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## ANNOUNCEMENT OF THE COLLEGE OF ARTS AND SCIENCES 1912-13

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## STUDY CARDS

must be filed at the office of the Dean, 143 Goldwin Smith Hall, not later than 5 p. m. on the following days:

For first term, 1912-13,

sophomores, juniors, and seniors, Tuesday, May 28, 1912,

freshmen and other new students, Saturday, September 28, 1912.

For second term, 1912-13,

all students, Wednesday, January 22, 1913.

Underclassmen, candidates for the degree of Bachelor of Arts, in filling out their study cards should conform to paragraphs thirteen and fourteen, upperclassmen to paragraph fifteen, of the requirements for that degree, printed on pages i-iii; and freshmen should observe the list of courses open to them as there printed. The original card of each student must bear the endorsement of his adviser.

Candidates for the degree of Bachelor of Chemistry in filling out their study cards should conform to the outline of the course as printed on page iv. Before submitting their study cards to the Dean, they should secure the endorsement of the Department of Chemistry.

No student in the College will be recognized by any department as a member of any of its classes until his registration has been made at the Dean's office.

## CALENDAR, 1912-13

Sept. 13,	Friday,	Entrance examinations begin.
Sept. 23,	Monday,	Academic year begins. Registration of new students. Scholarship examinations begin.
Sept. 24,	Tuesday,	Registration of new students.
Sept. 25,	Wednesday,	Registration of old students.
Sept. 26,	Thursday,	Instruction begins. President's annual address to the students.
Nov.	Thursday-Friday,	Thanksgiving recess.
Dec. 23,	Monday,	Instruction ends
Jan. 6,	Monday,	Instruction resumed } Christmas Recess.
Jan. 11,	Saturday,	Founder's Day.
Jan. 27,	Monday,	Term examinations begin.
Feb. 8,	Saturday,	Registration, undergraduates.
Feb. 10,	Monday,	Instruction begins.
April 2,	Wednesday,	Instruction ends
April 8,	Tuesday,	Instruction resumed } Spring Recess.
May 31,	Saturday,	Navy Day.
June 2,	Monday,	Term examinations begin.
June		Commencement.
July 7,	Monday-	
Aug. 15,	Friday,	Summer Session.

## 1913-14

Sept. 12,	Friday,	Entrance examinations begin.
Sept. 22,	Monday,	Academic year begins. Registration of new students. Scholarship examinations begin.
Sept. 23,	Tuesday,	Registration of new students.
Sept. 24,	Wednesday,	Registration of old students.
Sept. 25,	Thursday,	Instruction begins. President's annual address to the students.
Nov.	Thursday-Friday,	Thanksgiving recess.
Dec. 20,	Saturday,	Instruction ends
Jan. 5,	Monday,	Instruction resumed } Christmas Recess.
Jan. 11,	Sunday,	Founder's Day.
Jan. 26,	Monday,	Term examinations begin.
Feb. 7,	Saturday,	Registration, undergraduates.

# THE COLLEGE OF ARTS AND SCIENCES

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

1. The requirements for the degree of Bachelor of Arts are residence for eight terms\*, and in addition to the prescribed work in the Departments of Physical Culture and Military Science and Tactics, the completion of one hundred and twenty hours of work under the rules governing the choice of studies.

### TERMS AND HOURS

2. In case a student has gained college credit by passing at admission the examinations set for that purpose, the amount of such credit will be deducted from the one hundred and twenty hours required for graduation, and a student of whom not more than one hundred and eight hours are thus required for graduation will be considered as having completed one term of residence.

3. A student who has satisfied the entrance requirements of this College, and has afterwards completed in two or more summer sessions of Cornell University at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied a term of residence. Under no circumstances shall work done in summer sessions be accepted as the equivalent of more than two terms. Subject to the same restrictions as apply to courses in the Cornell Summer Session, courses pursued in summer sessions of universities belonging to the Association of American Universities, by a student regularly registered in this College or in a college of like standing, may be credited towards the degree of Bachelor of Arts, if recommended by the appropriate department of this College, and if the institution where such summer courses were pursued shall certify that those courses, if pursued by a student regularly registered there, would be credited towards the corresponding degree in that college.

4. A student admitted to the College of Arts and Sciences from another college of Cornell University or from any other institution of collegiate rank shall be regarded as having completed the number of terms and of hours to which his records entitle him, and will receive all the privileges of students who have completed the same number of terms and hours by residence in the College. In order, however, to obtain the degree of Bachelor of Arts he must have been in residence at least two terms in the College of Arts and Sciences, and in that College only.

5. The degree of Bachelor of Arts will not be conferred unless the last two of the required eight terms have been spent in Cornell University.

6. A student must register for at least twelve hours each term. A student registering for the first time may register and receive credit for a maximum

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\*The academic year is divided into two terms.

of eighteen hours for the term. A student whose marks average 85 or more in any term may register and receive credit for a maximum of twenty hours for the following term. A student whose marks average less than 85 in any term may register and receive credit for a maximum of eighteen hours for the following term.

7. A student desiring to elect courses outside the College of Arts and Sciences must first obtain the approval of the Faculty. But any student who, while registered in the College of Arts and Sciences only, is permitted to pursue a course or courses in another college, shall have the number of hours that he may take in any other college under the provisions of paragraph 8 correspondingly reduced, and under no circumstances will he be allowed to take more than thirty hours under the provisions of this paragraph.

8. A student who has satisfied at least six terms of residence, no one of them under the provisions of paragraph 2, and who has a credit of at least ninety hours, 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.

#### CHOICE OF STUDIES

9. A student registering in the College of Arts and Sciences for the first time must hand in his study card with list of courses for the term at the Dean's office on or before the third day of instruction.

10. Two weeks before the end of each term a student must hand in his study card with list of courses for the next term at the Dean's office.

11. With the consent of the Dean, a student may alter his list of courses in the first term prior to the seventh day of instruction, and in the second term prior to the second day of instruction.

12. Thereafter no student shall have the right to withdraw from 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.

13. Each freshman and sophomore must obtain on his study card the signature of an underclass adviser before handing in the card to the Dean. Advisers will be assigned by the chairman of the Committee on Underclass Advisers, Goldwin Smith 159. The function of the adviser is to consult with the student regarding his choice of studies, to confer with him during the term regarding his work, and in general to give him such friendly counsel as he may desire.

14. Before a student may be registered as a junior he must have completed sixty hours of work which shall include in English and history six hours, in one or more languages other than English six hours, in philosophy and mathematics six hours, and in physics, chemistry, geology, physical geography, and the biologic sciences six hours, of which 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, philosophy six hours), or partly in one and partly in another (for example, philosophy three hours and mathematics three hours). College credit gained under paragraph 2 may not be applied in satisfaction of any of these required groups of six hours.

15. Each student shall choose at the beginning of his junior year one of the following groups:

- |                                   |  |
|-----------------------------------|--|
| 1. Ancient Languages.             | 7. Physics.                                |
| 2. Modern Languages.              | 8. Chemistry.                              |
| 3. English and Oratory.           | 9. Botany.                                 |
| 4. Philosophy and Education.      | 10. Zoology and Entomology.                |
| 5. History and Political Science. | 11. Physiology, Histology, and Embryology. |
| 6. Mathematics and Astronomy.     | 12. Geology and Physical Geography.        |

In the group thus chosen he must complete during his junior and senior years at least twenty hours of work. In selecting these twenty hours the student must obtain the advice and approval of some one professor or assistant professor within the group, who shall be chosen by the student himself, and whose signature must appear on the study card before it is filed with the Dean. But a senior in this college who is registered also in some other college of Cornell University is excused from ten of these twenty hours.

#### COURSES OPEN TO FRESHMEN WITHOUT SPECIAL PERMISSION OF THE ADMINISTRATIVE BOARD IN CHARGE OF FRESHMEN AND SOPHOMORES

Greek, 1, 3, 5; Latin, A, 1, 1a, 3, 4; Germanic Languages, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 33; Romance Languages, 1, 2, 3, 4, 5, 6, 30, 32, 40, 42, 44; English, 1, 3; History, 1, 21; Political Science, 51b; Bibliography, 1, 1a; Mathematics, 1, 2, 3, 5, 6a, 7a, 7b, 7c; Physics, 1, 5, 6, 10; Chemistry, 1, 6, 7; General Biology, 1; Botany, 1, 2; Entomology, etc., 4, 5; Vertebrate Zoology and Neurology, 1, 2; Geology, 1, 2, 11.

#### THESES

Any senior in the College of Arts and Sciences who is a candidate for the degree of Bachelor of Arts may 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, in the discretion of the department. Arrangements regarding a baccalaureate thesis should be made, when possible, at the close of junior year, and may not be made later than the fifteenth day of October in senior year.

#### VOCATIONAL STUDY

A student preparing to be a teacher should consult the directions given by the School of Education on page 24.

Students preparing for other vocations, such as journalism, banking, business, philanthropy, or the various forms of civil service, are advised to plan their studies with the assistance of the professors most intimately concerned.

A student who intends to follow chemistry as a profession should pursue the course leading to the degree of Bachelor of Chemistry.

## THE DEGREE OF BACHELOR OF CHEMISTRY

The requirements for the degree of Bachelor of Chemistry are residence for eight terms and the completion of the following courses.

## First Year

	No. of Course	First Term	Second Term
Introductory Inorganic Chemistry.....Chemistry	1	6	-
Qualitative Analysis.....Chemistry	7	-	6
Analytic Geometry, Differential Calculus, Integral Calculus.....Mathematics	7	5	5
Introductory Experimental Physics.....Physics	1	-	4
Drawing.....Sibley College	D 3	3	-
First Year English.....English	1	4	4

## Second Year

Quantitative Analysis.....Chemistry	12	6	-
Organic Chemistry.....Chemistry	30	6	6
Microchemical Methods.....Chemistry	65	0 or 2	2 or 0
Gas Analysis.....Chemistry	19 & 20	4 or 0	0 or 4
Introductory Physics.....Physics	6	-	4
Introductory Physical Experiments.....Physics	10	-	2
Crystallography.....Geology	12	3	-
Elective.....		-	3

## Third Year

Introductory Physical Chemistry.....Chemistry	50	3	3
Physical Chemistry Laboratory.....Chemistry	51	3	3
Spectroscopic Chemical Analysis.....Chemistry	17	-	3
Quantitative Analysis, Lectures.....Chemistry	15	-	2
Advanced Quantitative Analysis.....Chemistry	14	-	4
Physical Experiments.....Physics	14	3	1
Mechanics.....Sibley College	M 5	5	-
Mechanical Laboratory.....Sibley College	X 11	-	3
Elective.....		3	-

## Fourth Year

Electrical Engineering Laboratory....Sibley College	E 13	4	-
Mechanical Laboratory.....Sibley College	X 20	3	-
Research.....Chemistry	96(at least)	4	4
Electives.....at least		5	5

In choosing his elective subjects in the senior year the student is advised to select as his special field some one of the following six divisions of chemistry: inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry, sanitary chemistry, or agricultural chemistry. While the greater part of the elective work should lie in the field thus chosen, the remainder may comprise

courses in any division of chemistry, or such other courses as may be approved by the department of Chemistry.

A student who has satisfied the entrance requirements of the course leading to the degree of Bachelor of Chemistry, and has afterwards completed in two or more summer sessions of Cornell University the equivalent of at least twelve hours of the courses specified in the foregoing outline, may be regarded as having thus satisfied a term of residence. Under no circumstances will work done in summer sessions be accepted as the equivalent of more than two terms. Subject to the same restrictions as apply to courses pursued in the Cornell Summer Session, courses taken in summer sessions of universities belonging to the Association of American Universities, by a student regularly registered in the College of Arts and Sciences of Cornell University or in a college of like standing may, if approved by the Department of Chemistry, be credited toward the degree of Bachelor of Chemistry.

A student admitted from a college of Cornell University or from another institution of collegiate rank to candidacy for the degree of Bachelor of Chemistry will be regarded as having completed the number of terms and the courses to which his records entitle him. But in order to obtain the degree he must have been a candidate and in residence for at least two terms in this College, and in this College only.

A student must register for at least twelve hours each term. No student may without special permission of the Department of Chemistry register for more than nineteen hours in any term.

A student registering in the College of Arts and Sciences for the first time must hand in his study-card with list of courses for the term at the Dean's office on or before the third day of instruction.

Two weeks before the end of each term a student must hand in his study-card with list of courses for the next term at the Dean's office.

A student may make changes in his list of courses only as specified in paragraphs 11 and 12 under "The Degree of Bachelor of Arts." These paragraphs apply equally to candidates for the degree of Bachelor of Chemistry.

### **COURSES TO BE COMPLETED IN OTHER COLLEGES**

A student intending to follow the five year course leading to the degree of Civil Engineer, of which an outline is given in the Announcement of the College of Civil Engineering, or that leading to the degree of Mechanical Engineer, of which an outline is given in the Announcement of Sibley College, is subject in all respects, while registered in the College of Arts and Sciences, to the same regulations as are candidates for the degree of Bachelor of Arts, except that he should register in his freshman and sophomore years, and may receive credit, for all courses specified in the outline which he elects to follow; but he may not register or receive credit, during those years, for any other courses in mathematics, physics, or chemistry, or any other courses outside the College of Arts and Sciences than those there specified; nor may he register, during his freshman or sophomore year, for any course in the College of Arts and Sciences which is specified for a later year of the outline which he is following.



# COURSES OF INSTRUCTION

## SEMITIC LANGUAGES AND LITERATURES

1. **Hebrew.** Throughout the year, credit three hours a term. Professor SCHMIDT. M T Th, 2, Goldwin Smith 127.

Grammar (Harper, Gesenius—Kautzsch). Genesis. Ruth and Esther at sight. Exercises in composition. Open only to juniors, seniors, and graduates.

2a. **Arabic.** Throughout the year, credit two hours a term. Professor SCHMIDT.

Grammar (Socin, Wright, Caspari—Müller). Selections from prose writers, poets, and the Qurân. Primarily for graduates.

[2b. **Advanced Arabic.** Throughout the year, credit two hours a term. Prerequisite course 2a. Professor SCHMIDT.

Grammar (Wright-DeGoeje). A group of early suras in the Qurân. Selections from the Prolegomena of Ibn Khaldun.] Not given in 1912-13.

3. **Ethiopic.** Throughout the year, credit two hours a term. Prerequisite courses 1, 2. Professor SCHMIDT. T Th, 3, Goldwin Smith 127.

Grammar (Dillmann-Bezold). Liber Baruch in Dillmann's Chrestomathia Aethiopica, and The Book of Enoch, xxxvii-lxxi (ed. Charles). Study of Ethiopic manuscripts. Open only to students who have had Arabic. Primarily for graduates.

[4a. **Assyrian.** Throughout the year, credit two hours a term. Prerequisite courses 1, 2. Professor SCHMIDT.

Grammar (Lyon, Delitzsch). Selections from Meissner's Chrestomatie, Delitzsch's Lesestücke. and Rawlinson's Cuneiform Inscriptions of Western Asia. Open only to graduates.] Not given in 1912-13.

4b. **Aramaic.** Throughout the year, credit two hours a term. Professor SCHMIDT. T Th, 4, Goldwin Smith 127.

Grammar (Nestle, Nöldeke, Duval). The Gospel of Matthew in the Sinaitic Syriac, the Curetonian Fragments, the Peshita, and the Evangelium Hierosolymitanum. Inscriptions in the Corpus Inscriptionum Semiticarum, and the Elephantine Papyri.

5a. **Egyptian.** Throughout the year, credit two hours a term. Prerequisite courses 1, 2. Professor SCHMIDT. W, 4-6, Goldwin Smith 127.

Grammar (Erman). Hieroglyphic texts. Study of squeezes in the Eisenlohr collection. Primarily for graduates.

[5b. **Coptic.** Throughout the year, credit two hours a term. Prerequisite course 5a. Professor SCHMIDT.

Grammar (Steindorff). Selections from the Gospels and from Pistis Sophia. Primarily for graduates.] Not given in 1912-13.

6. **Semitic Literature.** Throughout the year, credit two hours a term. Professor SCHMIDT. M W, 3, Goldwin Smith 120.

General introduction to the Bible, including Apocrypha and Pseudepigrapha, and special introduction to each book. Designed to give in brief compass the results of scientific inquiry concerning the origin, date, composition, and character of the Jewish and Christian Scriptures. Preparation of papers, discussion of special topics, and examinations. Open to juniors, seniors, and graduates. No knowledge is required of Semitic languages or of Greek.

7. **Semitic Seminary.** Throughout the year, credit two hours a term. Prerequisite courses 2a, 2b. Professor SCHMIDT. M, 4-6, Goldwin Smith 127.

Study of Arabic inscriptions in Berchem's Corpus Inscriptionum Arabicarum, or Exodus in the Hebrew text and the ancient versions.

8. **Comparative Semitic Philology.** Throughout the year, credit one hour a term. Prerequisite courses 1, 2, 4b. Professor SCHMIDT. F, 3, Goldwin Smith 127.

Study of certain morphological and syntactical peculiarities of the Aramaic dialects. Interpretation, for purposes of comparison, of texts in Mandaic, Babylonian Talmudic, ancient and modern Syriac, Galilaeen, Samaritan and Judaeen Aramaic, Palmyrene, and Nabataean. For graduates.

[9a. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. Introduction to the history of Asia.] Not given in 1912-13.

9b. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. T Th, 10, Goldwin Smith 120.

Introduction to the history of Africa. This course, like the one given in alternate years on Asia, is designed to acquaint the student in a general way with the civilization of the Orient; sources, methods of study, and present problems; the great epochs, the leading personalities, and the chief institutions. The history of Egypt, Libya and the Cyrenaica, Carthage, Mauretania, Nubia, Ethiopia, and the various Egyptian and Maghrebite caliphates in outline, and the growth of European influence in Modern Africa. The illustrative material of the department will be used. Preparation of papers, and frequent examinations. Open to juniors, seniors, and graduates.

## GREEK

1. **Elementary Greek.** The essentials of the grammar; simple exercises in composition; reading of Xenophon's *Anabasis*, books I-IV; selections from the New Testament in Greek. Throughout the year, credit six hours a term. This course is however continuous through the year, and no credit will be allowed for the first term alone. Assistant Professor JONES. Daily, 9, Goldwin Smith 134.

This course is designed for and may be elected by all students that wish to acquire, by extraordinary effort in one year, the ability to read Attic prose.

3. **Plato's *Apology*, *Crito*, and Selections; Homer's *Odyssey*.** Throughout the year, credit three hours a term. Prerequisite course 1. Assistant Professor JONES. T Th S, 10, Goldwin Smith 134. May, by permission, be entered in the second term.

5. **Lysias.** First term, credit two hours. Open to those who have taken or are taking course 3, with which it affords an opportunity for freshmen to take five hours of Greek. Assistant Professor JONES. M W, 10, Goldwin Smith 137.

Selected speeches of Lysias illustrative of normal Attic prose and of the simple style in oratory. Collateral lectures on the development of Attic oratory.

[6. **Herodotus.** Second term, credit two hours. Open to those who have taken or are taking course 3, with which it affords an opportunity for freshmen to take five hours of Greek. Professor BRISTOL. The story of the Persian Wars will be read.] Not given in 1912-13.

7. **Greek Composition.** Throughout the year, credit one hour a term. Prerequisite course 3 or the equivalent. Assistant Professor JONES. S, 11, Goldwin Smith 137.

This course is based on a systematic and practical study of Greek grammar.

10. **Euripides, the *Iphigenia in Tauris* and the *Medea*.** First term, credit three hours. Prerequisite course 3 or the equivalent. Professor STERRETT. M W F, 11, Goldwin Smith 134.

11. **Sophocles, the *Oedipus Tyrannus* and the *Antigone*.** Second term, credit three hours. Prerequisite courses 3 and 10 or the equivalent. Professor STERRETT. M W F, 11, Goldwin Smith 134.

15. **Demosthenes, On the Crown.** First term, credit two hours. Prerequisite courses 3, 10, 11, or the equivalent. Professor BRISTOL. M, and either T or W, at hours to be arranged, Goldwin Smith 137.

16. **Aristophanes** (two comedies). Second term, credit two hours. Prerequisite courses 3, 10, 11. Professor STERRETT. T Th, 12, Goldwin Smith 137.

20. **Theocritus, Bion, and Moschus.** First term, credit two hours. Professor STERRETT. T Th, 12, Goldwin Smith 137. Open to seniors and graduates.

21. **Plato, the Republic.** Second term, credit two hours. Assistant Professor JONES. T Th, 12, Goldwin Smith 134. Open to seniors and graduates.

23. **Greek Literature.** Throughout the year, credit two hours a term. Professor STERRETT. T Th, 11, Goldwin Smith 137. For undergraduates and graduates.

A history of the development of poetical literature in connection with the political and social history of the people.

26. **New Testament Greek.** Throughout the year, credit two hours a term. T Th, 8, Barnes Hall Library. Dr. WHITE.

First term: St. John's gospel (Westcott and Hort); second term: Apologies of Justin Martyr (Gildersleeve).

30. **Comedy.** First term, credit three hours. Intended to afford an opportunity for rapid reading in Aristophanes. M W F, 12, Goldwin Smith 134. Professor STERRETT. Open to seniors and graduates.

[33. **Greek Life.** Throughout the year, credit two hours a term. Professor STERRETT.

The land and the people; home life and private antiquities; public life and social institutions. A study of the private life of the Greeks with illustrations by lantern views, photographs, etc., from ancient monuments and remains.] Not given in 1912-13.

35. **Advanced Greek Composition.** Throughout the year, credit one hour a term. Assistant Professor JONES. S, 12, Goldwin Smith 137.

Open to graduates and by special permission to undergraduates. Designed for advanced students who are specializing in the ancient languages and who desire a comparative view of the forms, style, and syntax of classic Greek and Latin prose.

40. **The Tragedies of Sophocles.** Throughout the year, credit two hours a term. Professor STERRETT. W F, 12, Goldwin Smith 137. Special attention is given to the structure of the tragedies and to the metrical reading of the choral passages.

A rapid reading course devoted to the study of the entire works of some one author or of a particular field of literature. Exclusively for graduates.

43. **The Agamemnon of Aeschylus.** First term. Professor STERRETT. T Th, 11, Goldwin Smith 137. Textual criticism and literary interpretation. Exclusively for graduates.

44. **Pindar.** The Olympian and Pythian Odes. Second term. Professor STERRETT. T Th, 11, Goldwin Smith 137. The fluent rhythmical reading of the odes is insisted upon. Exclusively for graduates.

[46. **The Dialect of Homer.** Throughout the year, credit one hour a term. Professor STERRETT. For graduates and undergraduates.] Not given in 1912-13.

50. **Greek Seminary.** Homeric questions from the archaeological point of view. Papers and discussions. Professor STERRETT. W, 2-4. Library, Greek and Latin Seminary Room. Exclusively for graduates.

**Pausanias.** See GREEK ART AND ANTIQUITIES, course 5.

**Modern Greek.** See GREEK ART AND ANTIQUITIES, course 7.

**Greek Epigraphy.** See GREEK ART AND ANTIQUITIES, course 6.

## GREEK ART AND ANTIQUITIES

Courses 1 and 3 in this department do not require any knowledge of Greek or of Latin and are open to all students except freshmen.

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

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. Assistant Professor ANDREWS. First term, M W F, 11; second term, M W F, 9, Goldwin Smith 35.

Lectures on pre-Greek art and civilization, Greek architecture, terra cottas, coins, bronzes, gems, and vases. 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.

5. **Pausanias.** Credit two hours. Assistant 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 readings from Thucydides and Herodotus.

6. **Greek Epigraphy.** Credit two hours. Assistant Professor ANDREWS. Days and 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. Assistant Professor ANDREWS. Days and hours to be arranged after consultation, Goldwin Smith 35.

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

## 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. Professor ELMER. Credit five hours a term. The course is however continuous throughout the year, and no credit will be allowed for the first term alone.

[1. **Livy: Cicero, De Senectute; Horace, Odes and Epodes; Latin Writing.** Throughout the year, credit three hours a term.

Sec. 1, M W F, 9, Goldwin Smith 124. Professor ELMER.

Sec. 2, M W F, 10, Goldwin Smith 128. Professor DURHAM.

Sec. 3, M W F, 12, Goldwin Smith 128. Professor DURHAM.

1a. **Freshman Latin Composition and Conversation.** Throughout the year, credit one hour a term. Professor DURHAM. A systematic drill intended for those who are taking course 1.] Not given in 1912-13.

