasitism.** Second term. Credit two hours. Must be preceded or accompanied by Zoology 1. Lectures, M, 9. Practical exercises, M, 2-4:30. *Roberts Hall* 392. Assistant Professor MATHESON and Mr. L. S. WEST.

A consideration of the origin and biological significance of parasitism, and of the structure, life history, and economic relations of representative parasites. Laboratory fee, \$2.

31. **The Relations of Insects to Disease.** Second term. Credit two hours. Prerequisite course 3. Lecture W, 10. *Roberts* 392. Practical exercise, W, 2-4:30. Assistant Professor MATHESON and Mr. L. S. WEST.

Causation and transmission of disease by insects and other arthropods. Laboratory fee, \$2.

LIMNOLOGY

50. **General Limnology.** Second term. Credit three hours. Open only to students who have taken or are taking Biology 1. Acting Professor HILTON, Assistant Professor CLAASSEN, and Mr. SIBLEY. Lectures, Th, 8. *Roberts* 392. Laboratory, Th, 2-4:30, and one period by appointment. *Roberts* 492. Laboratory fee, \$2.50.

An introduction to the study of the life of inland waters. Aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations. Laboratory fee, \$2.50.

RESEARCH

100. **Research.** Throughout the year. Credit three or more hours a term. Prerequisite, permission to register from the professor under whom the work is to be taken. *Roberts Hall*. Professors NEEDHAM, HILTON, HERRICK, CROSBY, JOHANNSEN, BRADLEY, and EMBODY, and Assistant Professors MATHESON, ALLEN, and CLAASSEN.

Seminary. Throughout the year. M, 4:30-5:30. *Roberts* 392.

The work of an entomological seminary is conducted by the *Jugatae*, an entomological club which meets for the discussion of the results of investigations by members.

NOTE. The course in the *Natural History of the Farm* formerly offered in this department by Professor Needham has been transferred to the Department of Rural Education (See *Announcement of the New York State College of Agriculture, Rural Education Course 60, Field Natural History.*)

GEOLOGY

GENERAL GEOLOGY

*1. **Elementary Geology.** Repeated in second term. Credit three hours. Professor RIES, and Messrs. BELL, BOWEN and STUCKEY, and Miss ST. JOHN. Lectures, first term, T Th, 11, *Sibley Dome*; second term, T Th, 9, *Sibley Dome*. Laboratory period, M T W Th F afternoon or S morning. Students must register

*May not be counted for upperclass group.

for laboratory assignments at *Elementary Geology Laboratory, McGraw Hall*, before the beginning of the course.

Planned to give beginners the fundamental principles of this branch of science. Those desiring additional work in geology are advised especially to take one or more of the following courses: 1a, 2, 11, 21, 32.

1a. **Dynamic and Structural Geology.** Second term. Credit three hours. Prerequisite course 1 or its equivalent. Prof. RIES and Mr. —. T Th, 11. *McGraw Laboratory*, Wed. afternoon.

This course comprises study of certain dynamic and structural phenomena and of the main facts underlying some of the greater problems of geology.

PHYSICAL GEOGRAPHY

*2. **Elementary Physical Geography.** Throughout the year. Credit three hours a term. Professor VON ENGELN and Mr. ———. Lectures, M W, 9. *McGraw, Geological Lecture Room*. Laboratory, W or Th, 2-4.30. Students must register for laboratory assignments at the Physical Geography Laboratory before the beginning of the course.

High school courses are not the equivalent of this course and will not be so considered as a prerequisite for advanced courses. All students are required to go on one all-day excursion to Enfield Gorge and Falls and Connecticut Hill.

3. **Geography of North America.** First term. Credit four hours. Registration only by permission of instructor. Limited to 15 students who have made good records in course 2. Reading, map work, and reports included. Professor VON ENGELN. Lectures, T Th, 10. Recitations, T Th, 11. *McGraw, Geological Lecture Room*.

A course describing the physiographic features of North America with discussion of their influence upon the settlement and development of the various sections. Illustrated lectures.

[4. **Geography of Europe.** First term. Credit four hours. Professor VON ENGELN.] Not given in 1922-23.

5. **Glaciers and Glaciation.** Second term. Credit three hours. Prerequisite course 2 or, with permission, course 1. Professor VON ENGELN. Lectures, M W, 11. *McGraw*. Laboratory, T, 2-4.30. *McGraw*.

A study of living glaciers and the phenomena of the glacial period. Field excursions during the laboratory period in the spring; longer excursions on Saturday. Mapping and interpretation of glacial deposits.

6. **Commercial Geography.** Second term. Credit two hours. Prerequisite course 2. Professor VON ENGELN. Lecture, T, 10. Recitation, Th, 10. Report period, F, 10-12. *McGraw, Geological Lecture Room*. Lectures, reading, and term report.

A consideration of the geographic factors affecting production and distribution of commodities, with special reference to the rational development of natural resources, particularly of North America. Discussion of routes of commerce, localization of industry, modern city sites, utilization of tropical lands, etc.

*May not be counted for upperclass group.

8. Advanced Physiography, Experimental and Research Work. Throughout the year. Credit, variable. Registration only by permission. Professor VON ENGELN. Hours to be arranged. *McGraw*.

Original investigation is undertaken by each student. Reading, conferences, excursions, and presentation of reports of progress to correlate with work. In general, graduate students registering for a minor in physical geography will be expected to take up some problem in this course.

9. Seminary. Second term. Credit two hours. For upperclassmen and graduate students with requisite preparation. Registration only by permission. Professor VON ENGELN. M, 3.30. *McGraw, Physical Geography Laboratory*.

Preparation and reading of reports upon special topics. Abstracts and discussions of current physiographic literature.

Meteorology and Climatology. (See *Announcement of the College of Agriculture*.)

MINERALOGY AND PETROGRAPHY

***11. Elementary Mineralogy.** Repeated in second term. Credit three hours; if taken after course 12, credit two hours. Prerequisite, Chemistry 101. Professor GILL and Messrs. VIEWEG and MARTENS. Lectures, M W, 8. *McGraw, Geological Lecture Room*. Laboratory sections to be arranged.

For beginners who desire a general knowledge of the commonest minerals and their uses, the properties by which they are recognized, and their significance as constituents of the earth's crust, or as sources of useful substances.

12. Crystallography. First term. Credit three hours; if taken after course 11, credit two hours. Prerequisite, Chemistry 205 or 210, and Physics 1. Professor GILL and Mr. VIEWEG. Lectures, T, Th, 8. *McGraw Geological Lecture Room*. Laboratory hours to be arranged.

13. Mineralogy. Second term. Credit three hours; if taken after course 11, credit two hours. Prerequisite course 12. Professor GILL. Lectures, T, Th, 8. *McGraw, Geological Lecture Room*. Laboratory hours to be arranged.

For students wishing to become acquainted with the commoner minerals and with the scientific and practical problems which they present.

14. Blowpipe Determination of Minerals. First term. Credit one hour. Prerequisite course 11 or 13 and Chemistry 205 or 210. Professor GILL. One laboratory period Saturday morning, *McGraw, Mineralogical Laboratory*.

15. General Lithology. Second term. Credit one hour. Prerequisite courses 1 and 11. Professor GILL. Lectures, recitations, and laboratory practice, S, 8-10. *McGraw, Mineralogical Laboratory*.

An elementary course designed to teach recognition of the various kinds of rocks, their mineral composition, mode of origin, etc.

16. Crystal Measurement and Drawing. Second term. Credit two hours. Prerequisite course 12. Professor GILL. Hours to be arranged. *McGraw, Mineralogical Laboratory*. Laboratory, measurement of crystals, with computation and drawing. Course 16 should be taken after Course 12 by students who intend to continue in course 17 or in course 20.

*May not be counted for upperclass group.

17. **Optical Determination of Minerals.** First term. Credit three hours. Prerequisite course 13. Professor GILL. M W, and laboratory to be arranged. *McGraw, Mineralogical Laboratory.*

18. **Petrography.** Second term. Credit three hours. Prerequisite course 17. Professor GILL. M W, and laboratory to be arranged. *McGraw, Mineralogical Laboratory.*

19. **Seminary in Mineralogy and Crystallography.** Throughout the year. Credit one hour a term. Prerequisite courses 12, 13, 17. Professor GILL. Hour to be arranged. *McGraw.*

20. **Advanced or Special Work in Mineralogy and Petrography.** Throughout the year. Prerequisite courses dependent on nature of work. Professor GILL. Hours to be arranged. *McGraw.* Adapted to the needs of the individual student.

PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

*21. **Historic Geology.** Second term. Credit three hours. Prerequisite course 1 or its equivalent; a course in invertebrate zoology is also desirable. Professor HARRIS. Lectures, T Th, 10. *McGraw* 28. Laboratory hours to be arranged.

An elementary review of the geologic history of the earth and its inhabitants with special emphasis on the American continent; the second half of the ordinary course in Elementary Geology. Field excursions take the place of laboratory work when weather permits.

22. **General Stratigraphic Geology.** Throughout the year. Credit three hours a term. Prerequisite, courses 1 and 21. Professor HARRIS. Three periods a week, M W F, 10, for lectures; laboratory or field work, hours to be arranged. *McGraw* 28.

First term: Paleozoic of the world; second term: Mesozoic and Cenozoic of the world.

23. **Geological Surveying.** First term. Credit two hours. Prerequisite courses 1 and 21 or equivalents, and spherical trigonometry. Professor HARRIS. Hours to be arranged. *McGraw* 28.

24. **Invertebrate Paleontology.** Credit two hours each term. Prerequisite, a three-hour course in biology. Professor HARRIS. M W, 9 (or other hours if more convenient). *McGraw* 28.

25. **Special Geologic Problems and Research.** Prerequisites will depend largely on the nature of the problems attacked. Outside of the consideration of a few local Paleozoic questions the energy of this branch of the department will be largely concentrated for the next three years on systematic conchology with greatest emphasis on American Tertiary Gastropoda and Pelecypoda. Professor HARRIS. *McGraw* 28.

ECONOMIC GEOLOGY

30. **Petroleum Geology.** Credit three hours. Prerequisite, Geology 1. T Th, 11. Laboratory, W, 2. *McGraw.* A course on the geology, distribution, and methods of obtaining petroleum.

*May not be counted for upperclass group.

***31. Engineering Geology.** Repeated in second term. Credit three hours. Professor RIES and Mr. DOANE. Lectures, M W, 11. Two laboratory periods, M and W or T and F. *McGraw*.

Discussion of the practical application of geologic principles to engineering work and the occurrence of such economic materials as are of importance to engineering students.

Required of Civil Engineering students. Open to Arts students by special permission.

32. General Economic Geology. Throughout the year. Credit three hours a term. First term, prerequisite course I or equivalent; second term, prerequisite courses I and II, or their equivalent. Professor RIES. Lectures, M W, 10; laboratory, Th, 2. *McGraw*.

The origin, nature, distribution, and uses of the non-metallic and metallic products of the earth's crust. First term, the non-metallics, including coal, oil, gas, clays, salt, fertilizers, etc.; second term, the metallic products, including the ores of iron, copper, lead, zinc, gold, silver, etc.

35. Clay Investigation. Prerequisite courses Geology I or 31 and Chemistry 101 or its equivalent. Can be taken either one or two terms. Professor RIES. Hours to be arranged. *McGraw*. Lectures and laboratory work. Credit variable.

36. Advanced or Special Work in Economic Geology. Throughout the year. Prerequisite courses dependent on the nature of the work. Professor RIES. Hours to be arranged. Credit three hours a term. *McGraw*.

37. Seminary in Economic Geology. Throughout the year. Credit two hours a term. Prerequisite courses I, II or 13 and 32. Professor RIES. Hours to be arranged. *McGraw*.

GERMAN

***I. Course for Beginners: Oral Training, Grammar, Composition, Translation.** Repeated in second term. Credit six hours.

First term:

Sec. 1, daily, 8. *Goldwin Smith* 183. Mr. BISSELL.

Sec. 2, daily, 10. *Goldwin Smith* 183. Professor POPE.

Second term:

Sec. 1, daily, 8. *Goldwin Smith* 183. Mr. BISSELL.

Sec. 2, daily, 9. *Goldwin Smith* 183. Assistant Professor ANDREWS.

This course is equivalent to first year and second year German of the entrance requirements (credit two units). It may be elected for three hours' credit by students who have entrance credit for only one unit of German (first year German).

***1a. Course for Beginners: Oral Training, Grammar, Composition, Translation.** Throughout the year. Credit three hours a term.

Sec. 1, M W F, 11. *Goldwin Smith* 177. Professor BOESCHE.

Sec. 2, M W F, 12. *Goldwin Smith* 190. Assistant Professor ANDREWS.

This course is equivalent to first year and second year German of the entrance requirements (credit two units). It may be elected in the second term by students who have had first year German (one unit).

*May not be counted for upperclass group.

***3. Oral Training, Grammar, Composition, Translation.** Repeated in second term. Credit five hours. Prerequisite course 1 or entrance credit for two units of German (first year German and second year German).

First term:

Sec. 1, M T W Th F, 9. *Goldwin Smith* 183. Assistant Professor ANDREWS.

Sec. 2, M T W Th F, 10. *Goldwin Smith* 190. Professor FAUST.

Second term:

Sec. 1, M T W Th F, 10. *Goldwin Smith* 183. Professor FAUST.

Sec. 2, M T W Th F, 2. *Goldwin Smith* 190. Assistant Professor ANDREWS.

This course is equivalent to third year German of the entrance requirements.

***3a. Oral Training, Grammar, Composition, Translation.** Throughout the year. Credit three hours a term. Mr. BISSELL. T Th S, 12. *Goldwin Smith* 183.

This course is equivalent to third year German of the entrance requirements.

***4. Elementary German Composition and Conversation.** Throughout the year. Credit three hours a term. Open to those who are taking or have taken course 3.

Sec. 1, M W F, 11. *Goldwin Smith* 183. Mr. BISSELL.

Sec. 2, M W F, 2. *Goldwin Smith* 183. Professor POPE.

Exercises conducted in German. It is advisable to combine course 4 with course 3 or 5.

***5. Intermediate German Course.** Throughout the year. Credit three hours a term. Prerequisite course 3, or its equivalent.

Sec. 1, T Th S, 10. *Goldwin Smith* 177. Mr. BISSELL.

Sec. 2, M W F, 11. *Goldwin Smith* 190. First term, Professor FAUST; second term, Professor POPE.

German grammar treated topically; translation and oral exercises in German on the text; reading from modern German prose. Course 4 may be combined with course 5.

***8. Scientific German.** Second term. Credit three hours. Prerequisite courses 1-3 or three years of German in High School. M W F, 10. *Goldwin Smith* 177. Assistant Professor ANDREWS.

9. Nineteenth Century Drama. Kleist, Grillparzer, Hebbel, Hauptmann. Throughout the year. Credit three hours a term. Prerequisite courses 1-5, or the equivalent. Professor POPE. T Th S, 11. *Goldwin Smith* 190.

10. Advanced German Composition and Conversation. Throughout the year. Credit three hours a term. Prerequisite courses 1-5 or the equivalent. Professor BOESCHE. M W F, 10. First term. *Goldwin Smith* 177. Second term. *Goldwin Smith* 190.

