

# OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

VOLUME V

NUMBER 10

## ANNOUNCEMENT OF THE COLLEGE OF ARTS AND SCIENCES 1914-15

MAY 1, 1914  
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, 1914-15,  
sophomores, juniors, and seniors, Tuesday, May 26, 1914.  
freshmen and other new students, Saturday, September 26, 1914.
- For second term, 1914-15,  
all students, Wednesday, January 20, 1915.

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 viii-ix; 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 pages ix, x. 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

### First Term, 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.
Sept. 26, Saturday,	Registration, Graduate School.
Oct. 13, Tuesday,	Last day for payment of tuition.
Nov.	Thanksgiving recess.
Dec. 22, Tuesday,	Instruction ends. { Christmas Recess.
Jan. 5, Tuesday,	Instruction resumed.
Jan. 11, Monday,	Founder's Day.
Jan. 23, Saturday,	Instruction ends.
Jan. 25, Monday,	Term examinations begin.

### Second Term, 1914-15

Feb. 6, Saturday,	Registration, undergraduates.
Feb. 8, Monday,	Registration, Graduate School.
Feb. 8, Monday,	Instruction begins.
Feb. 26, Friday,	Last day for payment of tuition.
Mar. 31, Wednesday,	Instruction ends. { Spring Recess.
April 8, Thursday,	Instruction resumed.
May 22, Saturday,	Navy Day.
June 2, Wednesday,	Term examinations begin.
June 16, Wednesday,	Commencement.

### First Term, 1915-16

Sept. 17, Friday,	Entrance examinations begin.
Sept. 27, Monday,	Academic year begins. Registration of new students. Scholarship examinations begin.
Sept. 28, Tuesday,	Registration of new students.
Sept. 29, Wednesday,	Registration of old students.
Sept. 30, Thursday,	Instruction begins. President's annual address to the students.

# COLLEGE OF ARTS AND SCIENCES

## FACULTY

- Schurman, Jacob Gould, A.M., D.Sc., LL.D., President.  
Nichols, Edward Leamington, Ph.D., LL.D., Dean of the College, and Professor of Physics.  
Paine, Ernest Trowbridge, A.M., Secretary of the College.
- Adams, Joseph Quincy, jr., Ph.D., Assistant Professor of English.  
Albee, Ernest, Ph.D., Professor of Philosophy.  
Allen, Arthur Augustus, Ph.D., Instructor in Zoology.  
Anderson, Elam J., A.B., Instructor in Public Speaking.  
Anderson, Ross Peter, Ph.D., Assistant Professor of Chemistry.  
Andrews, Albert LeRoy, Ph.D., Instructor in German and Scandinavian.  
Andrews, Eugene Plumb, A.B., Assistant Professor of Archaeology.  
Atkinson, George Francis, Ph.B., Professor of Botany.  
Bailey Elmer James, Ph.D., Instructor in English.  
Baldwin, Dane L., M.A., Instructor in English.  
Bancroft, Wilder Dwight, Ph.D., Professor of Physical Chemistry.  
Bauer, John, Ph.D., Assistant Professor of Economics.  
Bedell, Frederick, Ph.D., Professor of Applied Electricity.  
Bennett, Charles Edwin, A.B., Litt.D., Goldwin Smith Professor of Latin.  
Bennett, Charles William, Ph.D., Assistant Professor of Chemistry.  
Bidwell, Charles Clarence, A.B., Instructor in Physics.  
Blaker, Ernest, Ph.D., Assistant Professor of Physics.  
Blakey, Roy G., Ph.D., Assistant Professor of Economics.  
Boesche, Albert Wilhelm, Ph.D., Assistant Professor of German.  
Boring, Edwin Garrigues, A.M., Instructor in Psychology.  
Boulter, Lewis Henry, A.B., Instructor in English.  
Bown, Ralph M.E., Instructor in Physics.  
Bradley, James Chester, Ph.D., Assistant Professor of Systematic Entomology.  
Bretz, Julian Pleasant, Ph.D., Professor of American History.  
Bristol, George Prentice, A.M., Professor of Greek, Director of the School of Education and of the Summer Session.  
Broughton, Leslie Nathan, Ph.D., Instructor in English.  
Brown, George H., A.M., Instructor in the Romance Languages.  
Brown, Harry Phillip, A.M., Instructor in Botany.  
Brown, Thomas Benjamin, Instructor in Physics.  
Browne, Arthur Wesley, Ph.D., Professor of Inorganic and Analytical Chemistry.  
Buckley, Oliver Ellsworth, B.S., Instructor in Physics.  
Bull, Henry Tilghman, C.E., U. S. Army, Professor of Military Science and Tactics.  
Burr, George Lincoln, A.B., Litt. D., LL.D., Professor of Medieval History.  
Carver, Walter Buckingham, Ph.D., Assistant Professor of Mathematics.  
Catterall, Ralph Charles Henry, Ph.D., Professor of Modern European History.  
Cavanaugh, George Walter, B.S., Professor of Agricultural Chemistry.  
Chamot, Emile Monnin, Ph.D., Professor of Sanitary Chemistry and Toxicology.  
Comfort, William Wistar, Ph.D., Professor of the Romance Languages and Literatures and Head of the Department.  
Cooper, Lane, Ph.D., Assistant Professor of English.  
Craig, Clyde Firman, Ph.D., Instructor in Mathematics.  
Creighton, James Edwin, Ph.D., LL.D., Professor of Logic and Metaphysics and Dean of the Graduate School.  
Crowell, Melvin Gleason, A.M., Instructor in English.  
Dale, George Irving, A.B., Instructor in the Romance Languages.  
Dann, Hollis Ellsworth, Mus.D., Professor of Music.  
Darling, Frederic Warren, A.B., Instructor in Mathematics.  
Davidson, Hermann Christian, Ph.D., Assistant Professor of German.  
Dennis, Louis Munroe, Ph.B., B.S., Professor of Inorganic Chemistry and Head of the Department of Chemistry.  
Drummond, Alexander M., A.M., Instructor in Public Speaking.  
Durham, Charles Love, Ph.D., Professor of Latin.  
Elmer, Herbert Charles, Ph.D., Professor of Latin.  
Elston, Ellsworth David, A.B., Instructor in Geology.  
Faust, Albert Bernhardt, Ph.D., Professor of German.  
Foster, William Silliman, Ph.D., Instructor in Psychology.  
Fraser, David Kennedy, M.A., Assistant Professor of Education.  
Gibbs, Roswell Clifton, Ph.D., Assistant Professor of Physics.  
Gibson, Kasson Stanford, A.B., Instructor in Physics.  
Gilbert, Allan H., Ph.D., Instructor in English.  
Gill, Adam Capen, Ph.D., Professor of Mineralogy.  
Gillespie, David Clinton, Ph.D., Assistant Professor of Mathematics.  
Gilman, Frederick, A.M., Instructor in Economics.  
Givens, Maurice Hope, Ph.B., Instructor in Physiology and Biochemistry.  
Guérac, Othon Goëpp, Licencié ès lettres, Licencié en droit, Assistant Professor of the Romance Languages.  
Hamilton, George Livingstone, Ph.D., Assistant Professor of the Romance Languages.  
Hammond, William Alexander, Ph.D., Sage Professor of Ancient Philosophy and Aesthetics.