[2. **Sight Translation: Gellius, Selections; Ovid, Metamorphoses.** Oral translation, at sight, from English into Latin. Throughout the year, credit one hour a term.] Not given in 1912-13.

3. **Sight Translation: Caesar's Civil War; Phaedrus; Martial.** Throughout the year, credit one hour a term.

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

Sec. 2, S, 10, 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.

4. **Virgil's Aeneid, Books I-VI.** Second term, credit three hours. Professor ELMER. T Th S, 12, Goldwin Smith 124.

7. **Classic Myths in English Literature.** Lectures, translations, and illustrative readings from English literature. Prerequisite preparatory Latin. Not open to freshmen. First term only, credit two hours. T Th, 12, Goldwin Smith 128, Professor DURHAM.

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 group in foreign language.

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

[8a. **Sophomore Latin Composition and Conversation.** Throughout the year, credit one hour a term. Professor DURHAM. Th, 8, Goldwin Smith 128. A systematic drill intended for those who are taking course 8.] Not given in 1912-13.

[9. **Terence, Adelphi and Andria; Horace, Satires and Epistles; Virgil, Bucolics and Georgics; Ovid, Amores.** Throughout the year, credit three hours a term. Prerequisite course 1. Professor DURHAM.] Not given in 1912-13.

[10. **Sight Translation for Sophomores.** Throughout the year, credit one hour a term. Professor DURHAM.] Open to students in the second year of their Latin work. Not given in 1912-13.

11. **Selections from Cicero's Letters; Cicero, De Oratore, Book 1.** Throughout the year, credit two hours a term. Prerequisite course 1. Professor ELMER. T Th, 3, or hours to be arranged.

[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. Professor ELMER.] Not given in 1912-13.

Courses 11 and 12 are given in alternate years.

16. **Selections from the Republican Literature: Plautus, the Captives and Mostellaria; Lucretius; Lectures on the History of Roman Literature.** Throughout the year, credit three hours a term. Prerequisite course 8, 9, 11, or 12. Professor BENNETT. T Th S, 9, Goldwin Smith 120.

[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, 9, 11, or 12. Professor BENNETT. Courses 16 and 17 are given in alternate years.] Not given in 1912-13.

21. **Intermediate Course in Latin Writing.** Throughout the year, credit one hour a term. Prerequisite course 8, 9, 11, or 12. Professor ELMER. F, 2, Goldwin Smith 124.

26. **Teachers' Training Course.** Throughout the year, credit three hours a term. Open, upon personal application to the professor, to students who have had course 8, 9, 11, or 12, and have taken or are taking course 16 or 17. Professor BENNETT. M W F, 12, Goldwin Smith 120.

Study of the evidences for the pronunciation of Latin; hidden quantities; peculiarities of orthography; theoretical consideration of Latin syntax; lectures on problems connected with the teaching of Latin in secondary schools. Special study of some Latin author read in the schools, with reference to all the points that should be emphasized in elementary instruction.

[27. **Roman Antiquities.** Throughout the year, credit two hours a term. Open to students of the sophomore, junior, and senior years. Professor BENNETT. W F, 12, Goldwin Smith 120.

First term and until Easter recess: topography and architectural remains of the city of Rome; a systematic consideration of the constitution of the Roman family, status of women, marriage, children, education, slavery, the Roman

house and its furniture, food, dress, baths, games and amusements, books, trade, travel, religion, death, burial, etc. Lectures illustrated by lantern views, photographs, and material in the Museum of Casts. Easter recess until end of second term: the political and legal antiquities of the Romans.] Not given in 1912-13.

34. **Cicero, in Verrem, Fourth Oration of the Actio Secunda.** Throughout the year, credit one hour a term. Prerequisite course 8, 9, 11, or 12, or the equivalent. Professor ELMER. Th, 11, or some hour to be arranged, Goldwin Smith 124.

This course requires no prepared translation for the class-room work. The professor in charge will himself translate the work with full comments on subject matter, style, difficulties, etc. The members of the class will endeavor merely to read the original Latin as Cicero himself would have read it. Designed to develop in students the ability to understand and to appreciate the Latin without translating.

[35. **Cicero's Philippics.** Throughout the year, credit one hour a term. Prerequisite course 8, 9, 11, or 12, or the equivalent. Professor ELMER. This course alternates with 34 and has a similar aim.] Not given in 1912-13.

41. **Latin Seminary.** Throughout the year. Professor BENNETT. T, 2, and S, 10, Library, Greek and Latin Seminary Room.

The work of the seminary for 1911-12 will consist of the textual and exegetical study of Plautus, combined with the reading of about a dozen of the comedies.

The object of the seminary is to familiarize its members with the methods and habits of independent investigation. The work therefore, as far as possible, is thrown into the hands of the students themselves. Exclusively for graduates.

42. **History, Aim, and Scope of Latin Studies.** Throughout the year. Professor BENNETT. W, 9, Goldwin Smith 120.

This course will present the history of Latin study since the Renaissance, will outline the various fields of investigation, stating the present state of knowledge in each, along with the chief problems still awaiting solution, and will give a very full bibliography. Exclusively for graduates.

[43. **Historical Latin Syntax.** Throughout the year. Professor BENNETT. Lectures on the moods and tenses of the Latin verb, with special reference to the subjunctive,—its primitive meaning and its development in subordinate clauses. Exclusively for graduates.] Not given in 1912-13.

44. **Historical Grammar of the Latin Language.** Throughout the year. Professor BENNETT. T Th, 10-11.15, Goldwin Smith 120.

Lectures and exercises on the sounds and inflections of the Latin language from the historical point of view. Exclusively for graduates.

45. **Latin Writing, Advanced Course.** Throughout the year. Professor ELMER. F, 2, Goldwin Smith 124. For graduates. Students who have taken course 21 may also be admitted to this course.

46. **History and Development of Roman Epic Poetry.** Throughout the year. Professor ELMER. W, 2, Goldwin Smith 124. Exclusively for graduates.

[47. **Vulgar Latin.** First term, credit three hours. Open to graduates and to qualified undergraduates. Professor DURHAM.

A study of the extension of the Latin language to the Roman provinces and an investigation of the phonology, the flexions, and the syntax of vulgar Latin. Petronius, *Cena Trimalchionis*; Consentius, *de metaplasms et barbarismis*; Silviae vel potius Aetheriae peregrinatio ad loca sancta; Diehl, *Vulgärlateinische Inschriften*. A reading knowledge of French and German is required.] Not given in 1912-13.

48. **Vulgar Latin. Gregory of Tours or Mulomedicina Chironis.** Second term, credit two hours. Open to graduates and to qualified undergraduates. Professor DURHAM. Goldwin Smith 128.

[49. **Ennius, Fragments of the Annales.** Second term, credit one hour. Open to graduates and qualified undergraduates. Professor DURHAM.] Not given in 1912-13.

[50. **Latin Epigraphy.** Throughout the year, credit three hours a term. Professor DURHAM. The interpretation of selected inscriptions. Special topics in the administrative history of the Roman Empire will be assigned for investigation. *Carmina Latina Epigraphica* (ed. Bücheler). Open to graduates and qualified undergraduates. A reading knowledge of German and French is required.] Not given in 1912-13.

**Roman History**, see ANCIENT HISTORY.

**Latin Paleography**, see HISTORY, course 43.

## GERMAN

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

First term.

Sec. 1, daily, 9, Goldwin Smith 183. Assistant Professor POPE.

Sec. 2, daily, 11, Goldwin Smith 177. Mr. ZINNECKER.

Second term.

Sec. 1, daily, 10, Goldwin Smith 177. Mr. ZINNECKER.

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).

Walter-Krause, *Beginning German*. Hewett's *German Reader*.

2. **Oral Training, Grammar, Composition, Translation.** First term only, credit three hours. Prerequisite first-year German of the entrance requirements. T Th S, 10, Goldwin Smith 221. Assistant Professor BOESCHE.

Intended for students who have entrance credit for only one unit of German (first-year German). This course is equivalent to second-year German of the entrance requirements.

Bierwirth's *Abstract of German Grammar*. Till *Eulenspiegels lustige Streiche*; Zschokke, *Der zerbrochene Krug*.

3. **Oral Training, Grammar, Composition, Translation.** Repeated in second term, credit five hours. Prerequisite course 1, or course 2, or entrance credit for two units in German (first-year German and second-year German).

First term.

Sec. 1, M T W Th F, 9, Goldwin Smith 177. Mr. ZINNECKER.

Sec. 2, M T W Th F, 10, Goldwin Smith 177. Dr. ANDREWS.

Sec. 3, M T W Th F, 11, Goldwin Smith 183. Dr. ANDREWS.

Second Term.

Sec. 1, M T W Th F, 8, Goldwin Smith 177. Dr. ANDREWS.

Sec. 2, M T W Th F, 9, Goldwin Smith 221. Dr. ANDREWS.

Sec. 3, M T W Th F, 11, Goldwin Smith 177. Mr. ZINNECKER.

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

Thomas's *Practical German Grammar*; Baumbach, *Das Habichtsfräulein*; Heyse, *Anfang und Ende*; Schiller, *Jungfrau von Orleans*.

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, 12, Goldwin Smith 183. Assistant Professor POPE.

Sec. 2, T Th S, 10, Goldwin Smith 183. Assistant Professor DAVIDSEN.

Textbooks: Thomas's *Practical German Grammar*; Pope's *Colloquial German Composition*. Illustrative maps, charts, and pictures. Exercises

conducted in German. It is advisable to combine course 4 with another German course, e. g., 5-6, or 8-9.

**5. Intermediate German Course.** First term only, credit three hours. Prerequisite course 3, or the equivalent.

Sec. 1, T Th S, 9, Goldwin Smith 190. Professor FAUST.

Sec. 2, M W F, 10, Goldwin Smith 221. Mr. ZINNECKER.

German grammar treated topically. Translation and oral exercises in German on the text. Readings: Heine's Prose; Gutzkow, Zopf und Schwert. Course 4 may be combined with course 5, or, instead of these, course 7 may be taken.

**6. Intermediate German Course.** Second term only, credit three hours. Prerequisite course 3, or the equivalent.

Sec. 1, T Th S, 9, Goldwin Smith 190. Mr. ZINNECKER.

Sec. 2, M W F, 10, Goldwin Smith 221. Assistant Professor POPE.

Continuation of course 5. Readings: Schiller, Egmonts Leben und Tod; Belagerung von Antwerpen. Freytag, Aus dem Jahrhundert des grossen Krieges.

**7. Intermediate German Course.** Throughout the year, credit five hours a term. Prerequisite course 3, or the equivalent.

Sec. 1, M T W Th F, 9, Goldwin Smith 221. Assistant Professor BOESCHE.

Sec. 2, M T W Th F, 10, Goldwin Smith 190. Assistant Professor FLUEGEL.

This course, in two terms, completes the work of courses 4, 5, and 6. Oral practice and written exercises based on the texts read and on Pope's Colloquial German Composition. First term: Eichendorff, Aus dem Leben eines Taugenichts; Hoffmann, Das Fräulein von Scuderi; Heine, Die Harzreise; Mörike, Mozart auf der Reise nach Prag. Second term: Wildenbruch, Neid; C. F. Meyer, Jürg Jenatsch; Rosegger, Aus den Schriften des Waldschulmeisters.

**8. Reading Course.** First term only, credit two hours. Prerequisite courses 1-6, or the equivalent. T Th, 11, Goldwin Smith 221. Assistant Professor FLUEGEL.

Interpretation of difficult literary prose: Paszkowski, Lesebuch zur Einführung in die Kenntnis Deutschlands und seines geistigen Lebens.

**9. Rapid Reading Course.** Repeated in second term, credit two hours a term. Prerequisite courses 1-6, or the equivalent. T Th, 11, Goldwin Smith 183. Assistant Professor FLUEGEL.

A large number of texts of ordinary difficulty selected from the works of modern German authors are read and discussed in German.

**10. Advanced German Composition and Conversation.** Throughout the year, credit three hours a term. Prerequisite courses 1-6, or the equivalent.

Sec. 1, M W F, 9, Goldwin Smith 234. Assistant Professor FLUEGEL.

Sec. 2, M W F, 10, Goldwin Smith 183. Assistant Professor DAVIDSEN.

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. Schiller's Wallenstein.** First term only, credit three hours. Prerequisite courses 1-6. T Th S, 9, Goldwin Smith 227. Assistant Professor FLUEGEL.

Additional readings: Geschichte des dreissigjährigen Krieges. Historical and philosophical essays.

**12. Goethe's Faust,** part I and selected portions of part II. First term, credit three hours. Prerequisite courses 1-6, or the equivalent. Professor FAUST. M W F, 9, Goldwin Smith 190.

A survey of the genesis and development of the drama, an examination of its historical and legendary elements, and a study of its criticism of life.

**[13. History of German Literature.** First term, credit three hours. Prerequisite courses 1-6, or the equivalent. Professor FAUST.

An outline lecture course beginning with the Old High German period and extending through the seventeenth century. Lectures, recitations, and collateral readings.] Not given in 1912-13.

[14. **History of German Literature.** Second term, credit three hours. Prerequisite courses 1-6, or the equivalent. Professor FAUST. An outline lecture course beginning with the eighteenth century and extending to the present time. Lectures, recitations, and collateral readings.] Not given in 1912-13.

[15. **The German Drama of the Nineteenth Century.** First term, credit three hours. Prerequisite courses 1-6, and 10, or the equivalent. Assistant Professor DAVIDSEN. From Kleist to Hebbel. Lectures in German, and collateral readings.] Not given in 1912-13.

[16. **The German Drama of the Nineteenth Century.** Second term, credit three hours. Prerequisite courses 1-6, and 10, or the equivalent. Assistant Professor DAVIDSEN. From Hebbel to the present time. Lectures in German, and collateral readings. Continuation of course 15.] Not given in 1912-13.

17. **The Literature of the Reformation.** First term, credit three hours. Prerequisite courses 1-6, and 10, or the equivalent. Assistant Professor DAVIDSEN. M W F, 11, Goldwin Smith 190.

Lectures in German, illustrative readings from the works of Martin Luther, Ulrich von Hutten, Hans Sachs, Thomas Murner, and Johann Fischart; also from the Volksbücher and folk-songs of the sixteenth century.

18. **Lessing, His Life, Works, and Period.** Second term, credit three hours. Prerequisite courses 1-6, and 10, or the equivalent. Assistant Professor DAVIDSEN. M W F, 11, Goldwin Smith 190.

Lectures in German and collateral readings from Lessing's dramas and prose writings.

19. **Goethe's Life and Work,** Second term only, credit three hours. Prerequisite courses 1-6, or the equivalent. Assistant Professor BOESCHE. M W F, 10, Goldwin Smith 190.

Lectures in German, alternating with recitations and discussions. Readings: selected works of Goethe in Erich Schmidt's six volume edition (Insel-Verlag); Ernst Hartung's edition of Goethe's letters.

[20. **Sturm und Drang.** Second term, credit three hours. Prerequisite courses 1-6, or the equivalent. Assistant Professor BOESCHE.

Lectures and readings illustrating the character of the Storm and Stress movement in Germany and its significance in the history of German literature. Attention will also be given to the English and French influences upon the origin of Storm and Stress.] Not given in 1912-13.

21. **Friedrich Hebbel;** his dramatic works and theory of the drama. First term, credit two hours. Prerequisite courses 1-6, 10, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN. T Th, 11, Goldwin Smith 190.

22. **Henrik Ibsen.** Second term, credit two hours. Prerequisite courses 1-6, 10, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN. T Th, 11, Goldwin Smith 190.

A study of Ibsen's representative dramas (in the German translation), and of his influence on modern German literature.

[23. **Richard Wagner, His Life and Works.** Second term, credit three hours. Prerequisite courses 1-3. Assistant Professor POPE.

A lecture course in English on Wagner's theory of the music drama, the sources of his operas, his place in German literature, and his influence on modern culture. The texts of the principal operas will be read in class and biweekly illustrative recitals will be given throughout the term.] Not given in 1912-13.

24. **Lyric and Ballad Poetry.** Second term, credit three hours. Prerequisite courses 1-5. Assistant Professor POPE. T Th S, 10, Goldwin Smith 190.

The development of German lyric poetry from the Middle High German period to the present. Especial attention given to a literary appreciation of modern lyrics and ballads.

[25. **Studies in the Technique and Style of Nineteenth Century Prose Writers.** First term, credit two hours. Prerequisite courses 1-6, 10, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN.] Not given in 1912-13.

[26. **Studies in the Technique and Style of Nineteenth Century Prose Writers.** Second term, credit two hours. Prerequisite courses 1-6, 10, and at least x hours advanced work in German literature. Assistant Professor DAVIDSEN. Continuation of course 25.] Not given in 1912-13.

27. **Lectures in German on Epochs of German History.** First term, credit one hour. Assistant Professor BOESCHE. M, 12, Goldwin Smith 190.

The purpose of the course is to present in outline the period of migration, the Middle Ages, the Reformation, the Thirty Years' War, the wars of Frederick the Great, the age of Napoleon, and of Bismarck, and therewith to impress the relations between German history and literature. The lectures will be illustrated by lantern slides.

[28. **Lectures in German on Germany and German Institutions.** Second term, credit one hour. Assistant Professor DAVIDSEN.

The country and its population; the constitution of the Empire; the army and the navy; schools and universities.] Not given in 1912-13.

29. **Lectures in German on German Art.** Second term, credit one hour. Assistant Professor DAVIDSEN. S, 11, Goldwin Smith 190.

German churches and castles; Dürer and Holbein; German painters of the nineteenth century. The lectures will be illustrated by lantern views.

[30. **The History of the German Element in the United States.** First term, credit one hour. Professor FAUST.

The characteristics of the German immigrations of the seventeenth, eighteenth, and nineteenth centuries; their arrival, location, and activities. The relative importance of the German as a formative element in the building of the nation, with special reference to political, social, and educational influences.] Not given in 1912-13.

[31. **German Folklore.** Second term, credit one hour. Assistant Professor FLUEGEL. Lectures in German, in part illustrated, on ancient German superstitions, legends, customs, and traditions. Collateral readings in E. H. Meyer's *Deutsche Volkskunde*.] Not given in 1912-13.

32. **Teutonic Mythology.** Second term, credit one hour. Prerequisite courses 1-6. Assistant Professor FLUEGEL. W, 11, Goldwin Smith 183.

Lectures in German on the religious conceptions, worship, and rites of the ancient Germans. Textbook: Mogk, *Germanische Mythologie*.

33. **Scientific German.** Second term, credit two hours. Prerequisite courses 1-3, or three years of German in high school. Assistant Professor FLUEGEL. M F, 11, Goldwin Smith 183.

Texts: Wallentin, *Grundzüge der Naturlehre*, followed by scientific monographs selected to meet the needs of the class.

[34. **Elementary Phonetics and its Application to the Study of Modern Languages.** First term, credit one hour. Assistant Professor DAVIDSEN.] Not given in 1912-13.

35. **Principles of Word-Formation.** First term, credit one hour. Assistant Professor DAVIDSEN. S, 11, Goldwin Smith 190.

Composition and derivation of words and similar phenomena. A course supplementing the study of German grammar and affording a deeper insight into the structure of the German language.

**36. Topics in Historical German Syntax.** Second term, credit three hours. Assistant Professor BOESCHE. M W F, 11, Goldwin Smith 181.

An examination and explanation of difficult or peculiar modern German constructions in the light of the past stages of the language and of analogous developments in other languages. Lectures and reports on assigned works of reference. This course is especially adapted to the needs of teachers.

**37. Elementary Middle High German.** First term, credit three hours. Prerequisite courses 1-6, 10, and at least six hours advanced work in literature. Assistant Professor POPE. T Th S, 10, Goldwin Smith 182.

Grammar; reading of the popular epics, Nibelungenlied and Kudrun. Paul's *Mittelhochdeutsche Grammatik*; Bachmann's *Mittelhochdeutsches Lesebuch*.

**38. Modern Scandinavian.** First term, credit three hours. Dr. ANDREWS. T Th S, 12, Goldwin Smith 177.

A brief study of the principles of Swedish grammar, followed by readings from standard Swedish authors. For advanced students in languages and literatures.

**39. Modern Scandinavian.** Second term, credit three hours. Dr. ANDREWS. T Th S, 12, Goldwin Smith 177.

Readings from standard Norwegian authors, with a brief outline of the history of the Norwegian language and literature. For advanced students in languages and literatures.

**40. Teachers' Course.** First term, credit two hours. Prerequisite courses 1-6, 10, and twelve hours of advanced work in German literature or philology. Professor FAUST, assisted by other members of the German department. F, 2-4, Goldwin Smith 181.

Methods of teaching modern languages; examination and criticism of textbooks available for the study of German; requirements for teachers' examinations.

**41. Advanced Middle High German.** Second term, credit three hours. Prerequisite course 37. Assistant Professor POPE. M W F, 9, Goldwin Smith 177.

Detailed study of Middle High German grammar. Special study of Hartmann von Aue. Primarily for graduates.

**[42. Gothic.** First term, credit three hours. Assistant Professor BOESCHE. Streitberg's *Gotisches Elementarbuch*; *Die Gotische Bibel*, hrg. von Streitberg. This course will serve as a general introduction to Germanic philology. Primarily for graduates.] Not given in 1912-13.

**43. Old High German.** First term, credit three hours. Prerequisite course 37. Assistant Professor BOESCHE. M W F, 10, Goldwin Smith 236.

Primarily for graduates. Braune's *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*.

**[44. Old Icelandic.** First term, credit three hours. Dr. ANDREWS. A study of the elements of Old Norse grammar and the relation of Old Norse to the other Germanic dialects. Reading of saga-texts: *Hoensna-Thoris-saga*, and *Bandamanna-saga*. Primarily for graduates.] Not given in 1912-13.

**[45. Old Icelandic.** Second term, credit three hours. Dr. ANDREWS. Reading of some group of Eddic poems with an introduction to their critical study. The poems treating the Sigurd legend will be studied in connection with the *Volsunga-saga* and other sources.] Not given in 1912-13.

**46. The Viking Age.** Second term, credit one hour. Mr. HERMANSSON. W, 12, Goldwin Smith 190.

Lectures, in part illustrated by lantern slides, on the life and culture of the Northmen during the Viking age, and their relations with other European nations.

[47. **Principles of Germanic Philology.** Second term, credit one hour. Prerequisite course 42. Dr. ANDREWS. A discussion of the fundamental principles of linguistic relationships within the old Germanic dialects. Lectures and illustrative problems.] Not given in 1912-13.

48. **Seminary in German Literature.** First term, credit two hours. Professor FAUST. T, 2-4, Goldwin Smith 181. Primarily for graduates.

German American literature, including a study of the Pennsylvania-German dialect, travel-literature, books on America. Reports and independent investigation by members of the seminary.

49. **Seminary in German Literature.** Second term, credit two hours. Primarily for graduates. Assistant Professor DAVIDSEN. T, 2-4, Goldwin Smith 181.

Technique of the German "Novelle".

50. **Seminary in German Philology.** Second term, credit two hours. Primarily for graduates. Assistant Professor BOESCHE. F, 2-4, Goldwin Smith 181.

Special study of difficult Old High German monuments. Reports and investigations.

**The Deutscher Verein**, a club consisting of faculty members and students interested in the study of German literature and institutions, meets twice a month for social intercourse, lectures and discussions, and practice in speaking German.

## ROMANCE LANGUAGES

Students intending to teach should take the following courses as a minimum requirement for their purpose: 4, 5, 6, 10, 13, 14, 23, and at least two other courses in French literature.

1. **Course for Beginners, Grammar, Composition, Translation.** Repeated in second term, credit six hours.

First term.

Sec. 1, daily, 12, Goldwin Smith 283. Assistant Professor MASON.

Sec. 2, daily, 8, Goldwin Smith 283. Assistant Professor GORDON.

Sec. 3, daily, 9, Goldwin Smith 277. Dr. PUMPELLY.

Second term.

Sec. 1, daily, 12, Goldwin Smith 290. Assistant Professor MASON.

Sec. 2, daily, 8, Goldwin Smith 290. Mr. BARNUM.

This course is equivalent to first-year French and second-year French of the entrance requirements (credit 2 units). It may be elected for three hours credit by students who have entrance credit for only one unit of French (first-year French).

2. **Grammar, Composition, Translation.** Repeated in second term, credit three hours. Prerequisite first-year French of the entrance requirements.

First term.

