

ARP#602

OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

VOLUME IV

NUMBER 11

ANNOUNCEMENT OF THE COLLEGE OF ARTS AND SCIENCES 1913-14

MAY 15, 1913
PUBLISHED BY CORNELL UNIVERSITY
ITHACA, NEW YORK

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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, 1913-14.

sophomores, juniors, and seniors, Tuesday, May 29, 1913.

freshmen and other new students, Saturday, September 27, 1913.

For second term, 1913-14.

all students, Wednesday, January 21, 1914.

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, 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.
Feb. 9,	Monday,	Instruction begins.
April 1,	Wednesday,	Instruction ends
April 9,	Thursday,	Instruction resumed } Spring Recess.
May 23,	Saturday,	Navy Day.
June 3,	Wednesday,	Term examinations begin.
June 17,	Wednesday,	Commencement.
July 7,	Monday-	
Aug. 15,	Friday,	Summer Session.

1914-15

Sept. 11,	Friday,	Entrance examinations begin.
Sept. 21,	Monday,	Academic year begins. Registration of new students. Scholarship examinations begin.
Sept. 22,	Tuesday,	Registration of new students.
Sept. 23,	Wednesday,	Registration of old students.
Sept. 24,	Thursday,	Instruction begins. President's annual address to the students.
Nov.	Thursday-Friday,	Thanksgiving recess.
Dec. 22,	Tuesday,	Instruction ends
Jan. 5,	Tuesday,	Instruction resumed } Christmas Recess.
Jan. 11,	Monday,	Founder's Day.
Jan. 25,	Monday,	Term examinations begin.
Feb. 6,	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

*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 during the first six days of instruction, and in the second term during the first 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, 6; Latin, A, B, 1, 2; Germanic Languages, 1, 2, 3, 4, 4a, 5, 5a, 6, 7, 8; Romance Languages, 1, 2, 3, 4, 5, 30, 32, 40, 42; English, 1, 3; History, 1, 2, 31, 32; Bibliography, 1, 1a; Music 1; Mathematics, 1, 2, 3, 4, 5, 6, 7, 8; Physics, 1, 5, 6, 10; Chemistry, 1, 6, 7, 85; General Biology, 1; Botany, 1, 2, 3, 4; Entomology, etc., 4, 5; Vertebrate Zoology and Neurology, 1, 2; Physiology, 3, 6; Geology, 1, 2, 11, 21, 40.

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 23.

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.

COLLEGE OF ARTS AND SCIENCES

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 or 0	0 or 6
Analytic Geometry, Differential Calculus, Integral Calculus.....Mathematics	7	5	5
Introductory Experimental Physics.....Physics	1	—	4
Drawing.....Sibley College	D3	3	—
First Year English.....English	1	4	4
Second Year			
Quantitative Analysis.....Chemistry	12	0 or 6	6 or 0
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
Optico-chemical Methods.....Chemistry	17	—	3
Quantitative Analysis, Lectures.....Chemistry	15	—	2
Advanced Quantitative Analysis.....Chemistry	14	—	4
Physical Experiments.....Physics	14	3	1
Mechanics.....Sibley College	M5	5	—
Mechanical Laboratory.....Sibley College	X11	—	3
Elective.....		3	—
Fourth Year			
Electrical Engineering Laboratory....Sibley College	E13	4	—
Mechanical Laboratory.....Sibley College	X20	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.

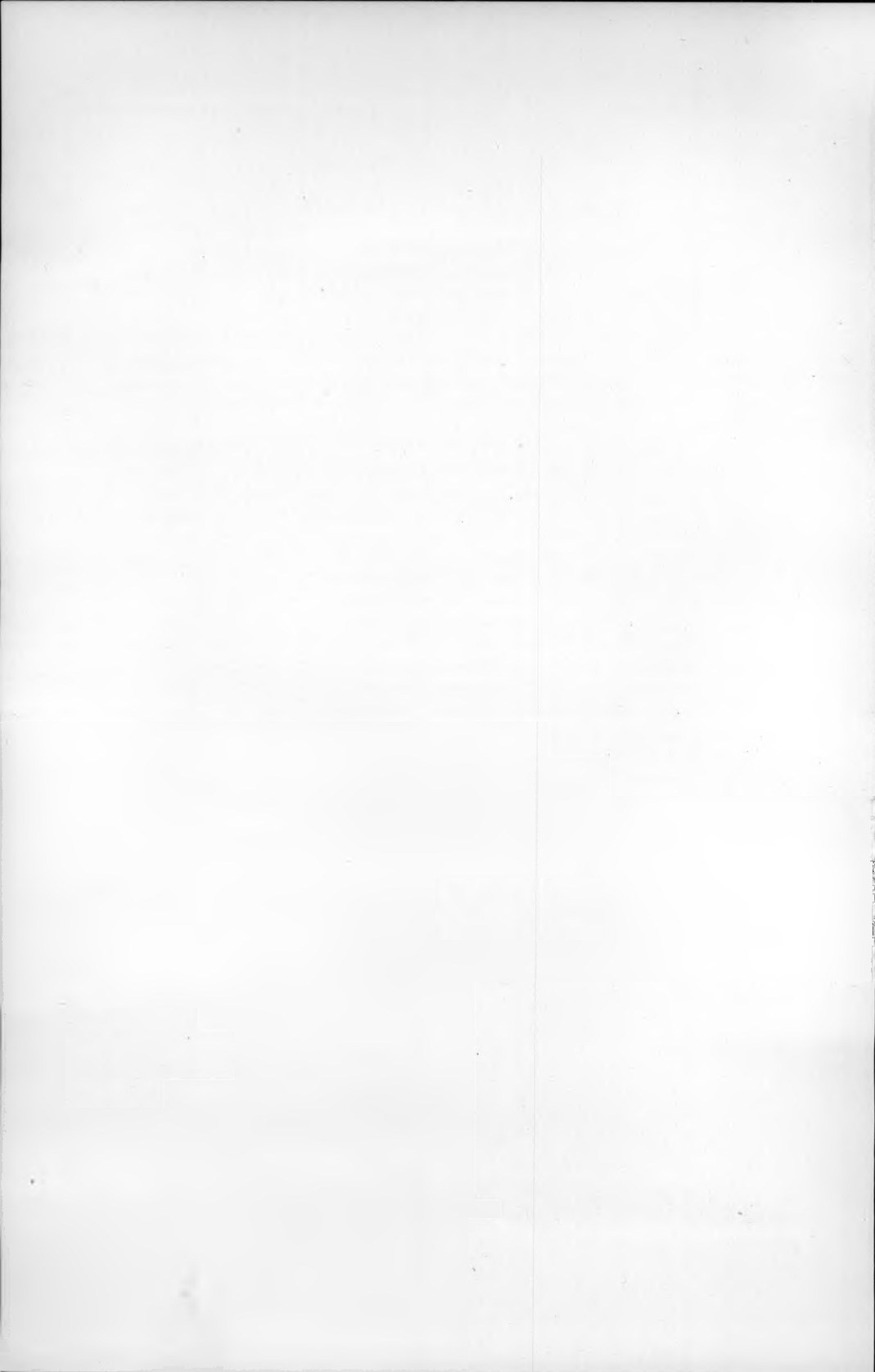
A student admitted from a college of Cornell University or from another institution of collegiate rank to candidacy for the degree of Bachelor of Chemistry will be regarded as having completed the number of terms and the courses to which his records entitle him. But in order to obtain the degree he must 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 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. T Th, 9, Goldwin Smith 127.

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 1913-14.

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. T Th, 4, Goldwin Smith 127.

Grammar (Lyon, Delitzsch). Selections from Meissner's Chrestomathie, Delitzsch's Lesetücke, and Rawlinson's Cuneiform Inscriptions of Western Asia. Open only to graduates.

[4b. **Aramaic.** Throughout the year, credit two hours a term. Professor SCHMIDT.

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.] Not given in 1913-14.

[5a. **Egyptian.** Throughout the year, credit two hours a term. Prerequisite courses 1, 2. Professor SCHMIDT.

Grammar (Erman). Hieroglyphic texts. Study of squeezes in the Eisenlohr collection. Primarily for graduates.] Not given in 1913-14.

5b. **Coptic.** Throughout the year, credit two hours a term. Prerequisite course 5a. Professor SCHMIDT. W, 4-6, Goldwin Smith 127.

Grammar (Steindorff). Selections from the Gospels and from Pistis Sophia. Primarily for graduates.

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 1, 4b. Professor SCHMIDT. M, 4-6, Goldwin Smith 127.

Study of the Syriac Odes of Solomon, and of the Hebrew text coming from the Covenanters of Damascus.

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, Galilaean, Samaritan and Judean Aramaic, Pelymyrene, and Nabataean. For graduates.

9a. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. T Th, 10, Goldwin Smith 256.

Introduction to the history of Asia. Designed, like course 9b, to acquaint the student in a general way with the civilizations of the Orient; sources, methods of study, and present problems; the great epochs, the leading personalities, and the chief institutions. The history of Asia Minor, Syria, Arabia, Irak, Iran, India, China, Japan, Central Asia, and Asiatic Russia will be presented in outline. The illustrative material of the Department will be used. Preparation of papers, and frequent examinations. Open to juniors, seniors, and graduates.

[9b. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. Introduction to the history of Africa.] Not given in 1913-14.

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 however is continuous through the year, and no credit will be allowed for the first term alone. Assistant Professor JONES. Daily, 8, 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 Dialogues, 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 134.

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. M W, 10, Goldwin Smith 137. The story of the Persian Wars will be read.

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, consisting chiefly of lectures the first term and composition exercises the second term.

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.] Not given in 1913-14.

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.

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

First term, St. John's gospel (Westcott and Hort); second term, Epistles of John and Revelation.

27. **Myths of the Epic Cycle.** First term, credit two hours. Assistant Professor JONES. W F, 3, Goldwin Smith 134.

The entire cycle of myths relating to events before, during, and after the Trojan War will be illustrated by lantern views of extant monuments, vase-paintings, bas-reliefs, sculpture in the round, gems, and coins.

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.

[35. **Advanced Greek Composition.** Throughout the year, credit one hour a term. Assistant Professor JONES.

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.] Not given in 1913-14.

40. **The Tragedies of Sophocles.** Throughout the year, credit two hours a term. Professor STERRETT. W F, 9, 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.

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. Courses 5 and 6 presuppose facility in reading Greek.

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 of Casts.

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

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

Lectures on pre-Greek art and civilization, 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. 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. Hours to be arranged after consultation, Goldwin Smith 35.

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

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. May be elected for five hours total credit by students who have entrance credit for only one unit of Latin.

B. **Cicero, Selected Orations; Virgil, Aeneid, Books I-VI.** Throughout the year, credit three hours a term. Prerequisite course A or entrance credit for two units in Latin (first year and second year Latin). Professor ELMER. M W F, 2, (or an hour to be selected), Goldwin Smith 124. May be entered in the second term by students who have entrance credit for only three units in Latin.

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

Sec. 1, M W F, 10, Goldwin Smith 120. Professor BENNETT.

Sec. 2, M W F, 1, 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 1913-14.

2. **Sight Translation: Gellius, Selections; Ovid, Metamorphoses.** Oral translation, at sight. 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.

[3. **Sight Translation: Caesar's Civil War; Phaedrus; Martial.** Throughout the year, credit one hour a term.] Not given in 1913-14.

7. **Classic Myths in English Literature.** Lectures, translations, and illustrative readings from English literature. Prerequisite preparatory Latin. Second term only, credit two hours. Professor DURHAM. T Th, 12, Goldwin Smith 128.

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

8. **Terence, Phormio; 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. A systematic drill intended for those who are taking course 8.] Not given in 1913-14.

[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 1913-14.

[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 1913-14.

[11. **Selections from Cicero's Letters; Cicero, De Oratore, Book I.** Throughout the year, credit two hours a term. Prerequisite course 1. Professor ELMER.] Not given in 1913-14.

12. **Selections from the last six books of Virgil's Aeneid; Cicero, De Officiis.** Throughout the year, credit two hours a term. Prerequisite course 1 or the equivalent. Professor ELMER. T Th, 2, (or hours to be arranged), Goldwin Smith 124.

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.] Not given in 1913-14.

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. T Th S, 9, Goldwin Smith 120.

Courses 16 and 17 are given in alternate years.

21. **Intermediate Course in Latin Writing.** Throughout the year, credit one hour a term. Prerequisite course 1. Professor ELMER. W, 3, 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.] Not given in 1913-14.

27. **Roman Life and Art.** Throughout the year, credit two hours a term. Professor BENNETT. W F, 12, Goldwin Smith 120.

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.

[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.] Not given in 1913-14.

This course alternates with 35 and has a similar aim.

35. **Cicero's Philippics.** Throughout the year, credit one hour a term. Prerequisite course 8, 9, 11, or 12, or the equivalent. Professor ELMER. Th, 11, Goldwin Smith 124.

This course requires no prepared translation for the class-room work. The professor in charge will himself translate the orations 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.