Exercises conducted in German. Theme-writing. This course is essential for the pursuit of advanced work in the department, and must be completed by students who desire to be recommended as teachers of German.

[11. Lessing's Life and Works. First term. Credit three hours. Prerequisite courses 1-5.] Not given in 1922-23.

12a. Schiller's Dramas. First term. Prerequisite courses 1-5, or the equivalent. Assistant Professor ANDREWS. M W F, 2. *Goldwin Smith* 177.

*May not be counted for upperclass group.

12b. **Schiller's Lyrics and Prose.** Second term. Prerequisite courses 1-5 or the equivalent. Professor BOESCHE. T Th S, 10. *Goldwin Smith* 190.

13. **Goethe's Life and Works.** First term. Credit three hours. Primarily for juniors and seniors. Prerequisite courses 1-5 or the equivalent. Professor BOESCHE. T Th S, 9. *Goldwin Smith* 190.

14. **Goethe's Faust**, part I and selected portions of part II. Second term. Credit three hours. Primarily for juniors and seniors. Prerequisite courses 1-5 or the equivalent. Professor FAUST. T Th S, 9. *Goldwin Smith* 190.

15. **History of German Literature.** Throughout the year. Credit three hours a term. Prerequisite courses 1-5 or the equivalent. Professor FAUST. M W F, 9. *Goldwin Smith* 190.

An outline lecture course beginning in the first term, with the Old High German period and extending to the middle of the eighteenth century; in the second term beginning with Lessing and extending to the present time. Lectures, recitations, and collateral reading.

[16. **Contemporary German Literature.** Throughout the year. Credit three hours a term. Prerequisite courses 1-5 or the equivalent. Professor FAUST.] Not given in 1922-23.

37. **Middle High German.** Throughout the year. Credit three hours a term. Prerequisite courses 1-5, 10, and at least six hours of advanced work in German literature. First term, Assistant Professor ANDREWS. T Th S, 11, *Goldwin Smith* 177. Second term, Professor POPE. Hours to be arranged. *Goldwin Smith* 182.

39. **Teachers' Course in German Composition.** Throughout the year. Credit two hours a term. Admission by permission only. Professor BOESCHE. T Th, 12. *Goldwin Smith* 177.

40. **Teachers' Course in Methods.** Second term. Credit two hours. Prerequisite courses 1-5, 10, and twelve hours of advanced work in German literature or philology. Professor FAUST. T, 2-4. *Goldwin Smith* 181.

42. **Gothic.** First term. Credit three hours. Professor BOESCHE. M W F, 8. *Goldwin Smith* 177. Primarily for graduates.

[43. **Old High German.** First term. Credit three hours. Prerequisite course 37. Professor BOESCHE. Primarily for graduates.] Not given in 1922-23.

[48. **Principles of Germanic Philology.** Second term. Credit two hours. Prerequisite course 42. Assistant Professor ANDREWS]. Not given in 1922-23.

49. **Seminary in German Literature.** First term. Credit two hours. Professor FAUST. Th, 2-4. *Goldwin Smith* 181. For graduates only.

[50. **Seminary in German Literature.** Second term. Credit two hours. Professor POPE. Primarily for graduates.] Not given in 1922-23.

52. **Seminary in German Philology.** Topics in German syntax. Second term. Credit two hours. Professor BOESCHE. W, 2-4. *Goldwin Smith* 188. Primarily for graduates.

GOVERNMENT AND PUBLIC LAW

*1. **Political Institutions.** First term. Credit three hours. Assistant Professor SABY. Lectures, M W, 10. *Goldwin Smith B.* Quiz hours to be arranged.

*May not be counted for upperclass group.

An introduction to the study of politics, with special reference to American government. Lectures, readings, reports, quizzes. Students desiring to specialize in politics should take this course in their sophomore year.

***2. Comparative Politics.** Second term. Credit three hours. Lectures, M W, 10. *Goldwin Smith B.* Quiz hours to be arranged. Assistant Professor SABY.

A study of the political institutions of the leading European countries with special reference to constitutionalism and the representative system, imperialism and nationalism, and the changes wrought by the Great War. Lectures, readings, reports, quizzes.

3. Municipal Administration. First term. Credit three hours. Open to upperclassmen. Assistant Professor SABY. T Th S, 9. *Goldwin Smith 236.*

A study of the development of municipal government, special attention being paid to American conditions.

Lectures, readings, and reports. Each student will be required to make a careful detailed study of some city.

4. Municipal Problems. Second term. Credit three hours. Open to upperclassmen. Assistant Professor SABY. T Th S, 9. *Goldwin Smith 236.*

A study of special problems in municipal functions: city planning, the street railway, water and gas supply, health, police, charity and correction, education, recreation, etc. Lectures, readings, and reports. Each student will be required to make a special study of some problem.

[5. State Administration. Second term. Credit three hours. Prerequisite course 1.] Not given in 1922-23.

[6. The American Party System. First term. Credit two hours. Prerequisite course 1.] Not given in 1922-23.

[7. Constitutional Government. Second term. Credit three hours. Prerequisite course 1. Lectures, textbooks, and reports.] Not given in 1922-23.

8. History of Political Thought. First term. Credit three hours. Assistant Professor SABY. M W F, 9. *Goldwin Smith 236.* For advanced students in Political Science.

A study of the development of political thought from the Greeks to modern times in its relation to the history and development of political institutions. Lectures, textbook, and assigned readings.

9. Modern Political Thought. Second term. Credit three hours. Assistant Professor SABY. M W F, 9. *Goldwin Smith 236.* For advanced students in Political Science.

A general survey of the more important modern political movements. Ideas and ideals underlying the present political unrest. The various political ideas that have at different times striven for supremacy in American political life. Lectures, textbook, and assigned reading.

[10. The Nature of the State. Second term. Credit two hours. Assistant Professor SABY. For advanced students in Political Science.] Not given in 1922-23.

[11. International Law and Diplomacy. First term. Credit three hours. Lectures, textbook, and reports. Open to upperclassmen in Arts and Sciences,

*May not be counted for upperclass group.

to students in Law, and to approved upperclassmen in other colleges.] Not given in 1922-23.

[*22. **Government Control of Industry.** Second term. Credit three hours. Lectures, reports, quizzes. Open to upperclassmen in all colleges except Law.] Not given in 1922-23.

[31. **Research in Politics.** Throughout the year. Credit one to three hours a term. Hours to be arranged.] Not given in 1922-23.

32. **Seminary in Political Science.** Throughout the year. Credit two hours a term. W, 2:30. Assistant Professor SABY. *Political Science Seminary.*

An advanced course for the study of some special topic to be announced. Open to especially qualified students by permission of the professor in charge.

GREEK

*1. **Elementary Greek.** Throughout the year. Credit six hours a term. This course however is continuous throughout the year, and no credit will be allowed for the first term alone. Mr. HOLTZCLAW. Daily, 8. *Goldwin Smith* 134.

The essentials of the grammar; simpler exercises in composition; selections from Xenophon's *Anabasis*, books I-VII; selections from the New Testament in Greek.

Designed for students who wish to acquire, by extraordinary effort in one year, the ability to read Attic prose.

2. **Plato, Selections; Homer's Odyssey.** Greek Composition. Throughout the year. Credit three hours a term. Mr. HOLTZCLAW. T Th S, 10. *Goldwin Smith* 236.

A continuation of the work begun in course 1, which, or at least two years of high school Greek, is prerequisite.

3. **Euripides, Sophocles.** Reading of the *Alcestis* and *Oedipus the King*, with an introduction to the Greek drama. First term. Credit three hours. Professor JONES. M W F, 10. *Goldwin Smith* 236.

4. **Greek Composition.** Throughout the year. Credit one hour a term. Prerequisite course 2 or the equivalent. Mr. HOLTZCLAW. Hour to be arranged. *Goldwin Smith* 236.

5. **New Testament Greek.** Throughout the year. Credit two hours a term. Dr. WHITE. W F, 8. *Barnes Hall Library.*

First term, Gospel according to St. Luke. Introduction to the grammar and vocabulary of Biblical Greek; second term, Acts of the Apostles. Prerequisite course 1 or its equivalent.

6. **Herodotus.** Selections chosen to include the account of the conflicts between East and West. First term. Credit three hours. Professor JONES. Hours to be arranged. *Goldwin Smith* 236.

[*7. **Myths of the Epic Cycle.** Second term. Credit two hours. Professor JONES. Open only (1) to upperclassmen who have studied, or are studying, Freshman Latin or Greek and (2) to graduate students.] Not given in 1922-23.

*May not be counted for upperclass group.

9. **Dramatic Poetry.** Selected plays of Aeschylus and Sophocles, beginning with the Prometheus Bound. Second term. Credit three hours. Professor JONES. M W F, 10. *Goldwin Smith* 236.

10. **Lyric Poetry.** Second term. Credit three hours. Professor JONES. Hours to be arranged. *Goldwin Smith* 236.

Selections from Hiller-Crusius' Anthologia Lyrica to illustrate the various types of personal poetry.

[11. **Lucian and Aristophanes.** Throughout the year. Credit three hours a term. Professor JONES.] Not given in 1922-23.

12. **The Republic of Plato.** Throughout the year. Credit three hours a term. Professor HAMMOND. Reading of the Greek Text. Intended for students of Greek literature and of Greek philosophy. Hours to be arranged.

14. **Demosthenes, On the Crown.** Second term. Credit three hours. Professor JONES. Hours to be arranged. *Goldwin Smith* 125.

[15. **Thucydides.** First term. Credit three hours. Professor JONES.] Not given in 1922-23.

18. **Homer's Iliad (or Odyssey);** entire work to be read. Throughout the year. Credit three hours a term. Mr. HOLTZCLAW. Hours to be arranged. Open to graduates, and, by special permission, to undergraduates.

19. **Pindar.** First term. Credit three hours. Professor JONES. Hours to be arranged. *Goldwin Smith* 125.

20. **Greek Seminary.** Throughout the year. Credit three hours a term. Professor JONES. W, 2, and one other hour to be arranged. *Library, Greek and Latin Seminary Room.*

Homer, Oratory, or Geography. For graduates, and, by special permission, qualified seniors.

GREEK ART AND ANTIQUITIES

Courses 1, 3, 4a, and 4b in this department do not require any knowledge of Greek or of Latin. Courses 5, 6, and 7 presuppose facility in reading Greek. Course 7 is primarily for those expecting to study in Athens.

A. **Greek Art.** November to March inclusive. Professor ANDREWS. Th, 4. *Goldwin Smith Museum of Casts.*

An introductory course of popular illustrated lectures on Greek sculpture, Greek antiquities, and Greek topography. Planned and timed especially to meet the needs of students in the technical and professional colleges, but open to all students and to the public. No university credit.

1. **History of Greek Sculpture.** Repeated in second term. Credit three hours. Professor ANDREWS. First term, M W F, 9; second term, M W F, 11. *Goldwin Smith Museum of Casts.*

Lectures in the Museum of Casts. Intended to be supplemented by course 3, but may be taken separately.

3. **Greek Antiquities.** Repeated in second term. Credit three hours. Professor ANDREWS. First term, M W F, 11; second term, M W F, 9. *Goldwin Smith Museum of Casts.*

Lectures on pre-Greek art and civilization and on Greek terra cottas, bronzes, gems, and coins. Illustrated by the material in the Museum of Casts and by stereopticon views. Intended to be taken with course 1, but may be taken separately.

4a. **Greek Pottery.** First term. Credit two hours. Professor ANDREWS. T Th, 11. *Goldwin Smith Museum of Casts.*

Preferably to follow course 3.

4b. **Greek Architecture.** Second term. Credit two hours. Professor ANDREWS. T Th, 11. *Goldwin Smith Museum of Casts.*

Preferably to follow course 3.

5. **Pausanias.** Throughout the year. Credit two hours a term. Professor ANDREWS. Hours to be arranged after consultation. *Goldwin Smith 35.*

A reading course in the sources of knowledge of Greek topography with special reference to Athens, supplemented by illustrated lectures and by reading from Thucydides and Herodotus.

6. **Greek Epigraphy.** Credit two hours. Professor ANDREWS. Hours to be arranged after consultation. *Goldwin Smith 35.*

A study of Greek alphabets and inscriptions, chiefly from the large collection of squeezes owned by the department. For graduates and qualified undergraduates.

7. **Modern Greek.** Credit two hours. Professor ANDREWS. Hours to be arranged after consultation. *Goldwin Smith 35.*

The literary language and the colloquial idiom. Athenian newspapers and stories in the vernacular will be read.

HISTOLOGY AND EMBRYOLOGY

1. **The Tissues: Histology and Histogenesis.** First term. Credit four hours. No prerequisite, but previous work in biology (zoology and botany) or physiology is recommended. Mr. HUMPHREY and assistants. Lectures, M W, 11. *Stimson.* Laboratory. T Th, 2-4.30. *Stimson.*

For students of biology or those preparing for medicine. The cell and cellular origin of the body and the structure and development of its component tissues. Each student will prepare or receive a series of typical microscopic preparations.

2. **The Organs: Histology and Development.** Second term. Credit four hours. Prerequisite course 1 or the equivalent. Mr. HUMPHREY and assistants. A continuation of course 1. Courses 1 and 2 together give the fundamental facts of the microscopic structure and development of the body.

3. **Special Histology and Technique.** First term. Credit two hours. Prerequisite courses 1 and 2, or 1 and 4, or the equivalent. Mr. HUMPHREY. Two periods, M, p. m., W, p. m. *Stimson.*

In this course a more detailed knowledge of histology and greater facility in technique are gained by practical work in one or more of the fields of histology. Designed for those who desire a good working knowledge of histological methods for use in biology and in medicine and who have shown aptitude and ability.

4. **Embryology of Vertebrates.** Second term. Credit four hours. Prerequisite course 1 or the equivalent. Lectures or recitations, Professor KINGSBURY.

W, 8, F, 11. *Stimson Hall*. Laboratory, Mr. ADELMANN. W, p. m., F, p. m. *Stimson*.

For students of biology or zoology, or those preparing for medicine. Particular emphasis is placed on the embryology of the amphibian, chick, and pig, the course giving the basis for understanding the development of the human body.

7. Advanced Histology and Embryology. Throughout the year. Credit three or more hours a term. Prerequisite courses 1, 2, 3, or their equivalent. Laboratory work with conferences at hours to be arranged. Professor KINGSBURY and instructors.

Designed for those who are preparing theses or for those who wish to undertake special investigations in histology and embryology.

8. Seminary. Throughout the year. Credit one hour. Prerequisite course 1 and 2, or 4; may be taken with course 3 or 7. Hours to be arranged. *Stimson*.

For discussion of current literature and presentation of original work by members of the department staff and by those doing advanced work in the department.

HISTORY

***1. Ancient History.** Throughout the year. Credit six hours for the year; upperclassmen four hours only. Textbook, lectures, and collateral reading. Professor WESTERMANN. M W, 9, and an hour for quiz sections to be arranged. *Goldwin Smith A*.

First term. Political and cultural history of the Mediterranean world as affected by the ancient Greeks to 146 B. C.

Second term. The Mediterranean world under the leadership of the Roman republic and empire to the end of the fourth century.