- Harris, Gilbert Dennison, Ph.B., Professor of Paleontology and Stratigraphic Geology.  
 Hebel, John William, M.A., Instructor in English.  
 Hermannsson, Halldor, Lecturer in Scandinavian.  
 Holt, Frank, A.B., Instructor in German.  
 Hook, Joseph Stanley, A.M., Instructor in Geology.  
 Hull, Charles Henry, Ph.D., Goldwin Smith Professor of American History.  
 Hunter, Andrew, M.B., Assistant Professor of Biochemistry.  
 Hurwitz, Wallie Abraham, Ph.D., Instructor in Mathematics.  
 Hutchinson, John Irwin, Ph.D., Professor of Mathematics.  
 Jensen, Gerard, Ph.D., Instructor in English.  
 Johannsen, Oskar Augustus, Ph.D., Assistant Professor of Biology.  
 Johnson, Alvin Saunders, Ph.D., Professor of Economics.  
 Jones, Horace Leonard, Ph.D., Assistant Professor of Greek.  
 Keniston, Ralph Hayward, Ph.D., Assistant Professor of Romance Languages.  
 Kennard, Earle Hesse, Ph.D., Instructor in Physics.  
 King, Robert Waldo, A.B., Instructor in Physics.  
 Kingery, Hugh McMillan, M.A., Instructor in Histology and Embryology.  
 Kingsbury, Benjamin Freeman, Ph.D., M.D., Professor of Histology and Embryology.  
 Kirk, Richard Ray, A.M., Instructor in English.  
 Lauman, George Nieman, B.S.A., Professor of Rural Economy.  
 Leland, Ora Miner, B.S. (C.E.), Assistant Professor of Astronomy and Geodesy.  
 Lemon, Burton Judson, Ph.D., Instructor in Chemistry.  
 Livingston, Alfred Erwin, M.S., Instructor in Physiology.  
 Lundell, Gustav Ernst Fredrick, Ph.D., Assistant Professor of Chemistry.  
 Lunt, William Edward, Ph.D., Professor of Modern European History.  
 McKelvey, Joseph Vance, Ph.D., Instructor in Mathematics.  
 McMahon, James, A.M., Professor of Mathematics.  
 Mahood, Samuel Arthur, M.A., Instructor in Chemistry.  
 Mallory, William Garfield, A.M., Instructor in Physics.  
 Mason, James Frederick, Ph.D., Assistant Professor of the Romance Languages.  
 Mayer, Edwin Charles, A.B., Instructor in Physics.  
 Merritt, Ernest George, M.E., Professor of Physics.  
 Moler, George Sylvanus, B.M.E., Professor of Physics.  
 Monnett, Victor Elvert, A.B., Instructor in Geology.  
 Monroe, Benton Sullivan, Ph.D., Assistant Professor of English.  
 Muchmore, Guy Brooks, A.B., Assistant Professor of Public Speaking.  
 Needham, James George, Ph.D., Professor of Entomology and Limnology.  
 Northup, Clark Sutherland, Ph.D., Assistant Professor of English.  
 Oradoff, William Ridgely, Ph.D., Professor of Organic and Physiological Chemistry.  
 Orth, Samuel Peter, Ph.D., Professor of Political Science.  
 Otis, Charles Herbert, Ph.D., Instructor in Botany.  
 Owens, Frederick William, Ph.D., Instructor in Mathematics.  
 Pope, Paul Russel, Ph.D., Assistant Professor of German.  
 Power, Carleton Elderken, B.S., Instructor in Physics.  
 Prescott, Frederick Clarke, A.B., Assistant Professor of English.  
 Pumpelly, Laurence, Ph.D., Assistant Professor of the Romance Languages.  
 Ranum, Arthur, Ph.D., Assistant Professor of Mathematics.  
 Redfield, Harry Westfall, Ph.D., Instructor in Chemistry.  
 Reed, Hugh Daniel, Ph.D., Assistant Professor of Zoology.  
 Richtmyer, Floyd Karker, Ph.D., Assistant Professor of Physics.  
 Ries, Heinrich, Ph.D., Professor of Economic Geology and Head of the Department of Geology.  
 Riley, William Albert, Ph.D., Professor of Insect Morphology and Parasitology.  
 Rodgers, Ralph Chapman, A.M., Instructor in Physics.  
 Rowlee, Willard Winfield, D.Sc., Professor of Botany.  
 Saby, Rasmus S., Ph.D., Assistant Professor of Political Science.  
 Sampson, Martin Wright, A.M., Goldwin Smith Professor of English Literature and Head of the Department of English.  
 Schmidt, Nathaniel, A.M., Professor of Semitic Languages and Literatures.  
 Sharpe, Francis Robert, Ph.D., Assistant Professor of Mathematics.  
 Shearer, John Sandford, Ph.D., Professor of Physics.  
 Sheldon, Pearl Gertrude, Ph.D., Lecturer in Paleontology.  
 Sill, Henry Augustus, Ph.D., Professor of Ancient History.  
 Silverman, Louis Lazarus, Ph.D., Instructor in Mathematics.  
 Simpson, Sutherland, M.D. F.R.S.E., Professor of Physiology.  
 Smith, Frederick Miller, A.B., Instructor in English.  
 Smith, Harry Edwin, Ph.D., Instructor in Economics.  
 Snyder, Virgil, Ph.D., Professor of Mathematics.  
 Somers, Ransom Everts, A.B., Instructor in Economic Geology.  
 Sterrett, John Robert Sitlington, Ph.D., LL.D., Professor of Greek and Head of the Department.  
 Storrer, James, A.B., Instructor in Geology.  
 Strunk, William, Jr., Ph.D., Professor of English.  
 Tanner, John Henry, Ph.D., Professor of Mathematics.  
 Thilly, Frank, Ph.D., LL.D., Professor of Philosophy.  
 Thompson, George Ellsworth, Ph.D., Instructor in Physics.  
 Titchener, Edward Bradford, Ph.D., LL.D., Litt.D., Lecturer in Psychology and Head of the Department of Psychology.  
 Townley, John Herbert, Instructor in English.  
 Trevor, Joseph Ellis, Ph.D., Professor of Thermodynamics.  
 Turner, John Roscoe, Ph.D., Assistant Professor of Economics.  
 Usher, Abbott Payson, Ph.D., Assistant Professor of Economics.  
 von Engeln, Oscar Diedrich, Ph.D., Assistant Professor of Physical Geography.