41. **Latin Seminary.** First term. Professor BENNETT. T, 2, and S, 10, Library, Greek and Latin Seminary Room.

The work of the seminary for 1913-14 will consist of the textual and exegetical study of Horace, combined with the reading of all of Horace's works.

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.

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.] Not given in 1913-14.

43. **Historical Latin Syntax.** Second term. Professor BENNETT. T Th, 10-11.15, Goldwin Smith 120.

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.

[44. **Historical Grammar of the Latin Language.** Throughout the year. Professor BENNETT.

Lectures and exercises on the sounds and inflections of the Latin language from the historical point of view. Exclusively for graduates.] Not given in 1913-14.

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

[46. **History and Development of Roman Epic Poetry.** Throughout the year. Professor ELMER. Exclusively for graduates.] Not given 1913-14.

[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 metaplasmis et barbarismis; Silviae vel potius Aetheriae peregrinatio ad loca sancta; Diehl, Vulgarlateinische Inschriften. A reading knowledge of French and German is required.] Not given in 1913-14.

48. **Vulgar Latin. Elementary Course.** First term, credit two hours. Professor DURHAM. Goldwin Smith 128.

Petronius, *Cena Trimalchionis*; *Silviae vel potius Aetheriae peregrinatio ad loca sancta*; *Epistula Alexandri ad Aristotelem*; *Vulgate New Testament*, ed. White.

50. **Latin Epigraphy.** Second term, credit two hours. Professor DURHAM. Goldwin Smith 128. 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.

Roman History, see HISTORY, courses 1 and 2.

Latin Paleography, see HISTORY, course 73.

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. Dr. ZINNECKER.

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

Second term.

Sec. 1, daily, 10, Goldwin Smith 177. Dr. 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 128. Mr. HOLT.

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.

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. HOLT.

Sec. 2, M T W Th F, 10, Goldwin Smith 221. Dr. ZINNECKER.

Sec. 3, M T W Th F, 10, Goldwin Smith 177. Dr. ANDREWS.

Sec. 4, M T W Th F, 11, Goldwin Smith 183. Dr. ANDREWS.

Second Term.

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

Sec. 2, M T W Th F, 10, Goldwin Smith 221. Dr. ANDREWS.

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

This course is equivalent to third-year German of the entrance requirements. Joynes-Wesselhoeft, *German Lesson Grammar*; Von Hillern, *Höher als die Kirche*; Heyse, *Das Mädchen von Treppi*; Sudermann, *Frau Sorge*.

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 190. Acting Assistant Professor GROSSE.

Sec. 2, T Th S, 10, Goldwin Smith 190. Acting Assistant Professor GROSSE.

Textbook: Pope's *Writing and Speaking German*. Illustrative maps, charts, and pictures. Exercises conducted in German. It is advisable to combine course 4 with course 3 or 5.

4a. **Elementary German Composition and Conversation.** Second term only, credit five hours. Mr. HOLT. M T W Th F, 9, Goldwin Smith 183.

Primarily for students completing course 3 in the first term. This course is equivalent to course 4, which see for prerequisite courses, books, etc.

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

Sec. 1, M W F, 10, Goldwin Smith 120. First term, Professor FAUST; second term, Assistant Professor DAVIDSEN.

Sec. 2, T Th S, 9, Goldwin Smith 221. Assistant Professor BOESCHE.

Sec. 3, T Th S, 12, Goldwin Smith 190. Dr. ZINNECKER.

German grammar treated topically. Translation and oral exercises in German on the text. Readings: Modern German Novelists; Storm, Keller, C. F. Meyer, Sudermann. Course 4 may be combined with course 5, or, instead of these, course 7 may be taken.

5a. **Intermediate German Course.** Second term only, credit five hours. Prerequisite course 3, or the equivalent. Dr. ANDREWS. M T W Th F, 9, Goldwin Smith 234.

This course is equivalent to course 5, which see for prerequisite courses, books, etc. Primarily for students completing course 3 in the first term.

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, 10, Goldwin Smith 183. First term, Assistant Professor DAVIDSEN; second term, Mr. HOLT.

Sec. 2, M T W Th F, 12, Goldwin Smith 183. Assistant Professor BOESCHE.

This course, in two terms, covers the work of courses 4 (or 4a) and 5 (or 5a). Oral practice and written exercises based on the texts read and on Pope's Writing and Speaking German. 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: Storm, *Aquis Submersus*; Keller, *Romeo und Julia auf dem Dorfe*; C. F. Meyer, *Der Heilige*.

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

10. **Advanced German Composition and Conversation.** Throughout the year, credit three hours a term. Prerequisite courses 1-5, or the equivalent.

Sec. 1, M W F, 10, Goldwin Smith 190. Acting Assistant Professor GROSSE.

Sec. 2, M W F, 11, Goldwin Smith 190. 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 Life and Works.** Throughout the year, credit three hours a term. Prerequisite courses 1-5. Assistant Professor DAVIDSEN. T Th S, 11, Goldwin Smith 190.

12. **Goethe.** First term, credit three hours. Prerequisite courses 1-5, or the equivalent. Professor FAUST. T Th S, 9, Goldwin Smith 190.

Goethe's life as portrayed in his letters (edition Ernst Hartung, 2 vols.); his poems, illustrating his artistic and philosophical principles.

13. **Goethe's Faust**, part I and selected portions of part II. Second term, credit three hours. Prerequisite courses 1-5, or the equivalent. Professor FAUST. T Th S, 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.

14. **History of German Literature.** First term, credit three hours. Prerequisite courses 1-5, or the equivalent. Professor FAUST. M W F, 9, Goldwin Smith 190.

An outline lecture course beginning with the Old High German period and extending through the seventeenth century. Lectures, recitations, and collateral readings.

15. History of German Literature. Second term, credit three hours. Prerequisite courses 1-5, or the equivalent. Professor FAUST. M W F, 9. Goldwin Smith 190.

An outline lecture course beginning with the eighteenth century and extending to the present time. Lectures, recitations, and collateral readings.

16. The German Drama of the Nineteenth Century. Throughout the year, credit three hours a term. Prerequisite courses 1-5, and 10, or the equivalent. Acting Assistant Professor GROSSE. M W F, 11, Goldwin Smith 234. Recitations, lectures in German, and collateral readings.

17. The Literature of the Reformation. First term, credit three hours. Prerequisite courses 1-5, and 10, or the equivalent. Assistant Professor DAVIDSEN.

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.] Not given in 1913-14.

18. Lessing; His Life, Works, and Period. Second term, credit three hours. Prerequisite courses 1-5, and 10, or the equivalent. Assistant Professor DAVIDSEN.

Lectures in German and collateral readings from Lessing's dramas and prose writings.] Not given in 1913-14.

21. Friedrich Hebbel; his dramatic works and theory of the drama. First term, credit two hours. Prerequisite courses 1-5, 10, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN.] Not given in 1913-14.

24. Lyric and Ballad Poetry. Second term, credit three hours. Prerequisite courses 1-5. Assistant Professor POPE.

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.] Not given in 1913-14.

25. The Technique and Style of Nineteenth Century Prose Writers. Throughout the year, credit two hours a term. Prerequisite courses 1-5, 10, and at least six hours advanced work in German literature. Assistant Professor DAVIDSEN. M W, 12, Goldwin Smith 177.

27. Lectures in German on Germany and German Institutions. First term, credit one hour. Acting Assistant Professor GROSSE. S, 11, Goldwin Smith 183.

The country and its population; the constitution of the Empire; the schools and the universities.

28. Lectures in German on Epochs of German History. Second term, credit one hour. Acting Assistant Professor GROSSE. S, 11, Goldwin Smith 183.

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 1913-14.

34. Elementary Phonetics and its Application to the Study of Modern Languages. First term, credit one hour. Assistant Professor DAVIDSEN. S, 10, Goldwin Smith 183.

[35. **Principles of Word-Formation.** First term, credit one hour. Assistant Professor DAVIDSEN.] Not given in 1913-14.

[36. **Topics in Historical German Syntax.** Second term, credit three hours. Assistant Professor BOESCHE.

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.] Not given in 1913-14.

37. **Elementary Middle High German.** First term, credit three hours. Prerequisite courses 1-5, 10, and at least six hours advanced work in literature. Assistant Professor BOESCHE. T Th S, 10, Goldwin Smith 137.

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

[38. **Modern Scandinavian.** Throughout the year, credit three hours a term. Dr. ANDREWS.

A study of Danish grammar, with considerable reading from standard Danish authors and some consideration of the history of the Danish language and literature. [For advanced students in languages and literatures.] Not given in 1913-14.

[40. **Teachers' Course.** First term, credit two hours. Prerequisite courses 1-5, 10, and twelve hours of advanced work in German literature or philology. Professor FAUST, assisted by other members of the German Department.

Methods of teaching modern languages; examination and criticism of textbooks available for the study of German; requirements for teachers' examinations.] Not given in 1913-14.

41. **Advanced Middle High German.** Second term, credit three hours. Prerequisite course 37. Professor FAUST. T Th S, 10, Goldwin Smith 181.

Special study of Wolfram's *Parzival*. Primarily for graduates.

42. **Gothic.** First term, credit three hours. Assistant Professor BOESCHE. M W F, 9, Goldwin Smith 137.

Streitberg's *Gotisches Elementarbuch*; *Die Gotische Bibel*, hrg. von Streitberg. This course will serve as a general introduction to Germanic philology. Primarily for graduates.

[43. **Old High German.** First term, credit three hours. Prerequisite course 37. Assistant Professor BOESCHE.

Primarily for graduates. Braune's *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*.] Not given in 1913-14.

44. **Old Icelandic.** Throughout the year, credit three hours a term. Dr. ANDREWS. T Th S, 12, Library, German Seminary.

A study of Old Norse grammar and the relation of Old Norse to the other Germanic dialects. Reading of saga-texts in the first term; Eddic poems in the second. Primarily for graduates.

46. **The Icelandic Sagas.** Second term, credit one hour. Mr. HERMANNSSON. F, 12, Goldwin Smith 177.

Lectures on the origin, development, characteristics, and historical value of the Icelandic Sagas.

47. **Principles of Germanic Philology.** Second term, credit two hours. Prerequisite course 42. Dr. ANDREWS. W, 3-5, Goldwin Smith 177. A discussion of the fundamental principles of linguistic relationships within the old Germanic dialects. Lectures and illustrative problems.

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

For graduates only. Special study of Lessing's *Hamburgische Dramaturgie*.

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

Hebbel Problems. Primarily for graduates.

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

Subject for 1913-14, Old Saxon monuments, primarily the Heliand. Primarily for graduates.

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. **Elementary Course. Grammar, Composition, Translation.** Repeated in second term, credit six hours.

First term.

Sec. 1, daily, 12, Goldwin Smith 283. Dr. PUMPELLY.

Sec. 2, daily, 8, Goldwin Smith 283. Mr. BROWN.

Sec. 3, daily, 9, Goldwin Smith 277. Mr. BROWN.

Second term.

Sec. 1, daily, 12, Goldwin Smith 290. Dr. PUMPELLY.

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

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, 10, Goldwin Smith 290. Mr. ———.

Second term.

Sec. 1, M W F, 9, Goldwin Smith 281. Mr. ———.

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. Mr. BROWN.

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

Sec. 3, M T W Th F, 12, Goldwin Smith 283. 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, M W F, 9, Goldwin Smith 281. Dr. PUMPELLY.

Sec. 2, M W F, 11, Goldwin Smith 290. Assistant Professor GUERLAC.

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

Second term.

Sec. 1, T Th S, 9, Goldwin Smith 290. Professor COMFORT.

Sec. 2, M W F, 10, Goldwin Smith 277. Assistant Professor GUERLAC.

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, T Th S, 9, Goldwin Smith 281. Dr. PUMPELLY.

Sec. 2, M W F, 11, 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 277. Assistant Professor GUERLAC.

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. Recommended for all advanced students in French. Professor Guerlac's course is conducted in French; Professor Comfort's in English.

7. **French Literature of the Seventeenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. Professor COMFORT. M W F, 10, Goldwin Smith 290.

8. **French Literature of the Eighteenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. Assistant Professor GUERLAC. T Th S, 10, Goldwin Smith 277.

9. **French Literature of the Nineteenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. M W F, 9, Goldwin Smith 283. Assistant Professor MASON.

10. **French Dramatic Literature.** Throughout the year, credit three hours a term. Prerequisite course 4. 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. **French Phonetics.** Second term, credit one hour. Prerequisite courses 4, 5. Dr. PUMPELLY. S, 11, Goldwin Smith 283.

14. **Advanced French Composition.** Throughout the year, credit three hours a term. Prerequisite courses 4, 5. Assistant Professor GUERLAC. T Th S, 11, 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 professor 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 1913-14.

[22. **French Literature of the Sixteenth Century.** First term, credit three hours. Prerequisite course 6.] Not given in 1913-14.

23. **French Philology.** Second term, credit three hours. Prerequisite course 6, and entrance Latin. Dr. PUMPELTY. T Th S, 10, Goldwin Smith 290.