7. Economic History of the Ancient World. First term. Credit two hours. Open only to upperclassmen and graduates. Prerequisite course 1, 31, or an equivalent. Professor WESTERMANN. T Th, 2. *Goldwin Smith 234*.

Expansion of trade throughout the Mediterranean world; agricultural and industrial development from the earliest period in Mediterranean history to 400 A.D.

8. Seminary in Ancient Land Tenure. Throughout the year. Credit two hours a term. Hours to be arranged. Professor WESTERMANN. *Library, Latin Seminary Room*. First meeting, Tuesday, Sept. 26, at 4 p. m. Open to graduates only.

10. The Roman Empire in the East. Second term. Credit two hours. Open only to upperclassmen and graduates. Prerequisite course 31, or an equivalent. Professor WESTERMANN. T Th, 2. *Goldwin Smith 234*.

The political and cultural history of the Byzantine Empire from the time of Diocletian to the capture of Constantinople by the Ottoman Turks.

11. The Middle Ages. First term. Credit three hours. Professor SMITH. M W F, 12. *Goldwin Smith 234*.

*May not be counted for upperclass group.

The history of Christendom from the eve of the Middle Ages to the dawn of the Renaissance (300-1300 A.D.), with special attention to the life of society and the progress of civilization. Lectures and examinations.

12. The Age of the Renaissance and Reformation. Second term. Credit three hours. Professor SMITH. M W F, 12. *Goldwin Smith* 234.

The political, social, and religious history of Christendom during this age of transition (1300-1600 A.D.), with especial attention to the beginnings of modern life and thought. Lectures and examinations.

14. The Intellectual History of Modern Times. Throughout the year. Credit three hours. Professor SMITH. T Th S, 11. *Goldwin Smith*. 234.

While this course is primarily a history of science from the time of Copernicus (1543) to the present, account will be taken of the progress of ideas, among the educated classes of Western Europe and of America, as reflected in literature, in philosophy, in religion, and in art. Open to juniors, seniors, and graduates. Lectures and examinations for the undergraduates; the graduates may combine the lectures with advanced work in History 15, or take either course alone.

15. Science and Learning in the Period of the Renaissance. Throughout the year. Credit one hour. Professor SMITH. *Library, European History Seminary Room*. M, 4.

Advanced seminary in sight reading of some important works relating to science and scholarship written from the twelfth century to the seventeenth. Reading knowledge of Latin required. Open to graduates, who may combine it with History 14, or take it separately. First meeting, October 2.

22. History of Modern Europe. Throughout the year. Credit three hours a term. Professor BECKER. M W F, 3. *Goldwin Smith* 242.

A survey of European history from the beginning of the seventeenth century to the present. Political, economic, and intellectual movements will be emphasized in proportion to their international or European character and importance.

23. The French Revolution. First term. Credit two hours. Professor BECKER. T Th, 3. *Goldwin Smith* 242.

A study of the revolution from 1789 to 1795, with a preliminary survey of conditions in France before 1789. An elementary knowledge of modern European history is assumed, and a reading knowledge of French will be found of great advantage. The work of the course will consist of informal lectures, discussions, and the preparation of a paper by each student.

24. The Napoleonic Era. Second term. Credit two hours. Professor BECKER. T Th, 3. *Goldwin Smith* 242.

A study of the organization of France under Napoleon, the establishment of the Napoleonic empire, the restoration of Europe in 1814-15, and the attempt to establish a European Federation or Concert of the Powers from 1815 to 1825. An elementary knowledge of modern history is assumed, and a reading knowledge of French will be found of great advantage. The work of the course will consist of informal lectures, discussions, and the preparation of a paper by each student.

28. Seminary in Modern European History. Throughout the year. Credit two hours a term. Professor BECKER. *Library, European History Seminary Room*. Hour to be arranged.

An opportunity for advanced students to undertake special investigation from the sources in some subject connected with the French Revolution or the intellectual history of the eighteenth century. Open to graduates and to properly qualified seniors.

*31. **English History.** Throughout the year. Credit six hours for the year; upperclassmen four hours only. No credit for first term alone. First term, 1066-1689; second term, 1689-1922. An outline of political, social, and constitutional history. Textbooks, lectures, and assigned readings. Acting Assistant Professor ANDREWS. T Th, 10, and a third hour for recitation. *Goldwin Smith A.*

33. **English History, 1763-1858.** First term. Credit three hours. Prerequisite courses 1 and 2, or 31 and 32, or an equivalent satisfactory to the instructor. Acting Assistant Professor ANDREWS. M W F, 10. *Goldwin Smith 242.*

Emphasis will be laid upon cabinet and party development, colonial policy, upon the Industrial Revolution and the social and parliamentary reform following 1815. Lectures, assigned readings, and reports.

34. **English History, 1858-1921.** Second term. Credit three hours. Prerequisite courses 31 and 32 or an equivalent satisfactory to the instructor. Acting Assistant Professor ANDREWS. M W F, 10. *Goldwin Smith 242.*

Political, social, and diplomatic history. A recitation course with assigned reading and reports.

[40. **Anglo-German Relations, 1900-1914.** First term. Credit two hours. Professor NOTESTEIN. A research course open only to selected seniors and graduate students.] Not given in 1922-23.

[41. **Selected Topics in English History, 1640-1660.** Second term. Credit two hours. Professor NOTESTEIN. A research course open only to graduate students.] Not given in 1922-23.

51. **Colonial Constitutional History of the United States, 1600-1783.** First term. Credit three hours. Prerequisite courses 52 and 53. Professor HULL. M W F, 11. *Goldwin Smith 234.*

*52. **American History, 1783-1850.** First term. Credit three hours; upperclassmen two hours only. Professor BRETZ. M W F, 9. *Goldwin Smith C.*

Problems following the Revolution; formation of the new national government; European complications; second war with Great Britain; domestic problems; rise of sectional parties. Textbooks, lectures, and readings. Primarily for sophomores.

*53. **American History, 1850-1914.** Second term. Credit three hours; upperclassmen two hours only. Professor BRETZ. M W F, 9. *Goldwin Smith C.*

Secession and civil war, reconstruction, recent political and constitutional history. Textbooks, lectures and readings. Prerequisite course 52. Primarily for sophomores.

54. **Economic History of the Colonies, 1600 to 1815.** First term. Credit three hours. Professor HULL. M W F, 9. *Goldwin Smith 234.*

Colonization and settlement as business enterprises; the agricultural conquest of the coast; the competition between slave, indentured, and free labor; the

*May not be counted for upperclass group.

commerce of the Atlantic and its relation to the American Revolution and the European wars.

55. **Economic History of the United States since 1815.** Second term. Credit three hours. Prerequisite course 54. Professor HULL. M W F, 9. *Goldwin Smith* 234.

The introduction of manufactures; the westward movement; internal improvements; industrial differentiation of the sections; agriculture for export; the amalgamation of railways and the combination of industries.

56. **Constitutional History of the United States.** First term. Credit two hours. Professor BRETZ. T Th, 9. *Goldwin Smith* 234.

The course deals with the leading constitutional questions since the civil war. The constitutional aspects of current political questions are also studied. Prerequisite courses 52 and 53. Upperclassmen only.

58. **Foreign Relations of the United States, 1783-1914.** Second term. Credit three hours. Prerequisite courses 52 and 53. Professor HULL. M W F, 11. *Goldwin Smith* 234.

59. **American History, 1750-1848: The Settlement of the Middle West.** Second term. Credit two hours. Professor BRETZ. T Th, 9. *Goldwin Smith* 234. Prerequisite courses 52 and 53. Upperclassmen only.

60. **American History. Investigation of topics in a selected field.** Throughout the year. Credit two hours a term. Professor BRETZ. *Library, American History Room.* Monday, 2-4.

Primarily for upperclassmen who have special interest in history and who have had courses 52 and 53. Consult the instructor before registering. First meeting, Monday, September 25.

61. **Seminary.** Throughout the year. Credit two hours a term. Professor HULL. *Library, American History Room.* Thursdays, 2-4.

For graduates and open to qualified seniors by permission. First meeting, Thursday, September 28.

[76. **The Teaching of History.** Course for teachers. Second term. Credit two hours.] Not given in 1922-23.

77. **Introduction to the Literature of History.** A general survey, period by period, of the sources and literature of history. F, 3 (or as may be arranged). First meeting, Friday, October 6. *European History Seminary Room.* Professors SCHMIDT, WESTERMANN, SMITH, BECKER, HULL, BRETZ. For graduates only.

Oriental History. (See Semitic Languages and Literatures, course 9b.)

LATIN

*A. **Elementary Latin.** This course is intended for those who, after entering the University, have come to feel the need of Latin and wish by special effort to acquire a reading knowledge of ordinary prose in a single year. M T W Th F, 8. *Goldwin Smith* 124. Dr. FORMAN. Credit five hours a term.

*B. **Virgil, Aeneid, Books I-VI; Ovid.** Throughout the year. Credit three hours a term. Prerequisite course A, or entrance credit for two units of Latin. Dr. FORMAN. M W F, 2. *Goldwin Smith* 124.

*May not be counted for upperclass group.

1. Freshman Course: Cicero, De Amicitia, De Senectute; Horace, Odes and Epodes; Latin Writing. Throughout the year. Credit three hours a term.

Sec. 1. M W F, 10. *Goldwin Smith* 128. Professor DURHAM.

Sec. 2. M W F, 11. *Goldwin Smith* 128. Professor DURHAM.

Sec. 3. M W F, 12. *Goldwin Smlth* 128. Dr. FORMAN.

[2. **Sight Translation: Gellius, Selections; Ovid, Metamorphoses.** Throughout the year. Credit one hour a term. Professor ELMER.] Not given in 1922-23.

3. Sight Translation: Caesar's Civil War; Phaedrus. Throughout the year. Credit one hour a term. Professor ELMER.

Sec. 1. T, 11. *Goldwin Smith* 124. Professor ELMER.

Sec. 2. S, 10. *Goldwin Smith* 124. Professor ELMER.

Sec. 3. S, 11. *Goldwin Smith* 124. Professor ELMER.

Especially recommended as collateral work for those who are taking course 1, but open to all students. Courses 2 and 3 are given in alternate years.

[7. Classic Myths in English Literature. Lectures, translations, and illustrative readings from English literature. Prerequisite, preparatory Latin. Second term only. Credit two hours. Professor DURHAM. T Th, 12. *Goldwin Smith* 128.] Not given in 1922-23.

This course is not intended as a substitute for any of the regular courses in Latin, and it may not be taken to satisfy the underclass requirement in foreign language.

8. Terence, Phormio and Adelphi; Catullus; Horace, Satires and Epistles; Tacitus, Agricola; Seneca, Letters; Martial. Throughout the year. Credit three hours a term. Prerequisite course 1. Professor DURHAM. T Th S, 9. *Goldwin Smith* 128.

[11. Selections from Cicero's Letters; Cicero, De Oratore, Book I. Throughout the year. Credit two hours a term. Prerequisite course 1 or the equivalent. Professor ELMER.] Not given in 1922-23.

[12. Selections from the last six books of Virgil's Aeneid; Cicero, De Officiis. Throughout the year. Credit two hours a term. Prerequisite course 1 or the equivalent. Professor ELMER.] Not given in 1922-23.

16. Selections from the Republican Literature: Plautus, the Aulularia and Menaechmi; Lucretius; Lectures on the History of Roman Literature. Throughout the year. Credit three hours a term. Prerequisite course 8, or 11, or 12. Professor DURHAM. T Th S, 10. *Goldwin Smith* 128.

[17. Literature and History of the Early Empire: Suetonius, Lives of the Caesars; Pliny's Letters; Tacitus, Annals. Throughout the year. Credit three hours a term. Prerequisite course 8, or 11, or 12. Professor ELMER.] Not given in 1922-23.

Courses 16 and 17 are given in alternate years.

[18. Lyric Poetry. First term. Credit two hours. Open to students who have taken, or are taking, course 16 or 17. Professor DURHAM.] Not given in 1922-23.

19. Cicero in Verrem. Second term. Credit two hours. Prerequisite course 8, or 11, or 12. Professor ELMER. W F, 12. *Goldwin Smith* 124.

This course is especially designed to develop in students the ability to understand and appreciate the Latin without translating.

[20. **Cicero's Philippics.** Throughout the year. Credit two hours a term. Prerequisite course 8, or 11, or 12. Professor ELMER.] Not given in 1922-23. Courses 19 and 20 are given in alternate years.

21. **Latin Writing. Intermediate Course.** Throughout the year. Credit one hour a term. Prerequisite course 1. Professor ELMER. M, 12, or hour to be arranged. *Goldwin Smith* 124.

26. **Teachers' Training Course.** Throughout the year. Credit two hours a term. Open to students who have had course 8, or 11, or 12, and have taken or are taking course 16 or 17. First Term, Professor ELMER; second term, Professor DURHAM. T Th, 12. *Goldwin Smith* 124.

[27. **Ancient Rome: Private Life and Architectural Remains.** First term only. Credit two hours. Professor DURHAM.] Not given in 1922-23.

28. **Vulgar Latin; Petronius, *Cena Trimalchionis*; Vulgar Latin Inscriptions, including Christian Inscriptions.** First term. Credit two hours. Prerequisite course 8, or 11, or 12. Professor DURHAM. T Th, 12. *Goldwin Smith* 128.

40. **Latin Seminary.** The textual, exegetical, and historical study of the works of Virgil and their influence in medieval and modern times. T, 2, and F, 11. *Greek and Latin Seminary Room.* Professor ELMER. For graduates only.

The object of the seminary is to familiarize its members with the methods and principles of scholarly research and criticism. The work is therefore, as far as possible, put into the hands of the students themselves.

[41. **Latin Seminary.** The textual and exegetical study of Plautus, or the Orator of Cicero and the doctrine of prose rhythm. T, 2-4, and S, 10. Professor DURHAM.] Not given in 1922-23.

42. **Indo-European Philology.** The principles of phonetics; sounds and flexions of the Indo-European languages; sounds and flexions of the Italic branch. M, 2, and S, 11. *Greek and Latin Seminary Room.* Professor DURHAM. For graduates only; the Monday session open only to students with a major or a minor in Latin. The Saturday session (phonetics and general Indo-European philology) is open also to graduate students of other languages.

[43. **History, Aim, and Scope of Latin Studies.** Throughout the year. Professor ELMER. For graduates only.] Not given in 1922-23.

[44. **Historical Latin Syntax.** With special reference to the moods and tenses of the Latin verb. Two hours a week throughout the year. Professor ELMER. For graduates only.] Not given in 1922-23.

45. **Latin Writing, Advanced Course.** Throughout the year. Professor ELMER. W, 3. *Goldwin Smith* 124. For graduates. Undergraduates who have taken course 21 may also be admitted to this course.

[48. **Vulgar Latin, Advanced Course.** Throughout the year. Professor DURHAM. For graduates only.] Not given in 1922-23.

50. **Latin Epigraphy.** Throughout the year. Hours to be arranged. Professor DURHAM.

The interpretation of selected inscriptions. Special topics in the administrative history of the Roman Empire will be assigned for investigation. Open to graduates and to qualified undergraduates.