Weld Harry Porter, Ph.D., Assistant Professor of Psychology.  
 Welsh, Thomas Whitney Benson, Ph.D., Instructor in Chemistry.  
 Whipple, Guy Montrose, Ph.D., Assistant Professor of Educational Psychology.  
 White, Andrew Curtis, Ph.D., Reader in Greek.  
 Wilber, David Truxton, A.B., Instructor in Mineralogy.  
 Willcox, Walter Francis, Ph.D., LL.D., Professor of Economics and Statistics.  
 Winans, James Albert, A.M., LL.B., Professor of Public Speaking.  
 Wright, Albert Hazen, Ph.D., Instructor in Zoology.  
 Wright, William K., Ph.D., Instructor in Philosophy.  
 Young, Allyn Abbott, Ph.D., Professor of Economics and Finance.  
 Young, Charles Van Patten, A.B., Professor of Physical Culture.  
 Zinnecker, Wesley Daniel, Ph.D., Instructor in German.

### ASSISTANTS

Bennett, Harold Selden, A.B., Assistant in Chemistry.  
 Bishop, Homer Guy, M.S., Assistant in Psychology.  
 Burgess, Robert Wilbur, A.B., Assistant in Mathematics.  
 Cole, Howard Irving, Assistant in Chemistry.  
 Cooley, Clifford Stone, Assistant in Chemistry.  
 Davis, Merritt James, Assistant in Chemistry.  
 Davis, Norman Bruce, B.S., Assistant in Economic Geology.  
 Davison, Albert Watson, M.A., Assistant in Chemistry.  
 Denney, John DeWitt, A.B., Assistant in Zoology.  
 Dickinson, William Eugene, Assistant in Paleontology.  
 Dunham, Clarence Lucius, A.B., Assistant in Chemistry.  
 Einstein, John Lewis, A.B., Assistant in Ancient History.  
 Elley, Harold Walter, M.A., Assistant in Chemistry.  
 Engelder, Carl John, A.B., Assistant in Chemistry.  
 Erskine, Archibald Mortimer, Assistant in Chemistry.  
 Evans, Austin Patterson, A.B., Assistant in Medieval History.  
 Evans, Paul Demund, A.B., Assistant in American History.  
 Gilbert, Harvey Nicholas, B.S., Assistant in Chemistry.  
 Gulick, Robert Aaron, B.S., Assistant in Chemistry.  
 Harper, Francis, Assistant in Zoology.  
 Hausman, Leon Augustus, Assistant in Physical Geography.  
 Hovey, Edward A., B.Chem., Assistant in Chemistry.  
 Howes, Horace Leonard, B.S., Assistant in Physics.  
 Hunter, Merlin Harold, M.A., Assistant in Economics.  
 Kennedy, John Joseph, B.Chem., Assistant in Chemistry.  
 Lee, Ira Elver, A.M., Assistant in Chemistry.  
 Leighton, Alan, B.S., Assistant in Chemistry.  
 Leilich, Theodore Franz, A.B., Assistant in Economics.  
 Macdonald, Norman, B.A., Assistant in Modern European History.  
 Mack, Edward Lawrence, B.S., Assistant in Chemistry.  
 Miller, Carleton Friend, B.S., Assistant in Chemistry.  
 O'Brien, William James, B.Chem., Assistant in Chemistry.  
 Ostrander, Remsen Bleecker, A.B., Assistant in Political Science.  
 Overman, Oliver Ralph, A.M., Assistant in Chemistry.  
 Owen, Roberts Bishop, A.B., Assistant in Philosophy.  
 Parmelee, Alfred Edwin, B.S., Assistant in Chemistry.  
 Pidgeon, Howard A., M.S., Assistant in Physics.  
 Plumb, Leon Alton, Assistant in Economics.  
 Price, Leo, Assistant in Histology.  
 Rasmussen, Andrew Theodore, A.B., Assistant in Physiology.  
 Ray, Arthur Benning, M.A., Assistant in Chemistry.  
 Rhodes, Fred Hoffman, A.B., Assistant in Chemistry.  
 Robinson, Ray McCleod, M.E., Assistant in Physics.  
 Rose, Clifford Coutant, B.Chem., Assistant in Chemistry.  
 Sailor, Horace Price, M.E., Assistant in Physics.  
 Severance, Mildred, Assistant in Physics.  
 Sherwood, Francis Webber, M.S., Assistant in Chemistry.  
 Shilliday, Clarence Lee, M.S., Assistant in Histology and Embryology.  
 Smith, Charles Vivian, A.B., Assistant in Chemistry.  
 Story, Austin Putnam, Assistant in Chemistry.  
 Swisher, Charles Lee, A.B., Assistant in Physics.  
 Tarr, Russell Story, Student Assistant in Geology.  
 vander Meulen, Peter Andrew, B.Chem., Assistant in Chemistry.  
 Weeks, Paul Thorne, A.B., Assistant in Physics.  
 Weiser, Harry Boyer, A.M., Assistant in Chemistry.







# 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 of 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, will be regarded as having completed the number of terms and of hours to which his records entitle him, and will receive all the privileges of students who have completed the same number of terms and hours by residence in the College. In order, however, to obtain the degree of Bachelor of Arts he must have been in residence at least two terms in the College of Arts and Sciences, and in that College only.

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

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

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\*The academic year is divided into two terms.

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

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

8. A student who has satisfied at least six terms of residence, no one of them under the provisions of paragraph 2, and who has credit for 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 on or before the third day of instruction file at the Dean's office his study card with list of courses for the term.

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

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, psychology, 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, English six hours), or partly in one and partly in another (for example, English three hours and history 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, Psychology, 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 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, 3; Germanic Languages, 1, 2, 3, 4, 4a, 5, 5a, 7, 8, 10; Romance Languages, 1, 2, 3, 4, 4a, 5, 6, 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, 3, 5, 6, 10; Chemistry, 1, 6, 7, 85; General Biology, 1; Botany, 1, 2, 3, 4; Entomology, etc., 4, 5, 10; Vertebrate Zoology and Neurology, 15; Physiology, 3, 6; Geology, 1, 2, 11, 21.

#### THESES

Any senior 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. For details consult the Dean's office or the department concerned.

#### THE DEGREE OF BACHELOR OF CHEMISTRY

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

##### First Year

	No. of Course	First Term	Second Term
Introductory Inorganic Chemistry.....Chemistry	1	6	—
Qualitative Analysis.....Chemistry	7	—	6
Analytic Geometry, Differential Calculus, Integral Calculus.....Mathematics	7	5	5
Introductory Experimental Physics.....Physics	2	—	5
Drawing.....Sibley College	D3	3	—
English.....English	1	4	4

## Second Year

		No. of Course	First Term	Second Term
Quantitative Analysis .....	Chemistry	12	0 or 6	6 or 0
Organic Chemistry .....	Chemistry	30	6	6
Gas Analysis .....	Chemistry	19 & 20	0 or 4	4 or 0
Introductory Physical Experiments .....	Physics	10	2	—
Physical Experiments .....	Physics	14	—	2
Crystallography .....	Geology	12	—	3
Optico-Chemical Methods .....	Chemistry	17	—	3
Elective .....			—	3

## Third Year

Introductory Physical Chemistry .....	Chemistry	50	3	3
Physical Chemistry Laboratory .....	Chemistry	51	3	3
Microchemical Methods .....	Chemistry	65	2 or 0	0 or 2
Quantitative Analysis, Lectures .....	Chemistry	15	—	2
Advanced Quantitative Analysis .....	Chemistry	14	2	2
General Physics .....	Physics	9	2	—
Physical Experiments .....	Physics	14	2	—
Mechanics .....	Sibley College	M5	5	—
Mechanical Laboratory .....	Sibley College	X12	—	4
Elective .....				3

Students that wish to register in the junior year for a greater number of elective hours than the schedule demands may, with the consent of the department, defer taking some of the required courses of the junior year.