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.** Second term, credit two hours. Prerequisite course 6. Professor COMFORT. T Th, 12, Goldwin Smith 277.

25. **Old French Phonology and Morphology.** Second term, credit two hours. Assistant Professor HAMILTON. For graduates only. Hours to be arranged.

26. **Old French Texts.** Throughout the year, credit two hours a term. Prerequisite course 23. Professor COMFORT. T, 2.30, Library, French Seminary.

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

27. **Modern French Seminar.** Throughout the year, credit two hours a term. Assistant Professor MASON.

In 1912-13 the works of Alfred de Vigny were 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.

Primarily for graduates.] Not given in 1913-14.

30. **Italian. Elementary Course.** Throughout the year, credit three hours a term. T Th S, 9, Goldwin Smith 283. 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, 11, Goldwin Smith 281.

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

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 1913-14.

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

Sec. 1, M W F, 10, Goldwin Smith 283. Professor OLMSTED.

Sec. 2, T Th S, 11, Goldwin Smith 290. Mr. DALE.

Sec. 3, M W F, 12, Goldwin Smith 277. Mr. BROWN.

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. Mr. DALE. M W F, 11, 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.

The classical Spanish drama will be studied during the first term, the modern Spanish drama during the second term.] Not given in 1913-14.

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.

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 1913-14.

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, STELTER, GILBERT, and JENSEN; Messrs. BALDWIN, and CROWELL. 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 four plays of Shakespeare, four modern novels, selected essays, and poems of Milton, Tennyson, and Browning. Practice in composition in connection with the reading, with incidental study of the principles of writing. Registration in the course is in charge of Dr. BAILEY.

Students who elect English 1 must apply at Goldwin Smith A on Monday, Tuesday, or Wednesday 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, M W F, 9, Goldwin Smith 164. Assistant Professor NORTHUP.

Sec. 3, T Th S, 9, Goldwin Smith 164. Mr. KIRK.

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

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

Students who elect English 2 must apply at Goldwin Smith 173 on Monday, Tuesday, or Wednesday of registration week for assignment to sections.

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, 11, 12; W F, 11; F S, 10, 12. Messrs. KIRK and SMITH. Rooms to be announced.

Tennyson, Browning, Thackeray, 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. T Th S, 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 1913-14.

9b. Teachers' Course. Second term, credit one hour. Dr. BAILEY. Given in alternate years. Hour and room to be announced.

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

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.

Old English grammar. 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 and collateral reading 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 three hours a term. Prerequisite course 11. Professor STRUNK. T Th S, 9. Room to be announced.

First term, selections from Emerson's Middle English Reader; second term, reading of longer works, illustrative of the literature from the twelfth to the fourteenth century.

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, 11, Goldwin Smith 156. Professor STRUNK.

Sec. 3, T Th S, 9, Goldwin Smith 160. Assistant Professor PRESCOTT.

Sec. 4, M W F, 9, Goldwin Smith 160. Assistant Professor COOPER.

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.

Preliminary survey of Chaucer's life and time; reading, principally in the *Canterbury Tales*.

31. Sixteenth and Seventeenth Century Literature. Throughout the year, credit three hours a term. Open to upperclassmen only. Dr. BAILEY. T Th S, 9, Goldwin Smith 163.

A study of the verse and prose (other than the drama) from about 1570 to 1680, with some discussion of the political, social, and religious conditions of the period.

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

First term, comedies and histories; second term, tragedies and romances.

38b. Eighteenth Century Poetry. Second term, credit three hours. Prerequisite course 2 or 22. Assistant Professor MONROE. M W F, 12, Goldwin Smith 164.

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

41. The English Drama to 1642. Throughout the year, credit three hours a term. Open to upperclassmen only. 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. Open to upperclassmen only. Assistant Professor ADAMS. M W F, 11, Goldwin Smith 163.

The Renaissance, and the forces at work on the beginnings of modern English literature. The main authors to be studied are: Wyatt, Surrey, More, Ascham, Lyly, Greene, Sidney, Spenser, Daniel, Drayton, Raleigh, Bacon, Donne, and Herrick. Attention will also be given to the several types of literature: the sonnet, novel, essay, song, character, pamphlet, and the literature of travel.

42b. Shakespearean Tragedy. Second term, credit three hours. Open to upperclassmen only. Assistant Professor ADAMS. M W F, 11, Goldwin Smith 163.

A study of three or four of Shakespeare's tragedies, with special reference to their construction.

47. The Principles of Poetry and Versification. First term, credit two hours. Open to upperclassmen only. Assistant Professor PRESCOTT. M W, 10, Goldwin Smith 163.

An introduction to the study of poetry, in its content and form, with reading of typical English poems.

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 160.

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

50. Studies in Literature. Throughout the year, credit two hours a term. Open to upperclassmen only. Hours to be arranged with the instructors.

Studies, in class or in individual conference, in the fields here noted:

a. Lyric Poetry. A study of the lyric as a form, with a survey of the best English lyrics. Dr. STELTER.

b. **Milton and the Epic.** A study of Milton's use of the epic form, with illustration from the epics (in translation) of Virgil, Ariosto, and Tasso.
Dr. GILBERT.

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 Literature.** Throughout the year, credit three hours a term. Open to upperclassmen and graduates. Prerequisite course 2 or 22. Assistant Professor NORTHUP. M W F, 3. Goldwin Smith 160.

Lectures on the chief literary tendencies and characteristics of the period; studies of the leading poets and of some of the greater writers of prose.

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.

56a. **The Arthurian Legends.** First term, credit three hours. Open to upperclassmen only. Assistant Professor NORTHUP. Hours and room to be arranged. Studies in the origin and growth of the Arthurian legends and in the use made of them by modern European poets.

56b. **Middle English Literature.** Second term, credit three hours. Prerequisite course 11. Assistant Professor NORTHUP. Hours and room to be arranged.

Studies in the history of Middle English literature, with special reference to the romances and their relations to continental literature.

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 (first term) of the principles of dramatic construction, based upon Greek, Elizabethan, and classical French drama, with reading (second term) of about fifty representative modern plays.

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

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

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

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.

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

Partly designed for those who desire to teach English. A study of the chief theories of poetry, and types of literature, with illustrations mainly drawn from the English poets.

66. **The Epic and the Romance.** For graduates only. Assistant Professor NORTHUP. Hours to be arranged.

Studies of the English heroic epic, with special reference to Germanic culture, and of the other epic poetry of the Teutonic peoples; also of the conditions under which the epics were replaced by the romances.

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. Hours to be arranged.

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

69. **The Drama.** For graduates only. Professor SAMPSON. Hours to be arranged.

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

ORATORY

1. **Public Speaking.** Throughout the year, credit three hours a term. First term.

Sec. 1, M W F, 9, Goldwin Smith 24. Assistant Professor WINANS.

Sec. 2, M W F, 12, Goldwin Smith 24. Mr. DRUMMOND.

Sec. 3, T Th S, 8, Goldwin Smith 24. Assistant Professor EVERETT.

Sec. 4, T Th S, 10, Goldwin Smith 24. Assistant Professor WINANS.

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 pamphlet on prizes.

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

Sec. 1, T Th S, 8, Goldwin Smith 21. Assistant Professor WINANS.

Sec. 2, T Th S, 10, Goldwin Smith 21. Assistant Professor EVERETT.

Same as first term of course 1.

1b. **Public Speaking.** First term, credit three hours. Assistant Professor EVERETT. T Th S, 10, Goldwin Smith 21.

Same as second term of course 1.

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 may take instead the more complete general course 1; or on completion of course 6 may take the second half of course 1 for either two or three hours.

8. **Voice Training.** First term, credit one hour. Assistant Professor WINANS. M W F, 10, Goldwin Smith 21.

An elementary course for the development and improvement of normal voices, and for the removal of special defects. Individual instruction by appointment.

10. **Oral Reading.** Throughout the year, credit two hours a term. Mr. DRUMMOND. T Th, 11, Goldwin Smith 21.

Reading based on careful interpretative study of prose, poetry, and drama of assured literary value. The aim of the course is simple, intelligent, and appreciative reading.

11. **Oral Reading and Oral English.** Throughout the year, credit two hours a term. Prerequisite the consent of the instructor. Mr. DRUMMOND. W F, 11 (or hours to be arranged), Goldwin Smith 21.

For prospective teachers. In addition to practice, methods and texts will receive attention. Students who have completed course 10 may not receive credit for more than one hour a term in this course.

12. Argument and Debate. Throughout the year, credit three hours a term. Mr. DRUMMOND. T Th, 12, and an hour to be arranged, Goldwin Smith 21.

Study of the principles of argumentation; brief-writing, text books, discussions, and conferences. Principles and illustrative matter will be drawn largely from historical and stylistic study of the writings and speeches of Burke, Hamilton, and Lincoln. Constant practice in oral argument, based on written briefs. The aim is training in analysis, the use of authorities, the weighing of evidence, and fair-minded discussion.

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. Woodford orations may be worked out in connection with this course. See pamphlet on prizes.

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

16. Principles of Speech Preparation. First term, credit two hours. Pre-requisite course 1a. Assistant Professor WINANS. T Th, 9, Goldwin Smith 25.

Open to juniors and seniors only. A study of interest and persuasion. Practice in the composition and delivery of speeches, with careful criticism and correction. Woodford orations may be worked out in this course.

[29. Oral Expression for Architects. Assistant Professor WINANS. See Announcement of College of Architecture.] Not given in 1913-14.

PHILOSOPHY

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

Recitations:

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

Sec. 2, F, 11, Goldwin Smith 227. Dr. JORDAN.

Sec. 3, F, 11, Goldwin Smith 221. Mr. TUTTLE.

The fundamental problems of philosophy, together with a critical study of the most important solutions of them that are offered 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. Logic. First term, credit three hours. Dr. JORDAN. M W F, 12, Goldwin Smith 227.

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

3. Logic. Second term, credit three hours. Professor CREIGHTON. T Th S, 11, Goldwin Smith 225. Dr. JORDAN. T Th S, 9, Goldwin Smith 227.

JORDAN.
The general character of the thinking process, its laws of development, and the methods by which thought actually proceeds to solve the problems presented

to it; the analysis of logical arguments and the detection of fallacies, in both the deductive and the inductive processes of reasoning. Creighton's *Introductory Logic* will be used as a textbook.

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

An elementary course on 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, Professor THILLY. M W F, 9, Goldwin Smith B.

Recitations:

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

Sec. 2, F, 9, Goldwin Smith 227. Dr. JORDAN.

Sec. 3, F, 9, Goldwin Smith 221. Mr. TUTTLE.

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. 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 determinism.

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. Philosophical Ideas in Nineteenth Century Literature. First term, credit two hours. Professor ALBEE. M W, 12, Goldwin Smith 225.

This course does not presuppose previous acquaintance with philosophy. After considering the tendencies of eighteenth century thought and the new departure represented by what is most characteristic in nineteenth century thought, both in philosophy and literature, the course will deal with the interpretations of life offered by well-known authors of the nineteenth century, both English and continental, and the relation of such interpretations to the recognized tendencies of contemporary philosophy.

10. Social and Political Ethics, and the Theory of the State. Second term, credit three hours. Prerequisite either course 1, 3, 5, 6, or 7. Professor THILLY. Lectures and reading, M W F, 11, Goldwin Smith 225.

For juniors, seniors, and graduates only.

[10a. **Philosophy of Law or Jurisprudence.** Second term, credit three hours. Prerequisite either course 1, 3, 5, 6, or 7. Professor THILLY. Lectures and reading. For juniors, seniors, and graduates only.] To alternate with course 10. Not given in 1913-14.

11. Philosophical Results and Applications. First term, credit one hour. Prerequisite at least one course in philosophy. Professor CREIGHTON. S, 12, Goldwin Smith 225.

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. Dr. JORDAN. S, 11, 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. Dr. JORDAN. T Th, 12, Goldwin Smith 227.

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. Dr. JORDAN. T Th, 12, Goldwin Smith 227.

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.

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 5 or the equivalent. Professor CREIGHTON.] Not given in 1913-14.

19. The Development of Modern Philosophical Problems. First term, credit two hours. Prerequisite either course 1, 3, 5, 7, 17, 20, or 21. Professor CREIGHTON. T Th, 12, Goldwin Smith 225.

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.

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.

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. Primarily for graduates.

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.

[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 1913-14.

[29. **Modern Idealistic Theories of Ethics.** Throughout the year, credit two hours a term. Professor THILLY.] Not given in 1913-14.

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

Lectures, discussions, and essays. The empiricist 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.

Lectures, discussions, and essays. Primarily for graduates.] Not given in 1913-14.

[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 1913-14.

[34. **Problems and Methods in Recent Philosophy.** Throughout the year, credit two hours a term. Professor ALBEE.

Lectures, reading of prescribed authors, and discussion. Primarily for graduates.] Not given in 1913-14.

35. **Logical Theory.** Throughout the year, credit two hours a term. Professor ALBEE. T Th, 12, Goldwin Smith 220.