Sec. 1, T Th S, 11, Goldwin Smith 290. Mr. BARNUM.

Second term.

Sec. 1, T Th S, 11, Goldwin Smith 290. Mr. BARNUM.

Intended for students who have entrance credit for only one unit of French. (first-year French). This course is equivalent to second-year French of the entrance requirements.

3. **Grammar, Composition, Translation.** Repeated in second term, credit five hours. Prerequisite course 1, or course 2, or entrance credit for two units in French (first-year French and second-year French).

First term.

Sec. 1, M T W Th F, 9, Goldwin Smith 290. Professor COMFORT.

Sec. 2, M T W Th F, 10, Goldwin Smith 281. Mr. DALE.

Sec. 3, M T W Th F, 12, Goldwin Smith 290. Mr. DALE.

Second term.

Sec. 1, M T W Th F, 9 Goldwin Smith 277. Dr. PUMPELLY.

Sec. 2, M T W Th F, 10 Goldwin Smith 281. Mr. DALE.

Sec. 3, M T W Th F, 12 Goldwin Smith 281. Mr. DALE.

4. **Advanced Translation.** Repeated in second term, credit three hours. Prerequisite course 3, or third-year French of the entrance requirements.

First term.

Sec. 1, T Th S, 11, Goldwin Smith 281. Assistant Professor MASON.

Sec. 2, M W F, 11, Goldwin Smith 290. Mr. DALE.

Sec. 3, T Th S, 12, Goldwin Smith 277. Assistant Professor HAMILTON.

Second term.

Sec. 1, M W F, 10, Goldwin Smith 277. Professor COMFORT.

Sec. 2, T Th S, 9, Goldwin Smith 283. Assistant Professor MASON.

Designed primarily for freshmen who have entrance credit for three units of French. It is prerequisite for all the following courses in French, except 5, which may be profitably taken in connection with it. Emphasis is laid upon the accurate translation in class of difficult texts, with the necessary grammatical explanations.

5. **Elementary French Composition.** Throughout the year, credit three hours a term. Prerequisite course 3, or third-year French of the entrance requirements.

Sec. 1, M W F, 11, Goldwin Smith 277. Dr. PUMPELLY.

Sec. 2, T Th S, 10, Goldwin Smith 277. Dr. PUMPELLY.

This course should be taken early by all students who are specializing in French, if possible in connection with course 4.

6. **History of French Literature.** Repeated in second term, credit three hours. Prerequisite course 4.

First term.

Sec. 1, M W F, 10, Goldwin Smith 290. Professor COMFORT.

Second term.

Sec. 1, M W F, 11, Goldwin Smith 290. Professor COMFORT.

Lectures on French literature since the Middle Ages, with outside reading and reports. Prerequisite for all the following courses in French literature.

[7. **French Literature of the Seventeenth Century.** Throughout the year, credit three hours a term. Prerequisite course 6. Professor COMFORT.] Not given in 1912-13.

[8. **French Literature of the Eighteenth Century.** Throughout the year, credit three hours a term. Prerequisite course 6. Assistant Professor GUERLAC.] Not given in 1912-13.

9. **French Literature of the Nineteenth Century.** Throughout the year, credit three hours a term. Prerequisite course 6. M W F, 9, Goldwin Smith 283. Assistant Professor MASON.

10. **French Dramatic Literature.** Throughout the year, credit three hours a term. Prerequisite course 6. Professor OLMSTED. M W F, 11, Goldwin Smith 283.

Study of the French drama since 1552. The classical period will be studied during the first term, and the drama since 1830 during the second term.

11. **French Fiction.** Throughout the year, credit two hours a term. Prerequisite course 4. Professor OLMSTED. T Th, 10, Goldwin Smith 283.

Study of the novel in France since 1610. The novel of the seventeenth and eighteenth centuries will be studied during the first term, the modern novel during the second term.

[13. **History of France from the Roman Conquest.** First term, credit three hours. Prerequisite course 4. Assistant Professor GUERLAC.

Intended for students who desire some knowledge of French history and institutions as a basis for the study of French literature. A reading knowledge of French is required. Lectures and reports.] Not given in 1912-13.

**14. Advanced French Composition.** Throughout the year, credit three hours a term. Prerequisite courses 4, 5. Dr. PUMPELLY. M W F, 12, Goldwin Smith 277.

Admission to this course depends upon the grade of work done in course 5; before registration, permission must be obtained from the instructor in charge.

**[18. French Lyric Poetry.** Credit one hour a term. Prerequisite course 6. Professor OLMSTED.

Study of the general development of lyric poetry in France since the fifteenth century.] Not given in 1912-13.

**22. French Literature of the Sixteenth Century.** First term, credit three hours. Prerequisite course 6. Assistant Professor GORDON. M W F, 11, Goldwin Smith 281.

**23. French Philology.** Second term, credit three hours. Prerequisite course 6, and entrance Latin. Assistant Professor GORDON. M W F, 11, Goldwin Smith 281.

This course should be taken in the junior or senior year by all students who expect to teach French, and must be taken during the first year of graduate study, if not before, by all candidates for the master's degree who present French as their major subject.

**[24. French Mediaeval Literature.** Credit two hours a term. Prerequisite course 6. Professor COMFORT.] Not given in 1912-13.

**[25. Old French Phonology and Morphology.** First term, credit two hours. Assistant Professor HAMILTON. For graduates only.] Not given in 1912-13.

**26. Old French Texts.** Throughout the year, credit two hours a term. Professor COMFORT. T, 2.30, Library, French Seminary.

A linguistic and literary study of selected old French texts. Primarily for graduates.

**27. Research Methods in Modern French Literature.** Throughout the year, credit two hours a term. Assistant Professor MASON.

In 1912-13 the works of Alfred de Vigny will be made the object of a thorough and critical study. The course is intended to initiate graduate students in the methods of independent research as applied to modern literature. Primarily for graduates. Hours to be arranged.

**28. Low Latin:** Its development and relation to the Romance languages. First term, credit two hours. Assistant Professor HAMILTON. Hours to be arranged.

Primarily for graduates.

**29. Teachers' Course.** Second term, credit two hours. W, 2.30, Goldwin Smith 277.

Intended for those who are going to teach French. This course, which is conducted by the staff of the department, should be taken in the senior year.

**30. Italian. Beginners' Course.** Throughout the year, credit three hours a term. M W F, 9, Goldwin Smith 281. Assistant Professor HAMILTON.

Grammar, composition, translation of modern Italian prose and poetry. This course may not be taken in the same year as course 40. The course is continuous throughout the year, and no credit will be allowed for the first term alone.

**32. Italian Poetry: Dante, Leopardi, Carducci.** Throughout the year, credit three hours a term. Prerequisite course 30, or second-year Italian of the entrance requirements. Assistant Professor HAMILTON. T Th S, 9, Goldwin Smith 281.

**33. Petrarch and the Renaissance.** Throughout the year, credit two hours a term. Prerequisite course 32.

Primarily for graduates. Hours to be arranged.

[35. **Dante: The Minor Works.** Throughout the year, credit two hours a term. Prerequisite course 32. Assistant Professor HAMILTON.

Studies in the sources and influence of Dante. Primarily for graduates.] Not given in 1912-13.

40. **Spanish. Beginners' Course.** Throughout the year, credit three hours a term.

M W F, 10, Goldwin Smith 283. Professor OLMSTED.

M W F, 12, Goldwin Smith 281. Assistant Professor GORDON.

T Th S, 8, Goldwin Smith 277. Mr. DALE.

Grammar, composition, translation. This course may not be taken in the same year with course 30. The course is continuous throughout the year, and no credit will be allowed for the first term alone.

42. **Spanish. Prose and Poetry.** Throughout the year, credit three hours a term. Prerequisite course 40, or second-year Spanish of the entrance requirements. Assistant Professor GORDON. T Th S, 12, Goldwin Smith 281.

Rapid reading in class of modern Spanish authors.

44. **The Spanish Drama.** Throughout the year, credit two hours a term. Prerequisite course 42, or third-year Spanish of the entrance requirements. Professor OLMSTED. T Th, 11, Goldwin Smith 283.

The classical Spanish drama will be studied during the first term, the modern Spanish drama during the second term.

[46. **The Spanish Novel.** Throughout the year, credit two hours a term. Prerequisite course 42, or third-year Spanish of the entrance requirements. Professor OLMSTED.

Study of the Spanish novel since 1553. First term: The Rogue novels, beginning with *Lazarillo de Tormes*, Cervantes' *Don Quijote* and *Novelas Ejemplares*, etc. Second term: The Spanish novel since the beginning of the nineteenth century.] Not given in 1912-13.

47. **Old Spanish.** Throughout the year, credit one hour a term. Prerequisite course 44 or 46. Professor OLMSTED.

A study of old Spanish grammar and reading of early texts. Primarily for graduates. Hours to be arranged.

[50. **Portuguese Grammar and Reading.** Throughout the year. Professor OLMSTED. Primarily for graduates.] Not given in 1912-13.

60. **Old Provençal.** First term, credit two hours. Assistant Professor HAMILTON. Primarily for graduates. Hours to be arranged.

## ENGLISH

1. **Introductory Course.** Throughout the year, credit four hours a term. Students who have not taken the course in the first term may enter in the second term in sections provided for them. Open only to underclassmen who have satisfied the entrance requirement in English. Freshmen who are candidates for the degree of Bachelor of Arts will ordinarily take Course 3, and may not enroll in Course 1 except with the consent of the head of the department. Assistant Professors ADAMS and MONROE, Drs. BAILEY, BROUGHTON, and GILBERT, and Messrs. KIRK, PRALL, STELTER, and BALDWIN. Twenty-one sections at the following hours: T W Th F, 8, 9, 10, 11, 12. Rooms to be announced.

A study of representative works in English literature, including three plays of Shakespeare, five modern novels, and selected lyrics and essays. Practice in composition in connection with the reading, with incidental study of the principles of writing. The course is in charge of Professor STRUNK.

Students who elect English 1 must apply at Goldwin Smith 159 on Tuesday, Wednesday, or Thursday of registration week for assignment to sections.

2. **Nineteenth Century Prose.** Throughout the year, credit three hours a term. Prerequisite course 1.

Sec. 1, M W F, 12, Goldwin Smith 164. Assistant Professor PRESCOTT.

Sec. 2, T Th S, 9, Goldwin Smith 164. Assistant Professor NORTHUP.

Sec. 3, M W F, 9, Goldwin Smith 164. Mr. KIRK.

Sec. 4, T Th S, 12, Goldwin Smith 164. Dr. PEEK.

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

3. **English Literature.** Throughout the year, credit four hours a term. Students who have not taken the course in the first term may enter in the second term. Open only to freshmen who are not taking course 1. Lectures, T Th, 11, Goldwin Smith A, Professor SAMPSON. Recitations, M W, 8, 9, 10, 12; F S, 8, 9, 10, 11. Dr. PEEK and Mr. SMITH. Rooms to be announced.

Tennyson, Browning, Thackeray, Landor, Milton, Shakespeare, the Old Testament, with practice in composition.

Students who elect English 3 must apply at Goldwin Smith 163 on Tuesday or Wednesday of registration week for assignment to sections.

5. **Advanced Composition.** Throughout the year, credit three hours a term. Open to upperclassmen who satisfy the instructor of their proficiency in composition. Mr. SMITH. M W F, 10, Goldwin Smith 163.

Essays, short stories, and other exercises. Intended especially for students who look forward to writing as a profession.

[6a. **Argumentative Composition.** First term, credit three hours. Prerequisite course 1. Assistant Professor MONROE. A study of the principles of argumentative writing, with practice in composition.] Not given in 1912-13.

[9b. **Teachers' Course.** Second term, credit one hour. Dr. BAILEY. Given in alternate years.

Lectures and conferences on the teaching of English in the secondary schools. Open to seniors and graduates who intend to teach English.] Not given in 1912-13.

10. **Play-Writing.** Throughout the year, credit two hours a term. Professor SAMPSON. T Th, 12, Goldwin Smith 163.

Open to upperclassmen who have distinguished themselves in composition, or who show some special aptitude for the proposed work.

11. **Old English.** Throughout the year, credit three hours a term. Prerequisite course 1. Assistant Professor MONROE. M W F, 11, Goldwin Smith 164.

Reading of selections from the Old English Chronicle, King Alfred, Ælfric, and other representative prose texts, and of the simpler poetry. Some attention is given to one or two important Middle English texts. Supplementary lectures on the growth of the language.

No student will be recommended for a high school teachership in English unless he has had this course or its equivalent.

[12. **Middle English.** Throughout the year, credit two hours a term. Prerequisite course 11. Professor STRUNK. Hour and room to be announced.

A study of the language and of representative authors from the twelfth to the fifteenth centuries.] Not given in 1912-13.

[18a. **Linguistics.** First term. Assistant Professor MONROE.

A survey of the principles of the life and growth of language. An elementary course of lectures and assigned reading, the illustrative material being chosen mainly from English as a living speech.] Not given in 1912-13.

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

Sec. 1, M W F, 11, Goldwin Smith 156. Professor SAMPSON.

Sec. 2, T Th S, 9, Goldwin Smith 162. Assistant Professor COOPER.

Sec. 3, T Th S, 11, Goldwin Smith 156. Professor STRUNK.

Wordsworth, Coleridge, Byron, Shelley, and Keats.

24. **English Translations of Greek and Latin Classics.** Throughout the year, credit three hours a term. Open to upperclassmen. Assistant Professor COOPER. T, 3, Th, 3-5, Goldwin Smith 163.

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

25b. **Old English Readings.** Second term, credit two hours. Prerequisite, first term of course 11. Assistant Professor MONROE. M W, 3, or hours to be arranged, Goldwin Smith 164.

Reading of selected Old English works, including portions of Beowulf.

30a. **Chaucer.** First term, credit three hours. Prerequisite course 2, 11, or 22. Professor STRUNK. T Th S, 10, Goldwin Smith 164.

A study of the poetry of Chaucer, with a survey of the literature of his time.

31a. **Spenser.** First term, credit three hours. Prerequisite course 2 or 22. Dr. BAILEY. T Th S, 9. Goldwin Smith 162.

A study of the poetry of Spenser, with reference to the literature of his time.

31b. **Milton.** Second term, credit three hours. Prerequisite course 2 or 22. Dr. BAILEY. T Th S, 9, Goldwin Smith 162.

A study of the poetry and the prose of Milton, with reference to the literature of his time.

37. **Shakespeare.** Throughout the year, credit three hours a term. Prerequisite course 2 or 22. First term, Professor STRUNK; second term, Assistant Professor ADAMS. M W F, 10, Goldwin Smith 164.

A study of representative plays, together with a survey of the Elizabethan period and its literature.

38b. **Eighteenth Century Poetry.** Second term, credit three hours. Prerequisite course 2 or 22. Assistant Professor MONROE. M W F, 12, Goldwin Smith 162.

The history of English poetry through the eighteenth century; a study of Pope, Thomson, Gray, Goldsmith, and Burns; beginnings of the romantic movement.

41. **The English Drama to 1642.\*** Throughout the year, credit three hours a term. Open to upperclassmen. Assistant Professor ADAMS. T Th S, 11, Goldwin Smith 164.

First term: a study of the origin of the drama, miracles, moralities, interludes, and the first regular comedies and tragedies. Second term: a study of Elizabethan society and playhouses, characteristic plays of Lyly, Peele, Kyd, Greene, Marlowe, Jonson, and Beaumont and Fletcher; assigned readings in other representative dramatists.

42a. **Elizabethan Non-Dramatic Literature.** First term, credit three hours. Assistant Professor ADAMS. M W F, 11, Goldwin Smith, room to be announced.

Open to upperclassmen. The Renaissance and the beginning of modern poetry; Italian influences; sonnet cycles; pamphlet literature; fiction; epic, pastoral, and lyric verse.

48. **American Literature.** Throughout the year, credit three hours a term. Prerequisite course 2 or 22. Assistant Professor PRESCOTT. T Th S, 12, Goldwin Smith 162.

First term: the growth of American literature; Irving, Bryant, Cooper, and Poe. Second term: Emerson, Longfellow, Hawthorne, and Whitman. Open to seniors and graduates.

51. **Dante in English.** Throughout the year, credit two hours a term. Assistant Professor COOPER. M, 3-5, Goldwin Smith 163.

A certain amount of reading for the sake of literary and historical perspective, followed by a study in detail of selections from the Divine Comedy. Open to seniors and graduates.

52. **Victorian Poetry.** Throughout the year, credit three hours a term. Prerequisite course 2 or 22. Assistant Professor NORTHUP. M W F, 9, Goldwin Smith 163.

A study of the leading works of Tennyson, Browning, Matthew Arnold, Clough, William Morris, Swinburne, and the Rossettis, and of the characteristics of the Victorian era.

54. **Methods and Materials in the Study of English.** Throughout the year, credit two hours a term. Assistant Professor COOPER. Hours to be arranged.

Reading of important treatises on the method of scholarship; a study of the relations between English and similar disciplines; an introduction to the bibliography of English. Applicants must be prepared to read French and German. Open to graduates.

56. **The Arthurian Legends.** Throughout the year, credit three hours a term. Prerequisite course 11. Assistant Professor NORTHUP. T Th S, 9, Goldwin Smith 163.

Studies in the origin and growth of the Arthurian legends contained in the chronicles and the romances, with some attention to the use of the legends by modern European poets.

57a. **Shakespeare: Advanced Course.** First term, credit three hours. Professor STRUNK. M W F, 11, Goldwin Smith 163.

Open to seniors and graduates. Designed for those who are intending to teach English. The sources of the text; Shakespeare's versification, language, and dramatic method; works of reference; editions; criticism. Detailed study of three plays.

59. **Dramatic Structure.** Throughout the year, credit three hours a term. Open to seniors and graduates. Professor SAMPSON. M W F, 12. Goldwin Smith 163.

A study of the principles of dramatic construction, based mainly upon English drama of the seventeenth and nineteenth centuries, but with frequent illustration from classical and modern continental drama.

60. **Victorian Poetry.** For graduates only. Dr. BAILEY.

61. **The Tudor-Stuart Drama.** For graduates only. Assistant Professor ADAMS.

62. **Pastoral Poetry.** For graduates only. Dr. BROUGHTON.

63. **Layamon's Brut.** For graduates only. Assistant Professor MONROE. Textual and historical study of the poem with special reference to its connection with the Arthurian legend.

64. **The English Novel.** For graduates only. Dr. PEEK.

65. **The Principles of Literary Criticism.** Throughout the year, credit two hours a term. Assistant Professor COOPER. W, 3-5, Goldwin Smith.

Primarily designed for those who intend to teach English. Candidates must satisfy the instructor concerning the extent of their previous reading. A study, in part historical, of the most important theories of poetry.

66. **The Epic and the Romance.** For graduates only. Assistant Professor NORTHUP.

A study of the forms of classic and medieval narrative, and especially of selected Middle English romances and their relations to continental literature.

67. **The Phonology, Inflections, and Metre of Old English.** For graduates only. Professor STRUNK.

The relation of Old English to Modern English and to German. Reading of *Elene* or *Beowulf*.

68. **American Literature.** For graduates only. Assistant Professor PRESCOTT.

**69. The Drama.** Throughout the year, credit two hours a term. Professor SAMPSON. For graduates only.

A study of the methods of several of the chief Elizabethan and modern dramatists. Ability to read French is required.

**Prizes.** For the Guilford, Shakespeare, Browning, and Morrison prizes, see the University pamphlet on prizes. Copies may be obtained from the Registrar.

The subjects for the Corson Browning Prize competition and for the Barnes Shakespeare Prize competition will be duly announced.

## ORATORY

**1a. Public Speaking.** Repeated in second term, credit three hours.

First term.

Sec. 1, M W F, 9, Goldwin Smith 24. Mr. FALLIS.

Sec. 2, T Th S, 8, Goldwin Smith 24. Assistant Professor EVERETT.

Sec. 3, M W F, 12, Goldwin Smith 24. Assistant Professor WINANS.

Second term: T Th S, 11, Goldwin Smith 21. Mr. ———.

Designed to give the student the fundamentals of speech preparation and to help him to acquire a simple, direct manner of speaking. Original speeches and interpretation of selections. Individual instruction will be given by appointment.

Students who elect this course should apply at Goldwin Smith 25, on Wednesday or Thursday of registration week, for assignment to sections.

The '86 Memorial Prize in declamation is awarded annually in connection with the courses in public speaking. See special pamphlet on prizes.

**1b. Public Speaking.** Second term, credit three hours. Prerequisite course 1a.

Sec. 1, M W F, 9, Goldwin Smith 24. Mr. FALLIS.

Sec. 2, T Th S, 8, Goldwin Smith 24. Assistant Professor EVERETT.

Sec. 3, M W F, 12, Goldwin Smith 24. Assistant Professor WINANS.

A continuation of course 1a.

**[2. Special Course for Women.** Throughout the year, credit three hours a term. Mr. FALLIS. Reading, speaking, and voice training.] Not given in 1912-13.

**4. Advanced Public Speaking.** Repeated in second term, credit one hour. Prerequisite course 1b.

Delivery of speeches before the sections of courses 1a and 1b; individual instruction and criticism. Students electing this course should, during the first week of the term, consult Assistant Professor WINANS.

**6. Public Speaking for Engineers.** Repeated in second term, credit two hours. Assistant Professor EVERETT. M W, 12, Goldwin Smith 21.

Engineering students whose work permits are advised to take courses 1a and 1b. Those who take this course in the first term may for the second term continue in course 1b, taking either two or three hours.

**8. Voice Training.** Throughout the year, credit one hour a term. Mr. FALLIS. M W F, 8.30-9, Goldwin Smith 21.

For the development and improvement of normal voices, and for removal of special defects. Training in action. Individual instruction by appointment.

**10. Reading.** Throughout the year, credit two hours a term. Mr. FALLIS. W F, 10, Goldwin Smith 21.

Oral interpretation of prose, poetry, and dramatic literature.

**12a. Brief Making and Debate.** First term, credit two hours. Assistant Professor WINANS. T Th, 12, Goldwin Smith 21.

Study of the principles of argumentation and the forms of brief-writing; textbooks, discussions, and conferences. Oral arguments based upon written briefs. Designed to give training in fair-minded discussion, the use of authorities, and the weighing of evidence.

**12b. Debate.** Second term, credit two hours. Prerequisite course 12a or English 6a. Assistant Professor WINANS. T Th, 12, Goldwin Smith 21. Constant practice in oral argument, with some attention to parliamentary law.

**14. Extemporaneous Speaking.** Throughout the year, credit two hours a term. Assistant Professor EVERETT. M W, 10, and by appointment. Goldwin Smith 21.

Weekly addresses based upon prepared outlines; topics assigned in the fields of American history, politics, and current events; stories and descriptions. One written speech each term.

Open by special permission to upperclassmen who have done satisfactory work in course 1b.

**16. Principles of Speech Preparation.** First term, credit two hours. Prerequisite course 1a. Assistant Professor WINANS. T Th, 10, Goldwin Smith 25.

Open to juniors and seniors only. A study of interest and persuasion based upon famous examples of the various forms of public address. Practice in the composition and delivery of speeches, with careful criticism and correction. Woodford orations may be worked out in this course.

## PHILOSOPHY AND PSYCHOLOGY

**1. Problems of Philosophy.** First term, credit three hours. Lectures, discussions, and prescribed reading. Lectures, Professor THILLY, M W, 11, Goldwin Smith 225.

Recitations.

Sec. 1, F, 11, Goldwin Smith 225. Professor THILLY.

Sec. 2, F, 11, Goldwin Smith 227. Mr. JONES.

Sec. 3, F, 11, Goldwin Smith 221. Dr. JORDAN.

The fundamental problems of philosophy, together with a critical study of the most important solutions that are offered to them by thinkers today. The nature and scope of philosophy; its relation to the physical and mental sciences and religion; materialism; idealism; dualism; the double-aspect theory; the mechanical theory of the world; the teleological theory; the theory of evolution; the belief in God; rationalism, empiricism, and criticism; realism and idealism.

**2. Elementary Psychology.** First term, credit three hours. Assistant Professor BENTLEY, Mr. RUCKMICH, and Mr. BORING. Lectures, T Th, 11, Goldwin Smith C; class room work, S, various hours.

Intended as an introduction to psychology. A general account of the human mind and of the scientific methods used in the study of mental phenomena.

**3. Logic.** Second term, credit three hours. T Th S, 11, Goldwin Smith C, Professor CREIGHTON and Mr. JONES; T Th S, 9, Goldwin Smith 225, Mr. JONES.