## Fourth Year

Electrical Engineering Laboratory .....	Sibley College	E 13	4	—
Seminary .....	Chemistry	95	—	1
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.

The provisions of paragraphs 3, 4, 5, 6, 9, 10, 11, and 12 under "the Degree of Bachelor of Arts" apply in general to candidates for the degree of Bachelor of Chemistry. But a candidate for the latter degree may register for nineteen hours a term. To register for more than nineteen hours in any term he must secure the permission of the Department 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-Brockelmann, 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. W F, 2, Goldwin Smith 127.

Grammar (Wright-DeGoeje). A group of early suras in the Qurân. Selections from the Prolegomena of Ibn Khaldun.

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

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

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

Grammar (Lyon, Delitzsch). Selections from Meissner's Chrestomathie, Delitzsch's Lesestücke, and Rawlinson's Cuneiform Inscriptions of Western Asia. Open only to graduates.] Not given in 1914-15.

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

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

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

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

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

Grammar (Steindorff). Selections from the Gospels and from Pistis Sophia. Primarily for graduates.] Not given in 1914-15.

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 Judaean Aramaic, Palmyrene, and Nabataean. For graduates.

9a. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. Introduction to the history of Asia.] Not given in 1914-15.

9b. **Oriental History.** Throughout the year, credit two hours a term. Professor SCHMIDT. T Th, 10, Goldwin Smith 256. Introduction to the history of Africa.

The history of Ancient Egypt, Libya and the Cyrenaica, Carthage, Mauretania, Nubia, Ethiopia, and the various Egyptian and Maghrebite Caliphates will be presented in outline, and the growth of European influence in Modern Africa will be traced. The illustrative material of the department will be used, and frequent examinations will be held. Open to juniors, seniors, and graduates.

## GREEK

1. **Elementary Greek.** The essentials of the grammar; simple exercises in composition; selections from Xenophon's *Anabasis*, books I-VII; 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 students who wish to acquire, by extraordinary effort in one year, the ability to read Attic prose.

3. **Lucian, 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.** 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. 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.** 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. 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. Hour to be arranged. 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 1914-15.

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.] Not given in 1914-15.

25. **Thucydides.** 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. T Th, 12, 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. Knowledge of Greek not required.

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 1914-15.

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 through 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-IV.** Throughout the year, credit three hours a term. Prerequisite course A or entrance credit for two units of 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 of 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, 11, 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 1914-15.

[2. **Sight Translation: Gellius, Selections; Ovid, Metamorphoses.** Oral translation at sight. Throughout the year, credit one hour a term.] Not given in 1914-15.

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

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

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

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

[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.] Not given in 1914-15.

8. **Terence, Phormio; Catullus; Horace, Satires and Epistles; 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. Goldwin Smith 128. A systematic drill intended for those who are taking course 8.

11. **Selections from Cicero's Letters; Cicero, De Oratore, Book I.** Throughout the year, credit two hours a term. Prerequisite course 1 or the equivalent. Professor ELMER. T Th, 2, or hours to be arranged, Goldwin Smith 124.

Courses 11 and 12 are given in alternate years.

[12. **Selections from the last six books of Virgil's Aeneid; Cicero, De Officiis.** Throughout the year, credit two hours a term. Prerequisite course 1 or the equivalent. Professor ELMER.] Not given in 1914-15.

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, 11, or 12. Professor BENNETT. T Th S, 9, Goldwin Smith 120.

Courses 16 and 17 are given in alternate years.

[17. **Literature and History of the Early Empire: Suetonius, Lives of the Caesars; Pliny's Letters; Tacitus's Annals.** Throughout the year, credit three hours a term. Prerequisite course 8, 11, or 12. Professor BENNETT.] Not given in 1914-15.

21. **Intermediate Course in Latin Writing.** Throughout the year, credit one hour a term. Prerequisite course 1. Professor ELMER. W, 3, or at an hour to be arranged. Goldwin Smith 124.

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

[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.] Not given in 1914-15.

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

This course requires no prepared translation for the classroom 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.

[35. **Cicero's Philippics.** Throughout the year, credit one hour a term. Prerequisite course 8, 11, or 12, or the equivalent. Professor ELMER.] Not given in 1914-15. This course alternates with 34 and has a similar aim.

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

The work of the seminary for 1914-15 will consist of the textual and exegetical study of Plautus, combined with the extensive reading of Plautus'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 1914-15.

[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.] Not given in 1914-15.

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. T Th, 10, Goldwin Smith 120.

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 in 1914-15.

47. **Vulgar Latin. Elementary Course.** Second 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.

48. **Vulgar Latin.** First term, hours to be arranged. 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. Consentius, *de metaplasms et barbarismis*; Diehl, *vulgarlateinische Inschriften*, *lateinische altchristliche Inschriften*; *Mulomedicina Chironis*. A reading knowledge of French and German is required.

50. **Latin Epigraphy.** First 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 to 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 177. Assistant Professor POPE.

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

### 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 124. Assistant Professor BOESCHE.

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

**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 of German (first year German and second year German).

### First term.

Sec. 1, M T W Th F, 9, Goldwin Smith 221. Dr. ZINNECKER.

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

Sec. 3, M T W Th F, 10, Goldwin Smith 221. Mr. HOLT.

Sec. 4, M T W Th F, 11, Goldwin Smith 221. Mr. HOLT.

### 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*; Heyse, *Hochzeit auf Capri*; Storm, *Pole Poppenspäler*; Fulda, *Der Talisman*.

**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 177. Dr. ZINNECKER.

Sec. 2, T Th S, 9, Goldwin Smith 183. First term, Dr. ANDREWS; second term, Assistant Professor POPE.

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, 10, Goldwin Smith 225.

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, T Th S, 10, Goldwin Smith 190. First term, Professor FAUST; second term, Assistant Professor POPE.

Sec. 2, M W F, 9, Goldwin Smith 183. Mr. HOLT.

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

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 225.

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. Assistant Professor DAVIDSEN.

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. Readings from German prose writers, including Storm, Keller, C. F. Meyer, Sudermann.

**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. Assistant Professor POPE.

Sec. 2, T Th S, 11, Goldwin Smith 183. Assistant Professor DAVIDSEN.

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

**11. Schiller's Life and Works.** Throughout the year, credit three hours a term. Prerequisite courses 1-5. Assistant Professor BOESCHE. T Th S, 11, Goldwin Smith 190.

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

Goethe's autobiographical works, and his dramas exclusive of Faust.

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

A study of the text, and of the genesis and development of the drama; an examination of its historical and legendary elements, and of its philosophical principles.

**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 to the middle of the eighteenth century. Lectures, recitations, and collateral reading.