Lectures, reading of prescribed authors, and discussions. A careful examination of Bosanquet's Logic, or the Morphology of Knowledge, and a comparison of the method there developed with related and opposing methods employed by other important contemporary writers on logical theory. Primarily for graduates.

37. **Seminary in Ethics.** Investigation of special problems. Throughout the year, credit two hours a term. Professor THILLY. Hours and room to be arranged.

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 1913-14 will be devoted to the reading and discussion of selected dialogues of Plato and the Politics of Aristotle in English translations.

40. **Seminary in Logic and Metaphysics.** T, 3-5, Goldwin Smith 231. Professor CREIGHTON and Dr. JORDAN.

The subject for 1913-14 will be a study of the methodology of the leading sciences or the philosophy of scientific and historical procedure.

PSYCHOLOGY

1. **Elementary Psychology.** First term, credit three hours. Professor TITCHENER, Assistant Professor WELD, Mr. RUCKMICH, Mr. BORING, and Mr. FOSTER. Lectures, T Th, 11, Goldwin Smith C; class room work, S, 10, 11, or 12. This course is not open to juniors or seniors except by permission of Mr. FOSTER.

2. **General Psychology: Problems and Points of View.** Second term, credit three hours. Prerequisite course 1. Assistant Professor WELD. Lectures, T Th, 11, class room work, S, 11, Morrill 46.

3. **Experimental Psychology: Qualitative.** First or second term, credit three hours. Assistant Professor WELD, Mr. RUCKMICH, and Mr. BORING. M W F, 2-4, Morrill, Psychological Laboratory. Prerequisite course 1.

4. **Experimental Psychology: Quantitative.** First or second term, credit three hours. Prerequisite courses 1 and 3. Assistant Professor WELD, Mr. RUCKMICH, and Mr. BORING. M W F, 2-4, Morrill, Psychological Laboratory.

5. **Systematic Psychology: Sensation, Perception, Feeling, and Attention.** First term, credit three hours. Prerequisite courses 1 and 2, or 1 and 3. Assistant Professor WELD, Mr. BORING, and Mr. FOSTER. Lectures, M W, 9; discussion, demonstration, and recitation, F 9, Morrill 46.

6. **Systematic Psychology: Association, Memory, Imagination, Action, and Thought.** Second term, credit three hours. Prerequisite courses 1 and 2, or 1 and 3. Mr. RUCKMICH. Lectures, M W, 9; discussion, demonstration, and recitation, F, 9, Morrill 46.

7. **Reading of German Psychology.** First term, credit one hour. Mr. RUCKMICH. Hour to be arranged, Morrill 46.

Text: Stumpf's *Die Anfänge der Musik*.

The primary aim of this course is the accurate rendering of the German text. Opportunity will also be given for discussion of elementary musical theory.

8. **Reading of French Psychology.** Second term, credit one hour. Mr. FOSTER. Hour to be arranged, Morrill 46.

Text: Ribot's *Problèmes de psychologie affective*.

9. **Psychological Problems.** Throughout the year, credit one to five hours a term. (a) Assistant Professor WELD. Prerequisite courses 3, 5, and 6. (b) Mr. RUCKMICH, Mr. FOSTER, and Mr. BORING. Prerequisite courses 3 and 4.

For particulars of graduate work see the Announcement of the Graduate School.

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.

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. M W, 2. Goldwin Smith 256. 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.

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 co-education, etc. The seminary is designed to be of assistance to high-school teachers.

9. The Teaching of Language. First term, credit three hours. Professor BRISTOL. M T W, 11, 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. Mental Tests. 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 Mental and Physical Tests. Students that wish to undertake experimental problems may register in course 14. Primarily for graduates.

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.

16. Esthetic Education. Second term, credit two hours. Lectures, readings, and laboratory work. Prerequisite courses 3 and 4. Professor DEGARMO. F, 2-4, 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.

17. Reading of German Educational Psychology. Second term, credit one hour. Assistant Professor WHIPPLE. T, 4, (or as may be arranged), Goldwin Smith 251.

Translation of a selected monograph, with special attention to the securing of a smooth and accurate English rendition.

HISTORY

A. The History of Civilization. Throughout the year, F, 12, Goldwin Smith A. Professors SCHMIDT, SILL, BURR, CATTERALL, and LUNT.

A course of public lectures on some of the principal epochs and characters of history, and on 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.

1. Greek and Roman History. First term, credit three hours. Professor SILL. M W F, 10, Goldwin Smith A.

A general survey of the history of the Mediterranean world from the beginnings of Greek civilization to the Second Punic War. Intended especially for freshmen. Text-books, lectures, and collateral readings.

2. Greek and Roman History. Second term, credit three hours. Professor SILL. M W F, 10, Goldwin Smith A.

From the Second Punic War to the dissolution of the Roman Empire in the West. Intended especially for freshmen. Text-books, lectures, and collateral readings.

3. Roman History: The Revolutionary Period. First term, credit three hours. Professor SILL. T Th S, 9, Goldwin Smith 120.

The effects of Roman imperialism; the causes of the revolution; the democratic reformers; the senate and the capitalists; the collapse of the constitution; Julius Caesar; the triumvirate; Augustus.

4. The Roman Empire from Augustus to Constantine. Second term, credit three hours. Professor SILL. T Th S, 9, Goldwin Smith 120.

The history of the civilized world under the rule of Roman emperors. The foundation and development of the Augustan principate; organization, extension, and defence of the Empire; social and economic changes; the literature of the imperial age; the conflict of religions and the victory of Christianity; symptoms and causes of decadence.

5. Roman Law. Second term, credit three hours. Professor SILL. T Th S, 11, Goldwin Smith 234.

An introduction to the history and system of the civil law of Rome, intended especially for those who expect to study law. Not open to freshmen in Arts and Sciences.

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.

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.

11a. Christendom during the Middle Ages. First term, no credit (except to students registered for course 11). Professor BURR. W, 3, Goldwin Smith 245.

These Wednesday lectures of course 11, surveying the history of civilization in Christendom from Constantine to Dante, are open to all interested. If taken by students registered for course 11, of which they are a part, they carry one hour of credit; otherwise they carry none. They are continued by the lectures of course 12a.

12. The Renaissance and the Reformation. Second term, credit five hours. 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. Course 12 is so arranged that it may be taken entire (and this is advised), or a part of it may be taken, as course 12b (with or without 12a), and a part as course 12c (with or without 12a), viz:

12a. Lectures on the Renaissance and the Reformation. Second term, no credit (except to students registered for course 12 or 12b or 12c). Professor BURR. W, 3, Goldwin Smith 245.

These Wednesday lectures of course 12, on the history of civilization in Christendom from Dante to Luther and from Luther to Galileo, are open to all interested, and are meant to offer to those who have time only to be listeners a connected survey of the period.

12b. Germany and Italy during the Renaissance and the Reformation. Second term, credit two hours (or with 12a three hours). Professor BURR. M F, 3, Goldwin Smith 245.

Students taking this course are urged to take also, if possible, course 12a, for which they will receive, on examination, an additional hour of credit.

12c. France during the Renaissance and the Reformation. Second term, credit two hours (or with 12a three hours). Professor BURR. T Th, 3, Goldwin Smith 245.

Students taking this course are urged to take also, if possible, course 12a, for which they will receive, on examination, an additional hour of credit.

[13. The Rise of Tolerance. Throughout the year, credit two hours a term. Professor BURR.

A study of the history of intellectual and religious liberty in Christendom.] Not given in 1913-14.

14. Medieval Life. First term, credit one hour. 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 1913-14 the subject of study will be monastic tales of the 13th Century.

15. Seminary in Medieval History. Second term, one hour. Professor BURR. S, 11, Library, European History Seminary Room.

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. Professor BURR.

The constitutional history of the Christian Church and the elements of ecclesiastical law. Primarily for graduates.] Not given in 1913-14.

22. Modern European History, 1600 to 1815. First term, credit three hours. Professor CATTERALL. M W F, 9, Goldwin Smith 242. Lectures and recitations.

23. Europe in the Nineteenth Century. Second term, credit three hours. Professor CATTERALL. M W F, 9, Goldwin Smith 242. Lectures and recitations.

24. Prussia from 1648 to 1786. First term, credit three hours. Professor CATTERALL. M W F, 11, Goldwin Smith 242. Lectures and recitations. Students will be expected to have a reading knowledge of either French or German.

25. The French Revolution. Second term, credit three hours. Professor CATTERALL. M W F, 11, Goldwin Smith 242. Lectures and recitations. Students will be expected to have a reading knowledge of either French or German.

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

31. **English History to 1558.** First term, credit three hours. Professor LUNT. T Th, 10, and an hour for recitation to be arranged, Goldwin Smith C. An outline of political, constitutional, economic, and social history, intended as an introductory course. Text-books, lectures, collateral readings, and reports. Open to freshmen.

32. **English History, 1558 to 1914.** Second term, credit three hours. Pre-requisite course 31, or an equivalent satisfactory to the instructor. Professor LUNT. T Th, 10, and an hour for recitation to be arranged, Goldwin Smith C. A continuation of course 31. Open to freshmen.

33. **English Constitutional History to the Sixteenth Century.** Second term, credit five hours. Professor LUNT. M T W Th, 9, and an hour for recitation to be arranged, Goldwin Smith C.

A study of the formation and growth of English institutions, designed to be particularly useful to those who intend to study law. Not open to freshmen in Arts and Sciences.

36. **English History during the Eighteenth Century.** First term, credit three hours. Professor LUNT. T Th S, 11, Goldwin Smith 242.

The course includes the development of modern English institutions; the economic and social growth of the nation; foreign relations; and colonial and imperial affairs. History 31 and 32 form a useful introduction to this course.

37. **English History since the Eighteenth Century.** Second term, credit three hours. Professors LUNT. T Th S, 11, Goldwin Smith 242.

A continuation of course 36 to the present. It may be elected independently of course 36.

40. **Selected Topics in the History of England during the Thirteenth and Fourteenth Centuries.** First term, credit two hours. Professor LUNT. T, 2-4, Library, European History Seminary Room.

A course of research. The topics considered this term will be those which arise in connection with a critical study by the class of the *Historia Maior* of Matthew of Paris. A reading knowledge of easy Latin is presumed. Open to graduates and to qualified undergraduates.

[50. **American History to 1763.** Second term, credit three hours. Professor HULL. M W F, 11, Goldwin Smith 234. Lectures, readings, and recitations.

The period of discovery; settlement of North America; problems of colonial empire; the American rivalry of England, France, and Spain in trade and in war.] Not given in 1913-14.

52. **American History 1783 to 1850.** First term, credit three hours. Professor BRETZ. M W F, 10, Goldwin Smith C.

A general course from the Revolution to the Compromise of 1850. Problems following the war; the formation of the new national government; European complications; the second war with Great Britain; new constitutional problems; the rise of the sectional issue. Text, lectures, and readings.

53. **American History 1850 to 1898.** Second term, credit three hours. Professor BRETZ. M W F, 10, Goldwin Smith C.

The trend toward secession and civil war, the Civil War, reconstruction, recent problems, political and constitutional. Text, lectures and readings.

[54. **Economic History of the Colonies, 1600 to 1788.** First term, credit two hours. Professor HULL.

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. Textbooks, readings, reports, and lectures.] Not given in 1913-14.

[55. **Economic History of the United States, 1789 to 1890.** Second term, credit two hours. Professor HULL.

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.] Not given in 1913-14.

56. Constitutional History of the United States since 1860. First term, credit three hours. Prerequisite courses 52 and 53, 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.

57. The Period of the Civil War. Second term, credit two hours. Prerequisite course 53 (same as 33, 1912-13) or the equivalent. Professor BRETZ. T Th, 9, Goldwin Smith 234.

This course deals primarily with the military history of the years 1861-1865, but attention will be paid to other important aspects of the period.

59. American Social History: The Settlement of the Middle West. Second term, credit three hours. Professor BRETZ. M W F, 9, 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.

60. Seminary. Throughout the year, credit two hours a term. Professor BRETZ. First meeting, Thursday, October 2, 4 p. m., Library, American History Seminary.

71. The Sciences Auxiliary to History. Second term, credit one hour. Professor BURR. S, 8, 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, archaeology, philology, epigraphy, paleography, diplomatics, sphragistics, numismatics, heraldry, genealogy, chronology, geography. Not open to underclassmen.

[72. Historical Geography. Throughout the year, credit one hour a term.

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.] Not given in 1913-14.

73. Paleography and Diplomatics. Throughout the year, credit one hour a term. S, 12, Library, European History Seminary Room. 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.

75. 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.

76. The Teaching of History. Course for teachers. Second term, credit two hours. S, 9-11, Library, European History Seminary Room. Professor BURR with aid from his colleagues. Open only to seniors and graduates who are specializing in history.

POLITICAL SCIENCE

51. Elementary Economics. Throughout the year, credit three hours a term. One lecture and two recitations each week. Lectures, Sibley Dome, M, 9; repeated M, 11, Assistant Professor BAUER. Recitations, T Th, 8, 9, 10, 11, 12; W F, 8, 9, 10, 11, 12. Assistant Professor BLAKEY, Drs. USHER and SMITH, and Mr. GILMAN.