[51. **Seminary in Ancient History and Epigraphy.** The Monument of Ancyra and the organization of the Roman Empire by Augustus Caesar. Throughout the year. Professors WESTERMANN and DURHAM.

Open to graduates only. Reading knowledge of Latin, French, and German required.] Not given in 1922-23.

MATHEMATICS

Examinations for the removal of conditions in courses 1 to 8 are held in September just before registration, and near the end of each term. For further information regarding the time and place of these examinations students should apply to Professor Ranum.

All students taking any of the courses from 1 to 15 inclusive should go to White 5 on one of the registration days at the beginning of each term for assignment to sections.

Students wishing to take any of the courses numbered above 15 except 41, 61, and 82 are asked to meet in White 5 at 3:30 p. m. on the day following the last day of registration of each term to arrange their schedules.

Of courses 1-8 not more than six (6) hours may be taken simultaneously without the special permission of the department.

*1. **Solid Geometry.** Repeated in second term. Credit three hours. First term, T Th S, 10; second term, M W F, 10.

*2. **Advanced Algebra.** Repeated in second term. Credit five hours. Daily, exc. S, 9.

*3. **Plane Trigonometry.** Repeated in second term. Credit three hours. First term, M W F, 10; second term, T Th S, 10.

4, 5, 6. **Analytic Geometry and Calculus.** Primarily for students in the College of Engineering. Prerequisite courses 1, 2, 3, or their equivalent. These courses are offered each term.

4. Credit three hours.

5. Daily except S. Credit five hours. Continuation of course 4.

6. Credit three hours. Continuation of course 5.

7(1), 7(2). **Analytic Geometry and Calculus.** Primarily for candidates for the degrees of A.B. and B. Chem. Prerequisite courses 1, 2, 3, or their equivalent. Daily except S. These courses are offered each term.

7(1). Credit five hours.

7(2). Credit five hours. Continuation of 7(1).

*8. **Analytic Geometry and Calculus.** Primarily for students in the College of Architecture. Throughout the year. Credit three hours a term. Prerequisite courses 1, 2, 3, or their equivalent.

*15. **Elementary Course in Higher Mathematics.** Throughout the year. Credit three hours a term. Prerequisite courses 1, 2, and 3, or their equivalent. Assistant Professor CARVER. T Th S, 9. White 10.

*May not be counted for upperclass group.

Intended for students who do not plan to take many courses in mathematics, but who nevertheless wish to become acquainted with the principal ideas of the subject. The object will be to make clear the fundamental aims, methods, and results of a number of subjects, rather than to develop the technique of any one. The course will deal with theory of numbers, vector analysis, groups; synthetic geometry, including some topics in projective, non-euclidean, and higher dimensional geometry; analytic geometry, calculus, famous problems of mathematics. Lectures, assigned reading, and exercises.

[20. **Teachers' Course.** Throughout the year. Credit three hours a term. Prerequisite course 7, which may be taken at the same time. Assistant Professor CRAIG.] Not given in 1922-23.

23. **Modern Higher Algebra.** Throughout the year. Credit three hours a term. Prerequisite course 7 or its equivalent. Assistant Professor WILLIAMS.

The subject matter of this course will depend somewhat upon the preparation and needs of the students. Some or all of the following topics will be studied: determinants and matrices, hyper-complex numbers, linear substitutions, the theory of equations and the theory of forms.

26. **Theory of Finite Groups.** Second term. Credit three hours. Mr. VANDIVER.

This course will include among other topics, substitutions, permutation groups, abstract groups, theorems of Sylow and Frobenius, linear groups, and collineation groups.

41. **Elementary Differential Equations.** Repeated in second term. Credit three hours a term. Prerequisite course 7 or its equivalent. T Th S, 12. Dr. REED. *White* 27.

42. **Advanced Calculus.** Throughout the year. Credit three hours a term. Prerequisite course 7 or its equivalent. Assistant Professor CARVER. M W F, 11. *White* 10.

This course is a study of the processes of the calculus, their meanings and applications. It is designed to furnish a necessary preparation for advanced work in analysis and applied mathematics.

43a. **The Definite Integral.** Throughout the year. Credit three hours a term. Prerequisite course 42 or its equivalent. Assistant Professor GILLESPIE. The Riemann definition of the integral with its range of applicability, followed by a study of some of the more recent definitions of integration.

44. **Infinite Series.** Throughout the year. Credit three hours a term. Prerequisite course 42 and some other course in analysis. Assistant Professor HURWITZ.

The greater part of the course will deal with the modern theory of divergent series, with emphasis on recent research and outstanding problems.

46. **Entire Functions.** Throughout the year. Credit one hour. Prerequisite course 7 and preferably course 42. Professor HUTCHINSON. *White* 25.

The theory as developed during the past forty years. A treatment, as simple and elementary as possible, of the more important properties of entire functions of finite genus, particularly of genus zero, or one. Illustrative applications to various well-known functions.

61. Projective Geometry. Throughout the year. Credit three hours a term. Prerequisite course 7 or its equivalent. Assistant Professor CRAIG. M W F, 10. *White* 4.

The elements of projective geometry treated synthetically.

62. Advanced Analytic Geometry. Throughout the year. Credit three hours a term. Prerequisite course 7 or its equivalent. Dr. ROBISON.

This course consists of the study of anharmonic properties of conics, homogeneous co-ordinates and an introduction to the geometry of algebraic curves.

66. Algebraic Geometry. Throughout the year. Credit three hours a term. Prerequisite courses 61 and 62. Professor SNYDER.

The study of birational transformations in space of two and three dimensions, with particular reference to involutions and to cyclic transformations.

67. Differential Geometry. Throughout the year. Credit three hours a term. Prerequisite course 6 or 7. Assistant Professor RANUM. *White* 9.

The application of the calculus to the study of the metric properties of curves and surfaces, including the curvature and torsion of curves, ruled and developable surfaces, the lines of curvature, asymptotic lines and geodesics on surfaces, minimal surfaces, the conformal representation and applicability of surfaces.

***82. Introduction to the Mathematics of Finance.** First term. Credit two hours. Repeated in the second term. Professor TANNER. M F, 12. *White* 28.

Designed primarily for students in accounting, finance, and actuarial work.

83. Theory of Probabilities. Throughout the year. Credit three hours a term. Prerequisite course 7 or its equivalent. Assistant Professor OWENS. T Th S, 10. *White* 2.

Theory of probabilities with applications to problems in statistics, curve-fitting, theory of errors, life-tables, insurance, correlation, etc., to suit individual needs.

85. Vector Analysis. First term. Credit three hours. Prerequisite course 7 or its equivalent. Professor SHARPE.

An elementary course for students in Physics and Engineering.

88. Dynamical Systems. Second term. Credit three hours. Prerequisite course 42 or its equivalent. Assistant Professor H. M. MORSE.

The aim of the course will be to present the more recent dynamical theories developed by Poincare, Hadamard, Birkhoff, and others, rather than to study in detail the older classical theory. Some of the topics to be considered are: stability in the sense defined by Poincare, recurrent motions including periodic motions, asymptotic motions. Applications will be made to the problem of three bodies.

90. The Einstein Theory. First term. Credit three hours. Prerequisite course 42 or its equivalent. Assistant Professor H. M. MORSE.

The course will commence with a study of the relevant facts of Non-Euclidean Geometry, including Non-Euclidean Differential Geometry, and Non-Euclidean Mechanics, thereby aiming to furnish an historical as well as a logical background for the mathematical formulation of the theory of relativity. Some of the more recent theories of gravitational and electromagnetic phenomena will be considered.

*May not be counted for upperclass group.

MUSIC

The courses offered by the Department of Music are designed to afford to all students having sufficient native ability, the opportunity to study music as a part of the college course. The aim is to make musical training contribute to liberal culture.

Credit for courses 1 to 7 inclusive may be counted as part of the thirty hours which a student may elect outside the College of Arts and Sciences but may not be counted as part of the ninety hours required in the College. (See paragraph, 2, p. xii)

Individual examinations for admission to all courses in music by new students and others not previously classified will be held in Sage Chapel, daily, Wednesday to Saturday, September 20, 21, 22, 23, from 10 to 12:30 a.m., and at other times by appointment.

1. Elementary. Throughout the year. Credit two hours a term. Open to all students showing sufficient aptitude to pursue the subject with profit. M, 4:45 p.m.; T, 7:15 p. m. *Sage Chapel.* Assistant Professor QUARLES.

Ear training, elementary sight reading, and elementary theory, including construction of the major scale; normal, harmonic, and melodic minor scales; notation of chromatic scale with each key-signature; intervals, triads, and their inversions; voice training and part singing. Attendance is required at the Sunday morning service at Sage Chapel, for which service the members of this class form the choir.

7. Advanced Choir. Throughout the year. Credit two hours a term. Assistant Professor QUARLES. M, 7:15; T, 4:45; Sunday, 2:30. *Sage Chapel.*

This course may not be repeated for credit.

Preparation and presentation of the best choral works. This course is offered as advanced training to students possessing good singing voices and the ability to read at sight music of moderate difficulty. The class is limited to ninety members, distributed approximately as follows: twenty-eight sopranos, twenty contraltos, eighteen tenors, and twenty-five basses. All vacancies are filled by competition at the beginning of the first term, and all members of the Choir obligate themselves to continue for the entire year.

10. Harmony. Throughout the year. Credit three hours a term. Prerequisite course 1 or the equivalent. Assistant Professor QUARLES. M W F, 11. *Sage Chapel.*

A course dealing with the construction and interconnection of triads and their inversions, chords of the Seventh and their inversions, chords of the Ninth, chromatic harmony, suspensions, and ornamental tones, harmonizing both bass and soprano melodies. This course is for Sophomores.

12. Advanced Harmony. First term. Credit two hours a term. Prerequisite course 10 or the equivalent. Assistant Professor QUARLES. M W, 10. *Sage Chapel.*

14. Applied Form and Composition. Throughout the year. Credit two hours a term. Assistant Professor QUARLES. M F, 12. *Sage Chapel.*

A course in practical composition. Analysis of musical masterpieces. It is recommended that Courses 14 and 17 be pursued simultaneously.

16. **Counterpoint.** Throughout the year. Credit two hours a term. Assistant Professor QUARLES. Open to students who have completed Course 10, and to others equally qualified. T Th, 10. *Sage Chapel.*

A course dealing with the principles of melodic combination. It should be pursued in combination with Course 12.

17. **Canon and Fugue.** Throughout the year. Credit two hours a term. Open to students who have completed Course 16, and to others equally qualified. Assistant Professor QUARLES. T Th, 11. *Sage Chapel.*

A continuation of Course 16, giving practical work in contrapuntal forms. It should be taken with Course 14.

18. **History of Music.** Throughout the year. Credit two hours a term. No preliminary training required. Assistant Professor QUARLES. T Th, 12. *Sage Chapel.*

A general survey of the historical development of music from earliest time to the present. Current musical topics.] Not given in 1922-23.

PHILOSOPHY

*1. **Problems of Philosophy.** First term. Credit three hours. Lectures. Professor THILLY. M W, 11. *Goldwin Smith B.* Recitations, Professor THILLY, Dr. PAINE, and Dr. COOKE. F, 11. *Goldwin Smith B, 225, 227.*

The fundamental problems of philosophy, together with a critical study of the most important types of philosophical theory.

*2. **Logic.** First term. Credit three hours. Dr. PAINE. M W F, 12. *Goldwin Smith 227.*

This course will cover practically the same ground as course 3, which is given in the second term. More emphasis will, however, be laid upon the criticism and construction of various forms of argument both deductive and inductive.

*3. **Logic.** Second term. Credit three hours. Dr. MORROW. T Th S, 11. *Goldwin Smith 225.* Dr. PAINE. T Th S, 9. *Goldwin Smith 227.*

The general character of the thinking process, its laws of development, and the methods by which thought actually proceeds to solve the problems presented to it; the analysis of logical arguments and the detection of fallacies, in both the deductive and the inductive processes of reasoning. Creighton's *Introductory Logic* will be used as a textbook.

*4. **The Fine Arts; their Philosophy and History in Outline.** First term. Credit three hours. Professor HAMMOND. T Th S, 10. *Goldwin Smith 225.*

An elementary course on aesthetics. Lectures, assigned readings, and examinations.

4a. **The Renaissance.** Second term. Credit three hours. Professor HAMMOND. T Th S, 10. *Goldwin Smith 225.*

Lectures and assigned readings. A philosophical study of the civilization of the Renaissance, with special reference to the fine arts, the rise of humanism, and the beginnings of modern philosophical and political theories.

5. **History of Philosophy.** Throughout the year. Credit three hours a term. Professor CREIGHTON. T Th S, 9. *Goldwin Smith 225.*

*May not be counted for upperclass group.

The history of philosophical speculation from its origin among the Greeks to the present time; the various philosophical systems in their relation to the science and general civilization of the ages to which they belong, and their application to social, political, and educational problems; the speculative problems of the present century, and especially the philosophical meaning and importance of the notion of evolution or development. Reading will be assigned from time to time but there will be no class textbook. Open to juniors, seniors, and graduates.

5a. **Supplement to 5.** Two hours. Time to be arranged. For honor students and others who have the necessary qualifications. Lectures, discussions, and reports on reading, running parallel to and supplementing the instruction given in course 5. Dr. MORROW.

*6. **Moral Ideas and Practice.** Second term. Credit three hours. Lectures. Professor THILLY. M W, 11. *Goldwin Smith B.* Recitations, F, 11. *Goldwin Smith B.* 227.

The evolution of moral ideas and practice from primitive times to the present, with an examination of the fundamental virtues.

7. **Ethics.** First term. Credit three hours. Professor THILLY. M W F, 10. *Goldwin Smith* 225.

A study of the moral consciousness and of the principles of human conduct in their relations to the individual and society. Open to juniors, seniors, and graduates.

7a. **Social and Political Ethics, and the Philosophical Theory of the State.** Second term. Credit three hours. Professor THILLY. M W F, 10. *Goldwin Smith* 225. Open to juniors, seniors, and graduates.

9. **Philosophical Ideas in Nineteenth Century Literature.** First term. Credit three hours. Professor ALBEE. M W F, 12. *Goldwin Smith* 225.

This course does not presuppose previous acquaintance with philosophy. After considering the tendencies of eighteenth century thought, particularly as represented by British empiricism, the course will deal with the interpretations of life offered by well-known authors of the nineteenth century, English, continental, and American, and the relation of such interpretations to the recognized tendencies of contemporary philosophy.

9a. **The Philosophy of William James.** Second term. Credit two hours. Professor ALBEE. M W, 12. *Goldwin Smith* 225.

A study of pragmatism as developed in the writings of William James. Lectures and discussions. Primarily for juniors and seniors.

[*11. **Philosophical Results and Applications.** Professor CREIGHTON.] Not given in 1922-23.

12. **The Theory of Evolution. Its History and Significance.** Throughout the year. Credit one hour a term. Dr. PAINE. S, 11. *Goldwin Smith* 227.

Intended primarily for undergraduates. No acquaintance with the history or special terminology of philosophy is presupposed.

13. **Origin and Development of Religious Ideas.** First term. Credit two hours. Dr. PAINE. T Th, 12. *Goldwin Smith* 227.

*May not be counted for upperclass group.