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 227.

An elementary course on esthetics. Lectures, assigned readings, and examinations. An historical survey of the more important branches of art and the psychology of the appreciative feelings and the esthetic judgment.

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

Intended primarily for the general student who wishes to know something of the history of thought and of the influence that philosophical ideas have exerted in the development of civilization. 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.

6. **Moral Ideas and Practice.** Second term, credit three hours. Lectures, discussions, and prescribed reading. Lectures, M W, 9, Goldwin Smith B.

Recitations.

Sec. 1, F, 9, Goldwin Smith 225. Professor THILLY.

Sec. 2, F, 9, Goldwin Smith 227. Mr. JONES.

Sec. 3, F, 9, Goldwin Smith 221. Dr. JORDAN.

Sec. 4, F, 9, Goldwin Smith B. Mr. ———.

The development of moral ideas and practices from primitive times to the present, with an examination of the fundamental virtues and duties.

7. **Ethics.** First term, credit three hours. Professor THILLY and Mr. JONES. M W F, 9, Goldwin Smith 225.

Lectures and discussions.

The nature and methods of ethics; theories of conscience; analysis of conscience; the ultimate ground of moral distinctions; the teleological conception; hedonism; energism; critique of hedonism; the highest good; optimism and pessimism; free will and determination. Thilly's Introduction to Ethics will be used as a textbook.

8. **The Renaissance.** Second term, credit three hours. Professor HAMMOND. T Th S, 10, Goldwin Smith 227.

Lectures and assigned readings. An elementary study of the Renaissance, with especial reference to the fine arts, the rise of humanism, and the beginnings of modern philosophical and political theories.

9. **The Relations between Philosophy and Literature during the Nineteenth Century.** Second term, credit one hour. Professor ALBEE. S, 10, Goldwin Smith 221.

The general influence of philosophical conceptions, and particularly of German idealism, upon certain British and American writers of the nineteenth century. The general relations between philosophy and literature, and the leading philosophical conceptions of eighteenth and nineteenth century thought. Coleridge, Wordsworth, Shelley, Browning, Carlyle, Emerson, and Whitman from the point of view of their philosophical significance.

10. **Experimental Psychology.** Throughout the year, credit, first term, three hours; second term, two or three hours. Prerequisite course 2. Assistant Professor BENTLEY, Mr. RUCKMICH, and Mr. BORING. M W F, 3, Morrill, Psychological Laboratory.

This course may be entered either in the first or in the second term. Qualitative experiments upon sensation, affection, attention and action, perception and idea, and the association of ideas. Textbook, Titchener's Experimental Psychology, part i. Quantitative: verification of Weber's Law in the various departments of sense, determination of stimulus limens, the psycho-physics of selective and volitional action (compound reaction experiments), etc. Textbook, Titchener's Experimental Psychology, part ii. Experiments in comparative psychology may, at the discretion of the department, be pursued during one term.

11. **The Philosophy of Greece, the Middle Ages, and the Renaissance.** First term, credit three hours. Professor HAMMOND. Lectures and assigned readings, including selected dialogues of Plato. An introduction to philosophy from the historical point of view.] Not given in 1912-13.

**11a. Philosophical Results and Applications.** First term, credit one hour. Professor CREIGHTON. T, 12, Goldwin Smith 221.

The purpose of the course is to show how philosophical ideas enter into other departments of thought and have a bearing on concrete problems of life and society. This will be illustrated by a consideration of certain aspects of the movement of thought and civilization in the nineteenth century.

**12. The Theory of Evolution: its History and Significance.** Throughout the year, credit one hour a term. Mr. JONES. F, 12, Goldwin Smith 227.

The history of the theory of evolution from the first appearance of the concept among the Greeks to its formulation in modern times by Darwin; the recent modifications of the theory, and the application of the evolutionary method to the various sciences, with special attention to its bearing on ethics, sociology, and religion; an estimate of the significance of the evolutionary point of view for a theory of the world as a whole.

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. Mr. JONES. T Th, 12, Goldwin Smith 231.

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.

**14. Problems of the Philosophy of Religion.** Second term, credit two hours. Mr. JONES. T Th, 12, Goldwin Smith 221.

Some of the main problems of the philosophy and psychology of religion; the philosophical basis of theism; the nature of religion and its relation to morality and to science.

**15. Reading of German Psychology.** Second term, credit two hours. Prerequisite course 2. Assistant Professor BENTLEY. T Th, 12, Morrill Hall, Psychological Lecture Room.

The primary aim of this course is to assist toward the accurate rendering of German psychological texts and articles.

**16. Reading of German Philosophy.** Throughout the year, credit one hour a term. Professor HAMMOND. T, 2, Goldwin Smith 220.

The primary aim of this course is to aid students in acquiring a knowledge of German philosophical terminology and facility in the translation of philosophical prose. 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, 9, 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 three hours. Prerequisite course 13 or the equivalent. Professor CREIGHTON.] Not given in 1912-13.

**19. The Development of Modern Philosophical Problems.** First term, credit two hours. Prerequisite course 5 or the equivalent. Professor CREIGHTON. T Th, 12, or hours to be arranged, Goldwin Smith 221.

A review and an interpretation of the leading philosophical ideas of modern schools and systems, with the purpose of tracing the evolution of philosophical conceptions, especially during the nineteenth century, in the light of the various scientific, social, and religious problems with which they are connected. Intended for graduates and seniors already acquainted with the main facts of the leading modern systems.

**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. A history of moral ideals and reflection in antiquity, the Middle Ages, and the Renaissance, treated in connection with social and political institutions. Primarily for seniors and graduates.

**21. History of Modern Ethics.** Second term, credit two hours. Professor ALBEE. M W, 11, Goldwin Smith 220.

The history of modern ethics with special reference to the development of 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 of philosophical discipline. Primarily for graduates.

**22. The Psychology of Sound.** First term, credit three hours. Prerequisite course 2. Mr. RUCKMICH. Lectures, T Th, 11; discussions, demonstrations, and recitations, S, 11, Morrill, Psychological Lecture Room.

A review of the more important facts and theories of auditory sensation and perception, and a discussion of recent psychological work on the appreciation and the interpretation of music.

**23. Association, Memory, and Learning.** Second term, credit three hours. Prerequisite course 2. Mr. RUCKMICH. Lectures, T Th, 11; discussions, demonstrations, and recitations, S, 11, Morrill, Psychological Lecture Room.

This course gives a systematic treatment of these subjects from an historical and experimental point of view. A number of the classical experiments will be demonstrated and criticised.

**24. General Psychology.** Throughout the year, credit three hours a term. Prerequisite course 2, and either 10 or 23. Assistant Professor BENTLEY. M W F, 12, Morrill, Psychological Lecture Room.

An advanced course in human psychology which aims to derive from historical and current writings a coherent account of mind, and to explain the relations which psychology sustains to the biological and the social sciences.

**25. Psychological Problems and Studies.** Throughout the year, credit one to five hours a term. Prerequisite courses 2 and 10. Assistant Professor BENTLEY, Mr. RUCKMICH, and Mr. BORING. Hours to be arranged, Psychological Laboratory.

Simple laboratory problems, historical studies, and essays.

**26. Advanced Ethics.** Throughout the year, credit three hours a term. Professor THILLY. Lectures, reading, discussion, and essays. M W F, 10, Goldwin Smith 220.

The study and criticism of the ethical theories of Bentham, J. S. Mill, Spencer, and Sidgwick.

**[27. The Republic of Plato.** Throughout the year, credit three hours a term. Professor HAMMOND. Reading of the Greek text. This course is intended for students of Greek literature as well as of Greek philosophy.] Not given in 1912 and 13.

**[28. Aristotle's Ethics.** Throughout the year, credit three hours a term. Professor HAMMOND.

Reading of the Greek text. The Nicomachean Ethics will be read and interpreted in connection with Aristotle's political theories.] Not given in 1912-13.

**[29. Modern Idealistic Theories of Ethics.** Throughout the year, credit two hours a term. Professor THILLY.] Not given in 1912-13.

**30. Empiricism and Rationalism.** First term, credit three hours. Professor ALBEE. T Th S, 11, Goldwin Smith 220.

Lectures, discussions, and essays. The empirical movement as represented by Locke, Berkeley, and Hume, and the rationalistic movement as represented especially by Descartes, Spinoza, and Leibniz, with reference to their distinctive methods. Locke's Essay (Bohn edition, 2 vols.), Hume's Treatise of Human

Nature (Clarendon Press), and Leibniz's Philosophical Works (Duncan's translation, Tuttle, Morehouse & Taylor, New Haven). Primarily for graduates.

**31. The Critical Philosophy of Kant.** Second term, credit three hours. Professor ALBEE. T Th S, 11, Goldwin Smith 220.

Lectures, discussions, and essays. A study of the Critique of Pure Reason (Müller's translation), with frequent references to standard commentaries and to the more recent literature on the subject; the relation in which the three Critiques of Kant stand to each other. Primarily for graduates.

**32. Early Rationalism: Spinoza and Leibniz.** First term, credit three hours. Professor ALBEE. M W F, 12, Goldwin Smith 220.

Lectures, discussions, and essays. A critical study of early rationalism, with special reference to the divergent tendencies represented by Spinoza and Leibniz. The principal works of both philosophers will be read, and the influence of both upon later speculation will be considered. Primarily for graduates.

**[33. German Pessimism, with special reference to Schopenhauer.** First term, credit three hours. Professor ALBEE. Lectures, discussions, and essays. Primarily for graduates.] Not given in 1912-13.

**34. Problems and Methods in Recent Philosophy.** Throughout the year, credit two hours a term. Professor ALBEE. T Th, 12, Goldwin Smith 220.

Lectures. A detailed examination of the problems and methods involved in current philosophical investigation as a basis for a positive treatment of the fundamental problems of the present day. Primarily for graduates.

**[35. Logical Theory.** Throughout the year, credit two hours a term. Professor ALBEE. Lectures, reading of prescribed authors, and discussions. Primarily for graduates.] Not given in 1912-13.

**36. Realism, Historical and Contemporary.** Second term, one hour. Lectures. For graduates only. Mr. JONES. Hours to be arranged.

**37. Seminary in Ethics.** Investigation of special problems. Throughout the year, credit two hours a term. Professor THILLY. M, 7-30 P. M., Goldwin Smith 220.

**38. Seminary in Ancient and Medieval Philosophy.** Throughout the year, credit two hours a term. Professor HAMMOND. W, 3-5 (or hours to be arranged), Goldwin Smith 220.

The work in 1912-13 will be devoted to the reading and discussion of selected dialogues of Plato and the Politics of Aristotle in English translations.

**39. Seminary in Psychology.** Throughout the year, credit two hours a term. Assistant Professor BENTLEY. Morrill, Psychological Laboratory. Hours to be arranged.

Studies in psychological theory. Essays and reports. Advanced work upon experimental problems may also be included.

**40. Seminary in Logic and Metaphysics.** F, 10-12, Goldwin Smith 231. Professor CREIGHTON and Dr. JORDAN.

The subject for 1912-13 will be the philosophy of evolution.

## THE SCHOOL OF EDUCATION

The School of Education was established in 1907 by the Board of Trustees for the purpose of providing professional training, both theoretical and practical, to all persons who are looking forward to teaching, or who are actually engaged in the work.

The School offers courses of instruction for three classes of students:

A. Graduate students. For these are intended courses described as primarily for graduates. These are planned to meet the needs of college graduates that are

preparing themselves for positions of leadership in education, as professors of education, superintendents of school systems, and directors or supervisors of special phases of school work. By completing a satisfactory amount of work in education and in such other departments of instruction as each case may demand, these students may receive the degree of Master of Arts or of Doctor of Philosophy.

B. Undergraduates. The distinctive work offered in the School of Education for prospective teachers in secondary schools consists of the courses on the history of education, principles of education, educational psychology, school hygiene, and special methods in teaching the subjects in which the student chooses to specialize. By far the largest share of preparation for high school teaching consists of the regular studies of a four years' course in Arts and Sciences. It is expected therefore that the student will give the major portion of his time to the studies in the department or departments that he elects. Further, certain subjects are of such importance for the general culture of all teachers that they are necessary parts of every one's course. Such subjects are physiology, psychology, logic, elementary economics, and at least one foreign language. Such acquaintance with the history of philosophy as may be gained in course 5 in Philosophy is strongly urged. Beyond all in importance is the ability to speak and write English with accuracy and facility. Students registered in the College of Arts and Sciences have the opportunity of taking work amounting in all to one year's study in any of the other colleges of the University. This arrangement permits any student to prepare himself for teaching one or more of the so-called special subjects to which so much attention is now paid, such as drawing, manual training, industrial and agricultural education, music, and nature study.

C. Special students. Persons of mature age that either cannot or will not qualify as candidates for a regular university degree, may be admitted to study whatever subjects they wish to pursue. Special courses will be laid out for them, and upon the satisfactory completion of these they will receive certificates indicating what they have done.

#### NEW YORK STATE TEACHERS' CERTIFICATES

The New York State Education Department grants two kinds of certificates to graduates of the College of Arts and Sciences:

1. The College Graduate Limited Certificate. This will be given at graduation. It is a license to teach in any school in the state except the primary and grammar grades of city schools and is good for two years. It will then be renewed if the holder shall pass state examinations in psychology, history of education, principles of education, and methods of teaching.

2. The College Graduate Professional Provisional Certificate. This is granted at graduation to students that have completed in the School of Education courses approved by the State Department. It is a license to teach for three years in any grade of any school in New York State, and may then be made permanent upon presentation of a certificate of three years' successful teaching.

The following studies are prescribed by the State Department for students that wish the professional certificate: psychology, general and educational, ninety hours; history and principles of education, ninety hours; methods in teaching, sixty hours; observation, twenty hours.

This requirement may be met at present by completing the following courses: Philosophy 2 (psychology), Education 1, 3, 4, and four hours of elective work in courses in the Science and Art of Education, including the teachers courses indicated under Latin, page 5; German, page 11; French, page 14; English, page 16; History, page 31; Botany, page 52.

## COLLEGE OF ARTS AND SCIENCES

## INDUSTRIAL EDUCATION

The following course is prescribed for students planning to become teachers in the field of industrial education.

## FIRST YEAR

First Term		Second Term	
Subject.	Hours.	Subject.	Hours.
English .....	4	English .....	4
German .....	6 or 5	German .....	3 or 5
Mathematics:		Mathematics (Adv. Algebra) ....	5
Solid Geometry .....	3	Physics:	
Trigonometry .....	3	Course 1 .....	4
Drawing .....	3	Course 5 .....	2

## SECOND YEAR

Psychology .....	3	Educational Psychology .....	4
Economics (Course 51) .....	3	Economics (Course 51) .....	3
Chemistry (Course 1) .....	6	Chemistry (Course 6) .....	5
Drawing .....	3	Woodworking .....	3
Physics (Course 10) .....	2	Physics (Course 10) .....	2

## THIRD YEAR

History of Education .....	4	Principles of Education .....	4
American History (32) .....	3	American History (33) .....	3
Political Science (66a) .....	3	Political Science (66b) .....	3
Forge Work .....	2	Foundry Work .....	2
*Elective .....	6	*Elective .....	6

## FOURTH YEAR

School Hygiene .....	2	Elementary Education .....	2
History of Economics .....	4	History of Economics .....	4
Machine Work .....	2	Machine Work .....	2
Principles of Mnfg .....	2	Industrial Organization ....	2
*Elective .....	8	*Elective .....	8

## THE SCIENCE AND ART OF EDUCATION

1. **Principles of Education.** Second term, credit four hours. Prerequisite courses Philosophy 2, Education 4. Professor DEGARMO. M T W Th, 2, Goldwin Smith 234.

An introduction to the general theory of education, in both its individual and its social aspects. Social and individual bases of modern education; basis for selection of studies; fundamental differences between the sciences and the humanities; function and worth of the various studies; their organization into curricula; vocational courses; principles underlying scientific methodology, such as the acquisition of facts at first and at second hand, the use of problem, hypothesis, and analogy, explanation in the form of cause, classification or generalization, the inductive approach, the deductive approach, application, etc. Textbook, DeGarmo's Principles of Secondary Education, volumes I and II.

[2. **Present Problems in Education.** Second term, credit one hour. A course of lectures on important problems in education.] Not given in 1912-13.

[2a. **Industrial Education.** Second term, credit one hour.

A course of lectures on modern industry, its development and the relation to it of education.] Not given in 1912-13.

\*All elective work must be chosen with the advice and approval of the Director of the School of Education. The student is recommended to elect work outside of the narrower field in which he is specializing, for example such courses as Philosophy 5, 6, 7.<sup>1</sup>

3. **History of Education.** First term, credit four hours. Prerequisite courses Philosophy 2, Education 4. Professor DEGARMO. M T W Th, 2, Goldwin Smith 234.

A general survey of the history of education. It will follow in the main the topics and readings prescribed in the syllabus of the New York State Education Department for the guidance of college graduates. Special emphasis is laid upon the following topics: the education of the Greek people; the rise and development of humanism; the rise and development of science and scientific methods in education; the doctrines of educational reformers; the development of modern systems of education. Monroe's Textbook in the History of Education.

4. **Educational Psychology.** Second term, credit four hours. Prerequisite course Philosophy 2. Assistant Professor WHIPPLE. M T W Th, 2. Goldwin Smith 256.

A complete system of functional psychology as applied to education, covering the relation of mental to nervous activity, and the large groups of psychophysical functions, volition, cognition, and emotion. Particular reference is given to such topics as nervous plasticity, habit, the nature of educational training and discipline, the psychology of temperament, attention and interest, association, apperception, perception, observation, memory, imagination, conception, judgment, and reasoning. Where feasible, psychological experiments that apply to the work in hand are described or performed. Whipple's Questions in General and Educational Psychology will be used.

[5. **School Hygiene.** First term, credit two hours. Assistant Professor WHIPPLE. Lectures, prescribed readings, and demonstrations.

Construction of school buildings, situation, heating, ventilation, sanitation; followed by the hygiene of instruction, fatigue, school diseases, defects of sight and hearing, medical inspection, hygiene of reading, writing, and other studies. Occasional demonstrations of an experimental type. Whipple's Questions in School Hygiene will be used.] Not given in 1912-13.

Students that are particularly interested in this phase of the work and are competent for experimental investigation may register for systematic work in course 14. For this work students should have taken or be taking course 4, and should afterward take course 6.

6. **The Education of Exceptional Children.** Second term, credit two hours. Assistant Professor WHIPPLE. M, 3-5, Goldwin Smith 251.

Discussions, reports, and essays. The problem of the atypical child. The psychology and pedagogy of the retarded (idiot, imbecile, moron, laggard), the accelerated (precocious and gifted), and the defective (blind and deaf.)

Students will find it desirable to take also Education 5 and 12, and History and Political Science 57.

7. **Elementary Education.** Second term, credit two hours. Professor DEGARMO. W, 3-5, Goldwin Smith 251.

Designed for prospective principals, superintendents, and training-teachers in elementary education. Readings, reports, and round-table discussions on elementary studies and methods.

[8. **Seminary in Mental Development.** First term, credit two hours. Prerequisite course 4, and preferably also 1 and 3. Assistant Professor WHIPPLE.

The genetic phases of mental life with special reference to their application to educational problems. Heredity and environment, the nature and utilization of instinctive tendencies, the doctrine of recapitulation, the theory of culture epochs, physical and mental changes of adolescence, the development of the sex instinct, the hygiene of sex, social organizations, the teaching of science in the high school, the problems of coeducation, etc. The seminary is designed to be of assistance to high-school teachers.] Not given in 1912-13.

9. **The Teaching of Language.** First term, credit three hours. Professor BRISTOL. M T W, 2, Goldwin Smith 137.

An introduction to the study of language as speech, especially with reference to the description of foreign and native sounds. Consideration of the problems of teaching a foreign language; linguistic and literary aims in school work; principles of translating and of composition; the aims of foreign language study in secondary schools; discussions and practice exercises. For all seniors that are planning to teach foreign languages.

**10. School Administration.** First term, credit two hours. Professor DEGARMO. W, 3-5, Goldwin Smith 251.

Readings, discussions, and reports. The comparative study of school administration in American cities and in foreign countries, especially Germany and England. Primarily for graduates.

**11. Seminary in Philosophy of Education.** Throughout the year, credit two hours a term. Professor DEGARMO. Th, 3-5, Goldwin Smith 251.

A course in advanced educational theory. It follows in the main Professor MacVannel's outline in the Philosophy of Education, and embraces such topics as the following: evolution and idealism as bases of education; personality and environment; the individual and society; moral institutions; democracy and education; the course of personal development; the school as a social institution; the course of study. Primarily for graduates.

**[12. Experimental Study of School Children.** First term, credit three hours. Prerequisite courses Philosophy 10, Education 4. Assistant Professor WHIPPLE.

A survey of the literature of physical and mental tests, particularly of tests of school children, with reference to purposes, methods, and results. Demonstrations of the more important tests and practice in their administration. The work is based upon Whipple's Manual of Physical and Mental Tests. Students that wish to undertake experimental problems may register in course 14. Primarily for graduates.] Not given in 1912-13.

**13. Seminary in Ethical Training in Secondary Schools.** First term, credit two hours. Professor DEGARMO. F, 2-4, Goldwin Smith 251.

Readings, discussions, and reports. Regulative principles of conduct under static and under dynamic social conditions, the adolescent in modern society, moral habits, the function of interest in the moral life, the moral value of school studies, ethical training through athletics, etc. Primarily for graduates.

**14. Seminary for Experimental Investigation.** Second term. Hours to be arranged. Prerequisite course 5 or 12. Assistant Professor WHIPPLE. Goldwin Smith 248.

Solution of minor problems in school hygiene or educational psychology, or of larger problems set as theses for advanced degrees. Primarily for graduates.

**[15. Seminary for the Science and Art of Education.** Throughout the year, one hour a term. Prerequisite courses 1 or 3, and 4. Professor DEGARMO and Assistant Professor WHIPPLE.] Not given in 1912-13.

**16. Esthetic Education.** Second term, credit two hours. Prerequisite courses 3 and 4. Professor DEGARMO. F, 3-5, Goldwin Smith 251.

The application of esthetic principles in the development of appreciation for the beautiful in nature and in the useful and fine arts.

## HISTORY AND POLITICAL SCIENCE

### PUBLIC LECTURES

**A. The History of Civilization.** A course of public lectures on some of the principal epochs of ancient and modern history, with reference to their significance in the progress of humanity. The lectures will be open to all students and to the public, but no university credit will be given. Throughout the year, W, 12, Goldwin Smith A. Professors SCHMIDT, SILL, BURR, and CATTERALL.

## ANCIENT HISTORY

1. **Roman History.** First term, credit five hours for underclassmen, four hours for upperclassmen. Professor SILL. M T W Th F, 9, Goldwin Smith 142.

A general survey of Roman history, intended primarily for freshmen. Text-books, lectures, collateral readings.

2. **Greek Cities.** First term, credit two hours. Professor SILL. T Th, 11, Goldwin Smith 134. A study of Greek city life. The principal cities of the ancient Greek world will be considered in turn: their extant remains, their government, their social life, their famous men, their contributions to civilization.

3. **Byzantine History.** Second term, credit two hours. Professor SILL. T Th, 11, Goldwin Smith 134. The later Roman Empire, from the time of Constantine to the fall of Constantinople.

4. **Roman Law.** Second term, credit three hours. Professor SILL. M W F, 9, Goldwin Smith 124. An introduction to the history and system of the civil law of Rome, intended especially for those who expect to study law.

5. **Julius Caesar.** Second term, credit one hour. Professor SILL. T, 12, Goldwin Smith 236. A study in historical biography.

6. **Seminary in Greek and Roman History.** Throughout the year, credit two hours a term. Professor SILL. T, 4, or as may be arranged, Library, Greek and Latin Seminary Room. Open to graduates and to qualified undergraduates.

## MEDIEVAL HISTORY

11. **The Middle Ages.** First term, credit five hours. Professor BURR. M T W Th F, 3, Goldwin Smith 245.

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

12. **Renaissance and Reformation.** Second term, credit five hours. Prerequisite course 11 or the equivalent. Professor BURR. M T W Th F, 3, Goldwin Smith 245.

A study of 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.

13. **The Rise of Tolerance.** Throughout the year, credit two hours a term. Prerequisite course 11 or the equivalent. Professor BURR. T Th, 12, Goldwin Smith 245.