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 the Library, Political Science Seminary.

52. Elements of Economics. Throughout the year, credit two hours a term. Assistant Professor TURNER. Lectures; hours to be arranged.

A special course for seniors in mechanical engineering. Not open to students in other colleges. Production and distribution of wealth, emphasizing particularly the financial or practical view instead of the theoretical. Lectures, textbooks, readings, and class discussions.

53a. Political Institutions. First term, credit three hours. Professor ——— and Assistant Professor SABY. Lecture, T, 10, Goldwin Smith 142; recitations, hours and room to be arranged.

A general introduction to the study of politics with special reference to the government of the United States. One lecture a week; two recitations a week based upon textbooks. Library work and special reports.

Beginning September 1914, courses 53a and 53b will be prerequisite to courses 54a, 54b, 61a, 61b, 78, 79a, 79b, and 94.

53b. Comparative Politics. Second term, credit three hours. Prerequisite course 53a. Professor ——— and Assistant Professor SABY. Lecture, T, 10, Goldwin Smith 142; recitations, hours and room to be arranged.

A study of the political institutions of the leading European countries. One lecture a week; two recitations a week based upon textbooks. Library work and special reports. A continuation of 53a and to be taken only after that course.

Beginning September 1914, courses 53a and 53b will be prerequisite to courses 54a, 54b, 61a, 61b, 78, 79a, 79b, and 94.

54a. Municipal Administration. First term, credit three hours. Prerequisite courses 53a, 53b. Professor ———. M W F, 11, Goldwin Smith 256.

A study of the historical development of city government in Europe and America. Especial attention will be paid to the structure of present day city government in the United States, municipal functions and administrative problems. Lectures, textbook, library work and reports.

[54b. State Administration. Second term, credit three hours. Prerequisite courses 53a, 53b. Professor ———. M W F, 11, Goldwin Smith 256.

A study of the American state; the county and the township; the powers and functions of administrative organs, boards, and commissions; judicial control.

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

55a. Elementary Social Science. First term, credit three hours. Course 51 should precede or be taken with this course. Professor WILLCOX. T Th S, 9, Goldwin Smith 256.

An introductory course upon social science or sociology, its field and methods, with especial reference to the human family as a social unit, to be studied by the comparative, the historical, and the statistical methods.

[55b. Elementary Social Science. Second term, credit three hours. * Course 51 should precede or be taken with this course. Professor WILLCOX.

A continuation of the preceding course but with especial reference to the dependent, defective, and delinquent classes. Open to all who have taken 55a and by special permission to others.] Not given in 1913-14.

56a. Elements of Business Law. First term, credit three hours. Professor ———. M W F, 10, Goldwin Smith B.

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

Courses 56a and 56b are designed primarily to meet the needs of students who contemplate entering business and not the profession of law, and credit will not be given to law students for these courses.

56b. Elements of Public Law. Second term, credit three hours. Pre-requisite 56a. Professor ———. M W F, 12, Goldwin Smith B.

A study of the development of legal institutions; especial attention will be paid to the relation of the state to private enterprises. Lectures, reports, and library work.

Courses 56a and 56b are designed primarily to meet the needs of students who contemplate entering business and not the profession of law, and credit will not be given to law students for these courses.

57a. Lectures on Citizenship. First term, credit two hours. M W, 12, Goldwin Smith B.

A lecture each Wednesday by some non-resident lecturer and each Monday by a member of the Department. The course has been arranged, in coöperation with the Department, by a committee of Cornell Alumni who are actively engaged in civic and social work. Those who have already agreed to speak are as follows: John Ihlder, Lee F. Hanmer, Munson A. Havens, Henry Brûère, Franklin Matthews, Clinton Rogers Woodruff, Porter R. Lee, Jeremiah Whipple Jenks, John M. Glenn. The course will be under the general charge of Professor WILLCOX. Readings, written papers, and reports will be required.

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

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 good will, 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. Second term, credit two hours. Prerequisite course 51. Assistant Professor BLAKEY. T Th, 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 recommended to all students who take course 64 or course 70. Open only by special permission to those who have not had the first term of course 64.

[61a. The American Party System. First term, credit two hours. Prerequisite courses 53a, 53b. Professor ———.

A study of the evolution of the American political party; its relations to the machinery of government; election laws; the convention, caucus, and primary; the judicial control of parties. Lectures, library work, reports, and recitations.] Not given in 1913-14.

[61b. Constitutional Government. Second term, credit two hours. Prerequisite courses 53a, 53b. Professor ———.

A study of the development of constitutional systems, especially in democratic governments; the growth of constitutionalism in the United States; the representative system; the division of powers; the place of the courts in our governmental scheme; the initiative, referendum, and recall; the recall of judicial decisions. Lectures, readings, and reports.] Not given 1913-14.

62. Business Management. Repeated in second term, credit two hours. Prerequisite courses 51 and 58; or 58 may be taken at the same time. Professor KIMBALL. T Th, 12, Sibley 4.

Seniors and graduates; others by permission. See Industrial Organization, S 20, Sibley College of Mechanical Engineering and the Mechanic Arts.

63. Corporations and Trusts. First term, credit three hours. Prerequisite course 51. Professor YOUNG. T Th S, 11, Goldwin Smith 256.

Deals primarily with the business corporation, with especial reference to its economic significance and effects and the problems of its legal control, concluding with a discussion of industrial combinations.

64. Money and Banking. Throughout the year, credit three hours a term. Prerequisite course 51. Professor YOUNG. T Th S, 10, Goldwin Smith 142.

A discussion of the more important phases of the theory of money and credit is followed by a consideration of selected practical problems, including the projected revision of the American banking system. Practical work is required in the analysis of the controlling conditions of the money market, of organized speculation in securities and of foreign exchange.

[65a. The Industrial Revolution in England, 1700 to 1850. First term, credit three hours. Prerequisite course 51, 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 1913-14.

[65b. Social and Economic Problems of the 19th Century in England. Second term, credit three hours. Prerequisite course 51, 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 to 1907; the poor laws, 1834 and 1909; the coming of free trade, 1776 to 1846; railroads and rate-making; Germany and the industrial supremacy of England.] Not given in 1913-14.

66a. The Labor Problem. First term, credit three hours. Prerequisite course 51. 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 51. 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.

68. Railway Transportation. Second term, credit three hours. Prerequisite course 51. Professor YOUNG. T Th S, 11, Goldwin Smith 256.

The present American railway system, railway finance, theory of rates, methods of public control in Europe, Australasia, and America. Some attention is given to the related problem of the control of public service companies.

70. Public Finance. Throughout the year, credit two hours a term. Prerequisite course 51. Assistant Professor BLAKEY. T Th, 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. It is recommended that course 59 be taken in connection with the latter half of this course.

71. Investments. Second term, credit two hours. Prerequisite course 51; course 58 should precede or may accompany this course. Dr. SMITH. M W F, 9, Goldwin Smith 245.

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 courses 51 and 58; or 58 may be taken at the same time. Assistant Professor BAUER. T Th S, 9, Goldwin Smith 264.

(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.

76a. Elementary Statistics. First term, credit three hours. Prerequisite course 51. Professor WILLCOX. M W F, 9, Goldwin Smith 256; Laboratory, W, 2-4, Goldwin Smith 259.

An introduction to census statistics with especial reference to the Federal census of 1910 and to registration statistics with especial reference to those of New York State and its cities. The course gives an introduction to the methods and results of statistics in these, its best developed branches.

[76b. Economic Statistics. Second term, credit three hours. Professor WILLCOX.

A continuation of course 76a, dealing mainly with the agricultural and industrial statistics of the United States. Mature students that have not already had course 76a or its equivalent may be admitted by special permission. The course is an introduction to statistics in its application to more difficult fields, such as production, wages, prices, and index numbers.] Not given in 1913-14.

78. International Law. Throughout the year, credit two hours a term. Assistant Professor SABY. T Th, 12, Goldwin Smith 256.

The rights and obligations of states in their dealings with each other in times of peace. The world's peace movement. The laws of war and of neutrality. Special attention will be given to current international events. Lectures, text, and assigned readings.

79a. History of Political Thought. First term, credit two hours. Assistant Professor SABY. M W, 10, Goldwin Smith 234.

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

79b. Modern Political Thought. Second term, credit two hours. Assistant Professor SABY. M W, 10, Goldwin Smith 256.

A general survey of the more important modern political movements; ideas and ideals underlying the present political unrest. A study of the different political ideas that have at different times striven for supremacy in American political life. Lectures, text, and assigned readings.

80. The History of Protection and of Free Trade in Europe since 1660. First term, credit three hours. Prerequisite course 51; or open 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 to 1800: the mercantile system and its critics. The free trade doctrine of the 18th

century. Protective policy, 1800 to 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 51; 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 1913-14.

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.

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

For specially qualified students, interested in particular insurance problems.

92. Research in Finance. Throughout the year, credit two or three hours. Professor YOUNG. Hours and room to be arranged.

Individual or cooperative investigations of selected problems in money, banking, and corporation finance, in connection with lectures upon the bibliography of the sources and upon the use of the statistical method in such investigations.

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 especially qualified students interested in particular accounting problems.

94. Research in Politics. Throughout the year, credit one to three hours. Professor ——. Hours and room to be arranged.

A research course for advanced students in Public Law and Political Science. Subjects to be arranged.

99. General Seminary. Throughout the year, credit two hours a term. Professors WILLCOX, JOHNSON, YOUNG, —, LAUMAN, and Assistant Professors BAUER, SABY, and BLAKEY. 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, Political Economy Seminary.

A study of classification, cataloguing, indexing, reference books; typography, illustrations, preparation of manuscripts, administration, etc.

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

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, room to be announced.

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.

1. Elementary. Throughout the year, credit two hours a term. Open to all students showing sufficient aptitude to pursue the subject with profit. Professor DANN. T, 7.15 p. m. Th, 4.45 p. m. Sage Chapel.

Ear training, sight reading, and elementary theory. 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. Throughout the year, credit two hours a term. Open to students who have completed course 1 or who meet the requirements prescribed in course 1. Professor DANN. W, 4.45; Th, 7.15 p. m. Sage Chapel.

Musical dictation, intervals, triads, melody writing; 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 selections from the larger compositions. Attendance is required at the morning service at Sage Chapel, for which service the members of the class constitute the choir.

5. Choral. Throughout the year, credit one hour a term. Open to any student possessing a voice of satisfactory quality and volume, who is qualified to sing the larger choral works given at the annual music festival. Professor DANN. Hours to be arranged.

General vocal training, including position, breathing, breath support, the study of vowels and consonants as applied to singing, together with the study of the larger choral compositions. Members of this class form a part of the festival chorus.

7. Advanced Choral. Throughout the year, credit two hours a term. Professor DANN, M, 7.15; T, 4.45; Sunday, 2.40, Sage Chapel.

Preparation and public presentation of the best choral works, sacred and secular. This course is offered as advanced training to students possessing good singing voices and the ability to read at sight, music of moderate difficulty. The class is limited to 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 and form a part of the festival chorus.

8. Orchestra. Only a limited number can be admitted. Vacancies are filled by competition. Throughout the year, credit two hours a term. Mr. COLEMAN. T Th S, Sibley Dome.

Ensemble study of standard works, including compositions 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 music to be studied. The orchestra gives several concerts during the year and accompanies the advanced choir at the Sunday Vesper Service at Sage Chapel.

10. 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, 3.30, 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.

12. Advanced Harmony and Composition. Open to students who have completed course 10 and to others equally qualified. Throughout the year, credit two hours a term. Mr. JOHNSTON. M W, 3.30, Sage Chapel.

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

Courses 1, 3, 5, and 7, Tuesday, September 23; Wednesday, September 24; Thursday, September 25; Friday, September 26; and Saturday, September 27; from 3.30 to 5.30, Sage Chapel.

Course 8 (Orchestra), Thursday, September 25; and Friday, September 26; from 5 to 6, Sibley Dome.

Courses 10 and 12, (Harmony) Friday, September 26; and Saturday, 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. T Th S, 11, White 9. Assistant Professor RANUM.

Second Term. T Th S, 11, White 27. Assistant Professor SHARPE.

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 24. Professor SNYDER.

Second term. Daily except S, 9. White 9. Assistant Professor RANUM.

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. M W F, 11, White 21. Dr. MCKELVEY.

Second term. M W F, 11, White 27. Assistant Professor SHARPE.

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

4. **Algebra, Trigonometry, and Analytic Geometry.**

- a. From October 20th (approximately) to the end of the first term, credit five hours. Assistant Professor CARVER. Daily, 11, White 28.

Selected topics of algebra and plane trigonometry. For students who fail in the first part of course 6a below.

- b. Second term, credit six hours.

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

Sec. 2, daily, 11, White 28. Assistant Professor CARVER.

Analytic geometry and a brief introduction to differential calculus.