**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 reading.

[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. Assistant Professor DAVIDSEN. Recitations, lectures in German, and collateral reading.] Not given in 1914-15.

17. **The Literature of the Reformation.** First term, credit three hours. Prerequisite courses 1-5, and 10, or the equivalent. Assistant Professor DAVIDSEN. M W F, 11, Goldwin Smith 190.

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

18. **Lessing's Life and Works.** Second term, credit three hours. Prerequisite courses 1-5, and 10, or the equivalent. Assistant Professor DAVIDSEN. M W F, 11, Goldwin Smith 190.

24. **Lyric and Ballad Poetry.** Second term, credit three hours. Prerequisite courses 1-5. Assistant Professor POPE. M W F, 12, Goldwin Smith 190.

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

30. **The History of the German Element in the United States.** First term, credit one hour. Professor FAUST. M, 12, Goldwin Smith 190.

The characteristics of the German immigrations of the seventeenth, eighteenth, and nineteenth centuries; the arrival, location, and activities of the immigrants. The relative importance of the German element in the making of the nation, with special reference to political, social, and educational influences.

[34. **Elementary Phonetics and its Application to the Study of Modern Languages.** First term, credit one hour. Assistant Professor DAVIDSEN.] Not given in 1914-15.

35. **Principles of Word Formation.** First term, credit two hours. Assistant Professor DAVIDSEN. W F, 12, Goldwin Smith 190.

Composition and derivation; creation of words; foreign and loan words; onomatopoeia; popular etymology; semantics.

36. **Topics in Historical German Syntax.** Second term, credit three hours. Assistant Professor BOESCHE. M W F, 10, Goldwin Smith 182.

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

37. **Elementary Middle High German.** First term, credit three hours. Prerequisite courses 1-5, 10, and at least six hours advanced work in German literature. Assistant Professor POPE. T Th S, 10, Goldwin Smith 182.

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

38. **Modern Scandinavian.** Throughout the year, credit three hours a term. Dr. ANDREWS. M W F, 12, Goldwin Smith 178.

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.

40. **Teachers' Course.** Second term, credit two hours. Prerequisite courses 1-5, 10, and eighteen hours of advanced work in German literature or philology. Professor FAUST, assisted by his colleagues of the German Department. F, 2-4, Goldwin Smith 181.



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

[41. **Advanced Middle High German.** Second term, credit three hours. Prerequisite course 37. Assistant Professor POPE. Primarily for graduates.] Not given in 1914-15.

[42. **Gothic.** First term, credit three hours. Assistant Professor BOESCHE. Streitberg's *Gotisches Elementarbuch*; *Die Gotische Bibel*, hrg. von Streitberg. This course will serve as a general introduction to Germanic philology. Primarily for graduates.] Not given in 1914-15.

43. **Old High German.** First term, credit three hours. Prerequisite course 37. Assistant Professor BOESCHE. M W F, 11, Goldwin Smith 182.

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

[44. **Old Icelandic.** Throughout the year, credit three hours a term. Dr. ANDREWS.

A study of the 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.] Not given in 1914-15.

46. **Old Norse Mythology.** Second term, credit one hour. Mr. HERMANSSON. F, 11, Goldwin Smith 183.

Lectures in English on the mythology and religion of the ancient Norsemen.

[47. **Principles of Germanic Philology.** Second term, credit two hours. Prerequisite course 42. Dr. ANDREWS. A discussion of the fundamental principles of linguistic relationships within the old Germanic dialects. Lectures and illustrative problems.] Not given in 1914-15.

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

For graduates only. Study of German-American literary problems.

49. **Seminary in German Literature.** Second term, credit two hours. Assistant Professor DAVIDSEN. Hours to be arranged. Goldwin Smith 188. Gottfried Keller. Primarily for graduates.

50. **Seminary in German Philology.** Second term, credit two hours. Assistant Professor POPE. Hours to be arranged. Goldwin Smith 181.

Gottfried von Strassburg's *Tristan*. Primarily for graduates.

51. **Lectures in German on the History of German Art.** Second term, credit three hours. Professor ARTUR WEESE, Professor of the History of Art, University of Bern, Switzerland, Jacob H. Schiff non-resident lecturer for 1915. Daily except Saturday, 4.45 p. m. in February and March.

The lectures will outline the history of German painting and sculpture from the middle ages to the present time. They will be illustrated with lantern slides. Collateral reading will be required of those taking the course for credit.

## ROMANCE LANGUAGES

Students intending to teach French should take the following courses as a minimum requirement for their purpose: 4, 5, 6, 13, 14, 23, and at least three 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. Assistant Professor MASON.

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

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



**Second term.**

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

Sec. 2, daily, 8, Goldwin Smith 283. 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.** First term, credit three hours.

Prerequisite first year French of the entrance requirements. T Th S, 10, Goldwin Smith 290. Assistant Professor KENISTON.

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 of French (first year French and second year French).

**First term.**

Sec. 1, M T W Th F, 9, Goldwin Smith 290. Mr. DALE.

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

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. Assistant Professor GUERLAC.

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

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

**Second term.**

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

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 to 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.

**4a. Advanced Translation.** Second term, credit three hours. Prerequisite

course 4. T Th S, 10, Goldwin Smith 290. Assistant Professor HAMILTON.

This course is designed for those who wish further practice in translating difficult modern French prose.

**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. Assistant Professor PUMPELLY.

Sec. 2, M W F, 11, Goldwin Smith 277. Assistant Professor 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, 11, Goldwin Smith 283. Assistant Professor GUERLAC.

**Second term.**

Sec. 1, M W F, 11, Goldwin Smith 283. Assistant Professor GUERLAC.

Lectures on French literature since the Middle Ages, with outside reading and

reports. Recommended for all advanced students in French. In the first term the course is conducted in French; in the second term in English.

[7. **French Literature of the Seventeenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. Professor COMFORT.] Not given in 1914-15.

[8. **French Literature of the Eighteenth Century.** Throughout the year, credit three hours a term. Prerequisite course 4. Assistant Professor GUERLAC.] Not given in 1914-15.

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.] Not given in 1914-15.

11. **French Fiction.** Throughout the year, credit two hours a term. Prerequisite course 4. Assistant Professor GUERLAC. 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.** First term, credit one hour. Prerequisite courses 4, 5. Assistant Professor 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.

22. **French Poetry of the Sixteenth Century.** Second term, credit three hours. Prerequisite course 6. Assistant Professor MASON. Hours to be arranged.

23. **French Philology.** Throughout the year, credit three hours a term. Prerequisite course 6, and entrance Latin. Assistant Professor PUMPELLY. M, 2.30-4.30, Th, 10. Goldwin Smith 277.

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 Medieval Literature.** Second term, credit two hours. Prerequisite course 6. Professor COMFORT.] Not given in 1914-15.

[25. **Old French Phonology and Morphology.** Second term, credit two hours. Assistant Professor HAMILTON. For graduates only.] Not given in 1914-15.

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

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

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

In 1913-14 Victor Hugo's *Cromwell* was made the object of a thorough and critical study. The course is intended to initiate graduate students into 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. Hours to be arranged.