A study of the history of intellectual and religious liberty in Christendom.

14. **Medieval Life.** First term, credit one hour. Prerequisite course 11. Professor BURR. S, 11, Library, European History Seminary Room.

The reading of some medieval historian, with a view to acquaintance with medieval life and facility in the use of historical Latin. In 1911-12, the subject of study was the autobiography of Guibert of Nogent (1053-1124). Not open to underclassmen. The course presupposes some knowledge of Latin—as much, for instance, as is needed to read Caesar or Livy.

15. **Seminary in Medieval History.** Second term, one hour. Prerequisite course 11. Professor BURR.

A research class for the critical study of some period, event, or phase of medieval history. Open only to seniors and graduates. A reading knowledge of Latin is presupposed.

16. **Canon Law.** First term, credit two hours. Prerequisite courses 11, 12. Professor BURR.

The constitutional history of the Christian Church and the elements of ecclesiastical law. Primarily for graduates.] Not given in 1912-13.

### MODERN EUROPEAN HISTORY

21. **Modern European History, 1600 to 1900.** First term, credit five hours for underclassmen, four hours for upperclassmen. Professor CATTERALL. M T W Th F, 9, Goldwin Smith C.

A general survey of Modern European history, intended primarily for freshmen. Textbooks, lectures, collateral readings.

23. **English Constitutional History.** Second term, credit five hours. Professor CATTERALL. M T W Th F, 9, Goldwin Smith 142. Textbook, lectures, and readings. Intended primarily for students of the law school. Not open to freshmen in Arts and Sciences.

24. **Prussia from 1713 to 1740.** First term, credit three hours. Prerequisite course 21 or its equivalent. Professor CATTERALL. M W F, 11, Goldwin Smith 242. For upperclassmen and graduates.

25. **Prussia Under Frederick the Great, 1740-1786.** Second term, credit three hours. Prerequisite course 21 or its equivalent. Professor CATTERALL. M W F, 11, Goldwin Smith 242. For upperclassmen and graduates.

26. **Seminary in Modern European History.** Throughout the year, credit two hours. M, 4-6, Library, European History Seminary Room. Open to graduates, and by permission, to qualified seniors.

### AMERICAN HISTORY

32. **American History, 1750-1815.** First term, credit three hours. Professor HULL. M W F, 10, Goldwin Smith C.

The revolutionary period and the establishment of independence; the decline of European influence in the affairs of the time. Reference readings, textbooks, and lectures.

33. **American History, 1815-1877.** Second term, credit three hours. Professor BRETZ. M W F, 10, Goldwin Smith C.

The course treats the period of national expansion, the rise and solution of sectional questions, civil war and reconstruction, and more recent developments. Reference readings, textbooks, and lectures.

34. **Economic History of the Colonies, 1600-1788.** First term, credit two hours. Professor HULL. T Th, 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 commerce of the British Empire and its relation to the American Revolution. Textbook, readings, reports, and lectures.

35. **Economic History of the United States, 1789-1890.** Second term, credit two hours. Professor HULL. T Th, 9, Goldwin Smith 234.

Commerce during the European wars; the introduction of manufactures; the westward movement; industrial differentiation of the sections; agriculture for export; the amalgamation of railways and the combination of industries. Textbooks, readings, reports, and lectures.

36. **Constitutional History of the United States since 1860.** First term, credit three hours. Prerequisite courses 32 and 33, or the equivalent. Professor BRETZ. M W F, 9, Goldwin Smith 234.

The course deals primarily with constitutional development since the Civil War but attention is paid to current political questions of constitutional importance. A survey of recent constitutional development in the States is included. Not open to freshmen.

38. **History of the United States, 1850-1861.** Second term, credit three hours. Prerequisite course 33. Professor HULL. M W F, 10, Goldwin Smith 234.

A somewhat detailed course in political history; text, Rhodes's History of the United States, chapters 1-12; collateral reading, reports, and lectures.

39a. **American Social History: The Settlement of the Middle West.** First term, credit three hours. Professor BRETZ. M W F, 10, Goldwin Smith 234.

Exploration of the west, early settlers in the Ohio Valley, admission of states, disposal of the public lands, military and diplomatic relations with foreign powers in Northwest and Southwest. For upperclassmen and graduates.

39b. **American Social History: Religious Organizations in the Colonial and Early National Period.** Second term, credit three hours. Professor BRETZ. M W F, 9, Goldwin Smith 234.

The course includes the European background of American History in so far as religion is concerned, the transplanting of religious bodies to the new world, the relations between Church and State in the colonial period, the Revolution and the adjustment of the churches to the new order, and the leading features of church history in the national period.

Primarily for graduates. Open by permission to qualified upperclassmen.

40. **Seminary.** Throughout the year, credit two hours a term. Professors HULL and BRETZ. First meeting, Thursday, October 3, 4 p. m., Library, American History Room.

### HISTORY IN GENERAL

41. **The Sciences Auxiliary to History.** First term, credit two hours. Professor BURR. S, 12, Library, European History Seminary Room.

A glance at the aims, the methods, the literature, and the use to history of the more important auxiliary sciences—anthropology, ethnology, archæology, philology, epigraphy, paleography, diplomatics, sphragistics, numismatics, heraldry, genealogy, chronology, geography. Not open to underclassmen.] Not given in 1912-13.

42. **Historical Geography.** Throughout the year, credit one hour a term. Professor BURR.

A thorough study, with map and text, of the geography of history. Not open to underclassmen, and intended for those who have given much attention to history. As the order of topics is not of moment, the course may be begun with either the first or the second term.

43. **Paleography and Diplomatics.** Throughout the year, credit one hour a term. Professor BURR.

The reading of manuscripts and the interpretation of documents. Attention is devoted chiefly to the paleography of Latin and of the languages using the Latin alphabet (e. g., English, French, German, Italian). The course is an actual study of the manuscripts and facsimiles in which the University is rich.

45. **Historical Method.** First term, credit two hours. Professor BURR. S, 9-11, Library, European History Seminary Room.

History: its nature, its scope, its material, its methods. Open only to seniors and graduates, and intended especially for those who are looking forward to the teaching of history or to historical research.

### COURSE FOR TEACHERS

46. **The Teaching of History.** Second term, credit two hours. Professor BURR with aid from his colleagues. Open only to seniors and graduates who are specializing in history.

### POLITICAL SCIENCE

51a. **Elementary Economics.** Throughout the year, credit three hours a term. One lecture and two recitations each week. Lectures, M, 11; repeated M, 12, Professor KEMMERER. Recitations, T Th, 8, 10, 11, 12; W F, 8, 10, 11, 12. Drs. LAGERQUIST, USHER, SPEDDEN, and Mr. SMITH.

A general introduction to economics. This course is a prerequisite for most of the other courses in the field of political science. For section assignments and other information apply at Goldwin Smith 260.

**51b. Elementary Economics.** First term, credit five hours. Two lectures and three recitations each week. Lectures, M F, 11; repeated M F, 12, Professor KEMMERER. Recitations, T W Th F, 8, 10, 11, 12. Drs. LAGERQUIST, USHER, SPEDDEN, and Mr. SMITH.

Essentially the same as the preceding course except for schedule of hours.

**53a. Political Institutions.** First term, credit three hours. Professor JENKS. M W, 10. Recitation hours to be arranged. Goldwin Smith 142.

The principles of politics. Nature and historical development of political institutions. The constitutional and administrative laws of the United States and of Great Britain studied with special reference to their practical working. Lectures, and discussions twice a week, with library work and recitations once a week.

**53b. Comparative Politics.** Second term, credit three hours. Professor JENKS. M W, 10. Recitation hours to be arranged. Goldwin Smith 142.

Sketch of the constitutional and administrative laws and of the political institutions of the leading nations of Continental Europe, with especial reference to their relations to present political problems in the United States. A continuation of course 53a, and preferably to be taken after that, though it may be elected independently. Lectures, textbook, and discussions twice a week, with library work and recitations once a week.

**[54a. Administration.** First term, credit three hours. Prerequisite course 53a or an equivalent. Mr. SMITH. M W F, 9, Goldwin Smith 256.

A study of the organization and functions of the different branches of our federal and state service; administrative action; exercise of official powers; scope of judicial control; actions against officers; extraordinary legal remedies. Lectures, recitations, and reports.] Not given in 1912-13.

**[54b. Administrative Problems.** Second term, credit three hours. Prerequisite courses 53a, 54a, or equivalents. Mr. SMITH. M W F, 9, Goldwin Smith 256.

A study of federal and state administrative problems: organization and work of boards and commissions; delegation of legislative power. Special attention will be paid to the administrative control over public service corporations. Lectures, recitations, and reports.] Not given in 1912-13.

**[55. Elementary Social Science.** An introductory course upon the relation of evolutionary theories to the social sciences, the efforts to establish a science of sociology and the non-economic aspect of certain social problems, such as the family, race relations, immigration, labor questions, and crime. Discussions on assigned readings once a week. Course 51a or 51b should precede or be taken with this. Professor WILLCOX.] Not given in 1912-13.

**56. Business Law.** First term, credit three hours. Assistant Professor BAUER. T Th S, 12, Goldwin Smith B.

The principles of contract, with special reference to sales of goods, insurance, credits and loans, and commercial papers; a survey of the law of agency, master and servant, business associations, and real and personal property and conveyancing. Designed primarily to meet the needs of students entering business, not law, as a profession.

**[57. Methods of Modern Philanthropy.** Lectures on the defective, dependent, and delinquent classes and on the efforts of society to care for them and restrain their multiplication. Professor WILLCOX.

First term. Problems of dependency and of bodily and mental life and health as a primary requisite to economic independence.

Second term. Problems of crime and of the identification and punishment of crime. Theories of punishment. Efforts to diminish crime and to reform criminals.] Not given in 1912-13.

**58. Accounting.** Throughout the year, credit three hours a term. Courses 51a or 51b, and 56 should precede or may accompany this course. Assistant Professor BAUER. T Th S, 8, Goldwin Smith 264.

If there is a sufficient demand, a section covering the same work will be provided for M W F, 8.

First term: the theory of debits and credits; the nature of individual accounts, as of persons, various assets, expense, income, loss and gain, and capital; the interrelation, adjustment, and closing up of the several accounts, and the drawing up of the balance sheet and income statement.

Second term: the balance sheet, with special reference to valuing the several items; the classification of accounts; depreciation and appreciation, and how treated in the accounts; stocks and bonds, earnings, dividends, special reserves, surplus, how treated in the accounts; cost-keeping, its principles, and its importance in modern business.

**59. Financial History of the United States.** First term, credit three hours. Prerequisite 51a or 51b. Professor KEMMERER. T Th S, 11, Goldwin Smith 269.

An historical study of public revenues and expenditures, of public debts, and of currency and banking in the United States, during the national period. This course is preliminary to courses 64 and 70 and is recommended to all students that intend to take either of these courses.

**60a. Commercial Geography.** First term, credit three hours. Prerequisite course 51a or 51b. Dr. LAGERQUIST. M W F, 8, Goldwin Smith 264.

The resources upon which the industries of this country are based. Comparison with those resources of foreign countries with which the United States trades. A critical study of the methods and processes by which various resources and industries have been developed, with attention to the future economical utilization of resources and the expansion of industries and the market.

**60b. Commercial Policies.** Second term, credit three hours. Prerequisite course 51a or 51b. Dr. LAGERQUIST. M W F, 8, Goldwin Smith 264.

The development and organization of commerce during the last century, and the influence of political and economic conditions on trade, with special emphasis on American commerce; the theory of international trade, the operation and influence of foreign exchange, the present protective tariff, commercial treaties, reciprocities, and navigation policies, ocean transportation, trade-promoting institutions, and the consular services.

**61a. Municipal Government.** First term, credit three hours. Assistant Professor SABY. T Th S, 8, Goldwin Smith 256.

A study of the structure and functions of city government; the relation of the city to the state; the administration of public health and safety, charities and corrections, schools, public works, and finances. Lectures, text, and special reports.

**61b. Municipal Problems.** Second term credit three hours. Assistant Professor SABY. T Th S, 8, Goldwin Smith 256.

A study of special problems in municipal organization and administration: the commission form of government, municipal home rule, the relation of cities to public utilities, such as street railways, and gas and water supply. Lectures, assigned readings, and reports.

**62. Principles of Business Management.** Throughout the year, credit three hours a term. Prerequisite course 51a or 51b. Professor JENKS. M W, 11, Goldwin Smith C. Lectures, discussions, and practice. Sections for recitations, one hour a week; hours to be arranged.

The methods employed in organizing and financing modern business corporations and especially the general methods of management,—cost-keeping, price making, advertising, selling, buying, correspondence, shipping, relations with laborers, with the stock market, with the public, and similar topics as viewed by business managers. The main purpose of the course is to note the way in which the general principles of economics are seen and applied in actual business life.

63. **Corporations and Trusts.** Throughout the year, credit three hours a term. Prerequisite course 51a or 51b. Professor JENKS. M W, 12, Goldwin Smith C. Lectures, discussions, and practice. Sections for recitations, one hour a week; hours to be arranged.

A brief survey of the development and organization of corporate organizations, including combinations, from the legal and economic standpoint; the present methods of promotion, organization, and financing; the problems of dissolution, insolvency, receiverships and reorganization; the relation of the corporation problem to the tariff, wages, prices, and other social problems; the public regulation and control of corporations and combinations.

64. **Money, Credit, and Banking.** Throughout the year, credit four hours a term; without laboratory work, three hours a term. Prerequisite 51a or 51b. Course 59 is recommended, though not required, as a preliminary course. Professor KEMMERER. T Th S, 10. Laboratory, Th, 2-4, Goldwin Smith 264.

A study of the principles of money, credit, and banking; a study of the exemplification of those principles in the monetary and banking history of certain countries; a study of present day currency and banking problems in the United States.

[65a. **The Industrial Revolution in England, 1700-1850.** First term, credit three hours. Prerequisite course 51a or 51b, previously or concurrently, or work in European history. Dr. USHER.

The topography and resources of England, the Industrial Revolution, commercial expansion in the 18th century, the history of the Bank of England, the rise of London as a world metropolis.] Not given in 1912-13.

[65b. **Social and Economic Problems of the 19th Century in England.** Second term, credit three hours. Prerequisite course 51a or 51b, previously or concurrently. Dr. USHER.

The course can be followed most profitably by students who have taken course 65a, but it may be elected independently. The history of English agriculture, 1700-1907; the poor laws, 1834 and 1909; the coming of free trade, 1776-1846; railroads and rate-making; Germany and the industrial supremacy of England.] Not given in 1912-13.

66a. **The Labor Problem.** First term, credit three hours. Prerequisite course 51a or 51b. Professor JOHNSON. T Th S, 11, Goldwin Smith 264.

This course will present a systematic view of the progress and present condition of the working class in the United States and in other industrial countries; sketch the history and analyze the aims and methods of labor organizations; study the evolution of institutions designed to improve the condition of the working class; and compare the labor legislation of the United States with that of European countries.

66b. **Socialism.** Second term, credit three hours. Prerequisite course 51a or 51b. Professor JOHNSON. T Th S, 11, Goldwin Smith 264.

Due attention will be given in this course to the various forms of socialistic theory. Its main object, however, is to describe the evolution of the socialist movement and the organization of socialistic parties, to measure the present strength of the movement, and to examine in the concrete its methods and aims.

67a. **History of Labor Associations.** First term, credit three hours. Prerequisite course 51a or 51b. Dr. SPEDDEN. Lectures, M W, 9, Goldwin Smith 264; recitations, F, 9, Goldwin Smith 264; laboratory, F, 3.30, Goldwin Smith 269.

A study of the history of labor associations with a review of government regulation of labor in England and in the United States. See course 67b.

67b. **Employers' Associations.** Second term, credit three hours. Prerequisite course 67a. Dr. SPEDDEN. Lectures, M W F, 9, Goldwin Smith 264. Laboratory, F, 3.30, Goldwin Smith 269.

A study of employers' associations and trade societies among employers.

**68. Railway Transportation.** First term, credit three hours. Prerequisite course 51a or 51b; course 58 is recommended as preliminary. Assistant Professor BAUER. T Th S, 9, Goldwin Smith 256.

A brief outline of railway development in the United States; the organization and management of the business; various problems of railway finance, especially those connected with capitalization, stock watering, rate-making, competition and consolidations; a survey of railway legislation, and the problem of government control.

**70. Public Finance.** Second term, credit three hours. Prerequisite course 51a or 51b. Course 59 is recommended, though not required, as a preliminary course. Professor KEMMERER. T Th S, 12, Goldwin Smith 264.

A study of the principles of government revenue, government expenditure, and government debt, with particular reference to present-day problems of taxation in the United States.

**71. Investments.** Second term, credit two hours. Prerequisite course 51a or 51b; 58 is advised though not required. Dr. LAGERQUIST. W F, 9, Goldwin Smith 256.

An analysis of general market conditions and the underlying principles which govern the value of investments; the relation of speculation to investments; the relative merits of the different kinds of investments, particularly of city and farm mortgages, of national, state, and county bonds, and of public utility, railway, industrial, mining, and irrigation securities; the investments of savings banks, trust companies, and insurance companies together with legal regulations.

**73. Insurance.** Second term, credit three hours. Prerequisite course 51a or 51b; course 58 is recommended as preliminary. Assistant Professor BAUER. T Th S, 9, Goldwin Smith 256.

(a) Life insurance: its purpose and importance; the construction of mortality tables; the calculation of premiums and reserves; loading; policies and policy conditions; business organization and finance; taxation and state regulation. (b) Fire insurance: its importance in modern business; fire hazards; the principles and difficulties of fire rating; business organization and finance; current fire insurance problems.

**[75a. Race and Immigration Problems.** First term, credit two hours. Professor JENKS. Lectures, M W. Recitations at hours to be arranged.

A discussion of these questions which are fundamental in the social and political life of the United States and which may profoundly affect its future. Lectures twice a week with one recitation on lectures. Textbook and collateral reading.] Not given in 1912-13.

**[75b. Modern Questions in International Politics.** Second term, credit two hours. Professor JENKS. M W, 12.

A study of leading questions of the day in the field of international politics. The purpose of the course is not only to give general information but also to show the practical application to the study of current events of the principles of international law and politics. Lectures and discussions twice a week, with textbook, collateral reading, and recitation once a week at hours to be arranged.] Not given in 1912-13.

**76. Elementary Statistics.** Throughout the year, credit three hours a term. Prerequisite course 51a or 51b. Professor WILLCOX. Lectures M W F, 9, Goldwin Smith 256; laboratory, W, 2-4, Goldwin Smith 259.

An introduction to census statistics and registration statistics with practical work in tabulation and interpretation. Statistics is presented as a scientific method or tool useful and necessary in studying the social and economic sciences, a method best approached through its results in these its oldest and most developed fields.

**78. International Law.** First term, credit three hours. Assistant Professor SABY. T Th S, 10, Goldwin Smith 256.

The nature and development of international law. The rights and obligations of nations in time of peace. The arbitration movement. The laws of war and neutrality. America's contributions to international law. Specially recommended for students who intend to take course 75b. Textbook, cases, assigned readings, and reports.

**79. History of Political Thought.** Second term, credit three hours. Assistant Professor SABY. T Th S, 10, Goldwin Smith 256.

A study in the development of political thought from the Greeks to the present time, in its relation to the history and development of political institutions.

**80. The History of Protection and of Free Trade in Europe since 1660.** First term, credit three hours. Prerequisite course 51a or 51b; open or by special permission to those who have had courses in European history. Dr. USHER. M W F, 12, Goldwin Smith 264.

Nationalism and Protection; France, Germany, and England, 1660-1800: the mercantile system and its critics. The free trade doctrine of the 18th Century. Protective policy, 1800-1850, and the new protective theory. Imperial preference.

**81. The History of Price Making and the Growth of Produce Exchanges.** Second term, credit three hours. Prerequisite course 51a or 51b; open by special permission to those who have had courses in European history. Dr. USHER. M W F, 12, Goldwin Smith 264.

The medieval system of price-making; markets and fairs. The rise of the modern mechanism of international trade. Wholesale price-making in the 19th century: grain markets, cotton exchanges, and the wool auctions. Problems of the modern exchanges. The markets and the producers.

**[82. Advanced Accounting.** Throughout the year, credit three hours a term. Prerequisite courses 51 and 58. Assistant Professor BAUER.

The accounting systems of railroads, public service corporations, and municipalities. Attention will be given to system building and auditing. Open to graduates and qualified undergraduates.] Not given in 1912-13.

**84. Special Problems in Politics.** Throughout the year, credit two hours a term. Professor JENKS. T, 2.30, Political Science Seminary.

An advanced course dealing with a few fundamental questions, that are of especial interest to those studying political reforms. In 1912-13 special attention will be given to the referendum, initiative, and recall. Open only to graduates and to a few specially prepared undergraduates.

**87. The History of Economic Theory.** Throughout the year, credit three hours a term. Professor JOHNSON. T Th S, 9, Goldwin Smith 264.

It is the purpose of this course to trace the main currents of economic theory from the mercantilistic writers to the present day. Chief emphasis will be laid upon the development of the individualistic economic doctrines in 18th century France and England; the conditions, economic and social, upon which they were based; the consolidation of the doctrines in classical economics; and the modifications they have undergone through the influence of historical and social political criticism.

**88. Value and Distribution.** Throughout the year, credit two hours a term. Professor JOHNSON. Th, 2.30, Political Science Seminary.

This course is devoted to a study of the chief problems of current economic theory, including the nature, the value, and the laws of its growth, valuation of capital and capitalization, the interest problem, wages, profits, competition, and monopoly. The works of the chief contemporary authorities will be critically studied with a view to disclosing the basis of existing divergencies in point of view.

It is desirable that students registering for this course should have a reading knowledge of German and French.

**89. Currency and Banking Reform in the United States.** Throughout the year, credit three hours a term. Prerequisite 51a or 51b and 64, or the equivalent. Professor KEMMERER. Hours to be arranged, Library, Political Science Seminary.

A seminary devoted to a study of proposals for currency and banking reform in the United States. Special attention will be paid to the lessons afforded by European experiences. Primarily for graduates. Open to undergraduates only by special permission.

**91. Research in Life Insurance.** Throughout the year, credit two or three hours a term. Prerequisite course 73. Assistant Professor BAUER.

For students planning to enter the life insurance business or who are interested in particular life insurance problems.

**92. Research in Finance.** Throughout the year, credit two or three hours a term. Prerequisite courses 51 and either 64 or 70 or other advanced work in finance. Professor KEMMERER. Hours and place to be arranged.

**93. Research in Accounting.** Throughout the year, credit two or three hours a term. Prerequisite course 58. Assistant Professor BAUER. Hours to be arranged.

For students interested in particular accounting problems.

**94. Research in Politics and in the Economic History of the United States.** Throughout the year, credit one to three hours a term. Professor JENKS. Hours to be arranged, Goldwin Smith 254.

A few specially prepared students, primarily graduates, may undertake studies involving original investigation in the fields mentioned.

**95. Research in Statistics.** Throughout the year. Credit not more than three hours a term. Professor WILLCOX.

Students who have had training in elementary statistics may carry on the subject by individual work under personal direction.

**99. General Seminary.** Throughout the year, credit two hours a term. Professors JENKS, WILLCOX, KEMMERER, JOHNSON, LAUMAN, and Assistant Professor BAUER. M, 2.30-4.30, Goldwin Smith 269.

For research in the field of political sciences. Open only to graduate students.

## BIBLIOGRAPHY

**1. Introductory Course.** First term, credit two hours. Assistant Librarian AUSTEN. T Th, 12, Library Lecture Room.

A study of the principles of typography, bookbinding, indexing, classification, cataloguing, preparation of manuscripts, administration, etc.

**1a. Laboratory Work.** Second term, credit one hour. Prerequisite course 1. Assistant Librarian AUSTEN. Th, 4, Greek and Latin Seminary Room.

Laboratory work covering the subjects of course 1, and intended for students that wish more of the practical work.

**2. General Bibliography.** Second term, credit two hours. Librarian HARRIS. T Th, 12, Library Lecture Room.

The materials and form of books in ancient times; books in the Middle Ages, block books, early printed books, illustrated by examples of manuscripts and incunabula; book illustration, book-bindings; form notation; systems of classification and cataloguing; general bibliographical aids. Lectures and reference readings.

## MUSIC

The several 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 or in addition to the regular college course. The aim is to make musical training contribute to liberal culture. Consequently, attention is mainly directed to practical courses, or courses in so-called applied music. All instruction is given in classes.