5. **Analytic Geometry and Calculus.** For students in the College of Civil Engineering. Prerequisite courses 1, 2, and 3, or their equivalents.

- a. Analytic Geometry, preceded by a brief review of selected topics from algebra and trigonometry. First term, credit five hours.

- b. Differential Calculus. Second term, credit three hours.

- c. Integral Calculus. Second term, credit three hours.

Course 5 is divided into sections meeting daily except Saturday, first term; daily, second term, in White Hall. Divisions b and c are to be given consecutively: b, from the beginning of the second term to Easter (approximately), and c, thereafter to the end of the term.

6. **Analytic Geometry and Calculus.** For students in Sibley College. Prerequisite courses 1, 2, and 3, or their equivalents.

- A. Analytic Geometry, preceded by a brief review of selected topics from algebra and trigonometry. First term, credit six hours.

- B. Differential Calculus. Second term, credit three hours.

- C. Integral Calculus. Second term, credit three hours.

Course 6 is divided into sections, which meet daily, both terms, in White Hall. Divisions B and C are to be given consecutively: B, from the beginning of the second term to Easter (approximately), and C, thereafter to the end of the term.

7. **Analytic Geometry and Calculus.** Throughout the year. Prerequisite courses 1, 2, and 3, or their equivalents.

- a. Analytic Geometry. First term, credit four hours.

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

- c. Integral Calculus. Credit, three hours second term.

Assistant Professor CARVER. Daily except S, 10, White 28.

Recommended for students intending to specialize in physics or chemistry.

8. **Analytic Geometry and Calculus.** For students in the College of Architecture. Throughout the year, credit three hours a term. Prerequisite courses 1, 2, and 3, or their equivalents.

First term:

Sec. 1, M W F, 8, White 5. Dr. HURWITZ.

Sec. 2, T Th S, 8, White 5. Dr. HURWITZ.

Second term:

Sec. 1, M W F, 9, White 5. Dr. HURWITZ.

Sec. 2, T Th S, 9, White 5. Dr. HURWITZ.

Examinations for the removal of conditions and incompletes in courses 1-8 are held in block-week at the end of each term, and also along with the September entrance examinations, but at no other times. For further information regarding time and place of these examinations, students should apply to the Department.

10. **Teachers' Course.** Throughout the year, credit three hours a term.

First term. Dr. SILVERMAN. M W F, 9, White 6. Selected topics of algebra treated historically and critically.

Second term. Dr. OWENS. M W F, 9, White 2. A brief analysis of the fundamental basis of logical geometry, together with a critical review of the whole subject of school geometry.

This course should be taken by all students expecting to teach mathematics in secondary schools. It is given in alternate years and should be taken during the junior or senior year. Prerequisite course 7, or special permission.

11. Theory of Numbers. Second term, credit three hours. Dr. SILVERMAN. T Th S, 9, White 6.

An elementary course in the theory of numbers. Among the subjects to be considered are: divisibility of integers, congruences and quadratic residues.

14. Theory of Substitutions and Algebraic Equations. Second term, credit three hours. Prerequisite courses 1, 2, 3. Dr. HURWITZ. M W F, 10, White 6.

A general course in the theory of algebraic equations, with special emphasis on the application of substitution-groups according to the methods of Lagrange and Galois.

16. Theory of Finite Groups. First term, credit three hours. Prerequisite course 7 or its equivalent. Dr. HURWITZ. M W F, 10, White 6.

Abstract finite groups and the more important concrete illustrations; properties of such groups in general and of various special types; Sylow's theorem and its applications; group-characteristics.

21. Elementary Differential Equations. Throughout the year, credit two hours a term. Prerequisite course 7 or its equivalent. Assistant Professor SHARPE. T Th, 10, White 27.

The solution of the simpler types of ordinary and partial differential equations, the statement of physical problems in the form of differential equations, and the application of boundary conditions to the solutions found.

22. Advanced Calculus. A critical study of the methods of the calculus. Throughout the year, credit three hours a term. Prerequisite course 7 or its equivalent. Assistant Professor GILLESPIE. Hours to be arranged, White 1. Lectures and recitations.

26. Elliptic Functions. Second term, credit two hours. Prerequisite course 7 or its equivalent. Professor HUTCHINSON. Hours to be arranged, White 25. Lectures and recitations.

The more elementary and fundamental parts of the theory of elliptic integrals and functions, together with some of the applications.

27. Theory of Ordinary Differential Equations. Throughout the year, credit three hours a term. Dr. CRAIG. Hours to be arranged, White 2. Lectures and recitations.

The existence of the solution of the linear differential equation subject to given initial conditions; the nature of the solution of certain types of equations; simultaneous differential equations and the nature of the solutions of certain type forms.

31. Projective Geometry. Throughout the year, credit three hours a term. Prerequisite course 7 or its equivalent. Assistant Professor CARVER. M W F, 9, White 28. Lectures and recitations.

Attention will be given to the formal processes of projective geometry rather than to its logical foundations. Both analytic and synthetic methods will be used.

32. Advanced Analytic Geometry. Throughout the year, credit three hours a term. Prerequisite course 7 or its equivalent. Dr. McKELVEY. Hours to be arranged, White 21. Lectures and recitations.

An introduction to the theory of algebraic curves and surfaces, systems of coordinates, elementary transformations, polar systems, a summary of unicursal curves and of the theory of quadratic surfaces.

35. Advanced Analytic Geometry of Space. Throughout the year, credit two hours a term. Prerequisite courses 7, 14, 31, 32. Professor SNYDER. White 24.

Primarily for graduates. A systematic study of the geometry on an algebraic surface, including genera, linear systems of curves, and birational transformations.

38. **Foundations of Geometry.** Throughout the year, credit three hours a term. Dr. OWENS. Hours to be arranged. White 2.

The fundamental bases of Euclidean, non-Euclidean, and projective geometry together with their interrelations.

43. **Theory of Probabilities.** Throughout the year, credit two hours a term. Professor McMAHON. White 10.

Theory of probabilities with applications to problems in statistics, theory of errors, life-tables, insurance, correlation, etc., to suit individual needs. A knowledge of calculus is not essential.

45. **Vector Analysis.** Throughout the year, credit two hours a term. Assistant Professor SHARPE. White 27.

Classification of vector fields; illustrations and properties of the principal fields; applications to electric fields.

46. **Potential Functions; Spherical Harmonics.** Throughout the year, credit three hours a term. Professor McMAHON. White 10.

ASTRONOMY

1. **General Astronomy.** First term, credit three hours. No prerequisite, but a knowledge of elementary physics is desirable. Lectures and recitations illustrated with lantern slides and the observatory equipment. Assistant Professor LELAND. M W F, 12, Rockefeller C.

A fundamental course in descriptive astronomy including a comprehensive study of the structure of the universe and the heavenly bodies, their motions, relations, and evolution; methods of investigation; instruments and apparatus.

2. **Observations.** Second term, credit one hour. Prerequisite course 1. Assistant Professor LELAND. One evening a week to be arranged. Fuertes Observatory.

A general study of the constellations, the sun and the planets, double and multiple stars, and nebulae. Star-maps and catalogues, field glasses, and the equatorial telescope.

PHYSICS

1. **Introductory Experimental Physics.** Repeated in second term, credit four hours. Professors NICHOLS, MERRITT, and SHEARER, and Assistant Professor GIBBS. M T W Th. First term 9 or 12, second term 9 or 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. BUCKLEY, CHURCH, DAVEY, HOWES, KENNARD, RODGERS, ROOP, THOMPSON, and WARD. M W, or T Th, Rockefeller, as assigned.

6. **Introductory Physics. Class-room work.** Repeated in second term, credit four hours. Messrs. MURDOCK, HOWES, RODGERS, and THOMPSON. 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 Monday, September 22, 1913, at 9 a. m.

8. **General Physics. Theory.** Repeated in second term, credit two hours. Prerequisite courses 1 and 5 and Mathematics 1. Messrs. BIDWELL, BROWN,

FORMAN, GIBSON, KING, PIERCE, and TAYLOR. M W, T Th, or W F, 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, T Th, or W F, Rockefeller, as assigned.

Textbook work. A continuation of course 8. Current electricity, heat including thermometry, expansion, calorimetry, radiation, 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 courses 1 and 6, but open to those who are taking or have completed course 1. Assistant Professor BLAKER, and Messrs. MAYER, POWER, DAVIES, and WOOD. S, 8-10.30 and 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. Longer courses 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. BIDWELL, BROWN, FORMAN, GIBSON, KING, MAYER, MURDOCK, PIERCE, POWER, and TAYLOR. M T Th F S, 8-11; W, 10-1; 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 specializing in chemistry are required to take four hours. Other students may elect the desired number of hours.

Examinations for those who were unavoidably absent from either term examination in course 8, 9, 10, or 14, and for those who have conditions to make up, will be held on Monday, September 22, 1913, at 2 p. m., in lecture room C.

15. Photometry and Illumination. Laboratory work, first term, credit one to four hours. 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 1 and Physics 1. Professor MOLER. 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. Second term, credit five hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER. M T W Th F, 10, Rockefeller 110.

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.] Not given in 1913-14.

22. **Electricity and Magnetism.** First term, credit five hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER. M T W Th F, 10, Rockefeller 110.

[23. **Properties of Matter.** First term, credit five hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1913-14.

[24. **Sound.** Second term, credit two hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1913-14.

25. **Advanced Laboratory Practice.** Either term or throughout the year. Credit one to three hours a term. Prerequisite courses 1, 6, or 10, and at least four hours of 14. Assistant Professor BLAKER. One to three three-hour periods per week at hours to be arranged.

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. WEIBEL. 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. WEIBEL. 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. Hours 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 1913-14, a considerable part of the course will be given to the subject of the discharge of electricity through gases.

[41. **The Electric Transmission of Intelligence.** Second term, credit one hour. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS.] Not given in 1913-14.

42. **Primary and Secondary Batteries.** Second term, credit one hour. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS. S, 12, Rockefeller B.

A lecture course on the theory of voltaic cells and storage batteries.

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.

44. **X-Ray Photography.** Second term, credit two hours. Prerequisite Physics 1, 10, and a knowledge of ordinary photography. Professor SHEARER.

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.

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.

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.

51. **Theoretical Physics.** Mechanics and thermodynamics. Throughout the year, credit four hours a term. Professor MERRITT. Hours to be arranged. Primarily for graduates.

[52. **Theoretical Physics.** Electricity and magnetism. Throughout the year, credit four hours a term. Professor MERRITT. Primarily for graduates.] Not given in 1913-14.

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.

CHEMISTRY

INTRODUCTORY INORGANIC CHEMISTRY

1. **Introductory Inorganic Chemistry.** Lectures, recitations, and laboratory. Repeated in second term, credit six hours.

1a. Lectures. First term, M W F, 11, Professor DENNIS and Mr. DAVIS; T Th S, 11, Professor BROWNE and Mr. DAVIS. Second term, M W F, 11, Professor DENNIS and Mr. DAVIS. 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, Dr. WELSH, and Messrs. OVERMAN, GULICK, PARMELEE, WEISER, MACK, NORTON, and ———.

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.

ANALYTICAL CHEMISTRY

6. **Qualitative and Quantitative Analysis.** Repeated in second term, credit five hours. Prerequisite course 1. Mr. LEMON, and Messrs. LEE, RAY, DUGLISS, E. D. YOUNT, ———, ———, and ———. 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.** Repeated in second term, credit six hours. Prerequisite course 1. Mr. LEMON, and Messrs. E. D. YOUNT and ———. Lectures; T Th, 9, Morse L. R. 1. Laboratory: first term, M W, 2-5, S, 8-12; second term, T Th, 2-5, S, 8-12.

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.** Repeated in second term, credit one, two, or 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.** Repeated in second term, credit six hours. Prerequisite course 6 (or preferably 7). Dr. LUNDELL and Messrs. O'BRIEN and MILLER. Lectures, T Th, 9, Morse, L. R. 3.

Laboratory will be open: first term, M T Th S, 9-1; M T W Th, 2-5.30; second term, same hours as course 14.

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. O'BRIEN, MILLER, and VANDER MEULEN.

Laboratory sections: first term, M T W Th, 2-5.30; M T Th S, 9-12.30; second 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. VANDER MEULEN.

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. Optico-chemical Methods. Second term, credit three hours. Prerequisite course 6 (or 7 and 12); Physics 1 and 6. Dr. ANDERSON and Messrs. A. R. HITCH and NORTON. Lectures, T Th, 9, Morse, L. R. 3.

Laboratory sections, M T W Th F, 2-5; T Th, 10-1.