The origin of religious belief and the conditions of its development, with a brief examination of various forms of primitive religion; the history and significance of the more highly developed religions, such as Brahmanism, Buddhism, Judaism, Mohammedanism, and Christianity. Not open to underclassmen.

14. **Psychology and Philosophy of Religion.** Second term. Credit two hours. Dr. PAINE. T Th, 12. *Goldwin Smith* 225.

Psychological analysis of some of the more important types of contemporary individual and social religious experience; relation of religion to science; the question of the place of religion in a philosophical account of the world. Not open to underclassmen.

16. **Reading of Philosophical German.** Throughout the year. Credit two hours a term. Professor HAMMOND. F, 2-4. *Goldwin Smith* 220.

The text for class use will be Windelband's *Platon*.

17. **Sources of Ancient and Medieval Philosophy.** Second term. Credit two hours. Professor HAMMOND. M W, 11. *Goldwin Smith* 220.

Critical examination of the sources; lectures on historical problems, and discussions.

Primarily for graduates, and open to seniors only by special permission.

[18. **Types of Metaphysical Theory.** First term. Credit two hours. Prerequisite courses 1 and 5 or the equivalent. Professor CREIGHTON.] Not given in 1922-23.

19. **The Development of Modern Philosophical Problems.** Credit two hours. For graduate students and seniors who have had Philosophy 5. Dr. MORROW. T Th, 12.

20. **History of Ethics, Ancient, Medieval, and Renaissance.** First term. Credit two hours. Professor HAMMOND. M W, 11. *Goldwin Smith* 220.

Lectures and assigned readings. Primarily for seniors and graduates.

21. **History of Modern Ethics.** Second term. Credit two hours. Professor ALBEE. M W, 11. *Goldwin Smith* 227.

The history of modern ethics with special reference to the commonly recognized methods of ethics. The history of British ethics will receive particular attention as illustrating the gradual differentiation of ethics as an independent science or philosophical discipline. Primarily for seniors and graduates.

26. **The Ethics of Modern Utilitarianism.** Throughout the year. Credit three hours a term. Professor THILLY. Open to qualified seniors and graduates. Th, 3-5.30. *Goldwin Smith* 220.

27. **The Republic of Plato.** Throughout the year. Credit three hours a term. Professor HAMMOND. Reading of the Greek text. M W F, 10. *Goldwin Smith* 222. This course is intended for students of Greek literature as well as of Greek philosophy.

[29. **Modern Idealistic Theories of Ethics.** Throughout the year. Credit three hours a term. Professor THILLY.] Not given in 1922-23.

30. **Empiricism and Rationalism.** First term. Credit three hours. Professor ALBEE. T Th S, 11. *Goldwin Smith* 220.

Lectures and discussions. The empirical movement as represented by Locke, Berkeley, and Hume, and the rationalistic movement as represented especially by Leibniz. Primarily for graduates.

31. **The Critical Philosophy of Kant.** Second term. Credit three hours. Professor ALBEE. T Th S, 11. *Goldwin Smith 220.*

Lectures and discussions. A study of the *Critique of Pure Reason* and of the *Critique of Judgment* with frequent references to standard commentaries and to more recent interpretations. Primarily for graduates.

32. **Early Rationalism. Spinoza and Leibniz.** Second term. Credit two hours. Professor ALBEE. T Th, 12. *Goldwin Smith 220.*

A critical study of early Rationalism with special reference to the divergent tendencies represented by Spinoza and Leibniz. Primarily for graduates.

[33. **The Philosophy of Bergson.** First term. Credit two hours. Professor ALBEE. Primarily for graduates.] Not given in 1922-23.

34. **Modern British Idealism.** First term. Credit two hours. Professor ALBEE. T Th, 12. *Goldwin Smith 220.* The lectures will deal mainly with representative works of T. H. Green, Bradley, and Pringle-Pattison. Primarily for graduates.

37. **Seminary in Ethics.** Throughout the year. Credit two hours a term. Professor THILLY. Hours to be arranged. *Goldwin Smith 220.* The Fundamental Concepts of Ethics.

38. **Seminary in Ancient and Medieval Philosophy.** Throughout the year. Credit two hours a term. Professor HAMMOND. M, 3-5, or hours to be arranged. *Goldwin Smith 220.*

The work is devoted to the reading and discussion of selected dialogues of Plato and the *Politics* of Aristotle in English translation.

40. **Seminary in Logic and Metaphysics.** T, 3-5. *Goldwin Smith 231.* Professor CREIGHTON and Dr. MORROW.

The subject for 1922-23 will be announced at the beginning of the year.

41. **Seminary in Aesthetics.** Historical study of aesthetic theories. Throughout the year. Credit two hours a term. Professor HAMMOND. Hours to be arranged. Open to seniors by permission.

PHYSICAL EDUCATION

The following courses are especially designed for the training of teachers and supervisors of physical education but are also open to others, particularly to students who desire to supplement their preparation as teachers in other subjects.

20a. **History and Literature of Physical Education.** For juniors and seniors. First term. Credit three hours. Lectures, T Th, 8. *Goldwin Smith 236.* Three hours of practice at hours to be arranged. Professor YOUNG and Miss BATEMAN.

A study of the distinguishing characteristics of various peoples, as to habits of living and forms of physical activity and the part these have played in their national development. The practice work of Courses 20a and 20b will consist of lower grade methods (gymnastic stories, rhythm, singing games, marching, and freehand work), and assigned hours of teaching in outside schools.

20b. Theory of Physical Education and Methods of Teaching. For juniors and seniors. Second term. Credit three hours. Lectures, T Th, 8. *Goldwin Smith* 236. Three hours of practice at hours to be arranged. Professors JORDAN and YOUNG, and Miss BATEMAN.

A study of the objects and scope of physical education, and of the principles and technique involved in its teaching (including arrangement, classification, and progression of exercises, etc.).

21. Theory, Organization, and Administration of Gymnastic Play and Athletics. For seniors. Throughout the year. Credit three hours a term. Lectures, F S, 8. *Goldwin Smith* 236. Three hours of assigned practice work. Professors YOUNG and JORDAN, and assistants.

Study of the social and educational value of play, with special emphasis upon the management and supervision of recreation centers, and of the various forms of athletic sports in schools and colleges (football, baseball, track, etc.).

22a. School Hygiene. For juniors and seniors. First term. Credit two hours. T Th, 12. *Stimson Hall*. Professor YOUNG.

Sanitary aspects of school and home environment, with methods and scope of health instruction and supervision.

22b. Physical Inspection. For juniors and seniors. Second term. Credit two hours. T Th, 12. *Stimson Hall*. Professor YOUNG and Dr. SMILEY.

Study of defects and deformities most commonly met with in the school, and the nature, causes, and symptoms of the more common diseases. Also first aid measures to be applied in cases of emergency.

23a. Kinesiology, Physiology, and Prescription of Exercise. For seniors. First term. Credit three hours. Lectures, M W, 8. *Goldwin Smith* 236. Three hours of practice at hours to be arranged. Professor YOUNG, Dr. GOULD, and Miss BATEMAN.

Study of the anatomical mechanism of movements, and of the technique and effects of therapeutic gymnastics, corrective appliances, and massage.

23b. Principles of Physical Education. For seniors. Second term. Credit three hours. Lectures, M W, 8. *Goldwin Smith* 236. Three hours of laboratory at hours to be arranged. Professors OGDEN and YOUNG, and Mr. WAKEMAN.

A study of the physical basis of education and the normal growth rates in children and adolescents, and the various factors by which these are affected. History and uses of anthropometry, with tests and measurements in common use.

PHYSICS

Students expecting to elect Physics for their upperclass group are advised to complete Mathematics 7 or its equivalent before the beginning of their junior year.

Students desiring to follow Physics as a profession either in education or in research or testing laboratories should consult with the Department concerning the opportunities in these fields. The members of the department will be glad to advise such students regarding the courses best suited to their needs. A circular outlining a four-year undergraduate course in Physics may be obtained upon application at the department office.

Examinations for those who were unavoidably absent from either term examination in courses 2 to 7 and for those who have conditions to make up will be held on Wednesday, Sept. 20, 1922, at 9 a.m. in Rockefeller A. Similar examinations in connection with courses 8 to 14 will be held in Rockefeller A at 2 p.m. on the same day. Students expecting to take any of these examinations should notify the department not later than September 13, 1922.

Entrance Physics is not accepted as an equivalent of any of the courses offered by the department.

***2. Introductory Experimental Physics.** Primarily for students in engineering and chemistry. Repeated in second term. Credit five hours. Three lectures, one classroom and one two-hour laboratory period a week. Technical students should not take this course earlier than the term in which they begin the study of analytic geometry. Lectures T Th S, 9; or T Th S, 11. *Rockefeller A.* Professors MERRITT and GIBBS, and Assistant Professor HOWE. Classroom and laboratory work, hours to be arranged. Assistant Professor HOWE and Messrs. FISHER, HOUSMAN, JOLLIFFE, MCCORLKE, MAY, MOON, NORTHROP, NOYES, PIERCE, RICHMOND, WILBER, and WOLFF.

***3. Introductory Experimental Physics.** Primarily for students in Arts and Sciences. Repeated in the second term. Credit six hours. Three lectures, two recitations, one two-hour laboratory period a week. Lectures, T Th S, 9; or T Th S, 11. *Rockefeller A.* Professors MERRITT and GIBBS and Assistant Professor HOWE. Classroom and laboratory work. Recitations: M W, 9, 10, 11, 12; T Th, 10, 12. Laboratory as arranged. Instructing staff same as in Physics 2.

4a. General Physics. Primarily for students in Arts and Sciences. Classroom work covering heat, magnetism, and electricity. First term. Credit three hours. Prerequisite, Physics 2 or 3, or the equivalent. M W F, 8. *Rockefeller 107.* Professor GIBBS.

4b. General Physics. Primarily for students in Arts and Sciences. Classroom work covering properties of matter, sound, and light. Second term. Credit three hours. Prerequisite, Physics 2 or 3, or the equivalent. M W F, 8. *Rockefeller 107.* Professor GIBBS.

Physics 4a and 4b are designed to meet the needs of students who desire a somewhat detailed survey of the fundamentals of physics. Course 4a may be taken either before or after 4b.

***7. General Physics.** Recitations and problem work. Primarily for students in engineering. Repeated in the second term. Credit three hours. Prerequisite, Physics 2. Hours as assigned. *Rockefeller.* Assistant Professor COLLINS and Messrs. JOLLIFFE, NORTHROP, PIERCE, SCOTT, TYNDALL, and WOLFF.

8. Heat and Light. Theory and problems. Required of candidates for B. Chem. First term. Credit two hours. Prerequisite, Physics 2 and Mathematics 7 (I). Two classroom periods a week. M W, 10, 12; T Th, 8. *Rockefeller.* Assistant Professor BIDWELL and Mr. ———.

9. Magnetism and Electricity. Theory and problems. Required of candidates for B. Chem. First term. Credit two hours. Prerequisite, Physics 2

*May not be counted for upperclass group.

and Mathematics 7 (2). Two classroom periods a week. M W, 12; T Th, 8, 9. *Rockefeller*. Assistant Professor BIDWELL and Mr. ———.

10. **Introductory Physical Experiments.** Either term. Credit three hours. Prerequisite, Physics 2 or the equivalent. A knowledge of trigonometry is desirable. Two laboratory periods a week, two and one-half hours each, with reports. T Th, 10-12.30, T Th, 2-4.30, M F, 2-4.30. *Rockefeller* 300-B. Assistant Professor COLLINS and Mr. McCORKLE.

Fundamental experiments covering properties of matter, heat, light, sound, magnetism, and electricity. Primarily intended for students in the College of Arts and Sciences who wish a general knowledge of experimental physics.

11. **General Physics.** Theory and problems covering selected topics in mechanics, heat, light, and electricity. Required of candidates for M.E. and E.E. Second term. Credit three hours. Prerequisite, Physics 7 and Mathematics 6. Three classroom periods as arranged. *Rockefeller*. Assistant Professor BIDWELL and Messrs. RICHMOND, BAYLEY, BECKER, BOARDMAN, COTTRELL, MACKEOWN, and REYNOLDS.

12. **Physical Measurements.** Primarily for students in Arts and Sciences. Either term or throughout the year. Credit two or four hours a term. One or two three-hour laboratory periods a week. Prerequisite, the calculus and at least six hours of physics taken from the preceding courses or five hours of Physics if Physics 4 be taken simultaneously. Laboratory open T Th, 8-1. *Rockefeller* 250. Professor RICHTMYER and Mr. HYATT.

Quantitative laboratory work in mechanics, heat, light, sound, electricity, and magnetism, with special reference to methods of measurement, sources of error and their elimination, the adjustment and use of instruments of precision, graphical methods of interpreting results.

14. **Physical Measurements.** Required of candidates for B. Chem., M.E., and E.E. Throughout the year, starting either term. Credit two hours a term. One three-hour laboratory period a week. Prerequisite, the calculus and Physics 7 or 8. Physics 11 or 9 must precede or accompany the second half of Physics 14. Eight sections as assigned. *Rockefeller* 250. Professor RICHTMYER and Messrs. HYATT, BAYLEY, BECKER, BEHR, BOARDMAN, COTTRELL, MACKEOWN, REYNOLDS, RICHMOND, and STANTON.

Physical measurements in properties of matter, mechanics, heat, light, sound, magnetism and electricity; the adjustment and use of instruments of precision. Results and errors are carefully discussed.

18. **Theory and Practice of Photography.** Either term. Credit two hours. Prerequisites, Physics 2 and Chemistry 101 or their equivalent. One lecture and one three-hour laboratory period a week. Lecture, M, 12. *Rockefeller* B. Laboratory M T Th F, 2-5. *Rockefeller* 332. Professor RICHTMYER and Messrs. PIERCE and RIDDLE.

A study of the fundamental principles of photography including the making of lantern slides, the use of various kinds of dry plates and papers, the after treatment of negatives and enlarging.

19. **Advanced Photography.** With special reference to its applications to problems of research. Professor RICHTMYER and Messrs. PIERCE and RIDDLE.

[20. **Heat.** Second term. Credit three hours. Prerequisite, Physics 4a, 4b, and 12 (2 hours), and Mathematics 7, or their equivalent. Assistant Professor MURDOCK.] Not given in 1922-23.

21. **Light.** Second term. Credit three hours. Prerequisite, Physics 4b, 12 (2 hours), and Mathematics 7, or their equivalent. T Th S, 8. *Rockefeller C.* Assistant Professor COLLINS.

Physics 20 and 21 are given in alternate years.

[22. **Electricity and Magnetism.** Throughout the year. Credit three hours a term. Prerequisite, Physics 4a, 4b, and 12 (4 hours), and Mathematics 7, or their equivalent. Professor RICHTMYER.] Not given in 1922-23.

23a. **Mechanics and Properties of Matter.** First term. Credit three hours. Prerequisite, Physics 4a, 4b, and 12 (2 hours), and Mathematics 7, or their equivalent. M W F, 8. *Rockefeller C.* Assistant Professor KENNARD.

23b. **Properties of Matter.** Second term. Credit three hours. Prerequisite, Physics 23a. M W F, 8. *Rockefeller C.* Assistant Professor KENNARD.