**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 through 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.] Not given in 1914-15.

**35. Dante: the Minor Works.** Throughout the year, credit two hours a term. Prerequisite course 32. Assistant Professor HAMILTON. Hours to be arranged.

Studies in the sources and influence of Dante. Primarily for graduates.

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

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

Sec. 2, T Th S, 11, Goldwin Smith 290. Assistant Professor KENISTON.

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

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

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

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

**[46. The Spanish Novel.** Throughout the year, credit two hours a term. Prerequisite course 42, or third year Spanish of the entrance requirements.] Not given in 1914-15.

**47. Old Spanish.** Throughout the year, credit two hours a term. Prerequisite course 44 or 46. Assistant Professor KENISTON.

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

**[60. Old Provençal.** First term, credit two hours. Assistant Professor HAMILTON. Primarily for graduates.] Not given in 1914-15.

## 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, GILBERT, and JENSEN; Messrs. BALDWIN, CROWELL, TOWNLEY, HEBEL and BOULTER. Twenty-five

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 or 3. Assistant Professors PRESCOTT and NORTHUP, Mr. KIRK, and Dr. BROUGHTON. M W F, 9, 12; T Th S, 9, 12. Goldwin Smith 164.

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 Wednesday or Thursday 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. Professor STRUNK, and 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 that they are proficient in composition. Mr. SMITH.

Essays, short stories, and other exercises. [Intended especially for students who are looking forward to writing as a profession.] Not given in 1914-15. See course 10.

**[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 1914-15.

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

Lectures and conferences on the teaching of English in the secondary schools. Open to seniors and graduates who intend to teach English.] Not given in 1914-15.

**10. Play Writing.** Throughout the year, credit two hours a term. Professor SAMPSON. T Th, 12, Goldwin Smith 167.

Open to underclassmen who have distinguished themselves in composition, or who show some special aptitude for the proposed work. In 1914-15 a limited number of upperclassmen may be admitted to this course for the purpose of carrying on their work as in course 5.

**11. Old English.** Throughout the year, credit three hours a term. Prerequisite course 1 or 3. 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. Hours and 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. Professors SAMPSON and STRUNK; Assistant Professors PRESCOTT and COOPER. M W F, 9, Goldwin Smith 160; M W F, 11, Goldwin Smith 159; T Th S, 9, Goldwin Smith 160; T Th S, 11, Goldwin Smith 156.

Wordsworth, Coleridge, Byron, Shelley, and Keats.

Students who elect English 22 must apply at Goldwin Smith 156 on Wednesday or Thursday of registration week for assignment to sections.

**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 236.

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's Canterbury Tales.** First term, credit three hours. Prerequisite course 2, 11, or 22. Professor STRUNK. T Th S, 9, Goldwin Smith 162.

Preliminary survey of Chaucer's life and times; 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.

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.] Not given in 1914-15.

**32. History of English Literature.** Throughout the year, credit three hours a term. Open to graduates, and to upperclassmen who have taken two full years of English. Dr. BAILEY. M W F, 9, Goldwin Smith 162.

Lectures on the development of English literature; discussion of political, social, and religious conditions; recitations on required reading.

**33. Recent English Poetry.** Second term, credit three hours. Open to upperclassmen only. Professor STRUNK. T Th S, 9, Goldwin Smith 162.

A study of the work of recent and contemporary poets: Robert Bridges, John Davidson, Rudyard Kipling, William Watson, W. B. Yeats, and others.

**37. Shakespeare.** Throughout the year, credit three hours a term. Open to upperclassmen only. Professor STRUNK. M W F, 10, Goldwin Smith 164.

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

**38b. Eighteenth Century Poetry.** Second term, credit three hours. Prerequisite course 2 or 22. Assistant Professor MONROE. M W F, 12. Room to be announced.

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: the origin of the drama; miracles; moralities; interludes; the first regular comedies and tragedies; the predecessors of Shakespeare. Second term: the contemporaries and successors of Shakespeare; dramatic companies and playhouses; Elizabethan society; the decadence of the drama.

**42a. Elizabethan Non-Dramatic Literature.** First term, credit three hours. Open to upperclassmen only. Assistant Professor ADAMS. M W F, 11, Goldwin Smith 167.

The main authors 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 detailed study of four of Shakespeare's tragedies.

**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. Open to seniors and graduates. 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.

**50. Studies in Literature.** Throughout the year, credit two hours a term. The consent of the instructor must be obtained before enrollment. Open to upperclassmen only.

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

- a. Pastoral Poetry. A study of the development of the pastoral in English, with illustrations from foreign literatures. Dr. BROUGHTON.
- 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 137.

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. 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.] Not given in 1914-15.

**55. Spenser.** Throughout the year, credit two hours a term. Assistant Professor COOPER. Hours to be arranged.

A survey of books and topics that are essential to the study of Spenser; reading, mainly in the Faerie Queene and the Fowre Hymnes; a detailed examination of significant passages. Open to seniors and graduates.

56a. **The Arthurian Legends.** First term, credit three hours. Open to upperclassmen and graduates. Assistant Professor NORTHUP. M W F, 10. Room to be announced.

An introduction to the comparative study of literature: the development of the Arthurian legends as illustrative of literary origins; the treatment of the legends by modern European poets.

56b. **Middle English Literature.** Second term, credit three hours. Open to upperclassmen and graduates. Assistant Professor NORTHUP. M W F, 10. Room to be announced.

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 167.

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

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

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

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 236.

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.

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.

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

69. **The Drama.** For graduates only. Professor SAMPSON.

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



## PUBLIC SPEAKING

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

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

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

Sec. 3, M W F, 10, Goldwin Smith 24. Professor WINANS and Mr. ANDERSON.

Sec. 4, T Th S, 8, Goldwin Smith 24. Assistant Professor MUCHMORE.

Sec. 5, T Th S, 10, Goldwin Smith 24. Professor WINANS and Mr. ANDERSON.

Designed to give the student the fundamentals of speech preparation and to help him 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. Mr. ANDERSON.

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

This course repeats the work of the first term in course 1.

6. **Public Speaking for Engineers.** Repeated in second term, credit two hours. Mr. Anderson. 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.

8. **Voice Training.** Repeated in second term, credit two hours. Assistant Professor MUCHMORE. M W F, 8, Goldwin Smith 21.

An elementary course for the improvement of untrained voices, and for the development of flexibility, strength, and purity of tone. The work will necessarily include exercises to give poise and freedom to the body. Recommended to all students in this department, but equally adapted to those who wish only to use their voices better in conversation. Individual instruction by appointment.

10. **Oral Reading.** Throughout the year, credit two hours a term. Assistant Professor MUCHMORE. W F, 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 expressive reading, and the appreciation of literature necessary to such reading. Class discussions will form part of the training.

- [11. **Oral Reading and Oral English.** Throughout the year, credit two hours a term. Prerequisite the consent of the instructor. Mr. DRUMMOND.

For prospective teachers. Students who have completed course 10 may not receive credit in this course.] Not given in 1914-15.