For students entering college without musical training, the department offers elementary instruction in ear training, sight reading, musical notation and terminology, harmony and composition, and elements of musical form, which, for performer and for listener, constitute a necessary basis for the proper understanding of the musical literature to be studied.

The department also provides a weekly organ recital, a musical program for the vesper service at Sage Chapel on Sunday afternoons, a course of lectures, a series of chamber concerts, and an elaborate festival of music, which is given annually about the first of May.

All courses continue through both terms and students are not admitted at the beginning of the second term, with the exception of those who, at entrance, pass the required work of the first term.

1. **Elementary.** Open to all students showing sufficient aptitude to pursue the subject with profit.

Throughout the year, credit two hours a term. Professor DANN. T, 7.15 p. m., Th, 4.45, Sage Chapel.

A thorough course in sight reading, ear and vocal training, and elementary theory, including a practical knowledge of the major and minor scales. Attendance is required at the morning service at Sage Chapel, for which service the members of this class form a part of the choir.

3. **Intermediate.** Open to students who have completed course 1 or who meet the requirements prescribed in course 1. Throughout the year, credit two hours a term. Professor DANN. W, 4.45; Th, 7.15 p. m., Sage Chapel.

Ear and vocal training, theory, including the study of intervals, triads, music notation and terminology, and the elements of musical form; more advanced sight reading and the study of standard sacred and secular music; the study through the aid of the piano player and the phonograph, of prescribed works selected from the larger compositions. Attendance is required at the morning service at Sage Chapel, for which service the members of the class constitute the regular choir.

5. **Advanced Choral.** Throughout the year, credit two hours a term. Professor DANN, M, 7.15; T, 4.45, Sage Chapel.

Preparation and public presentation of the best choral works, sacred and secular. This course is offered at advanced work to students possessing good singing voices and the ability to read at sight, music of moderate difficulty. The class is limited to one hundred, distributed approximately as follows: thirty sopranos, twenty-two contraltos, twenty tenors, and twenty-eight basses. All vacancies are filled by competition at the beginning of the first term.

Members of this class constitute the choir at the Sunday Vesper Service at Sage Chapel.

6. **Orchestra.** Only a limited number can be admitted. Vacancies will be filled by competition. Throughout the year. Mr. COLEMAN. T Th S, Sibley Dome.

Ensemble study of standard works, including composition for chorus and orchestra. This course is offered as advanced training for students who play some orchestral instrument sufficiently well to participate creditably in the study and performance of the works to be studied. The orchestra will give several concerts during the year, accompany the advanced choir at the Sunday Vesper Service at Sage Chapel, and participate in the performance of complete works given by the choir during the year.

7. **Harmony.** Open to all students who have completed course 3, or who have done the work prescribed in course 3. Throughout the year, credit two hours a term. Mr. JOHNSTON. T Th, Sage Chapel.

The subject is approached through a course in melody writing. The work requires a thorough knowledge of the major and minor scales and involves the study of intervals, the construction, relation, and progression of chords, and the harmonization of melodies.

8. **Advanced Harmony and Composition.** Open to students who have completed course 7, and to others equally qualified. Throughout the year. credit two hours a term. Mr. JOHNSTON. M W, 3.30, Sage Chapel.

This course is concerned with the analysis of form and with counterpoint in three or more parts.

Individual examinations for admission to all courses, for new students and others not previously classified, will be held as follows:

Vocal Music. Courses 1, 3, and 5, Wednesday, September 25; Thursday, September 26; Friday, September 27, and Saturday, September 28, from 3 to 5, Sage Chapel.

Orchestra. Course 6, Thursday, September 26, and Friday, September 27, from 5 to 6, Sibley Dome.

Harmony. Courses 7 and 8, Thursday, September 26, and Friday, September 27, from 5 to 6, Sage Chapel.

## MATHEMATICS

Whenever possible, course 1 should be taken either before or simultaneously with course 3. Of the other courses, 1 to 7 inclusive, no two may without special permission be taken simultaneously.

1. **Solid Geometry.** Repeated in second term, credit three hours.

First term. M W F, 11, White 28. Professor TANNER.

Second Term. M W F, 11, White 24. Professor SNYDER.

Open to all students, but designed especially for those who have entered with the minor requirements in mathematics and are preparing: (a) to teach mathematics in the secondary schools; (b) to take up engineering work later in the course; (c) to specialize in chemistry or physics.

2. **Advanced Algebra.** Repeated in second term, credit five hours.

First term. Daily except S, 9, White 21. Assistant Professor CARVER.

Second term. Daily except S, 9. White 28. Professor TANNER.

Open to all students, but designed especially for those mentioned under course 1.

3. **Plane and Spherical Trigonometry.** Repeated in second term, credit three hours.

First term. T Th S, 11, White 28. Professor TANNER.

Second term. T Th S, 11, White 10. Professor McMAHON.

Open to all students, but designed especially for those mentioned under course 1.

5. **Analytic Geometry and Calculus.** Twenty-four sections, daily except S, first term; daily, second term.

5a. Analytic Geometry. Credit four hours first term.

5b. Differential Calculus. Credit one hour first term, two hours second term; credit given only on completion of both parts.

5c. Integral Calculus. Credit four hours second term.

6a. **Analytic Geometry and Differential Calculus.** Second term, credit six hours. Not open, without special permission, to students who have had no previous training in analytic geometry. This course covers substantially the work of courses 5a and 5b.

Sec. 1, daily 9, White 24. Professor SNYDER.

Sec. 2, daily 11, White 21. Assistant Professor CARVER.

6b. **Integral Calculus.** First term, credit three hours. Prerequisite courses 5a and 5b, or the equivalent. Professor McMAHON. M W F, 9, White 10. This course covers substantially the work of course 5c.

7. **Analytic Geometry and Calculus.** Throughout the year.

7a. Analytic Geometry. Credit, four hours first term.

## PHYSICS

1. **Introductory Experimental Physics.** Repeated in second term, credit four hours. Professors NICHOLS and SHEARER, and Assistant Professor GIBBS. M T W Th. First term 9 or 12, second term 12, Rockefeller A.

Entrance physics is not accepted as an equivalent of this course.

5. **Introductory Physics. Class-room work.** Repeated in second term, credit two hours. Assistant Professor GIBBS, and Messrs. FORMAN, RODGERS, AYRES, BUCKLEY, HOWES, THOMPSON, DAVEY, and Miss DELANY. M W, or T Th, Rockefeller, to be assigned.

6. **Introductory Physics. Class-room work.** Repeated in second term, credit four hours. Messrs. MURDOCK, RODGERS, BUCKLEY, and DAVEY. M T W Th, Rockefeller, as assigned.

Examinations for those who were unavoidably absent from either term examination in course 1, 5, or 6, and for those who have conditions to make up, will be held on registration day, September 25, 1912, at 2 p. m.

8. **General Physics. Theory.** Repeated in second term, credit two hours. Prerequisite courses 1 and 5 and Mathematics 1. Messrs. FISHER, GALAJIKIAN, MAYER, MOLBY, SOMERVILLE, and TAYLOR. M W, or T Th, Rockefeller, as assigned.

Textbook work in statics, dynamics, properties of matter, electrostatics and magnetism. Two hours of course 14 must be taken in connection with course 8.

9. **General Physics. Theory.** Repeated in second term, credit two hours. Prerequisite course 8 and the first term of 14. Instructing staff as in course 8. M W, or T Th, Rockefeller, as assigned.

Textbook work. A continuation of course 8. Current electricity, heat (including thermometry, expansion, colorimetry, radiation, and conduction, properties of vapors, and an introduction to the kinetic theory of gases), and thermodynamics. Two hours of course 14 must be taken with course 9.

10. **Introductory Physical Experiments.** Either term or throughout the year, credit one to four hours a term. Especially for students taking 1 and 6, but open to those who are taking or have completed 1, 1 and 5, 6, or the equivalent. Assistant Professor BLAKER, and Messrs. HOWE, BIDWELL, POWER, DAVIES and PIERCE. M T W Th S, 8-10.30, S, 10.30-1, M T Th F, 2-4.30. Rockefeller 220-232.

A shorter course of two hours covering properties of matter, heat, light, sound, magnetism, and electricity may be taken for one term, the student electing two laboratory periods a week; or the course may be extended over a year, one period a week being taken. A longer course of three or four hours may be elected covering the same ground as the two hour course but more in detail, the work being done in one term or distributed over two terms.

14. **Physical Experiments.** Either term or throughout the year, credit one to eight hours a term. Prerequisite courses 1 and 6, or 1 and the two hour course in 10, or the equivalent. May be taken by students that are taking courses 8 and 9. Assistant Professors BLAKER and RICHTMYER, and Messrs. FISHER, GALAJIKIAN, MAYER, MOLBY, SOMERVILLE, and TAYLOR. T Th, 9-12, W F S, 8-11, M T Th F, 2-5. Rockefeller, 250-257.

Physical measurements, properties of matter, mechanics, heat, light, sound, magnetism, and electricity; the adjustment and use of instruments of precision. Results and errors are carefully discussed. Students that are specializing in chemistry are required to take four hours. Other students may elect the desired number of hours.

15. **Photometry and Illumination.** Laboratory work, either term or throughout the year, credit one to four hours a term. Prerequisite courses 1, 6 or 10, and 14. Assistant Professor RICHTMYER. Hours to be arranged.

A study of candle power and distribution of various sources of artificial light. Various forms of photometers will be investigated and calibrations made. Tests will be made of the illumination within a room under various conditions of lighting.

It is recommended that course 43 be taken with this course.

18. **Theory and Practice of Photography.** Repeated in second term, credit two hours. Prerequisite, the knowledge of chemistry and physics, that in general is possessed by those who have completed Chemistry I and Physics I. Professor MOLER and Mr. FORMAN. Lecture, Th, 3.30 and one three-hour laboratory period weekly; M T F, 2-5, or W Th, 9-12, Rockefeller Hall, third floor north; Lectures in A.

19. **Advanced Photography**, with special reference to its application to research. Repeated in second term, credit two hours. Prerequisite courses 1, 10 or 14, and 18, or the equivalent. Professor MOLER. Rockefeller Hall, Photographical Laboratory.

[20. **Heat.** First term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1912-13.

Courses 20-25 are intended for those who desire a more detailed study of the work indicated and who are preparing to teach or to take the advanced courses in theoretical physics which follow. Advanced mathematics is not required but if the calculus has not been taken it is advisable to take it at the same time. Physics 14 should precede, but it and 25 may be taken with 20-24.

21. **Light.** Second term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER. M W F, 11.

[22. **Electricity and Magnetism.** Second term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1912-13.

23. **Properties of Matter.** First term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER. M W F, 11.

24. **Sound.** Second term, credit three hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER. T Th S, 11.

25. **Advanced Laboratory Practice.** Either term or throughout the year. Credit one to four hours a term. Prerequisite courses 1, 6, or 10, and at least four hours of 14. Assistant Professor BLAKER. M T Th, 2-5; S, 9-12.

A laboratory course in general physics for students who desire to teach experimental physics or who desire to prepare themselves for the advanced laboratory courses in general physics which follow. The experiments will be selected to meet the requirements of the individual student.

27. **Advanced Photometry and Illumination.** Repeated in second term, and throughout the year. Credit, two to six hours a term. Prerequisite course 15. Assistant Professor RICHTMYER. Hours to be arranged. Rockefeller.

A continuation of course 15 along special lines to meet individual needs, or as a general course preparatory to research. Includes heterochromatic photometry, spectrophotometry, and a critical study of the several fundamental photometric methods and standards of illumination.

28. **Spectrophotometry.** Repeated in second term, credit two to four hours. Prerequisite course 14. Assistant Professor RICHTMYER. Hours to be arranged, Rockefeller.

After studying the fundamental principles of photometry, the various spectrophotometric methods will be taken up in such detail as will best suit individual needs. Four hours are required to complete the course, but students who have had course 15 may complete course 28 in two hours.

33. **Alternating Currents.** First term, credit two hours. Prerequisite courses 1, 6 or 10, and 14. Professor BEDELL. T Th, 11, Rockefeller.

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 courses 1, 6 or 10, and 14. Professor BEDELL and Mr. GOLDBERG. Daily 9-1, Rockefeller.

General dynamo laboratory practice, the testing of direct and alternating current apparatus and the investigation of special problems. Primarily for seniors.

**35. Advanced Electrical Laboratory.** Either term or throughout the year, credit as arranged. Prerequisite courses 1, 6 or 10, and 14. Professor BEDELL and Mr. GOLDBERG. Daily 9-1.

Similar to course 34 but of wider scope. The character of the work will be arranged to meet individual needs. Primarily for graduates.

**36. Advanced Alternating Currents.** Throughout the year, credit one or more hours a term, as arranged. Prerequisite courses 1, 6 or 10, 14, 33. Professor BEDELL. Hours as arranged, Rockefeller.

A colloquium on the theory and measurement of alternating currents. For graduates only.

**37. Theses in Applied Electricity.** Throughout the year or second term, credit two to eight hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor BEDELL. To be arranged, Rockefeller.

**39. Design and Construction of Apparatus for Research.** First term, credit two hours. Professor MOLER. Rockefeller Hall.

Lectures and laboratory at hours to be arranged. Primarily for graduates.

**40. Recent Advances in Experimental Physics.** Throughout the year, credit one hour a term. Professor MERRITT. F, 12, Rockefeller B.

Lectures, illustrated by experiments. In 1912-13, a considerable part of the course will be given to the subject of electric waves and oscillations.

**[41. The Electric Transmission of Intelligence.** Second term, credit one hour. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS. Rockefeller B.] Not given in 1912-13.

**[42. Primary and Secondary Batteries.** Second term, credit one hour. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS. A lecture course on the theory of voltaic cells and storage batteries.] Not given in 1912-13.

**43. Photometry and the Physics of Illumination.** First term, credit two hours. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS. T Th, 10. Rockefeller B.

Lectures on the theory of artificial illumination and on methods of determining the temperature, efficiency, and quality of sources of light.

**45. Advanced Laboratory Work in General Physics.** Throughout the year or either term. Prerequisite courses 1, 5, 8, 9, 4 hours of 14, and 25; 1, 6, 4 hours of 14, and 25; or 1, 2 hours of 10, 4 hours of 14, and 25. Professors NICHOLS, MERRITT, and SHEARER, and Assistant Professors BLAKER and RICHTMYER. Daily, Rockefeller.

**46. Light.** Throughout the year, credit four hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor SHEARER.

Primarily for graduates.

**[47. Heat.** Throughout the year, credit four hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor SHEARER. Hours to be arranged. Rockefeller B.

Production of high and low temperatures with methods of measurement; heat transfer; theory of heat and molecular physics; kinetic theory of matter.

Primarily for graduates.] Not given in 1912-13.

**49. The Application of Mathematics to Physics.** Throughout the year, credit two hours a term. Prerequisite courses 1, 6 or 10, and 14. Professor SHEARER. Primarily for graduates.

**50. Physics Seminary.** Throughout the year, credit two hours a term. Professor NICHOLS. Hours to be arranged, Rockefeller B.

A colloquium in which all members of the teaching staff in physics and all graduate students take part.

**51. Theoretical Physics.** Mechanics and thermodynamics. Throughout the year, credit four hours a term. Professor MERRITT. Primarily for graduates. Not given in 1912-13.

**52. Theoretical Physics.** Electricity and magnetism. Throughout the year, credit four hours a term. Professor MERRITT. Primarily for graduates.

**54. Thermodynamics.** Throughout the year, credit two or three hours a term. Prerequisite courses 1, 6 or 10, and 14, and Mathematics 1. Physics 20 is advised, though not required, as a preliminary course. Professor TREVOR. Hours to be arranged.

**55. History of Mechanics.** A course on the development of the fundamental ideas of the science, from Archimedes to Newton, based on E. Mach's Science of Mechanics. First term. Two hours as arranged. Mr. FISHER.

**56. The Kinetic Theory of Gases.** The elements of this theory, based on Boynton's Kinetic Theory and Jaeger's Die Fortschritte der kinetischen Gastheorie. Second term, two hours, as arranged. Mr. FISHER.

## CHEMISTRY

### INTRODUCTORY INORGANIC CHEMISTRY

**1. Introductory Inorganic Chemistry.** Lectures, recitations, and laboratory. Repeated in second term, credit six hours.

**1a. Lectures.** First term, T Th S, 11, Professor DENNIS and Mr. DAVIS; M W F, 11, Professor BROWNE and Mr. DAVIS. Second term, M W F, 11. Morse 1.

**1b. Recitations** (one hour a week to be arranged), and laboratory M F, 2-4.30; T Th, 2-4.30; W, 2-4.30, and S, 8-10.30. Professors DENNIS and BROWNE, Mr. WELSH, and Messrs. SHERWOOD, FINK, O'BRIEN, OVERMAN, GILBERT, HOOEY, and ROSE.

Entrance credit in chemistry does not carry with it University credit in course 1. If a student entering the University from a preparatory school desires credit in course 1 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 in September as the entrance examination. University credit in course 1 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 1 will be held at 2 p. m. on the day before instruction begins in the fall, and also in the month of May at a date to be announced. No special examinations will be given at other times.

### ANALYTICAL CHEMISTRY

**6. Qualitative and Quantitative Analysis.** Repeated in second term, credit five hours. Prerequisite course 1. Mr. LEMON, and Messrs. ULRICH, GIBBONS, ELLIOT, BRODERSON, BEAGLE, LEE, and MAHOOD. Lectures, T Th, 12, Morse L. R. 1. Laboratory sections: M W F, 2-5; T Th S, 8-11; T Th S, 9-12.

**Qualitative work:** the properties and reactions of the common elements and acids and their detection in various liquid and solid mixtures.

**Quantitative work:** the preparation and use of volumetric solutions and work in elementary gravimetric analysis.

Examinations for those who were unavoidably absent from the final examination in course 6 will be held at 2 p. m. on the day before instruction begins in the fall.

**7. Qualitative Analysis.** Second term, credit six hours. Prerequisite course 1. Mr. LEMON, and Messrs. ULRICH and ———. Lectures T Th, 9, Morse L. R. 1. Laboratory, F, 11-1; M, 2-4, T Th, 2-5.

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

Students in science are advised and candidates for the degree of Bachelor of Chemistry are required to take this course instead of course 6.

**9. Advanced Qualitative Analysis.** Second term, credit three hours. Prerequisite courses 17, 30, 50, and 65. Open to those who are taking course 50. Mr. LEMON. Laboratory sections at hours to be arranged.

Essentially a continuation of course 7. A study of the most approved methods for separating and detecting a large number of metals and acids not studied in course 7, including many of the rare elements. In certain cases a comparative study is made of different methods designed to accomplish a given separation. The qualitative analysis of a number of solutions, solid mixtures, and minerals will be required. For graduates and advanced undergraduates.

**12. Quantitative Analysis, Elementary Course.** First term, credit six hours. Prerequisite 6, or preferably 7. Dr. LUNDELL and Messrs. MONTGOMERY, and HART. Lectures, T Th, 9, Morse, L. R. 3.

Laboratory sections: T W Th, 2-5.30; W Th, 2-5.30 and S, 9-12.30.

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

Students in science are advised and candidates for the degree of Bachelor of Chemistry are required to take this course instead of the quantitative analysis of course 6.

**14. Quantitative Analysis, Advanced Course.** Repeated in second term. Credit one to four hours. Prerequisite course 6, or 7 and 12. Dr. LUNDELL, and Messrs. MARSH, MONTGOMERY, and HART.

Laboratory sections: 1st term, M T W Th, 2-5.30; M T Th S, 9-12.30; 2nd term, M T W Th F, 2-5; T Th S, 9-12.30. Required of candidates for the degree of Bachelor of Chemistry.

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

**15. Quantitative Analysis, Advanced Lectures.** Second term, credit two hours. Prerequisite course 6, or 7 and 12. Dr. LUNDELL. M W, 10, Morse, L. R. 2. Selected topics in advanced quantitative analysis.

**16. Electrochemical Analysis.** Repeated in second term, credit one to three hours. Prerequisite course 6, or 7 and 12. Dr. LUNDELL and Mr. MARSH.

Laboratory sections: First term, M T W Th, 2-5.30; T Th S, 9-12.30; second term, M T W Th F, 2-5; T Th S, 9-12.30.

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

**17. Spectroscopic Chemical Analysis and Colorimetry.** Second term, credit three hours. Prerequisite course 6, or 7 and 12; Physics I and 6. Mr. ANDERSON and Messrs. A. R. HITCH and LOWARY. Lectures, T Th, 9, Morse, L. R. 3.

Laboratory practice, (three actual hours) at hours to be arranged.

The lectures are devoted to a description of the instruments used in the laboratory and to a detailed discussion of spectroscopic methods. Besides spectroscopic apparatus, various types of colorimeters, polariscopes, and refractometers are considered, especial stress being laid upon the principles involved in their construction. The laboratory instruction includes the following work: the observation and mapping of emission spectra of various elements in the Bunsen flame, the oxy-hydrogen flame, the electric arc, and the electric spark; the qualitative analysis of mixtures and minerals by use of the Krüss spectroscope and the direct vision spectroscope; the observation and mapping of absorption spectra; the examination and identification of rare earths and organic dyes in solution by means of their absorption spectra; the calibration of spectroscopes; spectrum photography; and practice in the use of colorimeters, polariscopes, and refractometers of various types.

**18. Assaying.** First term, credit three hours. Prerequisite course 6, or 7 and 12, and if possible a course in mineralogy. Dr. LUNDELL and Mr. MONTGOMERY. Lecture F, 10, Morse 2. Laboratory sections: M W, 2-5; W F, 2-5; M F, 2-5.

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 assay of zinc, lead, copper, gold, and silver ores, mattes, and bullion. Designed for students that are specializing in chemistry and as an elective for students in mechanical and civil engineering.

**19. Qualitative and Quantitative Gas Analysis.** Lectures. Repeated second term, credit two hours. Prerequisite course 6 or 7; Physics 1. Mr. ANDERSON. M W, 11, Morse L. R. 3.

A detailed discussion of many representative types of apparatus employed by the gas analyst, and of the various methods of analysis involved in their use. Numerous simple problems are assigned which afford practice in the calculation and interpretation of the results obtained in the analysis of gases.

**20. Technical Gas Analysis.** Laboratory. Repeated second term, credit two hours. Prerequisite course 6, or 7 and 12; Physics 1 and 6. Open to those who are taking course 19. Mr. ANDERSON, and Messrs. A. R. HITCH and LOWARY. Laboratory practice at hours to be arranged.

The analysis of gas mixtures with the apparatus of Honigmann, Bunte, Orsat, Winkler, and Hempel; the complete analysis of flue gas, illuminating gas, generator gas, acetylene, and air; the determination of the heating power of gaseous, liquid, and solid fuels, and the analysis of various substances by gas analysis methods involving the use of the different types of gas evolution apparatus such as the Scheibler calcimeter, the Hempel and the Lunge nitrometer, the Lunge gasvolumeter, and the Bodländer gasbaroscope. Within certain limits the work may be selected to suit the requirements of the individual student.

**21. Gas Analysis.** Advanced course. Repeated in second term, credit one to four hours. Prerequisite courses 1, 6 (or 7 and 12), 19, and 20; Physics 1, and 5 or 6. Mr. ANDERSON. Laboratory practice at hours to be arranged. Morse. For seniors and graduate students.

Special topics in the field of either scientific or industrial gas chemistry.

## ORGANIC CHEMISTRY

**30. Organic Chemistry.** Throughout the year, credit six hours a term. Prerequisite course 6, or courses 7 and 12. Open to those who are taking course 12. Professor ORNDORFF, Mr. E. F. HITCH, and Messrs. BOIES and CARRUTH. Lectures and written reviews, M W F, 9, Morse L. R. 3.

Laboratory sections: M T, 1-5.30; F, 1-5.30 and S, 8-12.30. Morse 9.

The lectures and written reviews serve as an introduction to the general subject of the chemistry of the compounds of carbon. In the laboratory 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 or radicals is included in the laboratory work.

**31. Organic Chemistry.** Throughout the year, credit three hours a term. Prerequisite course 6, or courses 7 and 12. Open to those who are taking course 12. Professor ORNDORFF and Messrs. BOIES and CARRUTH. M W F, 9, Morse L. R. 3. This course consists of the lectures and written reviews of course 30.