[24. **Wave Motion and Sound.** First term. Credit three hours. Prerequisite, Physics 23 or its equivalent. Assistant Professor COLLINS.] Not given in 1922-23.

Physics 22, 23, and 24 are given in alternate years.

25. **Advanced Laboratory Practice.** Either term or throughout the year. Prerequisite, Physics 12 (4 hours), or the equivalent. Students beginning work in the course, one lecture and two laboratory periods a week, credit 3 hours; students who have had at least one term's work or its equivalent, one to three laboratory periods a week, credit one to three hours a term. Lecture M, 12. Laboratory periods to be arranged. *Rockefeller 301.* Assistant Professor MURDOCK and Mr. WOLFF.

The course is intended for those wishing to take up special topics for detailed experimentation, for those taking courses 20 to 24 and desiring to supplement them in the laboratory, and for those preparing to do research work and wishing to develop laboratory technique. Considerable time will be spent on each of a small number of experiments selected to meet the requirements of the individual student. The lectures will include an introductory discussion of the theory of measurements and the application of the theory to laboratory problems.

26. **Theory of Measurements.** First term. Credit two hours. Prerequisite, Physics 25, or its equivalent. Hours to be arranged. Assistant Professor MURDOCK.

[27. **Photometry and Spectrophotometry.** First term. Credit three hours. One lecture and two laboratory periods a week. Prerequisite, Physics 10 or 12, or the equivalent. Professor RICHTMYER.] Not given in 1922-23.

28. **Introduction to Modern Physical Theories.** Primarily for seniors (or first year graduate students) specializing in physics, but open to others who have had Physics 12 or 14, or the equivalent. Physics 21 and 22 are advised as prerequisites but not required. Lectures and assigned reading. Second term. Credit three hours. M W F, 11. *Rockefeller.* Professor RICHTMYER.

A summary of the development and present inter-relations of such subjects as electro-magnetic theory, spectrum phenomena, electron theory, photo-elec-

tricity, X-rays, radio activity, quantum theory, and the bearing of these on the structure of the atom and on other problems of modern physics.

29. High Temperature Measurements. First term. Credit three hours. Prerequisite, Physics 12 or 14. Laboratory, S, 8-1. *Rockefeller* 71. One lecture a week as arranged. Assistant Professor BIDWELL.

The calibration and use of thermo-junctions, resistance thermometers, radiation and optical pyrometers; the construction of arc and resistance furnaces for the laboratory; a study of properties of materials at high temperatures, with such original problems as time permits.

33. Alternating Currents. First term. Credit two hours. Prerequisite, Physics 12 or 14. T Th, 10. *Rockefeller* 155. Professor BEDELL.

A study of the underlying principles of alternating electric currents; the development of graphical methods of analysis as a basis for testing and for the solution of practical problems.

34. Electrical Laboratory. Either term or throughout the year. Credit as arranged. Prerequisite, Physics 12 or 14. Daily 9-1. *Rockefeller* 155. Professor BEDELL and Mr. HOLMES.

Testing of direct and alternating-current apparatus, and the investigation of special problems. The character of the work will be varied to meet individual needs.

36. Advanced Alternating Currents. Second term. Credit two hours. Prerequisite, Physics 33. Hours to be arranged. *Rockefeller*. Professor BEDELL.

Discussion of the theory and measurement of alternating currents. A seminary for graduates only.

37. Theses in Applied Electricity. Second term, or throughout the year. Credit two to eight hours a term. Prerequisite, Physics 12 or 14. Hours to be arranged. *Rockefeller*. Professor BEDELL.

38. Aerodynamics and the Mechanics of Flight. Second term. Credit two hours. Prerequisite, Physics 14. W F, 10. *Rockefeller* 155. Professor BEDELL.

A study of horizontal flight, climbing, gliding, propellers, airplane characteristics and conditions for stability are included.

[40. **Electric Waves and Oscillations.** Experimental lectures. Throughout the year. Credit one hour a term. Professor MERRITT.] Not given in 1922-23.

[40a. **Electric Waves and Oscillations.** Laboratory. Second term. Credit one to four hours. Prerequisites, Physics 12 and 40, or their equivalent. Professor MERRITT.] Not given in 1922-23.

41. Electrical Conduction in Gases. Experimental lectures. Throughout the year. Credit one hour a term. F, 12. Professor MERRITT.

Physics 40 and 41 are given in alternate years.

[42. **Spectroscopy and Luminescence.** Throughout the year. Credit two hours a term. Prerequisite, Physics 21 or its equivalent. Professor GIBBS.] Not given in 1922-23.

Physics 42 is given every other year.

42a. Spectroscopy and Luminescence. First term. Laboratory. Hours and credit as arranged. Prerequisite, the equivalent of Physics 21 and 25. (Laboratory accommodations limited.) Professor GIBBS.

50. **Physics Seminary.** Throughout the year. Credit one hour a term. Hour to be arranged. Professor MERRITT.

50b. **Junior Physics Seminary.** Throughout the year. Credit one hour a term. Hour to be arranged. Professor RICHTMYER.

A colloquium conducted by juniors and seniors specializing in physics, open to others who have had the necessary preparation.

[51. **Mechanics.** Primarily for graduates. First term or throughout the year. Prerequisite, Physics 23a or the equivalent. Assistant Professor KENNARD.] Not given in 1922-23.

52. **Electricity and Magnetism.** Primarily for graduates. Throughout the year. Prerequisite, Physics 22 or the equivalent. T Th S, 8. Assistant Professor KENNARD.

Such parts of the classical theory as do not involve specialized mathematics; the modern theory of radiation and the electromagnetic field.

[53. **Physical Optics.** Primarily for graduates. First term or throughout the year. Prerequisite, Physics 21 or the equivalent. Assistant Professor HOWE.] Not given in 1922-23.

54. **Thermodynamics.** Throughout the year. Credit three hours. Prerequisite, Mathematics 7 or its equivalent. Mathematics 42 is advised, though not required, as a preliminary course. Hours to be arranged. Professor TREVOR.

59. **Applications of Thermodynamics in Physics.** Primarily for graduates. First term. Two hours a week. Professor TREVOR.

Includes a drill in the fundamental laws and the classical treatment of thermal radiation.

60. **Kinetic Theory of Matter and Quantum Theory.** Primarily for graduates. First term. M W F, 10. Assistant Professor KENNARD.

An introduction to the kinetic theory, with special reference to gases, and to the quantum theory and its applications to thermal radiation, specific heats, photoelectricity and spectral phenomena.

[64. **Electron Theory and Atomic Structure.** Primarily for graduates. Assistant Professor KENNARD.] Not given in 1922-23.

69. **Relativity and the Foundations of Mathematical Science.** Second term. Two hours a week. M W or F, 10. Assistant Professor KENNARD.

Lectures, assigned reading, and discussions on the experimental basis and the elements of Relativity, the properties of space, time, and the ether, and the nature of mathematics.

[70. **Recent Advances in Theoretical Physics.** Second term. Credit two hours. Assistant Professor KENNARD.] Not given in 1922-23.

77. **Special Topics.** For graduates only. Credit to be determined. Assistant Professor KENNARD.

Directed reading, supplemented by written reports and regular conference, in any branch of physics.

Physics 51, 52, 53, 59, 60, 64 are given every other year.

PHYSIOLOGY AND BIOCHEMISTRY

***3. Elementary Human Physiology.** Repeated in second term. Credit three hours. First term, M W F, 10, Professor SIMPSON and assistants. Second term, section A, M W F, 10, Professor SIMPSON and assistants; section B, M W F, 12, Dr. BURLAGE. In registering for this course in the second term students are required to specify the section they desire to attend.

An introductory course for students of the biological sciences; also for students who expect to teach physiology in the secondary schools. The lectures will be fully illustrated by experiments, lantern slides, and diagrams.

6. Laboratory Work in Physiology. Repeated in second term. Credit two or more hours. Professor SIMPSON, Dr. BURLAGE, Mr. LIDDELL, and assistants. Five hours a week, hours and days for the first term to be arranged; in second term, any hours T Th, between 10 a. m. and 5.30 p. m.

A beginning course in practical physiology. May be taken after or along with course 3.

7. Seminary. Second term. Credit one hour. A seminary in physiology and biochemistry is held at which current literature is discussed, and at which the results of original investigations carried on by workers in the laboratories are presented for criticism. Students are required to attend these meetings and to take part in the discussions, and each student is expected to give a communication on at least one occasion during the term.

8. Advanced Work and Research in Physiology. Throughout the year. Professor SIMPSON and assistants. Daily. *Stimson Hall, Advanced Laboratory.* In connection with this course a weekly or fortnightly seminary is held.

9. Haematology. First term. Credit one hour. Prerequisite, Human Physiology 3. Dr. BURLAGE. Laboratory, S, 10-1 p. m. *Stimson Hall.* A course on general methods of blood examination.

14. Elementary Biochemistry. First term. Credit three hours. Prerequisite, Chemistry 375 or the equivalent. Assistant Professor SUMNER, Dr. BODANSKY, and Miss GRAHAM. Lectures, M W, 12; conferences, F, 12. *Stimson Hall Amphitheatre.*

Designed to impart an elementary knowledge of the substances met with in living, especially animal tissues, and the chief facts of digestion, metabolism, and nutrition.

(Courses 14 and 14a will not be accepted for the requirements of biochemistry in the medical college. Chemistry students are advised to take course 18.)

14a. Laboratory Work in Biochemistry. First term. Credit two hours. Open to those who are taking or have taken course 14. Assistant Professor SUMNER, Dr. BODANSKY, and Miss GRAHAM. M W, 2-5.

14b. Urine and Blood Analysis. Second term. Credit two hours. Prerequisite course 14a or the equivalent. Lectures and laboratory. Hours to be arranged. Assistant Professor SUMNER, Dr. BODANSKY, and Miss GRAHAM.

16. Advanced Biochemistry Lectures. Throughout the year. Credit one hour a term. Assistant Professor SUMNER and Dr. BODANSKY. S, 8.

*May not be counted for upperclass group.

17. **Special Chapters in Biochemistry.** First term. Credit two hours. Assistant Professor SUMNER and Dr. BODANSKY. T Th, 12.

18. **Biochemistry for Medical Students.** Throughout the year. Credit five hours. Prerequisite, Chemistry 375 or its equivalent. First term, M W, 8, and F, 9. Second term, F S, 9. Assistant Professor SUMNER, Dr. BODANSKY, and Miss GRAHAM.

18a. **Laboratory Work in Biochemistry.** Throughout the year. Credit four hours. Prerequisite, Chemistry 375. First term, T, 2-5; Second term, F, 10-1, 2-5, and S, 10-1. Assistant Professor SUMNER, Dr. BODANSKY, and Miss GRAHAM.

Courses 18 and 18a comprise lectures and experimental work on fats, carbohydrates, proteins, colloids, digestion, and metabolism. The concluding part of course 18a is devoted to modern methods of quantitative urine and blood analysis.

20. **Advanced and Research Work in Biochemistry.** Throughout the year. Assistant Professor SUMNER. Daily, 8-6.

Note—If a sufficient number of students desire a general course in biochemical preparation methods this will be given second term. M W, 2-5. Assistant Professor SUMNER and Dr. BODANSKY.

PSYCHOLOGY

*1. **Elementary Psychology.** First term. Credit three hours. Professors TITCHENER and WELD, Assistant Professor HOISINGTON, Dr. BISHOP, Mr. FELDMAN, and Mr. NAFE. Lectures, T Th, 11. *Goldwin Smith C.* Classroom work, S, 10, or 11.

Not open to juniors or seniors. Primarily for sophomores in the College of Arts and Sciences.

*1a. **Elementary Psychology.** First term. Credit three hours. Assistant Professor DALLENBACH and Mr. FELDMAN. Lectures M W, 12. *Goldwin Smith C.* Classroom work, F, 10, 11, or 12. Open to sophomores, juniors, and seniors.

*1b. **Elementary Psychology.** Second term. Credit three hours. Assistant Professor HOISINGTON and Dr. BISHOP. Lectures, M W, 12. *Goldwin Smith C.* Classroom work, F, 10, 11, or 12. Open to sophomores, juniors, and seniors.

2. **General Psychology, Problems and Points of View.** Second term. Credit three hours. Prerequisite course 1, 1a, or 1b. Professor WELD, Dr. BISHOP, Mr. FELDMAN, and Mr. NAFE. Lectures, T Th, 11. *Goldwin Smith C.* Classroom work, S, 10, 11, or 12.

3. **Experimental Psychology: Qualitative.** Repeated in second term. Credit three hours. Prerequisite course 1, 1a, or 1b. Professor WELD, Assistant Professors DALLENBACH and HOISINGTON, Dr. BISHOP, Mr. FELDMAN, and Mr. NAFE. M W F, 2-4. *Morrill, Psychological Laboratory.*

4. **Experimental Psychology: Quantitative.** Repeated in second term. Credit three hours. Prerequisite, courses 1, 1a, or 1b, and 3. Professor WELD, Assistant Professors DALLENBACH and HOISINGTON, Dr. BISHOP, Mr. FELDMAN, and Mr. NAFE. M W F, 2-4. *Morrill, Psychological Laboratory.*

*May not be counted for upperclass group.

[5. **Systematic Psychology: Sensation, Image.** First term. Credit three hours.] Not given in 1922-23.

5a. **Systematic Psychology: Perception, Idea.** First term. Credit three hours. Prerequisite course 3, or, by special permission, course 2. Professor WELD and Dr. BISHOP. Lectures, M W F, 9. *Morrill 42.*

[6. **Systematic Psychology: Feeling, Attention, Action.** Second term. Credit three hours.] Not given in 1922-23.

6a. **Systematic Psychology: Memory, Imagination, and Thought; Emotion and Volition.** Second term. Credit three hours. Prerequisite course 3, or, by special permission, course 2. Assistant Professors DALLENBACH and HOISINGTON. Lectures, M W F, 9. *Morrill 42.*

7. **Reading of German Psychology.** First term. Credit one hour. Professor WELD. Hour to be arranged. *Morrill 46.*

8. **Reading of French Psychology.** Second term. Credit one hour. Professor WELD. Hour to be arranged. *Morrill 46.*

9. **Psychological Problems.** Throughout the year. Credit one to five hours a term. Prerequisite course 4. Professor WELD, Assistant Professors DALLENBACH and HOISINGTON. *Morrill, Psychological Laboratory.*

For particulars of graduate work see the *Announcement of the Graduate School.*

PUBLIC SPEAKING

1. **Public Speaking.** Throughout the year. Credit three hours a term.

Sec. 1, M W F, 8. *Goldwin Smith 21.* Mr. HUDSON.

Sec. 2, M W F, 9. *Goldwin Smith 21.* Professor DRUMMOND and Dr. CAPLAN.

Sec. 3, M W F, 10. *Goldwin Smith 21.* Mr. HUDSON and Mr. HANNAH.

Sec. 4, M W F, 12. *Goldwin Smith 21.* Assistant Professor MUCHMORE and Dr. CAPLAN.

Sec. 5, T Th S, 8. *Goldwin Smith 21.* Mr. BAUER.

Sec. 6, T Th S, 10. *Goldwin Smith 21.* Mr. HANNAH and Mr. ———.