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, textbooks, 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. Professor WINANS.

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.] Not given in 1914-15.

**15. Advanced Public Speaking.** Throughout the year, credit three hours a term. Prerequisite five hours in other courses of this department, including three hours of 1 or 1a. Professor WINANS. T Th S, 11, Goldwin Smith 21.

This course will include the work heretofore done in courses 14 and 16. Speeches prepared by various methods and for various occasions will be delivered. Study of speech preparation, with special attention to interest and persuasion, and based upon analysis of notable speeches.

**[16. Principles of Speech Preparation.** First term, credit two hours. Prerequisite course 1a. Professor WINANS.

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 discussed in this course.] Not given in 1914-15.

**29. Oral Expression for Architects.** First term, credit three hours.

Sec. 1, M W F, 9, Goldwin Smith 21. Professor WINANS.

Sec. 2, T Th S, 9, Goldwin Smith 21. Professor WINANS.

See Announcement of College of Architecture.

## PHILOSOPHY

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

Recitations:

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

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

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

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. WRIGHT. 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. WRIGHT. T Th S, 9, Goldwin Smith 227.

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

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

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

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

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, 9, Goldwin Smith B.

Recitations:

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

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

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

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 225.

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 three hours. Professor ALBEE. M W F, 12, Goldwin Smith 225.

This course does not presuppose previous acquaintance with philosophy. After considering the tendencies of eighteenth century thought 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 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 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 1914-15.

**11. Philosophical Results and Applications.** Throughout the year, credit one hour a term. 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. WRIGHT. S, 11, Goldwin Smith 227.

Intended primarily for undergraduates. No acquaintance with the history or special terminology of philosophy is presupposed.

**13. Origin and Development of Religious Ideas.** First term, credit two hours. Dr. WRIGHT. 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. Psychology and Philosophy of Religion.** Second term, credit two hours. Dr. WRIGHT. T Th, 12, Goldwin Smith 227.

Psychological analysis of some of the more important types of contemporary individual and social religious experience; relation of religion to science; the question of the place of religion in a philosophical account of the world.

**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 two hours. Pre-requisite course 1 or 5 or the equivalent. Professor CREIGHTON.] Not given in 1914-15.

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

**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 or philosophical discipline. Primarily for graduates.

**[26. Advanced Ethics.** Throughout the year, credit three hours a term. Professor THILLY. Lectures, reading, discussion, and essays. Primarily for graduates.] Not given in 1914-15.

**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 theories.] Not given in 1914-15.

**29. Modern Idealistic Theories of Ethics.** Throughout the year, credit three hours a term. Professor THILLY. M W F, 10, Goldwin Smith 220. Primarily for graduates.

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

Lectures, discussions, and essays. The empirical movement as represented by Locke, Berkeley, and Hume, and the rationalistic movement as represented

especially by Descartes, Spinoza, and Leibniz, with reference to their distinctive methods. 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.** Second term. Credit, two hours. Professor ALBEE. M W, 12, Goldwin Smith 220.

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

**[33. German Pessimism, with Special Reference to Schopenhauer.** Second term, credit two hours. Professor ALBEE. Lectures, discussions, and essays. Primarily for graduates.] Not given in 1914-15.

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

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

**[35. Logical Theory.** Throughout the year, credit two hours a term. Professor ALBEE. Lectures, reading of prescribed authors, and discussions. Primarily for graduates.] Not given in 1914-15.

**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 1914-15 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. WRIGHT.

The subject for 1914-15 will be a study of certain leading metaphysical problems in the light of recent investigations.

## PSYCHOLOGY

**1. Elementary Psychology.** First term, credit three hours. Professor TITCHENER, Assistant Professor WELD, Dr. FOSTER, Mr. BORING, and Mr. BISHOP. Lectures, T Th, 11, Goldwin Smith C; class room work, S, 10, 11, or 12.

Not open to juniors or seniors.

**1a. Elementary Psychology.** First term, credit three hours. Dr. FOSTER and Mr. BISHOP. Lectures, T Th, 12, Goldwin Smith C; class room work, S, 12. This course is open to juniors and seniors.

**2. General Psychology: Problems and Points of View.** Second term, credit three hours. Prerequisite course 1 or 1a. 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. Prerequisite course 1 or 1a. Assistant Professor WELD, Dr.



FOSTER, Mr. BORING, and Mr. BISHOP. M W F, 2-4, Morrill, Psychological Laboratory.

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

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

6. **Systematic Psychology: Feeling, Attention, Action.** Second term, credit three hours. Prerequisite courses 1 or 1a, and 2 or 3. Dr. FOSTER, Mr. BORING, and Mr. BISHOP. Lectures, M W, 9; discussion, demonstration, and recitation, F, 9, Morrill 46.

[5a. **Systematic Psychology Perception and Idea.** First term, credit three hours.] Not given in 1914-15.

[6a. **Systematic Psychology: Memory, Imagination, and Thought; Emotion and Volition.** Second term, credit three hours.] Not given in 1914-15.

7. **Reading of German Psychology.** First term, credit one hour. Assistant Professor WELD. Hour to be arranged, Morrill 46.  
Text: Fechner's *Elemente der Psychophysik*.

8. **Reading of French Psychology.** Second term, credit one hour. Dr. FOSTER. Hour to be arranged, Morrill 46.  
Text: Delboeuf's *Éléments de psychophysique*.

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

A special announcement of the School of Education is issued. It contains, in addition to the courses described below, related courses in other colleges of the University, suggested courses of study for prospective teachers, and the laws of New York State for the licensing of public school teachers. This pamphlet should be read carefully by every student who expects to teach after graduation.

Course 1 in Psychology is prerequisite to all courses in Education. It should be taken in the first term of the sophomore year.

1. **Educational Psychology.** Second term, credit three hours. Assistant Professor WHIPPLE. M W F, 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. 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.

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

An introduction to the general theory of education, in both its individual and its social aspects.

3. **History of Education.** Second term, credit three hours. Prerequisite course 1. Assistant Professor FRASER. M W F, 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.

**4. 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 who are particularly interested in this phase of the work and are competent for experimental investigation may register for systematic work in course 22. For this work students should have taken or be taking course 1, and should afterward take course 20.

**10. Psychology of the High School Period.** First term, credit two hours. Prerequisite course 1, and preferably also courses 2 and 3. Assistant Professor WHIPPLE. M, 3-5, Goldwin Smith 251.

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 problems of coeducation, etc. The course is designed to be of assistance to high school teachers, and to prepare students for courses 11, 12, 13.

**11. High School Organization.** First term, credit two hours. Professor BRISTOL. M W, 11, Goldwin Smith 251.

A study through lectures, prescribed readings and reports of the American high school and its development in recent years. The various types of high school today. The curriculum. The teachers. Relation and duties of the high school to its students, to the college and to the community and the state.

**12. The Teaching of High School Science and Mathematics.** Second term, credit three hours. Assistant Professor FRASER. M W F, 11, Goldwin Smith 248.