**32. Elementary Organic Chemistry.** First term, credit four hours. Prerequisite course 6, or courses 7 and 12. Open to those who are taking course 12. Mr. E. F. Hitch and Messrs. BOIES and CARRUTH. Lectures, and oral and written reviews, M W F, 12, Morse L. R. 3. Laboratory, T or Th, 2-5.

**33. Special Chapters in Organic Chemistry.** Throughout the year, credit two hours a term. Prerequisite course 30. Professor ORNDORFF. T Th, 9, Morse L. R. 2.

Especial attention is given to certain important chapters of organic chemistry. Frequent references are made to the original literature, and an attempt is made to acquaint the student with the classical researches in organic chemistry.

**34. Advanced Organic Chemistry.** Laboratory practice. Throughout the year. Open to those who have had course 30 and are taking 33. Professor ORNDORFF and Mr. E. F. HITCH. Hours to be arranged. The laboratory is open daily, Morse 10 and 12.

The course in the preparation of organic compounds is here continued, the preparations, however, being more difficult and requiring more experience and skill on the part of the student. The original literature is consulted, and, before taking up original work in this field, the student is finally required to repeat some extended and important piece of work, and to compare his results with those published.

**[35. The Coal Tar Dyestuffs.** First term, credit one hour. Open to those who have had course 30 and have had or are taking 33. Professor ORNDORFF.

The methods of making the dyestuffs, their properties, constitution, and relations to each other are discussed, the treatment being scientific rather than technical.] Not given in 1912-13.

**36. Stereochemistry.** Second term, credit one hour. Prerequisite course 30 or 31. Professor ORNDORFF. Th, 12, Morse L. R. 3.

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

**37. Methods of Organic Analysis.** Throughout the year. Prerequisite course 30. Professor ORNDORFF and Mr. E. F. HITCH. Hours to be arranged. The laboratory is open daily, Morse 10.

Designed for students that desire practice in the qualitative and quantitative analysis of commercial organic products such as alcohols, ethers, organic acids, glycerin, formalin, acetates, coal tar distillates, petroleum products, soaps, acetanilid, etc.

## INORGANIC CHEMISTRY

**[46. Inorganic Chemistry.** Advanced course. Throughout the year, credit two hours a term. Prerequisite course 30, and open to those who have completed or are taking courses 50 and 51. Professor DENNIS.

The chemical elements are discussed in the order in which they occur in the Periodic Law of Mendeléeff, and special attention is paid 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.] Not given in 1912-13.

**47. Advanced Inorganic Chemistry.** Laboratory practice. Throughout the year. Prerequisite course 30. Professors DENNIS and BROWNE and Mr. RHODES. Morse 68.

The preparation and purification of inorganic compounds and the extraction of the rarer elements from ores and minerals.

Course 47 is designed to accompany course 46, but either course may be taken separately.

**48. Selected Topics in Advanced Inorganic Chemistry.** First term, credit two hours. Prerequisite 30. Courses 50 and 51 should either precede or accompany 48. Professor BROWNE. T Th, 11, Morse L. R. 3.

Experimental lectures, dealing chiefly in 1912-13 with the hydronitrogens and their derivatives, and with the compounds of hydrogen and oxygen.

Open only to seniors and graduate students in chemistry.

**49. Chemistry of Gases.** First term, credit one hour. Prerequisite course 6, or 7 and 12, and should be preceded or accompanied by 19 and 20. Mr. ANDERSON. F, 11, Morse L. R. 3.

The preparation, properties, and reactions of a large number of gases are discussed, and in many cases are illustrated by experiments. The various generalizations concerning gases are considered, not only in the light of their scientific value, but also to some extent from the point of view of their application to the practical problems of the gas chemist and of the gas engineer. The course may be elected by juniors, seniors, and graduate students in chemistry, and is open to seniors in mechanical engineering who intend to specialize in gas power work.

### PHYSICAL CHEMISTRY

**50. Introductory Physical Chemistry.** Throughout the year, credit three hours a term. Prerequisite course 30 and Physics 1, 6, and 10. Dr. BENNETT. M W F, 9, Morse L. R. 4.

A systematic presentation of modern chemical theory. Especial attention is paid to the theory of solution, reactions, velocity, catalysis, chemical equilibrium, and to the application of the principles of physical chemistry to chemical practice.

**51. Physical Chemistry Laboratory.** Throughout the year, credit three hours a term. Open only to those who have taken or are taking course 50. Dr. BENNETT and Messrs. YOUNT and GORDON. Two laboratory periods a week: M T, 2-5; F, 2-5, S, 9-12. Morse 77.

With the data obtained in the laboratory as a basis, detailed reports covering each sub-division are written. The subject matter includes: the calibration of pipettes, burettes, and measuring flasks; molecular weight determination by vapor density, freezing point, and boiling point methods; vapor pressure; viscosity; colloids; diffusion; adsorption; thermo-chemistry; reaction velocity; catalysis; dissociation; solubility; formation, separation, and identification of phases; study of photo-chemical effects.

**[52. Advanced Physical Chemistry.** Lectures. Throughout the year, credit three hours a term. Prerequisite course 50. Professor BANCROFT.

An exposition of the law of mass action in its application to chemical equilibrium and reaction velocities.] Not given in 1912-13.

**53. Colloid Chemistry.** Lectures. Throughout the year, credit two hours a term. Professor BANCROFT. T Th, 10. Morse L. R. 4.

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 50; to others only by special permission.

**55. Theoretical Electrochemistry.** Lectures. Throughout the year, credit three hours a term. Professor BANCROFT. M W F, 10, Morse L. R. 4.

The historical development of the subject with special reference to the theory of the voltaic cell. For advanced students in chemistry or physics.

**56a. Applied Electrochemistry.** Lectures. Throughout the year, credit two hours a term. Prerequisite course 6, or 7 and 12. Dr. BENNETT and Mr. BROWN. M W, 12, Morse L. R. 4.

The theory of electrolysis and plating; 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.

It is advisable to parallel this course with course 56b; this, however, is not obligatory.

**56b. Applied Electrochemistry.** Throughout the year, credit two hours a term. Open to those who have had 50 and 51, and have taken or are taking 56a. Laboratory practice.

T, 8-10; W, 8-11; W, 2-5; Th, 8-10. Morse 79. Dr. BENNETT and Mr. BROWN.

Measurements of electrical constants, qualitative study of conditions effecting electrolytic reactions; quantitative relations; determination of current and energy efficiencies in electrolytic and electrothermal work; electrolytic preparation of organic and inorganic compounds; tests of storage batteries; preparation of compounds in the electric furnace; temperature measurements.

**57. Advanced Laboratory Practice.** Either term or throughout the year. Credit one to six hours a term. Prerequisite courses determined in each case by the professor in charge. Professor BANCROFT, Dr. BENNETT, and Messrs. YOUNT, BROWN, and GORDON. Hours and work to be arranged. Morse.

Students may elect in mass law, reaction velocity, or efficiency measurements with special reference to course 52; in photochemistry, photography, or colloid chemistry with special reference to course 53; in conductivity or electrometric determinations with special reference to course 55; in electrolytic or electric furnace products with special reference to course 56; in metallography; in the application of physical chemical methods to organic chemistry.

### MICROCHEMISTRY AND MICROCHEMICAL ANALYSIS

**65. Microchemical Methods.** Either term, credit two hours. Prerequisite course 6, or 7 and 12. Professor CHAMOT and Mr. ———. Laboratory practice at hours to be arranged. Morse.

The use of the microscope, its accessories, and microchemical methods as applied to chemical investigations.

**66. Microchemical Analysis.** Either term, credit three or more hours. Prerequisite course 65. Professor CHAMOT and Mr. ———. Laboratory practice at hours to be arranged. Morse.

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

**67. Microchemical Analysis.** Either term, credit two or more hours. Prerequisite course 66. Professor CHAMOT. Laboratory practice. Morse.

This course may be arranged so as to comprise the analysis of either inorganic or organic compounds.

### SANITARY CHEMISTRY

**70. Foods, Beverages, and Food Accessories.** Either term, credit two hours. Prerequisite course 6, or 7 and 12. Mr. REDFIELD. T Th, 12, Morse L. R. 4.

What constitute foods, and why; chemical standards for foods, and how these have been determined; general methods of food analysis; the relation of pure and adulterated foods to the public health; sterilization and preservation of foods; detection of adulterants, dietary standards, and the economic value of different foods.

**71. Food Analysis.** Either term, credit four or more hours. Prerequisite course 6, or courses 7 and 12. Professor CHAMOT and Mr. REDFIELD. Laboratory practice.

The methods employed in the examination of foods by chemical and optical methods, with reference to adulteration, imitation, and alteration; the examination of foods for artificial coloring matters, preservatives, and poisonous substances; a study of milk, comestible fats and oils, cereal products, and starchy and saccharine foods, canned goods, jellies, etc. This course may be extended so as to include the analysis of alcoholic beverages.

**72. Microscopical Examination of Foods.** Either term, credit two hours or more. Prerequisite course 65. Professor CHAMOT and Mr. ———. Laboratory practice at hours to be arranged. Morse.

The use of the microscope in the examination of foods and condiments for the purpose of detecting deterioration, adulterations, and admixtures.

**75. Potable Water.** Either term, credit two hours. Prerequisite course 6, or courses 7 and 12. Professor CHAMOT. M W, 12, Morse L. R. 2.

Sources of potable water; how polluted; agencies at work leading to the natural or self purification of surface and ground waters, and what they accomplish; the data necessary for a decision as to the fitness of a water for household, municipal, and industrial use; the interpretation of the results of water analyses,

chemical, microscopical, and bacteriological. Modern methods of water purification, disinfection, and sterilization.

**76. Water Analysis.** Either term, credit three hours. Prerequisite course 6, or 7 and 12. Professor CHAMOT and Mr. REDFIELD. Laboratory practice at hours to be arranged. Morse. Should be taken with course 75.

The methods employed for the examination of waters with reference to their fitness for household, municipal, and industrial purposes, and for the testing of filters and water purifying devices for efficiency.

**80. Toxicology.** First term, credit two hours. Prerequisite course 30. Professor CHAMOT. Place and hour to be assigned.

A review of the present methods for the separation and identification of the common poisons, together with a brief review of the classification, cause of action, and method of elimination of poisonous substances.

**81. Toxicology.** First term, credit two or more hours. Prerequisite course 30, and open only to those who are taking 80. Professor CHAMOT. Laboratory practice.

### AGRICULTURAL CHEMISTRY

**85. Agricultural Chemistry.** Second term, credit four hours. Prerequisite course 1. Professor CAVANAUGH and Messrs. HEDGES, CROSS, and RICE. Lectures, T Th S, 11. One recitation a week, M, 8 or 9; W, 8 or 9; F, 8 or 9. Morse L. R. 1.

A general course treating of the relation of chemistry to agriculture and dealing with the composition and chemical properties of plants, soils, fertilizers, feedstuffs, insecticides, and fungicides.

**85a. Agricultural Chemistry, Laboratory Course.** Repeated in second term, credit two hours. Prerequisite courses 1, 6, 85. Professor CAVANAUGH and Messrs. HEDGES and RICE. T Th, 2-4.30; W F, 8-10.30. Designed to accompany course 85.

**86. Agricultural Chemistry, Advanced Course.** First term only, credit two hours. Prerequisite course 85a. Professor CAVANAUGH. Lectures, T Th, 9, Morse L. R. 4. The methods of the A. O. A. C. are studied in the analysis of fertilizers, soils, and insecticides.

**87. Agricultural Chemistry, Laboratory Course.** First term, credit three hours. Professor CAVANAUGH and Mr. CROSS. T Th, 2-5, S, 9-12. Designed to accompany course 86.

**88. Agricultural Chemistry, Laboratory Course.** Second term, credit three hours. Professor CAVANAUGH and Mr. CROSS. T Th, 2-5, S, 9-12. Designed to accompany course 89.

**89. Agricultural Chemistry, Advanced Course.** Second term, credit two hours. Prerequisite course 85a. Professor CAVANAUGH. Lectures, T Th, 9, Morse L. R. 4. Methods of the A. O. A. C. are studied in the analysis of foods, feedstuffs, sugars, and dairy products.

**90. Advanced Agricultural Analysis.** Either term. Prerequisite courses 86 and 87, or 88 and 89. Professor CAVANAUGH. Credit and hours by appointment. Designed to meet the needs of those who wish to do research in agricultural chemistry.

**92. Household Chemistry.** First term, credit two hours. Prerequisite courses 1, 6. Professor CAVANAUGH. Lectures, T Th, 11, Morse L. R. 2. Designed for students of home economics.

**93. Household Chemistry, Laboratory Course.** First term, credit three hours. Professor CAVANAUGH and Mr. HEDGES. T Th S, 8-10.30. Designed to accompany course 92.

## BOTANY

For a complete course in elementary botany, students are advised to take courses, 1, 2, and 3. These courses are intended to lay the foundation for advanced work in botany and to prepare students for teaching the elementary principles of the science.

**1. General Comparative Morphology of Plants.** First term, credit three hours. Professor ATKINSON, Dr. McALLISTER, and Messrs. HIGGINS and other assistants. Lecture, M, 11. Laboratory, T Th, 2-4.30, Sage College, Botanical Lecture Room. (If necessary, another section for lecture and for laboratory will be arranged.)

A study of the structure, development, and relationships of representative plants among the algae, fungi, liverworts, mosses, ferns, gymnosperms, and angiosperms, with discussions of the general lines of evolution. In the lectures, particular attention will be given to life histories of representative plants in the different groups, including the form and structure of the reproductive organs, the phenomena of fertilization, the general features of plant anatomy and a very general treatment of the distribution and importance of plant life.

**2. Elementary Plant Physiology.** Second term, credit three hours. Dr. McALLISTER, Mr. HIGGINS, and ———. Lecture M or W, 10. Laboratory, W, 11-1; Th, 2-5 (the time may be changed if necessary). Sage College, Botanical Lecture Room.

A study of the fundamental principles of plant activities, the cell, protoplasm, plant nutrition, respiration, irritability, response, and reproduction.

**3. Special Morphology, Taxonomy, and Ecology of the Higher Plants.** Second term, credit three hours. Prerequisite course 1. Professor ROWLEE, Mr. BROWN, and Messrs. HIGGINS and ———. One lecture, M, 11, and two laboratory periods a week as follows: Sec. 1, M W, 2-4.30; sec. 2, T, 8-10, 2-5. Sage College, Botanical Lecture Room.

Studies of typical plants representing the more general groups of angiosperms; field excursions for the purpose of studying the local flora. See also course 4.

**4. Geographical Botany.** Second term, credit two hours. Professor ROWLEE and Mr. PALMER. Lecture S, 9. Laboratory exercises and excursions F, 2-5. Sage College, Botanical Lecture Room.

A study of the vegetation of the earth, supplementary to course 2, which may advantageously accompany this course. Practical field studies in plant distribution; the preparation of an herbarium representing local flora. Photographs are used to illustrate the distribution of plants.

**5. Organography and Identification of the Higher Plants.** First term, credit three hours. Prerequisite course 3. Professor ROWLEE and Mr. PALMER. Lectures, S, 9; laboratory and field work, F afternoon and S morning. Sage College, Botanical Lecture Room.

A study of the kinds of plants with special reference to the morphology, identification, habitat, and range of species. Extra field work will be substituted for some of the lectures.

**7. Taxonomy and Phylogeny of Angiosperms.** Second term, credit three hours. Professor ROWLEE. Lectures, Th, 9. Laboratory work, W afternoon and Th morning, Sage College, Botanical Lecture Room.

A study of the genetic relationships of the phanerogamous orders. Practical studies in the laboratory of economic groups, illustrating the principles of natural classification.

**8a. Plant Cytology.** First term, credit three hours. Prerequisite courses 1 and 2. Mr. BROWN. Lecture F, 9. Laboratory work, F afternoon and S morning, and by appointment, Sage College, Histological Laboratory.

Introduction to methods of investigation. Studies of the vegetable cell, its multiplication and contents. Practical application of modern methods in a study of nuclear and cell-division.

8b. **Comparative Histology of Plants.** Second term, credit three hours. Prerequisite course 8a. Mr. BROWN. Lecture F, 9. Laboratory work, F afternoon and S morning, and by appointment, Sage College, Histology Laboratory.

Structure and development of the tissues of higher plants.

9a. **Dendrology.** First term, credit four hours. Course 5 may advantageously precede. Mr. BROWN and Mr. PALMER. Lecture T, 10. Laboratory and field work M afternoon and T morning. Sage College, Histology Laboratory. Open to graduates.

A biological and taxonomic study of trees and shrubs including laboratory study and field observations upon native species.

9b. **Xylology.** Second term, credit four hours. Courses 8b and 9a may advantageously precede this course. Mr. BROWN and Mr. PALMER. Lectures T, 10. Laboratory and field work, M afternoon and T morning. Sage College, Histology Laboratory. Open to graduates.

Study of the development of woody structures, structure and properties of different kinds of wood, identification of woods, laboratory technique.

10. **Comparative Morphology and Embryology.** Throughout the year, credit three hours a term. Prerequisite courses 1 and either 2 or 3. Dr. McALLISTER. Lectures, Th, 12. Laboratory work, M and W afternoons, or by appointment, Sage College, Botanical Lecture Room and Laboratory. Open to graduates.

A study of representative groups that illustrate the line of evolution of green plants. The development and homologies of sporogenous, reproductive, and embryological organs, with discussions of the principal plant phylae; permanent microscopic sections are made representing series in the liverworts, mosses, ferns, gymnosperms, and angiosperms.

11. **Mycology.** Throughout the year, credit four hours a term. Prerequisite courses 1 and either 2 or 3. Professor ATKINSON and Mr. ISHIKAWA. Lectures, T Th, 11. Laboratory work, M W afternoons. Sage College, Botanical Lecture Room and Laboratory. Open to graduates.

Intended as the basis for research in mycology and plant pathology. General classification, development, and plant pathology. Basidiomycetes, with especial attention to edible and poisonous mushrooms, and wood-destroying and parasitic species; the parasitic fungi; their history and development. Practice in the recognition of species, or research may in some cases be taken as a parallel course. See course 14a.

12. **Taxonomy of the Pteridophytes, Bryophytes and Algae.** Throughout the year, credit three hours a term. Dr. McALLISTER. Lecture, F, 11. Laboratory work, F afternoon and S morning, Sage College, Botanical Lecture Room and Laboratory. Open to graduates.

A study of typical genera, practice in taxonomy, and field work.

13. **Methods of Research in Morphology and Embryology.** Prerequisite course 10, except by special permission. Professor ATKINSON and Dr. McALLISTER. Hours by appointment, Sage College, Botanical Lecture Room.

Original research in sporogeny or embryology and the morphology of the nucleus with reference to sporogenesis, spermatogenesis, oogenesis, and fertilization, or in experimental morphology. A thesis embodying the results of the work will be prepared. Open to graduates.

14a. **General Taxonomic Survey of the Fungi.** First term or throughout the year, credit four or eight hours a term. Prerequisite course 11, except by special permission. Professor ATKINSON and Mr. ISHIKAWA. Hours by appointment, Sage College, Botanical Laboratory. Open to graduates.

**14b. Research in Morphology of the Fungi.** Throughout the year, credit four hours a term. Professor ATKINSON and Mr. ISHIKAWA. Hours by appointment.

Monograph of some genus or limited number of genera, or monographic study of development. A thesis combining the results of the investigation will be required. Reports weekly. Open to graduates.

**14c. Methods of Research in Plant Pathology.** Professor ATKINSON and Mr. ISHIKAWA. Open to graduates.

Methods of cultivation of the fungi to secure familiarity with manipulation in methods of separation, pure culture, and study of development; problems in plant pathology; conferences or lectures and discussions on the history and present condition of the subject.

**16. Research in Taxonomy and Phylogeny of the Angiosperms.** Prerequisite courses 7 and 8, except by special permission. Professor ROWLEE. Hours by appointment.

Four hours or more a week. A monograph of some group, including a comparative study of organs of taxonomic value and their development. Groups for investigation will be assigned preferably in the preceding spring. Among the groups that may be taken up are the glume bearing monocotyledons, the amentiferous dicotyledons, and the compositae. Since different groups will be taken up in different years, students may pursue this course more than one year. Open to graduates.

**17. Research in Comparative Histology and Cytology.** Prerequisite courses 8a and 8b. Professor ROWLEE and Mr. BROWN.

Not less than four hours a week. May form the basis of a major or minor subject for an advanced degree. Special problems in the comparative histology of a series of organs, or the anatomy of an individual plant. Cytology: the biology and structure of starch, plastids, and other cell contents, also nuclear division and cell formation, with special reference to tissue development. Open to graduates.

**18. Seminary in Embryology, Mycology, Physiology, etc.** Credit one hour. Professor ATKINSON. W, 5.

Discussions of current literature and problems under investigation. Required of all graduates and open to undergraduates that are interested in research.

**19. Seminary in Comparative Histology and Taxonomy of the Angiosperms.** Credit one hour. Professor ROWLEE. Hours by appointment.

Reading and discussion of current literature and problems under investigation in courses 16 and 17, will form the basis for the seminary work. Required of all graduates and open to undergraduates that are engaged in research.

## BIOLOGY

**1. General Biology.** Throughout the year, credit three hours a term. Lectures, M W, 9, Agricultural College, Auditorium. Practice, M T W Th or F, 2-4.30; T Th F S, 8-10.30; W, 10-12.30, Agricultural College, Main 302. Professor NEEDHAM, Assistant Professor MATHESON, and assistants.

An elementary course designed to acquaint the general student with the principles of biology, through selected practical studies of living things. The topics to be studied in the laboratory and in the field are: the interdependence of organisms, the simpler organisms, organization and phylogeny, oogenesis and ontogeny, 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.

**ENTOMOLOGY AND INVERTEBRATE ZOOLOGY**

[1. **Invertebrate Zoology.**] Not given in 1912-13. See course 1 in Vertebrate Zoology.

3. **General Entomology.** First term, credit two or three hours. Prerequisite General Biology 1 or Zoology 1. Lectures, M W, 9, Agricultural College, Main 392. Professor COMSTOCK. Practical exercises, Th, or F, 2-4.30. Agricultural College, Main 392, Professor COMSTOCK and Miss STRYKE.

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 (credit two hours) are taken by those who have had courses 4 and 5. Laboratory fee, \$3.

4. **Elementary Morphology of Insects.** Repeated in second term, credit three hours. Assistant Professor RILEY and Mr. FAURE. Laboratory open daily except Saturday, 8-5, Agricultural College, Main 391.

An introductory laboratory course required of all students who plan to do advanced work in the Department of Entomology. Laboratory fee, \$2.

5. **Elementary Systematic Entomology.** Repeated in second term, credit two hours. Must be preceded or accompanied by course 4. May advantageously be preceded by course 13. Laboratory and field work. Monday morning or afternoon, and Wednesday afternoon, or other hours by special arrangement. Agricultural College, Main 301. Assistant Professor BRADLEY.

Practice in the identification of insects, and in the methods of phylogenetic study as illustrated by their wing venation. Courses 4 and 5 are required of all students who plan to do advanced work in the Department of Entomology. Laboratory fee, \$2.

6. **Advanced Systematic Entomology.** Repeated in second term, credit three or more hours. Prerequisite courses 4 and 5. Assistant Professor BRADLEY. Laboratory work by appointment, Agricultural College, Main 301.

A training course in the identification and interpretation of obscure characteristics used in the classification of insects. An elementary knowledge of German is desirable for this course. Laboratory fee, \$2 an hour.

7. **Histology of Insects.** Lectures, first term. Laboratory repeated in second term, credit three or more hours. Prerequisite courses 3, 4, 5, and 12. Assistant Professor RILEY. Agricultural College, Main 391. A laboratory course to accompany or follow the first term of course 12. Laboratory fee, \$1.50 an hour.

10. **Classification of the Coccidae.** Second term, credit two hours. Prerequisite courses 4 and 5 and preferably 6. Assistant Professor BRADLEY. Laboratory work by appointment, Agricultural College, Main 301.

Designed to familiarize the student with the more injurious species of scale insects, the methods of preparing specimens for study, and the systematic arrangement of the species. Laboratory fee, \$3.

11. **Morphology and Classification of the Arachnida.** Throughout the year, credit three or more hours a term. Professor COMSTOCK and Miss STRYKE. Laboratory work by appointment, Agricultural College, Main 391.

12. **Morphology and Development of Insects.** Throughout the year, credit two hours a term. Prerequisite courses 3, 4, and 5. Laboratory work to accompany or to follow this course is offered under course 7. Professor COMSTOCK and Assistant Professor RILEY. T Th, 10, Agricultural College, Main 392.