Designed to give the student the fundamentals of speech preparation and to help him acquire a simple, direct manner of speaking. Individual instruction by appointment. Required readings on selected topics.

The '86 Memorial Prize in declamation is awarded annually in connection with this course. (See pamphlet on prizes.)

1a. **Public Speaking.** Second term. Credit three hours.

Sec. 1, T Th S, 8. *Goldwin Smith 24.* Mr. HANNAH.

Sec. 2, T Th S, 9. *Goldwin Smith 21.* Mr. HUDSON.

Sec. 3, M W F, 11. *Goldwin Smith 21.* Dr. CAPLAN and Assistant Professor HUNT.

This course repeats the work of the first term in course 1.

*8. **Voice Training.** Repeated in second term. Credit one hour. Assistant Professor MUCHMORE. M W F, 10. *Goldwin Smith 26.*

*May not be counted for upperclass group

An elementary course for the improvement of untrained voices, and for the development of flexibility, strength, and purity of tone. Exercises to give poise and freedom to the body. Individual instruction by appointment.

8a. Voice Training. Second term. Credit one hour. Prerequisite course 8 and consent of instructor. Assistant Professor MUCHMORE. Hours to be arranged. *Goldwin Smith* 26.

Practice and discussions of assigned readings relating to the science underlying voice training. Especially for teachers.

10. Oral Reading. Throughout the year. Credit two hours a term. Assistant Professor MUCHMORE. T Th, 11. *Goldwin Smith* 21.

The aim of the course is simple, intelligent, and expressive reading, based on interpretative study of prose, poetry, and drama of assured literary value.

12. Argument and Debate. Throughout the year. Credit three hours a term. Prerequisite course 1 or 1a. Assistant Professor HUNT. T Th S, 12. *Goldwin Smith* 21.

The application of rules of evidence, types of argument, analysis, detection of fallacies, and dialectic method to public debate and discussion. Illustrative material will be drawn from the debates on the adoption of the federal constitution and from the Lincoln-Douglas campaign.

15. Advanced Public Speaking. Throughout the year. Credit three hours a term. Open by consent of instructor to those who have had four hours in other courses of this department, including two hours of 1 or 1a. Professor DRUMMOND. M W F, 12. *Goldwin Smith* 26.

Problems of interest, persuasion, and composition studied; notable speeches analyzed; speeches of various types prepared and delivered.

16. Rhetoric of Public Address. First term. Credit three hours. Open by consent of instructor to juniors and seniors who have had course 1, or its equivalent. Assistant Professor HUNT. Hours to be arranged.

Classical theory of rhetoric in relation to forms of persuasive address.

17. Great Orations. Second term. Credit three hours. Open by consent of instructor to juniors and seniors who have had course 1, or its equivalent. Assistant Professor MUCHMORE. Hours to be arranged.

An intensive study, including historical and biographical background, of selected British and American orations and addresses. Analyses, reports, and speeches on selected topics.

20. Seminary. Throughout the year. Credit three hours a term. For graduates. Open to seniors by permission. Professor DRUMMOND. Th, 3-6. *Goldwin Smith* 28.

For the study of special subjects in the history, literature, psychology, and pedagogy of public speech.

29. Oral Expression for Architects. First term. Credit three hours. (See the *Announcement of the College of Architecture*.)

30. Dramatic Interpretation. Throughout the year. No credit. Consent of director required. Professor DRUMMOND.

Especially for those intending to teach. Affords training in the interpretation and direction of plays, with practice in connection with the work of the Cornell Dramatic Club.

ROMANCE LANGUAGES

FRENCH

*1. **Elementary Course.** Repeated in second term. Credit six hours; for upperclassmen, four hours only. Mr. KEENAN in charge. First term, two sections: daily 8, 12. Second term, one section: daily 8.

*1a. **Elementary Course.** For students in the professional colleges. Throughout the year. Credit three hours a term. M W F, 12. *Goldwin Smith 281.*

Not open to students in Arts and Sciences. The course is continuous throughout the year and no credit is allowed for the first term alone.

*2 **Intermediate Course.** First term. Credit three hours. Prerequisite, first year French of the entrance requirements. T Th S, 10. *Goldwin Smith 281.*

*3. **Advanced Course.** Repeated in second term. Credit five hours; for upperclassmen, four hours only. Prerequisite course 1, 1a, 2, or second year entrance French. Mr. WADSWORTH in charge. First term, three sections: daily exc. S, 8, 9, 11. Second term, two sections: daily exc. S, 8, 12.

*3a. **Advanced Course.** For students in the professional colleges. Throughout the year. Credit three hours a term. Prerequisite course 1, 1a, 2, or second year entrance French. T Th S, 12. *Goldwin Smith 256.*

Not open to students in Arts and Sciences. The course is continuous throughout the year and no credit is allowed for the first term alone.

*4a. **Advanced Translation.** Repeated in second term. Credit three hours. Prerequisite course 3, 3a, or third year entrance French. Mr. BISHOP in charge. First term, six sections: M W F, 8; M W F, 9; M W F, 10; M W F, 2; T Th S, 10; T Th S, 11. Second term, four sections: M W F, 11; M W F, 12; T Th S, 8; T Th S, 11.

Translation and outside reading.

Courses 4a and 5a may profitably be taken at the same time.

*4b. **Advanced Translation.** Repeated in second term. Credit three hours. Prerequisite course 4a. Mr. BISHOP in charge. First term, one section: T Th S, 11. Second term, five sections: M W F, 8; M W F, 9; M W F, 10; M W F, 2; T Th S, 10.

Translation and outside reading..

*5a. **Elementary Composition.** Repeated in second term. Credit three hours. Prerequisite course 3, 3a, or third year entrance French. Mr. ARWOOD in charge. First term, four sections: M W F, 11; M W F, 2; T Th S, 9; T Th S, 12. Second term, three sections: M W F, 9; T Th S, 10; T Th S, 11.

*5b. **Elementary Composition.** Repeated in second term. Credit three hours. Prerequisite course 5a. Mr. ARWOOD in charge. First term, one section: T Th S, 11. Second term, two sections: M W F, 11; T Th S, 9.

7a. **Intermediate Composition.** Repeated in second term. Credit three hours. Prerequisite course 5b. Assistant Professor PUMPELLY. First term, two sections: T Th S, 10; M W F, 12. *Goldwin Smith 277.* Second term, two sections; T Th S, 9, *Goldwin Smith 290*; T Th S, 11, *Goldwin Smith 283.*

*May not be counted for upperclass group.

7b. **Intermediate Composition.** Repeated in second term. Credit three hours. Prerequisite course 7a. Assistant Professor PUMPELLY. First term, one section: M W F, 10, *Goldwin Smith* 277. Second term, two sections: T Th S, 10, *Goldwin Smith* 281; M W F, 12, *Goldwin Smith* 283.

8. **Intermediate Composition.** Second term. Credit three hours. Prerequisite course 7b. Assistant Professor PUMPELLY. M W F, 10. *Goldwin Smith* 290.

Composition, conversation, and discussion of selected topics in French grammar. Courses 7a, 7b, and 8 are conducted in French.

9. **Advanced Composition.** Throughout the year. Credit three hours a term. Prerequisite course 7b. Professor GUERLAC. M W F, 10. *Goldwin Smith* 283.

Intensive study of French syntax; rapid translation from English; original themes and talks by students on literary and historical topics. The course is conducted in French.

16. **History of French Literature.** Throughout the year. Credit three hours a term. Prerequisite course 4a. Professor MASON. M W F, 11. *Goldwin Smith* 142.

Lectures on French literature since the Middle Ages.

[17. **Literature of the Seventeenth Century.** Throughout the year. Credit three hours a term. Professor GUERLAC.] Not given in 1922-23. Courses 17 and 18 are usually given in alternate years.

18. **Literature of the Eighteenth Century.** Throughout the year. Credit three hours a term. Prerequisite course 10. Professor GUERLAC. M W F, 11. *Goldwin Smith* 290.

[19. **The Romantic Movement in French Literature.** Throughout the year. Credit three hours a term. Professor MASON.] Not given in 1922-23.

20. **Modern French Literature.** Throughout the year. Credit three hours a term. Prerequisite course 10. Professor MASON. M W F, 9. *Goldwin Smith* 290.

Study of the literature of the period, 1850-1900.

[21. **Contemporary French Literature.** Throughout the year. Credit three hours a term. Professor MASON.] Not given in 1922-23.

22. **French Phonetics.** Second term. Credit two hours. Professor MASON. M W, 8. *Library, French Seminary Room.*

23. **French Philology.** Throughout the year. Credit three hours a term. Prerequisite course 5a and entrance Latin. Assistant Professor PUMPELLY. Th, 3-5, and one hour to be arranged. *Goldwin Smith* 277.

Lectures on the historical development of the French language, with a detailed phonological and morphological study of the *Chanson de Roland*.

[30. **The Teaching of French.** First term. Credit two hours. For seniors and graduates. Professor MASON.] Not given in 1922-23.

[31. **Prose of the Sixteenth Century.** Second term. Credit one hour. Professor MASON.] Not given in 1922-23.

32. **Poetry of the Sixteenth Century.** Second term. Credit one hour. Professor MASON. F, 8. *Library, French Seminary Room.*

[34. **French Criticism.** Throughout the year. Credit one hour a term. Professor MASON.] Not given in 1922-23.

35. **History of Literary Criticism.** First term. Credit two hours. Professor GUERLAC. T Th, 10. *Goldwin Smith* 124.

A survey of French literary criticism from the 17th century to the 20th century.

36. **Lectures in French.** Second term. Credit two hours. Professor GUERLAC. T Th, 12. *Goldwin Smith* 283.

Dramatic literature from 1850 to the present time. Lectures, outside reading, and reports.

41. **Old French Texts.** Throughout the year. Credit two hours a term. Primarily for graduates. Professor HAMILTON. Hours to be arranged.

47. **Modern French Seminary.** Throughout the year. Credit two hours a term. Primarily for graduates. Professor MASON. T, 3. *Library, French Seminary Room.*

ITALIAN

*1. **Elementary Course.** Throughout the year. Credit three hours a term. Assistant Professor PUMPELLY. M W F, 9. *Goldwin Smith* 283.

The course is continuous throughout the year and no credit will be allowed for the first term alone.

4. **Modern Italian Literature.** Throughout the year. Credit three hours a term. Prerequisite course 1, or second year Italian of the entrance requirements. Professor HAMILTON. T Th S, 9. *Goldwin Smith* 242.

Translation, outside reading, and discussion of modern novels and plays.

14. **Dante.** First term. Credit three hours. Prerequisite course 4. Professor HAMILTON. M W F, 2. *Goldwin Smith* 281.

Lectures on Dante and the Middle Ages. The *Divina commedia* and the *Vita nuova* will be studied in detail.

[15. **Literature of the Renaissance.** Second term. Credit three hours. Professor HAMILTON.] Not given in 1922-23.

19. **Nineteenth Century Poetry.** Second term. Credit three hours. Prerequisite course 4. Professor HAMILTON. M W F, 2. *Goldwin Smith* 281.

41. **Old Italian.** Second term. Credit two hours. Primarily for graduates. Professor HAMILTON. Hours to be arranged.

ROMANCE PHILOLOGY

[1. **Low Latin.** Second term. Credit two hours. Primarily for graduates. Professor HAMILTON.] Not given in 1922-23.

2. **Old Provençal.** First term. Credit two hours. Hours to be arranged. Primarily for graduates. Professor HAMILTON.

[5. **Romance Phonetics.** Second term. Credit two hours. For upperclassmen and graduates. Professor KENISTON.] Not given in 1922-23.

*May not be counted for upperclass group.

SPANISH

***1. Elementary Course.** Repeated in second term. Credit six hours; for upperclassmen, four hours only. Mr. BERKOWITZ in charge. First term, two sections: daily, 8, 12. Second term, one section: daily, 8.

Students entering with one unit in Spanish should take the second half of Spanish 1 for three hours of credit.

***1a. Elementary Course.** For students in the professional colleges. Throughout the year. Credit three hours a term. Mr. ZAPATA Y TORRES. M W F, 12. *Goldwin Smith 177.*

Not open to students in Arts and Sciences. The course is continuous throughout the year and no credit is allowed for the first term alone.

***3. Advanced Course.** Repeated in second term. Credit five hours; for upperclassmen, four hours only. Mr. CROWELL in charge. Two sections: daily exc. S, 8, 9.

***4a. Advanced Translation.** Repeated in second term. Credit three hours. Prerequisite course 3, or third year entrance Spanish. Mr. CROWELL in charge. First term, three sections: M W F, 8; M W F, 11; T Th S, 12. Second term, two sections: T Th S, 9; T Th S, 10.

Translation, outside reading, and discussion of modern novels and plays. Courses 4a and 5a may profitably be taken at the same time.

***4b. Advanced Translation.** Repeated in second term. Credit three hours. Prerequisite course 4a. Mr. BERKOWITZ in charge. First term, one section: T Th S, 10. Second term, two sections: M W F, 8; T Th S, 12.

Translation, outside reading, and discussion of representative works of Spanish literature.

***5a. Elementary Composition.** Repeated in second term. Credit three hours. Prerequisite course 3, or third year entrance Spanish. Mr. ZAPATA Y TORRES. First term, two sections: T Th S, 9; T Th S, 10. Second term, two sections: M W F, 9; M W F, 10.

***5b. Elementary Composition.** Repeated in second term. Credit three hours. Prerequisite course 5a. Mr. ZAPATA Y TORRES. First term, one section: T Th S, 11. Second term, two sections: T Th S, 9; T Th S, 10.

7a. Intermediate Composition. Repeated in second term. Credit three hours. Prerequisite course 5b. Mr. ZAPATA Y TORRES. First term, T Th S, 12. *Goldwin Smith 277.* Second term, T Th S, 11. *Goldwin Smith 277.*

7b. Intermediate Composition. Second term. Credit three hours. Prerequisite course 7a. Mr. ZAPATA Y TORRES. T Th S, 12. *Goldwin Smith 281.*

Courses 7a and 7b are conducted in Spanish. Special emphasis is placed on the attainment of accuracy and fluency in both written and oral expression.

9. Advanced Composition. Throughout the year. Credit three hours a term. Prerequisite course 7a. Dr. SANJURJO. M W F, 11. *Goldwin Smith 281.*

Original themes and classroom discussion in Spanish on topics in modern Spanish and Spanish-American civilization.

*May not be counted for upperclass group.

[10. **History of Spanish Literature.** Throughout the year. Credit three hours a term. Prerequisite course 4a. Professor KENISTON.] Not given in 1922-23.

16. **The Picaresque Novel in Spain.** First term. Credit three hours. Prerequisite course 4b. Professor KENISTON. T Th S, 11. *Goldwin Smith* 290. Lectures, outside reading, and classroom discussions.

17. **Cervantes.** Second term. Credit three hours. Prerequisite course 10 or 16. Professor KENISTON. T Th S, 11. *Goldwin Smith* 290.

A detailed study of the *Don Quixote*; outside reading and discussion of the minor works.

[19. **Literature of the Nineteenth Century.** Throughout the year. Credit three hours a term. Prerequisite course 4b. Dr. SANJURJO.] Not given in 1922-23.