The lectures deal with the construction and with the use in chemical analysis of the spectroscope, colorimeter, polariscope, and refractometer. 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 with the aid of the Krüss spectroscope and the direct vision spectroscope; the observation and mapping of absorption spectra; the examination and identification of rare earths and of organic dyes in solution by means of their absorption spectra; the calibration of spectroscopes; spectrum photography with the Hilger wave-length spectrometer and with the Steinheil grating spectrograph; 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. VANDER MEULEN. 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), and Physics 1. Dr. 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 Physics 1. Open to those who are taking course 19. Dr. ANDERSON, and Messrs. A. R. HITCH, GILBERT, and NORTON. Laboratory sections primarily for undergraduate chemists: first term, M, 2-4.30, and Th, 10-12.30; T, 10-12.30, and 2-4.30; W, 2-4.30, and F, 10-12.30; Th, 2-4.30, and S, 8-10.30; second term, M W, 2-4.30; T Th, 9-11.30; T Th, 2-4.30; S, 8-1. Sections for other students to be arranged individually.

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 analytical 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 Bodlander 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. Dr. 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 7 and 12). Open to those who are taking course 12. Professor ORNDORFF, Dr. E. F. HITCH, and Messrs. ROSE, KENNEDY, and MAHOOD. 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 7 and 12). Open to those who are taking course 12. Professor ORNDORFF and Messrs. ROSE and KENNEDY. 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 7 and 12). Open to those who are taking course 12. Dr. E. F. HITCH and Messrs. KENNEDY and MAHOOD. 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 Dr. 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. Th. 12, Morse L. R. 3.

The methods of making the dyestuffs, their properties, constitution, and relations to each other are discussed, the treatment being scientific rather than technical.

36. **Stereochemistry.** Second term, credit one hour. Prerequisite course 30 or 31. Professor ORNDORFF.

The stereochemistry of the compounds of carbon and nitrogen. The necessity of considering the space relations of the atoms in certain classes of physical isomers is shown and the close agreement of the facts and theory is brought out.] Not given in 1913-14.

37. **Methods of Organic Analysis.** Throughout the year. Prerequisite course 30. Professor ORNDORFF and Dr. 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.

47. **Advanced Inorganic Chemistry.** Laboratory practice. Either term, two, three, or four hours. Prerequisite course 30. Professors DENNIS and BROWNE and Mr. RHODES. Morse 68.

Practice in the use of methods of widely different types in the preparation and purification of inorganic compounds, in the extraction of elements from ores and minerals, and in the study of certain chemical reactions. Instruction in the elements of glass blowing will be included in this course. Graduate students may elect such parts of the work as they desire.

Course 47 is designed to accompany course 46, but either course may be taken separately.

48. **Selected Topics in Advanced Inorganic Chemistry.** Lectures. Throughout the year, credit two hours a term. Prerequisite course 30. Courses 50 and 51 should either precede or accompany this course. First term, Professor BROWNE. Second term, Dr. WELSH.

Experimental lectures, dealing in 1914-15 chiefly with (a) the chemistry of non-aqueous solutions, (b) the application of certain principles of physical chemistry, notably the phase rule, to inorganic chemistry, and (c) certain of the important recent advances in the field of inorganic chemistry.

Open to seniors and graduate students in chemistry; to others only by special permission.] Not given in 1913-14.

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. Dr. ANDERSON.

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.] Not given in 1913-14.

PHYSICAL CHEMISTRY

50. Introductory Physical Chemistry. Throughout the year, credit three hours a term. Prerequisite course 30 and Physics I, 6, and 10. Dr. BENNETT and Messrs. A. S. YOUNT and GORDON. 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, reaction 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. A. S. 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. M W F, 10, Morse L. R. 4.

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

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.

The historical development of the subject with special reference to the theory of the voltaic cell. For advanced students in chemistry or physics.] Not given in 1913-14.

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. Dr. BENNETT and Mr. BROWN. Laboratory practice; T, 8-10; W, 8-11; W, 2-5; Th, 8-10. Morse 79.

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. SHERWOOD. Laboratory sections: first term, W Th, 2-4.30; T Th, 10-12.30; second term, W Th, 2-4.30; T Th, 9-11.30. 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. SHERWOOD. Laboratory, M T, 2-4.30 and W, 10-12.30. 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

69. Elementary Sanitary Chemistry. Throughout the year, credit five hours a term. Prerequisite course 6 (or 7 and 12), and course 32 (or 30, or 31). Professor CHAMOT and Dr. REDFIELD. Lectures, M W, 11, Morse L. R. 2. Recitations, at hours to be assigned. The laboratory will be open M T Th F, 2-4.30.

The lectures, recitations, and laboratory practice are planned to serve as an introduction to the methods employed for the examination of water for municipal purposes; the analysis of sewage and garbage; testing of foods and beverages, for adulteration or spoilage; testing commercial disinfectants; and for detecting the presence of habit forming drugs and of common poisons. Students may elect the first term of this course independently of the second term, but the second term may not be taken save upon completion of the first term.

70. Special Topics in Food Examination. First term, credit two hours. Prerequisite course 69. Dr. REDFIELD. Lectures, T Th, 12, Morse L. R. 4.

This course is planned to meet the needs of those specializing in sanitary chemistry and will cover in detail the more advanced problems of foods and food adulteration, including the examination of fermented, malt, and distilled alcoholic beverages, and of preserving foods from the view point of manufacturing control.

72. Microscopical Examination of Foods. Either term, credit two hours or more. Prerequisite course 65. Professor CHAMOT and Mr. SHERWOOD. Laboratory will be open, M T, 2-4.30 and W, 10-12.30, Morse.

The use of the microscope in the examination of foods and condiments for the purpose of detecting deterioration, adulterations, and admixtures.

75. **Special Topics in Water Examination.** Second term, credit two hours. Prerequisite course 69. Professor CHAMOT. Lectures, T Th, 12, Morse L. R. 2.

This course is planned to meet the needs of those specializing in sanitary chemistry, and will include a discussion of the natural or self-purification of water, modern methods of water filtration and disinfection, the method employed for the proper control of water purification plants, and the preparation of reports on water examinations.

78. **Advanced Sanitary Chemistry.** Throughout the year, credit two or more hours a term. Prerequisite course 69. Professor CHAMOT and Dr. REDFIELD. Laboratory practice at hours to be arranged.

Students may elect work in any branch of water, food or beverage analysis, or in the fields of water purification or sewage disposal plant control, or in the detection and determination of poisons.

[80. **Toxicology.** First term, credit two hours. Prerequisite course 30. Professor CHAMOT.

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.] Not given in 1913-14.

AGRICULTURAL CHEMISTRY

85. **Agricultural Chemistry.** Second term, credit four hours. Prerequisite course 1. Professor CAVANAUGH and Messrs. RICE and CONLIN. Lectures, T Th S, 11. One recitation a week, M, 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 Mr. 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. Assistant Professor CROSS. 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. Assistant Professor CROSS and Mr. RICE. T Th, 2-5, S, 9-12. Designed to accompany course 86.

88. **Agricultural Chemistry, Laboratory Course.** Second term, credit three hours. Assistant Professor CROSS and Mr. RICE. 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 or 93. Assistant Professor CROSS. 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, or Assistant Professor CROSS. Credit and hours by appointment. Designed to meet the needs of those who wish to do research in agricultural chemistry.

92. **Household Chemistry.** Second term, credit two hours. Prerequisite courses 1, 6, 32. Professor CAVANAUGH. Lectures, W F, 9, Morse L. R. 2. Designed for students of home economics.

93. **Household Chemistry, Laboratory Course.** Second term, credit three hours. Professor CAVANAUGH and Mr. RICE. T Th S, 8-10.30. Designed to accompany course 92.

SEMINARY

95. **Seminary.** Throughout the year. One hour every other week throughout the year. Morse L. R. 3.

This is a general seminary in which graduate students with major subjects in chemistry, and seniors in the Course in Chemistry are required to take part.

RESEARCH

96. **Research for Undergraduate Students.** Throughout the year. Morse. Seniors in the Course in Chemistry are required to elect four hours a term in research under the direction of some member of the staff of instruction.

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. Those who wish to begin botany in the second term may begin with either course 2 or 3, or both.

1. **General Comparative Morphology of Plants.** First term, credit three hours. Professor ATKINSON, Mr. ——— and 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. Professor ATKINSON, Mr. ———, and assistants. Lecture, M or W, 10. Laboratory, W, 11-1; Th, 2-5 (the time may be changed if necessary). Sage College, Botanical Lecture Room. Those who wish to substitute 1 hour of greenhouse work in plant propagation for 1 period of laboratory work may do so on consultation.

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. Professor ROWLEE, Mr. BROWN, and Messrs. ——— 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 3, 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, Histological 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. Xylogy. Second term, credit four hours. Courses 8b and 9a may advantageously precede this course. Mr. BROWN and Mr. PALMER. Lecture, T, 10. Laboratory and field work, M afternoon and T morning. Sage College, Histological 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. Professor ATKINSON and Mr. ——. Lectures, one or two a week by appointment. Laboratory work one or two periods by appointment. Additional laboratory work, if desired, may be taken under course 13. Those who wish to take the lectures only may register for two hours. Sage College, Botanical Lecture Room and Laboratory. Open to graduates.

A study of representative groups which illustrate the line of evolution of green plants, including the development and homologies of sporogenous, reproductive, and embryological organs, with discussions of the principal plant phyla in the algae, 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 or by appointment. 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. Mr. ———. Lecture, F, 11. Laboratory work, F afternoon and S morning. Sage College, Botanical Lecture Room and Laboratory. Open to graduates. May not be given in 1913-14.

A study of typical genera, practice in taxonomy, and field work.

13. Research in Morphology and Embryology. Prerequisite course 10, except by special permission. Professor ATKINSON and Mr. ———. Hours by appointment, Sage College, Botanical Lecture Room. Open to graduates.

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.

14a. General Taxonomic Survey of the Fungi. First term or throughout the year, credit four hours a term (less with special permission). 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. Open to graduates.

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.

14c. 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. Open to graduates.

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 compositæ. Since different groups will be taken up in different years, students may pursue this course more than one year.

17. Research in Comparative Histology and Cytology. Prerequisite courses 8a and 8b. Professor ROWLEE and Mr. BROWN. Open to graduates.

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.

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; M W, 10-12.30; T Th S, 10.30-1. Agricultural College, Main 302. Professor NEEDHAM, Assistant Professor JOHANSEN, 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.

EUGENICS

A. **Eugenics.** Second term. W, 12, Goldwin Smith A.

A weekly course of public university lectures dealing with the problems of human heredity and their influence upon the individual and the race as a whole. The factors of heredity, environment, and training of human beings in their social and economic relations will be considered. The lectures, given under the auspices of the Cornell Eugenics Club, will be open to all students and to the public, but no university credit will be given. Detailed announcement of subjects and lecturers will be made later.

ENTOMOLOGY AND INVERTEBRATE ZOOLOGY

[1. **Invertebrate Zoology.**] Not given in 1913-14. 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, W Th, or F, 2-4.30; S, 8-10.30, 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. Professor RILEY and Mr. LEIBY. 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 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, \$3.

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. Laboratory fee, \$2 an hour.

7. **Histology of Insects.** Repeated in second term, credit three or more hours. A laboratory course to accompany or follow the first term of course 12. Prerequisite courses 3, 4, 5, and 12. Professor RILEY. Agricultural College, Main 391. 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 391.

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.** Repeated in second term, credit three or more hours a term. Miss STRYKE. Lectures, laboratory, and field work by appointment, Agricultural College, Main 391.

Students intending to take this course should prepare for so doing by making as large a collection of Arachnida as practicable. The department can not undertake to furnish specimens for classification.

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. Professors COMSTOCK and 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 T, 2-5 and S, 9-12. If necessary a second section will be arranged for Th and F, 2-5. 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. Professor RILEY. W, 7-9 p. m., Agricultural College, Main 391. Open only to advanced students in entomology or zoology.

15. **French Entomological Reading.** Throughout the year, credit one hour a term. Miss STRYKE. T, 7-9 p. m., Agricultural College, Main 392.

Open only to advanced students in entomology. The work in this course will be based on Henneguy's *Les Insectes*.

17. **Literature of Systematic Entomology.** First term, credit three hours. Prerequisite courses 3, or 4 and 5, or Zoology 5. Assistant Professor BRADLEY. Lectures, M, 10, Agricultural College, Main 392; laboratory and library work, hours to be arranged, Agricultural College, Main 301.

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. Laboratory fee, \$2.

19. **General Limnology.** Throughout the year, credit two hours a term. Open only to students who have taken or are taking General Biology I and Entomology 3. Professor NEEDHAM and Mr. LLOYD. Lectures, Th, 8, Agricultural College, Main 392; laboratory, Th, 2-4.30, Main 492.

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 492 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. 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. Professor RILEY. Lectures, T, 8, Agricultural College, Main 392. Practical exercises, sec. 1, M, 2-4.30; sec. 2, 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.

25. **Aquatic Nematoceros Diptera.** Second term, credit two hours or more. Prerequisite course 3, 4, 5. Assistant Professor JOHANNSEN. Laboratory and field work by appointment. Agricultural College, Main 322.

A study of habits and early stages of the Culicidae, Simuliidae, Chironomidae, etc., with special reference to the species of interest to the sanitarian and fish culturist.