13. **Entomotaxy.** Second term, credit two hours. This course should preferably precede or accompany course 5, and is required of all students taking advanced work in systematic entomology. Laboratory fee, \$3. Assistant Professor BRADLEY. Laboratory and field work by appointment. Agricultural College, Main 301.

Methods of collecting insects and of preserving them for study and the cabinet, and other matters of technique. The principles of insect photography.

**14. German Entomological Reading.** Throughout the year, credit one hour a term. Assistant Professor RILEY. W, 7-9 p. m., Agricultural College, Main 391. Open only to advanced students in entomology or zoology.

**[17. Literature of Systematic Entomology.** First term, credit three hours. Prerequisite course 3 or 5. Assistant Professor BRADLEY.

A study of general entomological literature. Practice in the use of generic and specific indices, and bibliographies, and in the preparation of the latter. The methods of preparing technical papers for publication, including the preparation of illustrations. The rules of nomenclature, including the derivation and formation of scientific names.] Not given in 1912-13.

**19. General Limnology.** Second term, credit three hours. Open only to students who have taken or are taking General Biology 1 and Entomology 3. Professor NEEDHAM and Mr. LLOYD. Lectures, Th, 8, Agricultural College, Main 392.

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.

**20. Research in Limnology.** Throughout the year, credit three or more hours a term. Prerequisite course 19 or the equivalent. Professor NEEDHAM. Hours by appointment, Agricultural College, Main 302 and Biological Field Station. Laboratory and field work.

**22. Animal Parasites and Parasitism.** First term, credit two hours. Must be preceded or accompanied by Zoology 1. Assistant Professor RILEY. Lectures, T, 8, Agricultural College, Main 392. Practical exercises; Sec. 1, M, 2-4.30; sec. 2, T, 2-4.30.

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

**23. The Relations of Insects to Disease.** Second term, credit two hours. Prerequisite course 3 or 22. Assistant Professor RILEY. Lectures, T, 8, Agricultural College, Main 392. Practical exercises, T, 2-4.30.

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

**24. The Classification of Immature Insects.** First term, credit three hours. Prerequisite courses 3, 4, 5, and 6. Laboratory, M, 2-5; W, 8-1. Agricultural College, Main 301. Assistant Professor BRADLEY. Laboratory fee, \$4.50.

**27. Research in Morphology of Insects.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 4, and 5. Professor COMSTOCK and Assistant Professor RILEY. Laboratory open daily except S, 8-5; S, 8-1, Agricultural College, Main 391.

Special work arranged with reference to the needs and attainments of each student. Laboratory fee, \$1.50 an hour.

**28. Research in Systematic Entomology.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 4, 5, 6, 13, and 17. Professor COMSTOCK and Assistant Professor BRADLEY. Laboratory open daily except S, 8-5; S, 8-1, Agricultural College, Main 301.

Special work arranged with reference to the needs and attainments of each student. Laboratory fee, \$.50-\$1.00 an hour.

**Seminary.** Throughout the year. M, 4.30-5.30, Agricultural College, Main 392.

The work of an entomological seminary is carried on by the Jugatae, an entomological club which meets for the discussion of current literature and of the results of investigations. Attendance at the meetings may be counted as laboratory work.

**Economic Entomology.** See Entomology in College of Agriculture, course 3.

**Advanced Economic Entomology and Insectary Methods.** See Entomology in College of Agriculture, course 9.

**Research in Economic Entomology.** See Entomology in the College of Agriculture, course 29.

**Forest Insects.** See Entomology in College of Agriculture, course 31.

**Aquiculture.** See Entomology in College of Agriculture, course 30.

**Nature Study Pedagogy and Literature.** See Nature Study in College of Agriculture, course 1.

**Nature Study in Field and Laboratory.** See Nature Study in College of Agriculture, course 2.

**Nature Study. Advanced Course.** See Nature Study in College of Agriculture, course 3.

**Nature Study Seminary.** See Nature Study in College of Agriculture, course 5.

## ZOOLOGY

1. **General Zoology.** First term, credit five hours. Assistant Professor REED. M W F, 10, McGraw 5.

Sec. 1, W F, 2-4.30, McGraw 5. Mr. GILMORE.

Sec. 2, T Th, 2-4.30 McGraw 5. Mr. GILMORE.

A general survey of the animal phyla, the life processes, adaptations, and relationships of animals, the principles of zoology, and an introduction to morphology and development. As far as possible each phase of the subject will be illustrated with living material.

2. **Systematic Zoology and Morphology of Invertebrates.** Second term, credit three hours. Prerequisite course 1. Lectures, to be arranged, McGraw 5, Mr. GILMORE. The laboratory will be open M T W, 8-5, McGraw 5.

Lectures on the classification, morphology, and development of invertebrate animals. Laboratory exercises include the study of structure and practice in classification.

2a. **Animal Behavior.** Second term, credit two hours. Prerequisite course 1. Mr. GILMORE. The laboratory will be open M T W, 8-5, McGraw 5.

A laboratory course with collateral reading and quizzes on the behavior of invertebrates under varied conditions.

Courses 2 and 2a may be taken separately or together.

3. **Comparative Anatomy of Vertebrates.** First term, credit four hours. Prerequisite course 1. Assistant Professor REED and Mr. LEONARD. Laboratory to be arranged.

A thorough study of the structure of each system of organs in representative forms of vertebrates.

4. **Comparative Morphology and Evolution of Vertebrates.** Second term, credit four hours. Prerequisite course 3. Assistant Professor REED.

The several systems of organs are considered with reference to their structures, development, homologies, and evolution in time. [Given in alternate years.] Not given in 1912-13.

5. **Systematic Vertebrate Zoology and Ecology.** Throughout the year, credit three hours a term. Assistant Professor REED, Dr. WRIGHT, and Dr. ALLEN. Lecture M, 8. Laboratory: sec. 1, T Th, 2-4.30; sec. 2, W F, 2-4.30, McGraw 7.

Lectures on the principles of classification and nomenclature; characters and relationships of groups; the habits, life histories, principles of coloration, and

economic value of the common species. Laboratory study of representative forms with special reference to the parts employed in classification, and with a view to practical identification. Field work is given during the fall and spring.

[6. **Ichthyology.** First term, credit three hours. Prerequisite course 5. Dr. WRIGHT. A fuller consideration of fishes with respect to the taxonomic value of organs of both living and extinct species, geographical distribution, genetic relationships, and origin and evolution of groups. Given in alternate years with course 8.] Not given in 1912-13.

[7. **Herpetology.** Second term, credit three hours. Prerequisite course 5. Dr. WRIGHT. A consideration of the amphibia and reptilia similar to that outlined for fishes in course 6. Given in alternate years with course 9.] Not given in 1912-13.

8. **Ornithology.** First term, credit three hours. Prerequisite course 5. Dr. WRIGHT. The scope and method of course 6 will be followed. Given in alternate years with course 6.

9. **Mammalogy.** Second term, credit three hours. Prerequisite course 5. Dr. WRIGHT. A study of mammals following the method of course 6. Given in alternate years with course 7.

10. **Mammalian Anatomy.** Second term, credit four hours. Assistant Professor REED and Mr. LEONARD. Recitations and laboratory hours to be arranged.

A full consideration of the anatomy of the cat compared with other mammalian forms below the primates. Designed for prospective medical students and others wishing to become familiar with mammalian structure.

12. **General Ecology.** Throughout the year, credit three hours a term. Prerequisite course 5. Dr. ALLEN.

A general study of animal activities, typical animal societies, and their environmental relations. Special attention will be given to the geographic distribution of animals in relation to physiography, vegetation and climate and to recent investigations in this field. Practice will be given in the use of instruments and methods of field investigation. A knowledge of physiology and the allied sciences is desirable.

13. **Advanced Work and Research.** Throughout the year. Assistant Professor REED and Drs. WRIGHT and ALLEN. Seminary. Fortnightly during the second term.

## PHYSIOLOGY AND BIOCHEMISTRY

3. **Elementary Human Physiology.** Second term, credit three hours. Professor SIMPSON and assistants. M W F, 10, Stimson Hall, Large Amphitheatre.

For students who expect to teach physiology in the secondary schools, and an introductory course for students of the biological sciences. A general review of the functions of the systems and organs of the human body, with introductory remarks on structure. The lectures will be fully illustrated by experiments, lantern slides, and diagrams, and periodical quizzes and examinations will be given.

6. **Laboratory Work in Physiology.** Second term, credit two hours. Professor SIMPSON and Assistants. Five hours a week, hours and days to be arranged, Stimson Hall, Practical Physiology Laboratory.

A beginning course in practical physiology. May be taken separately or along with course 3. In the laboratory the student is made to carry out for him-

self experiments which demonstrate the fundamental facts of the science, and he is taught to draw conclusions from these facts. All the apparatus required is supplied by the department.

**8. Advanced and Research Work in Physiology.** Throughout the year. Professor SIMPSON, Assistant Professor DRESBACH, and assistants. Daily, Stimson Hall, Advanced Laboratory.

The physiological and biochemical laboratories in Stimson Hall are open daily from 9 to 5 for advanced work and research. Subjects for original investigation are suggested and direction and advice are freely given during the prosecution of the work. A weekly or fortnightly semi-nary is held at which results are discussed and criticized by members of the staff and other workers in the department.

**14. Elementary Biochemistry.** First term, credit three hours. Prerequisite Chemistry 32, or the equivalent. Assistant Professor HUNTER. M W F, 12, Stimson Hall, Amphitheatre.

Designed to impart an elementary knowledge of the chemistry of the substances met with in living, especially animal, tissues, and of the chief facts of digestion, metabolism, and nutrition.

**17. Special Chapters in Biochemistry.** First term, credit one hour. Prerequisite course, 14, or Chemistry 31, or the equivalent of either. Assistant Professor HUNTER. One hour weekly, to be arranged. Stimson.

Advanced lecture course on some selected topic in biochemistry.

**18. Laboratory Work in Biochemistry.** Second term, credit three hours. Prerequisite Chemistry 32. Hours to be arranged. Stimson Hall, Biochemical Laboratory. Assistant Professor HUNTER and Mr. GIVENS.

Foods, tissues, digestion, excretion, and metabolism; the concluding part of the course is devoted to modern methods of quantitative urine analysis.

**20. Advanced and Research Work in Biochemistry.** Throughout the year. Assistant Professor HUNTER and Instructor GIVENS. Daily, 8-6.

## 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 recommended. Professor KINGSBURY and assistants. Lectures, W F, 11, Stimson; laboratory, M W, 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. Professor KINGSBURY 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.] Not given in 1912-13.

**3. Special Histology and Technique.** Either term, credit two or more hours. Prerequisite courses 1 and 2, or the equivalent. Professor KINGSBURY and assistants. Laboratory at hours to be arranged, Stimson.

In this course a more detailed knowledge of histology and 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.

**4. Embryology of Vertebrates.** Second term, credit three hours. Prerequisite course 1 or the equivalent. One lecture, demonstration, or recitation (W, 8) and two laboratory periods a week (hours to be arranged). Mr. BADERTSCHER and assistants.

For students of biology or zoology, or those preparing for medicine. Preparation and study of embryological specimens from all the chief groups of vertebrates.

**5. The Nervous System and Organs of Special Sense: Histology and Development.** Second term, credit two hours. Prerequisite course 1 or the equivalent. Laboratory work with demonstrations and quizzes. Professor KINGSBURY. M W, 10-1, Stimson.

Designed for those students who wish a more detailed consideration of the nervous system and organs of special sense than can be given in other courses offered by the department.

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

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 courses 1, 2; may be taken with course 3 or 7. Hours to be arranged, Stimson.

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

## GEOLOGY

**1. Dynamic Geology.** First term, credit three hours. Assistant Professor VON ENGELN and Messrs. —, —, —, and —. Lectures T Th, 11. McGraw, Geological Lecture Room; one laboratory period a week, sections afternoons daily except Saturday, also probably Friday and Saturday mornings.

Planned to give beginners a knowledge of the fundamental principles and facts of dynamic geology by means of lectures, maps, lantern slides, specimens, and field study. For those who desire to continue in geology this course may be followed in the second term by the elementary courses 2, 11, 21 or 30.

## PHYSICAL GEOGRAPHY

**2. Elementary Physical Geography.** Second term, credit three hours. Lectures, M W, 9, McGraw, Geological Lecture Room. Assistant Professor VON ENGELN. Laboratory, M or T, 2-4.30, Physical Geography Laboratory, Messrs. ELSTON and MORDOFF.

A study of the development of the main features of the earth and their influence on mankind. Lectures illustrated by maps, models, and lantern slides. One laboratory period a week; several short field excursions in the spring; in winter, indoor laboratory work, consisting of experiments to illustrate the development of the simpler land forms, and a study of the physiographic provinces of the United States. Required all-day excursions to Taughannock Falls and the Susquehanna Divide; voluntary excursions to Niagara Falls and Watkins Glen.

**3. Geography of North America.** Throughout the year, credit two hours a term. Prerequisite an elementary knowledge of physical geography, preferably course 2. Assistant Professor VON ENGELN and Mr. ELSTON. T Th, 10, McGraw, Geological Lecture Room.

A course for the general student emphasizing the influence of the physiographic features of North America upon the history and industrial development of the various sections. Illustrated lectures. A required weekly quiz of a half hour for each student at a period to be arranged.

**[4. Geography of Europe.** Throughout the year, credit two hours a term. Prerequisite course 2 or the equivalent. Assistant Professor VON ENGELN.

The physiographic features of Europe and their influence upon the history and industrial development of the several nations. Illustrated lectures and weekly quizzes.

Courses 3 and 4 are given in alternate years.] Not given in 1912-13.

5. **Glaciers and Glaciation.** Second term, credit three hours. Prerequisite course 2. Lectures, M W, 11, McGraw. Assistant Professor VON ENGELN; laboratory, M, 2-4.30, McGraw. Assistant Professor VON ENGELN and Mr. MORDOFF.

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

6. **Meteorology and Climatology.** Second term, credit three hours. Professor WILSON. M W F, 10, Agricultural College.

Lectures and weather observations. The general circulation of the atmosphere, development and movement of cyclones, tornadoes, and special storms, and conditions that attend them; practical weather maps and local observations; the use of meteorological instruments; general and special climatology, and its relation to agriculture.

8. **Experimental Physiography.** Throughout the year. Assistant Professor VON ENGELN and Mr. ELSTON. Hours to be arranged, McGraw.

Experiments by the individual students upon the origin and development of land forms. Credit depends on nature and amount of work.

9. **Seminary.** Throughout the year, credit two hours a term. Assistant Professor VON ENGELN. M, 4.30, McGraw, Physical Geography Laboratory.

Preparation and reading of reports upon special subjects, particularly upon investigations in the field. Abstracts and discussions of current physiographic literature.

10. **Physiographic Research.** Throughout the year. Assistant Professor VON ENGELN.

Field and laboratory work, with reading, conferences, excursions, and the presentation of reports. Original investigation, usually based upon field or experimental work, is undertaken by each student.

## MINERALOGY AND PETROGRAPHY

11. **Elementary Mineralogy.** Second term, credit three hours; if taken after course 12, credit two hours. Professor GILL and Mr. WILBER. Lectures, M W, 8, McGraw, Geological Lecture Room. Laboratory sections to be arranged.

For beginners who desire a general knowledge of the commoner 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 courses Chemistry I and 7, Physics I. Lectures, T Th, 8, McGraw, Geological Lecture Room; laboratory at hours to be arranged. Professor GILL and Mr. WILBER.

The object of this course is to furnish a fundamental knowledge of the characteristics of crystallized matter as a basis for further study of crystalline substances in mineralogy, chemistry, or physics.

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

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

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

15. **Crystal Measurement and Drawing.** Second term, credit two hours. Prerequisite course 12. Professor GILL. Days to be arranged, McGraw,

Mineralogical Laboratory. Laboratory measurements of crystals, with computation and drawing. Course 15 should be taken by students who intend to continue in either course 16 or course 19.

16. **Optical Determination of Minerals.** First term, credit three hours. Prerequisite courses 12, 13. Professor GILL. M W, and laboratory to be arranged. McGraw, Mineralogical Laboratory.

Especial attention is devoted to the optical properties of crystals.

17. **Petrography.** Second term, credit three hours. Prerequisite courses 1, 12, 13, 16. Professor GILL. M W, and laboratory to be arranged. McGraw, Mineralogical Laboratory. Designed to give an elementary knowledge of rocks and their determination under the microscope.

18. **Seminary in Mineralogy and Crystallography.** Throughout the year, credit one hour a term. Prerequisite courses 12, 13, 16. Professor GILL. Hours to be arranged, McGraw. Devoted to the study of current literature or of some of the more important classics on these subjects.

19. **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. Professor HARRIS and Messrs. — and —. Lectures, T Th, 11, McGraw; Laboratory hour to be arranged.

Designed to give the beginning student a knowledge of the fundamental principles of historic geology. Frequent field excursions take the place of laboratory work as soon as the weather permits.

22. **Stratigraphic Geology.** Throughout the year, credit three hours a term. Prerequisite course 1 or the equivalent. Professor HARRIS. Lectures, W M F, 11, generally, though laboratory and field work will occasionally take the place of lectures. McGraw 28.

First term: paleozoic of the world. Excursions to Little Falls, Syracuse, Rochester, and Wilkes-Barre. Second term: mesozoic and cenozoic of the world. For teachers and students of earth sciences generally.

23. **Geologic Mensuration.** First term, credit three hours. Prerequisite Geology 1 and spherical trigonometry. Professor HARRIS and Mr. OLSSON. Lectures to be arranged, McGraw 28.

Designed to give the field geologist a knowledge of such instruments, methods, and special mathematics as he will need in his professional work.

24. **Invertebrate Paleontology.** Second term, credit three hours. Prerequisite a three hour course in biology (one that includes invertebrate zoology). Professor HARRIS and Dr. SHELDON. M W, 9, McGraw 28; laboratory to be arranged.

Taking up foraminifera, graptolites, crinoids, brachiopods, mollusks, trilobites, limuloids, etc., i.e. those forms but poorly represented in present faunas, yet of paramount importance in zoological and paleontological advanced work.

25. **Paleontology and Stratigraphic Geology and Research.** Course 1 and Biology 1 or the equivalent must be taken before or with this work. Professor HARRIS, Dr. SHELDON, and Mr. OLSSON. Hours to be arranged, McGraw 28.

Advanced stratigraphic and paleontologic research, progress of research and current literature.

### ECONOMIC GEOLOGY

30. **Building Stones and Clay Products.** Second term, credit three hours. Professor RIES and Messrs. MACKENZIE and —. Lectures, T Th, 9. Laboratory, either T or Th, 10, McGraw.

The occurrence, distribution, and uses of building stones, and the applications of clay for structural products. Only by special permission may the lectures be taken without the laboratory work.

**31. Practical Geology.** Throughout the year, credit three hours a term. Registration by special permission. Professor RIES and Messrs. ———, MACKENZIE, and ———. Lectures, M W, 11; laboratory work, M T W Th F, 2, or S, 8, McGraw.

The practical application of geologic principles and the occurrence of such economic materials as are of importance to engineering students, the whole subject being treated with reference to their needs.

**32. General Economic Geology.** Throughout the year, credit three hours a term. Prerequisite course 1. Professor RIES and Mr. MACKENZIE. Lecture, M W 10; laboratory, T, 2, F, 9, or 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. Students may take lectures without laboratory only by special permission. A portion of the laboratory work may be replaced by field trips.

**33. Field Examination of Mineral Deposits.** First term, credit two hours. Prerequisite course 31 or 32. Professor RIES. Hours to be arranged, McGraw.

Designed to acquaint the student with the methods used for examining deposits of economic value, with a view to determining their extent and character.

**34. Mining of Mineral Deposits.** Two or three hours a term as the student desires to elect. Mr. ———. Lectures, time to be arranged. McGraw.

A general course describing the methods of mining deposits of economically valuable materials, and the relation between the origin and structure of the deposits and the methods used.

**35. Clay Investigation.** Prerequisite courses Geology 1 or 31, and Chemistry 1 or its equivalent. Professor RIES and Mr. MACKENZIE. Hours to be arranged, McGraw. Lecture and laboratory work. Designed to familiarize the student with the character, occurrence, and technology of clays.

**36. Advanced Economic Geology.** Throughout the year. Prerequisite course 32. Professor RIES. Hours to be arranged, McGraw.

Laboratory and one lecture each week. The course varies with the needs of the individual student. Primarily for graduates.

**37. Economic Geology Seminary.** Throughout the year. Professor RIES. Time to be arranged. Abstracts and discussions of current literature, and preparation of papers on special subjects.

**38. Seminary in Foreign Literature.** Throughout the year, credit two hours a term. Prerequisite course 32. Professor RIES. Hours to be arranged, McGraw. Reading and discussion of some of the more important foreign works on economic geology. For graduates only.

**39. Experimental Economic Geology.** Prerequisite courses 32 and Chemistry 1, or the equivalent. Professor RIES and Mr. MACKENZIE. Hours to be arranged, McGraw. Laboratory experiments demonstrating some of the general principles of ore deposition.

### SEMINARY

**51. General Department Seminary in Geology.** Once each month at hours to be arranged. Registration for the course is to be filed with the Chairman of the Department.

## MILITARY SCIENCE AND TACTICS

**1. Infantry Training and Instruction.** Throughout the year. Lieutenant GILLMORE and assistants. M W F, 4.45, Armory.

Practical and theoretical instruction, alternating according to the needs of the student.

A comprehensive course designed to equip the college man with such military instruction and training as will enable him to become an efficient company officer of volunteer infantry in time of war. Includes infantry drill; school of the soldier, company, battalion, and regiment; ceremonies; guard duty; position and aiming drills, gallery and target practice; minor tactics, advance and rear guard, outposts, and reconnoissance; camping and marching; first aid and sanitation; military bridges, roads, obstacles, and field entrenchments; military papers and company administration.

Required of all men in the four year courses. May be elected in lieu of physical training by men in the three year courses.

2. **Elective Drill.** Throughout the year, credit two hours a term. Pre-requisite course 1. Lieutenant GILLMORE, and assistants. M W F, 4.45, Armory.

An advanced course covering all phases of the practical work of the infantryman. May be elected by second year men of the four year courses in lieu of the required physical training.

3. **Military Science and Tactics.** Second term, credit two hours. T Th, 12, Goldwin Smith 124. Lieutenant GILLMORE.

4. **Band Music.** Practical and theoretical instruction. Throughout the year, credit two hours a term. Mr. BRISSETTE. M W F, 4.45, Armory.

All instruments, music, uniforms, etc., are furnished by the University free of cost to the student. The members constitute the University Band.

Open to all students who have made a satisfactory beginning with any of the customary band instruments. Properly qualified students may substitute this course for either the required military drill (course 1), or the required physical training.

## PHYSICAL CULTURE

1. **Physical Exercises.** Throughout the year. Professor YOUNG and assistants. Three days a week.

For those freshmen who, in the judgment of the Director, are physically unfitted for required military drill, and for all those who are allowed to substitute, for military drill, work in this department. Class and squad work; exercises prescribed for individual deformity and immaturity.

2. **Physical Exercises.** Throughout the year. Professor YOUNG and assistants. Three days a week.

For sophomores who elect work in the department as part of the required work in physical training. Class and squad work; special exercises or work prescribed in one of the various branches of athletics under the general supervision of the department.

3. **Physical Exercises.** Throughout the year. Professor YOUNG and assistants. Three days a week.

Elective for juniors and seniors. Class and squad work, or prescribed exercises.

4. **Boxing, Wrestling, and Fencing.** Throughout the year. Messrs. CONLEY, O'CONNELL, and GELAS. Daily except S, Gymnasium.

May be counted toward the required work of freshman and sophomore years, and toward work for which credit is given in the junior and senior years. A special fee of \$5.00 a term is charged for instruction in each branch.

5. **Swimming.** Throughout the year. Mr. READ. Daily except S, 3, Gymnasium. Required of all students who are unable to swim sixty feet. No student who is unable to satisfy this requirement will, unless excused because of physical disability, receive credit for work in the department.

10. **Physical Training for Women.** Throughout the year. Miss CANFIELD. Sage College. Required of freshmen and sophomores.

11. **Advanced Gymnastics.** Throughout the year, credit two hours. Pre-requisite course 10 or the equivalent. Miss CANFIELD. M T W Th F, 5.30, Sage College Gymnasium.