30. **The Teaching of Spanish.** Second term. Credit three hours. For upperclassmen and graduates. Professor KENISTON. T Th S, 10. *Goldwin Smith* 283.

33. **The Spanish Drama since 1800.** Throughout the year. Credit three hours a term. Prerequisite course 4b. Dr. SANJURJO. M W F, 10. *Goldwin Smith* 281.

Lectures in Spanish, outside reading, and reports.

[41. **Old Spanish.** Throughout the year. Credit two hours a term. Primarily for graduates. Professor KENISTON.] Not given in 1922-23.

43. **Seminary.** Throughout the year. Credit two hours a term. Primarily for graduates. Professor KENISTON. F, 3. *Library, French Seminary Room.*

Materials and methods of research in the field of Spanish literature.

SCANDINAVIAN LANGUAGES AND LITERATURES

1. **Old Icelandic.** Throughout the year. Credit three hours a term. Assistant Professor HERMANNSSON. T Th S, 11. *Library, Greek and Latin Seminary Room.*

Grammar; reading of sagas, Eddic and skaldic poems. For advanced students and graduates.

2. **Danish (and Dano-Norwegian).** Throughout the year. Credit two hours a term. Assistant Professor HERMANNSSON. M W, 11. *Library, Greek and Latin Seminary Room.*

Grammar; reading of works by modern Danish and Norwegian authors.

[3. **Swedish.** Throughout the year. Credit two hours a term. Assistant Professor HERMANNSSON.] Not given in 1922-23.

[4. **Norse Mythology.** First term. Credit one hour. Assistant Professor HERMANNSSON. Lectures and readings; knowledge of Icelandic required.] Not given in 1922-23.

5. **Old Norse-Icelandic Literature.** First term. Credit two hours. Assistant Professor HERMANNSSON. W F, 3. *Goldwin Smith* 164.

Lectures on the Eddic poetry, the skalds, the sagas, etc.

6. **Modern Scandinavian Literatures.** Second term. Credit two hours. Assistant Professor HERMANSSON. W F, 3. *Goldwin Smith* 160.
Lectures on selected periods of modern Scandinavian literatures.
- [7. **Early Scandinavian Civilization and History.** Throughout the year. Credit two hours a term. Assistant Professor HERMANSSON.] Not given in 1922-23.

SEMITIC LANGUAGES AND LITERATURES AND ORIENTAL HISTORY

- 1a. **Hebrew.** First term. Credit three hours. Professor SCHMIDT. M T Th, 2. *Goldwin Smith* 127.
Open only to juniors, seniors, and graduates.
- 1b. **Advanced Hebrew.** First term. Credit two hours. Prerequisite course 1a. Professor SCHMIDT. T Th, 8. *Goldwin Smith* 127.
The Book of Job, and Hebrew meter.
- 2a. **Arabic.** First term. Credit two hours. Professor SCHMIDT. T Th, 9. *Goldwin Smith* 127.
Open only to juniors, seniors, and graduates.
- 2b. **Advanced Arabic.** First term. Credit two hours. Prerequisite course 2a. Professor SCHMIDT. W F, 2. *Goldwin Smith* 127.
Meccan suras, and Prolegomena of Ibn Khaldun.
3. **Ethiopic.** First term. Credit two hours. Prerequisite courses 1a, 2a. Professor SCHMIDT. T Th, 3. *Goldwin Smith* 127.
Primarily for graduates.
- 4a. **Assyrian.** First term. Credit two hours. Prerequisite courses 1a, 2a. Professor SCHMIDT. T Th, 4. *Goldwin Smith* 127.
- 4b. **Aramaic.** First term. Credit two hours. Prerequisite course 1a. Professor SCHMIDT. T Th, 5. *Goldwin Smith* 127.
Inscriptions, Daniel ii-vii, and the Elephantine Papyri.
- 5a. **Egyptian.** First term. Credit two hours. Prerequisite courses 1a, 2a. Professor SCHMIDT. W, 4-6. *Goldwin Smith* 127.
Hieroglyphic texts. Primarily for graduates.
- 5b. **Coptic.** First term. Credit two hours. Prerequisite course 5a. Professor SCHMIDT. F, 4-6. *Goldwin Smith* 127.
Selections from the Gospels and from Pistis Sophia. Primarily for graduates.
6. **Biblical Literature.** First term. Credit two hours. Professor SCHMIDT. M W, 3. *Goldwin Smith* 120.
General introduction to the Bible. Open to juniors, seniors, and graduates. No knowledge is required of Semitic languages or of Greek.
7. **Semitic Seminary.** First term. Credit two hours. Prerequisite courses 1a, 4b. Professor SCHMIDT. M, 4-6. *Goldwin Smith* 127.
The Psalms and Odes of Solomon in the Syriac, and the Zadokite document.
8. **Comparative Semitic Philology.** First term. Credit one hour. Professor SCHMIDT. F, 3. *Goldwin Smith* 127. For graduates only.
- 9b. **Oriental History.** First term. Credit two hours. Professor SCHMIDT. T Th, 10. *Goldwin Smith* 256.

A general survey of the history of Africa. Open to juniors, seniors, and graduates.

ZOOLOGY

***1. General Zoology.** Throughout the year. Credit three hours a term. Professor REED. Assistant Professor YOUNG, Miss FISHER, Miss MEKEEL, and Miss McMULLEN. Two lectures and one laboratory period weekly. Lectures, *Goldwin Smith* B, Section 1, T Th, 9; Section 2, T Th, 11. Laboratory sections, *McGraw* 2, M T W F, 2-4.30; F, 9-11.30; S, 8-10.30.

A comprehensive view of the subject including the fundamentals of animal biology, the principles of structure, function, origin, and perfection of animal life, and a consideration of generalizations in zoological theory which seem to be the best founded. Animal types and their classification are employed as a service-base from which study may proceed.

Registration with the department before instruction begins is necessary for the assignment of lecture and laboratory sections.

***1a. General Zoology.** Second term. Credit three hours. Assistant Professor Young. Lecture, Th, 10. *McGraw* 5. Laboratory, *McGraw* 2, T Th, 2-4.30.

A general survey of the animal phyla with special emphasis on some of the fundamental biological principles. The classification of the larger and economic divisions is included in the course.

Primarily for veterinary students and pre-medical students who enter the University the second semester or change to a pre-medical course at that time. Registration with the department before instruction begins is necessary.

2. Invertebrate Zoology. Throughout the year. Credit three hours a term. Assistant Professor YOUNG. Three lecture-laboratory periods to be arranged, preferably on M W F, 2-4.30, *McGraw* 2-B.

A study of the structure, development, and relationship of, and the application of biological principles to invertebrate animals. The laboratory work consists of dissections or microscopic study of type forms and observations on living animals. Field periods will be devoted to the collection of material for laboratory use and the study of the local fauna.

3. Comparative Anatomy and Morphology of Vertebrates. Throughout the year. Credit four hours a term. Professor REED and Dr. GAMBLE. Lectures, W, 9 (or some other more convenient hour). *McGraw* 5. Laboratory, sections: 1, M W F, 2-4.30; 2, T Th, 2-4.30; S, 8-10.30. For students preparing for medicine and major work in animal biology.

The lectures may be taken without the laboratory work for one hour credit a term by those who are qualified. The laboratory work without the lectures may be elected for three hours credit a term.

A thorough dissection and study of the several systems of organs of each class of vertebrates. The lectures consider the various systems with reference to the significance of structure in establishing homologies and the theories of vertebrate phylogeny. Prerequisite courses 1 or 1a.

*May not be counted for upperclass group.

[4. **Protozoology.** Second term. Credit three hours. Prerequisite courses 1 and 2.] Not given in 1922-23.

5. **Systematic Vertebrate Zoology and Ecology.** Throughout the year. Credit three hours a term. Assistant Professor WRIGHT. Lectures, M, 8. *McGraw 7*. Laboratory, *McGraw 7*. Section 1, M W, 2-4.30; Section 2, T Th, 2-4.30.

Lectures on fishes, amphibians, reptiles, birds and mammals, dealing with the principles of classification and nomenclature; the characters and relationships of these groups; the habits, life histories, and principles of coloration. Laboratory study of the parts employed in classification and a practical identification of species of North American vertebrates. Field work on the various groups is given during the fall and spring.

6. **Field Ornithology.** Second term. Credit three hours. Lecture, W, 11. *McGraw 5*. Field work and laboratory, T Th, 2-4.30, or W F, 2-4.30. Assistant Professor ALLEN and Mr. LEISTER.

This course is intended primarily for students wishing to gain a knowledge of local birds, their habits, songs, nests, and eggs, their relation to agriculture, and the general principles of their conservation. Field work will be supplemented by laboratory studies, and after the first of May field trips will be held at 5.30 a. m.

7. **Ichthyology, Advanced Systematic and Field Zoology.** Second term. Credit three hours. Assistant Professor WRIGHT. Lectures, T Th, 9. *McGraw 7*. Laboratory, F, 2-4.30, or S, 8-10.30.

[8. **Herpetology.** First term. Credit three hours. Assistant Professor WRIGHT.] Not given in 1922-23.

9. **Advanced Ornithology.** First term. Credit three hours. Prerequisite, course 5 or 6. Lecture, W, 11. *McGraw 5*. Laboratory and field work, T Th, 2-4.30. Assistant Professor ALLEN and Mr. LEISTER.

A consideration of the birds of the world. The lectures will include the structure and classification of birds; geographical distribution; the literature and institutions of ornithology. Laboratory periods will be devoted to the identification of skins of native and exotic representatives of the different families of birds. The first part of the term will be devoted to field work on the fall migration and the identification of birds in winter plumage.

10. **Mammalogy.** First term. Credit three hours. Assistant Professor WRIGHT. Lectures, W F, 10. *McGraw 7*. Laboratory, F, 2-4.30, or S, 8-10.30.

[11. **Economic Ornithology and Mammalogy.** First term. Credit three hours. Should be preceded by course 5 or 6; presupposes an elementary knowledge of botany and entomology. Assistant Professor ALLEN and Mr. LEISTER.] Not given in 1922-23.

12. **Mammalian Anatomy.** Second term. Credit three hours. Dr. GAMBLE. Laboratory, M W F, 2-4.30. Conferences at hours to be arranged.

This course is designed to present the fundamentals of mammalian structure, to give practice in acquiring manipulative skill in dissection, and to lay a foundation for the study of the human body. Prerequisite course 1 or 1a.

17. **Special Problems and Research.** Throughout the year. Credit one or more hours. For seniors and graduates only. Opportunity is given for

*May not be counted for upperclass group.

the pursuit of special phases of zoological study, further than is permitted by the more elementary courses, and for investigation.

Permission necessary for registration.

18. **Seminary in Systematic Vertebrate Zoology.** Throughout the year. Credit one hour a term. Zoogeography of the New World. Life zone plans of the New World, 1820-1920. Assistant Professor WRIGHT. Hours to be arranged.

Department Conference. The department staff and graduate students meet either weekly or fortnightly throughout the year for the review of new books and current periodicals and the presentation of original investigations.

UNIVERSITY REQUIREMENTS FOR THE DEGREES A.B. AND B. CHEM.

HYGIENE AND PREVENTIVE MEDICINE

All freshmen and sophomores are required to take lectures in hygiene. These lectures will cover (a) General Hygiene, (b) Individual Hygiene, (c) Group Hygiene, (d) Intergroup Hygiene. The lectures will be given once a week at times and places to be announced.

MILITARY SCIENCE AND TACTICS

1. **Practical and Theoretical Training.** Throughout the year. Every able-bodied male student, a candidate for a baccalaureate degree, who is required to take five, six, seven, eight, or more terms in residence, must take in addition to the scholastic requirements for the degree, one, two, three, or four terms respectively in the Department of Military Science and Tactics. Three hours a week. Two hours on either M T W or Th, 3.15-5.15 p. m., as student may elect; and F, 4.45-5.45 p. m. *New York State Drill Hall.*

The requirements in Military Science and Tactics must be completed in the first terms of residence; otherwise the student will not be permitted to register again in the University without the consent of the University Faculty.

The course of training is that prescribed by the War Department as basic for Infantry and Field Artillery units (as elected) of Reserve Officers' Training Corps. The Infantry includes instruction in Physical training, disciplinary drills, ceremonies, military courtesy, auxiliary weapons (machine guns, automatic rifles, 37 m/m guns and trench mortars), indoor and outdoor rifle practice, pistol practice, topography and mapping, tent pitching and camp sanitation, signalling, bayonet combat, field engineering, field maneuvers, interior guard duty, fundamental principles in minor tactics and leadership. The Field Artillery includes instruction in organization of the battery, customs of the service, military courtesy and discipline, individual equipment, pistol practice, hippology, gunnery, signalling, physical training, equitation and horsemanship, topography and reconnaissance, and motors.

2. **Elective Military Training.** Throughout the year. Credit two hours a term. Hours by assignment. *New York State Drill Hall.*

This is the advanced course prescribed by the War Department for units of the Reserve Officers' Training Corps, and includes three hours each week in the

performance of the duty of officer or non-commissioned officer with organizations undergoing the training given under course 1, and two hours each week of theoretical instruction in preparation for such duties. Prerequisite course 1.

Course 2 may be elected only by permission of the Dean of the College of Arts and Sciences, and the Professor of Military Science and Tactics, but credit for this course may not be counted toward the ninety hours required in this college (see page xii.) To enjoy the benefits offered by the Federal Government the student must agree to continue the course for four terms, and to attend one summer camp having a duration of about six weeks.

PHYSICAL TRAINING FOR MEN

1. **For Freshmen Excused from Drill.** Throughout the year. Three periods a week. Class and squad work and prescribed exercises. Mr. AUER and assistants.

2. **For Sophomores Excused from Drill.** Throughout the year. Three periods a week. Class and squad work and prescribed exercises. Mr. AUER and assistants.

3. **For Juniors and Seniors.** Building up and corrective exercises as prescribed by the Medical Examiners as a result of the term's physical examination required of all students in the University. Mr. WHITESIDE.

4. Boxing and wrestling instruction for a small fee, at hours to be arranged. Mr. FALLON and Mr. O'CONNELL.

5. Swimming instruction, 4 to 6 p. m., daily except Saturday. Mr. GRAY.

PHYSICAL TRAINING FOR WOMEN

6. **For Freshmen.** Throughout the year. Three periods a week. Miss BATEMAN, Miss READ, Miss HARRISON, Miss CANFIELD, and Miss CASHO.

7. **For Sophomores.** Throughout the year. Three periods a week. Miss BATEMAN, Miss READ, Miss HARRISON, Miss CANFIELD, and Miss CASHO.

The work of the two years consists of outdoor games and exercises from the beginning of the year to Thanksgiving, and from the Easter vacation to the end of the year. From Thanksgiving to Easter the work is in large part indoors, and consists of floor exercises, folk and aesthetic dancing, and indoor games, in all of which certain prescribed tests must be met at the end of each period. For further information as to the required work in physical training, see the handbook issued by the Department.

8. **For Juniors and Seniors.** Building up and corrective exercises as prescribed by the Medical Examiners as a result of the term's physical examination required of all students in the University. Miss BATEMAN and assistants.

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