27. **Research in Morphology of Insects.** Throughout the year, credit three or more hours a term. Prerequisite courses 3, 4, and 5. Professors COMSTOCK and 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; Drs. WRIGHT and ALLEN; and Mr. DENNEY. Lectures, M W F, 10, McGraw 5. Laboratory: sec. 1, M, 2-4.30, S, 8-10.30; sec. 2, T Th, 2-4.30; sec. 3, W F, 2-4.30.

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.

[4. **Comparative Morphology and Evolution of Vertebrates.** Second term, credit three hours. Prerequisite courses 1 and 3 in Zoology and courses 1 and 4 in Histology and Embryology. 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 1913-14.

5. **Systematic Vertebrate Zoology and Ecology.** Second term, credit six hours. Assistant Professor REED. M W F, 9, McGraw 5. Laboratory, sec. 1, M W F, 2-4.30, McGraw 7; sec. 2, T Th, 2-4.30 and S, 8-10.30, McGraw 7. Assistant Professor REED; Drs. WRIGHT, and ALLEN; and Mr. HARPER.

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. **Advanced Systematic and Field Zoology.** Throughout the year, credit three hours a term. Prerequisite course 5. Drs. WRIGHT and ALLEN. Lectures, T Th, 9, McGraw 5; laboratory, 8-10.30, McGraw 7.

Ichthyology and herpetology. An amplification of the prerequisite, course 5. In the lectures special emphasis will be laid on the principal phases of animal life; the taxonomy, origin, and evolution of fossil and living groups; geographical distribution and the literature and institutions of zoology. Laboratory periods will be devoted to the identification of exotic and indigenous forms and museum and economic methods. Field work in ecologic methods, life histories, etc.

[7. **Ornithology and Mammology.** Throughout the year, credit three hours a term. Prerequisite course 5. Drs. WRIGHT and ALLEN.

A study of birds and mammals following the method of course 6. Given alternately with course 6.] Not given in 1913-14.

PHYSIOLOGY AND BIOCHEMISTRY

3. **Elementary Human Physiology.** First term, repeated in 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. First term, repeated in second term, credit two or more hours. Professor SIMPSON and assistants. Five hours a week, hours and days for first term to be arranged; in second term, $2\frac{1}{2}$ consecutive hours at any time between 10 a. m. and 5 p. m., T and Th.

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 himself 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.

7. Seminary. Second term. Credit, one hour. A seminary is held in association with Biochemistry at which current literature is discussed, and the results of original investigations carried on by workers in the laboratories are presented for criticism. Students are required to attend these meetings and to take part in the discussions, and each student is expected to give a communication on at least one occasion during the term.

8. Advanced 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 seminary 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.

Advanced lecture course on some selected topic in biochemistry.] Not given in 1913-14.

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 Mr. 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.

3. Special Histology and Technique. First term, credit two hours. Prerequisite courses 1 and 2, or 1 and 4, or equivalent courses. Mr. BADERTSCHER. Two periods at hours to be arranged, Stimson Hall.

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 four hours. Prerequisite course 1 or its equivalent. Professor KINGSBURY; lectures or recitations, M, 11, W, 8, Stimson Hall. Messrs. BADERTSCHER and SHILLIDAY; laboratory, T, p. m., S, a. m., Stimson Hall.

For students of biology or zoology, or those preparing for medicine. Preparation and study of embryological specimens from all the chief groups of vertebrates.

Particular emphasis is placed on the embryology of the amphibian, chick, and pig. The student also acquires a knowledge of special methods useful in embryological work.

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 and Mr. KINGERY. M, 8-11; W, 2-5.

Designed for those students who wish a more detailed consideration of the nervous systems and organs of special sense than can be given in other more general courses.

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 and Mr. BADERTSCHER.

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

GENERAL GEOLOGY

1. Dynamic Geology. First term, credit three hours. Assistant Professor VON ENGELN and Messrs. STORRER, VERWIEBE, ELSTON, and MORDOFF. Lectures T Th, 11; repeated second term, T Th, 9; McGraw Geological Lecture Room. One laboratory period a week, sections M T W Th F; recitations to be arranged. One all-day excursion required.

Planned to give beginners a knowledge of the fundamental principles and facts of dynamic geology by means of lectures, maps, lantern slides, specimens, text, 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 40.

PHYSICAL GEOGRAPHY

2. **Elementary Physical Geography.** Second term, credit three or five hours. Assistant Professor VON ENGELN and Messrs. ELSTON and MORDOFF. Lectures, M W F, 9, McGraw Geological Lecture Room. Laboratory, M T, 2-4.30, Physical Geography Laboratory.

Lectures may be taken without laboratory, but students taking lectures only must keep open a morning hour for recitation review. Students expecting to teach geography should take the laboratory work. All students are required to go on one all-day excursion to Taughannock Falls.

The course consists of a study of the physiographic features of the earth and their influence on mankind. Lectures illustrated by maps, models, and lantern slides. The indoor laboratory work in winter consists of experiments to illustrate the development of the simpler land forms and a study of the physiographic provinces of the United States; in spring a number of field excursions are made. Voluntary excursions to Niagara Falls and Watkins Glen are arranged.

[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.

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.] Not given in 1913-14.

4. **Geography of Europe.** Throughout the year, credit two hours a term. Prerequisite course 2 or the equivalent. Assistant Professor VON ENGELN and Mr. ELSTON. T Th, 10, McGraw, Geological Lecture Room.

The physiographic features of Europe and their influence upon the history and industrial development of the several nations. Illustrated lectures and a required weekly quiz of a half hour for each student at a period to be arranged.

5. **Glaciers and Glaciation.** Second term, credit three hours. Prerequisite course 2. Lectures, M W, 11, McGraw. Assistant Professor VON ENGELN; laboratory, W, 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. 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 6 or 7, Physics 1. 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 and Chemistry 6 or 7. Professor GILL and Mr. WILBER. One laboratory period Saturday morning, McGraw, Mineralogical Laboratory.

15. General Lithology. First term, credit one hour. Prerequisite courses 1 and 11. Professor GILL. Lecture or recitation, alternate S, 9; laboratory, alternate S, 8.30-11; McGraw Mineralogical Laboratory.

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

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

17. 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.

18. Petrography. Second term, credit three hours. Prerequisite courses 1, 12, 13, 17. 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.

19. Seminary in Mineralogy and Crystallography. Throughout the year, credit one hour a term. Prerequisite courses 12, 13, 17. 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.

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

PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

21. Historic Geology. Second term, credit three hours. Prerequisite course 1. Professor HARRIS. 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. First term till Christmas recess. Credit two hours first term, three hours second 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. Prerequisite courses 1 and 21.

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 till Christmas recess, credit two hours. Prerequisite Geology 1 and spherical trigonometry. Professor HARRIS and Mr. ———. Lectures to be arranged, McGraw 28. Lectures or field periods, three weekly.

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.

26. Areal Geology (Summer Field Work). June 15th to July 25th, credit six hours. Prerequisite courses 1 and 21 or the equivalents. Professor HARRIS and Messrs. ———. Field work, daily, 8-5.

Area for investigation, summer 1913: Warren Pa., camping in the field. Area for investigation summer 1914: central and eastern New York in Silurian and Ordovician, probably also reaching the east coast Southern Tertiaries, by boat.

ECONOMIC GEOLOGY

30. Building Stones and Clay Products. First term, credit three hours. Professor RIES and Messrs. Hook and DAVIS. Lectures, T Th, 9. Laboratory, either W or F, 2, 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. SOMERS, Hook, and DICKINSON. Lectures, M W, 10; 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 courses 1 and 11 or their equivalent. Professor RIES and Mr. Hook. Lecture, M W, 11; laboratory, T, 2, 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. SOMERS. 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. HOOK. 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. Prerequisite course 32.

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. HOOK. Hours to be arranged, McGraw. Laboratory experiments demonstrating some of the general principles of ore deposition.

40. Elementary Economic Geology. Second term, credit two hours. Prerequisite Geology 1. Professor RIES, T Th, 11, McGraw.

An introductory course, discussing the occurrence, distribution and uses of the more important economic products of the earth's crust.

MILITARY SCIENCE AND TACTICS

1. Infantry Training and Instruction. Throughout the year. Lieutenant BULL 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 BULL, 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 BULL.

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, credit one hour a term. Three days a week. Professor YOUNG and assistants. In addition to class and squad work, a series of lectures is given (between Thanksgiving and Easter) in physiology of exercise, preventive diseases, personal hygiene, etc., attendance upon which is obligatory.

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.

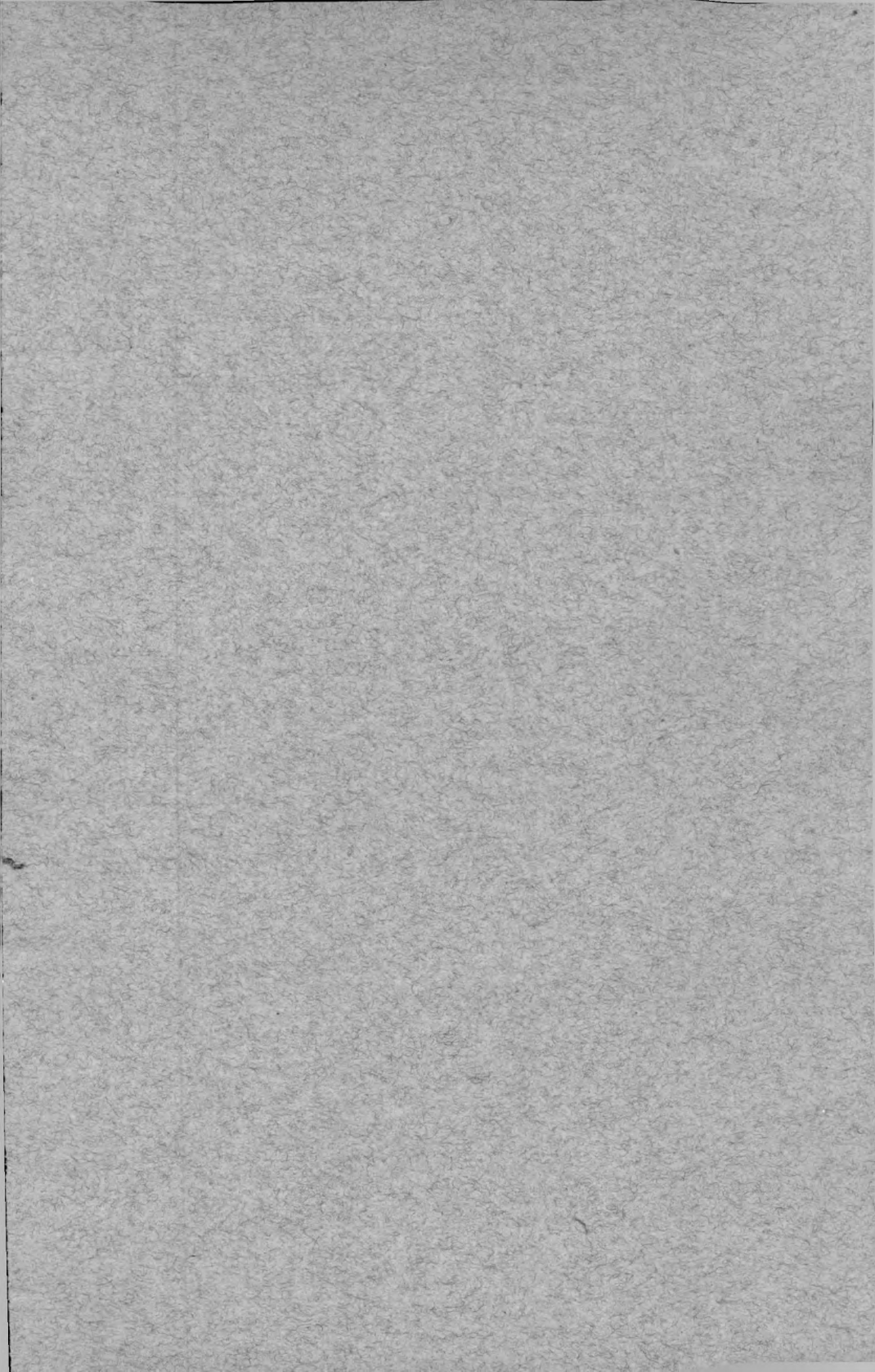
5. **Swimming.** Throughout the year. Mr. OSTRANDER. Daily except S, Gymnasium. Required of all students who are unable to swim sixty feet. No student who is unable to satisfy this requirement will, unless excused because of physical disability, receive credit for work in the department.

10. **Physical Training for Women.** Throughout the year. Miss CANFIELD. Sage Gymnasium. Daily except Saturday; freshmen at 11.00 or 15.00; sophomores at 12.00 or 4.30. 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.

12. **Corrective Gymnastics.** Throughout the year. Miss CANFIELD. Daily except S, 4, Sage Gymnasium.





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Announcement of the Sibley College of Mechanical Engineering and the
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Announcement of the College of Civil Engineering, February 15, 1913.

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Announcement of the Winter Courses in the College of Agriculture.

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