The methods of instruction, educational value and place in curriculum of algebra, geometry, trigonometry, physics, chemistry and biology. Lectures, discussions and reports. For all seniors who are planning to teach these subjects in the high school.

**13. The Teaching of Language in the High School.** Second term, credit three hours. Professor BRISTOL. M W and a third hour, to be arranged, 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 who are planning to teach foreign languages.

**20. 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 courses 4 and 21.

**21. Mental Tests.** First term, credit two hours. Prerequisite courses Psychology 3 or 4, Education 1. Assistant Professor WHIPPLE. T, 2-5, Goldwin Smith 248.



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 22. Primarily for graduates.

**22. Seminary for Experimental Investigation.** Hours to be arranged. Prerequisite course 4 or 21. 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.

**23. Reading of German Educational Psychology.** First term, credit two hours. Assistant Professor FRASER. Hours to be arranged, Goldwin Smith 251.

Translation of a selected monograph, with special attention to smoothness and accuracy.

**24. Seminary in Education.** Credit one or two hours. Assistant Professors WHIPPLE and FRASER. Every other Tuesday, 7-30 p. m., Goldwin Smith 251.

Studies in current educational problems. A portion of the time will be devoted to reviews and discussions of current periodical literature and recent books upon education. The remainder will be devoted to the investigation and report of specific problems, such as the teaching profession, experimental pedagogy, psychology of study and learning, school surveys, educational values, reform movements, coeducation, and the like. As subjects are not repeated, the course may be elected in successive years.

## HISTORY

**A. The History of Civilization.** Throughout the year, F, 12, Rockefeller A. Professors SCHMIDT, SILL, and BURR, and others.

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. Roman History.** First term, credit three hours. Professor SILL. M W F, 11, Goldwin Smith A.

The origins; the unification of Italy; the establishment of Roman supremacy in the Mediterranean world; the revolution; Julius Caesar. Intended especially for freshmen. Textbooks, lectures, quizzes, and collateral reading.

**2. Roman History.** Second term, credit three hours. Professor SILL. M W F, 11, Goldwin Smith A.

The history of the civilized world under the rule of Roman emperors, from Augustus to Justinian. Intended especially for freshmen. Textbooks, lectures, quizzes, and collateral reading.

**3. Greek History.** First term, credit two hours. Professor SILL. T Th, 11, Goldwin Smith 134.

Politics, economics, and intellectual life in the fifth and the fourth century before Christ. The Athenian democracy and the Athenian empire; Sparta, Thebes, Syracuse, and Marseilles; the decline of the Greek states, and Philip of Macedon; Athenian poets, artists, historians, and orators; Socrates, Plato, and Aristotle; the permanent significance of Greek ideas.

**4. Alexander's Empire and the Hellenistic Age.** Second term, credit two hours. Professor SILL. T Th, 11, Goldwin Smith 134.

Alexander the Great and his conquest of Asia for Hellenism; his successors; Egypt under the Ptolemies; Asia under the Seleucidae; Macedonia and Greece; commerce and industry, science and art, philosophy and religion; the Roman conquest and the adoption of Hellenism in the West as the basis of modern civilization. Course 3 is recommended but not required as preliminary.

5. **History of Law.** First term, credit three hours. Professor SILL. M W F, 9, Goldwin Smith 120.

Introduction: origin and nature of law; Babylonian and Hebrew law; Greek law. Main subject: history and elements of Roman law. Appendix: the influence of Roman law on English law and on the law of other countries.

Courses 5 and 6 are intended especially for those who expect to study law. They are open to freshmen in Law but not to freshmen in Arts and Sciences.

6. **The Roman Law of Property and Obligations.** Second term, credit three hours. Professor SILL. M W F, 9, Goldwin Smith 234.

An introduction to those portions of Roman law which are of particular educational value to the student of law because of their historical significance, their elementary and reasonable character, their scientific formulation, and their practical utility in forming the legal habit of mind.

Course 6 should if possible be preceded by course 5.

7. **Topics in Roman Law.** First term, credit two hours. Professor SILL. T, 4 (or as may be arranged), Goldwin Smith 239. Open to graduates and qualified undergraduates.

A study of selections from the Digest of Justinian.

8. **Seminary in Greek and Roman History.** Second term, credit two hours. Professor SILL. T, 4 (or as may be arranged), Greek and Latin Seminary Room. Open to graduates and 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 (unless the course is taken as part of 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. 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 special attention to the beginnings of modern life and thought. Lectures and examinations. Course 12 may be taken entire, and this is advised; or a part or parts of it may be taken, (see 12a, 12b, 12c below).

12a. **Lectures on the Renaissance and the Reformation.** Second term, no credit (unless the course is taken as part of course 12, or in combination with 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 course 12a.

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 course 12a.

13. **The Rise of Tolerance.** Second term, credit one hour. S, 10, Goldwin Smith 245.

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

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

The reading of some medieval historian, with view to acquaintance with medieval life and facility in the use of historical Latin.] Not given in 1914-15.

[15. **Seminary in Medieval History.** Second term, credit one hour. Professor BURR.

A research class for the critical study of some period, event, or phase of medieval history. Open only to seniors and graduates. A reading knowledge of Latin is presupposed.] Not given in 1914-15.

16. **Canon Law.** First term, credit two hours. Professor BURR. S, 10-12, European History Seminary Room.

The constitutional history of the Christian Church and the elements of ecclesiastical law. Primarily for graduates.

22. **Modern European History, 1600-1815.** First term, credit three hours. Professor CATTERALL. M W F, 9, Goldwin Smith 142. Lectures and recitations.

23. **Europe in the Nineteenth Century.** Second term, credit three hours. Professor CATTERALL. M W F, 9, Goldwin Smith 142. Lectures and recitations.

24. **Russia in the Eighteenth Century.** First term, credit two hours. Professor CATTERALL. T Th, 9, Goldwin Smith 242. Lectures and recitations. Students will be expected to have a reading knowledge of either French or German.

25. **Russia in the Nineteenth Century.** Second term, credit two hours. Professor CATTERALL. T Th, 9, 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. T, 4-6, Library, European History Seminary Room. Open to graduates and to qualified seniors.

31. **English History to 1509.** First term, credit three hours. Professor LUNT. T Th, 10, and an hour for recitation to be arranged, Goldwin Smith A.

An outline of political, constitutional, economic, and social history, intended as an introductory course. Textbooks, lectures, collateral reading, and reports.

32. **English History, 1509 to 1915.** Second term, credit three hours. Prerequisite course 32, 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.

33. **English Constitutional History to the Sixteenth Century.** Second term, credit three hours. Prerequisite course 31. Professor LUNT. T 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.

34. **English History during the Tudor Period.** First term, credit three hours. Professor LUNT. T Th S, 11, Goldwin Smith 236.

This course deals with the political and constitutional history of the sixteenth century; social and economic changes; religious development; foreign relations; and the growth of sea-power. History 31 and 32 form a useful introduction to the course.

35. **English History during the Stuart Period.** Second term, credit three hours. Professor LUNT. T Th S, 11, Goldwin Smith 236.

A continuation of course 34 through the seventeenth century. In addition to the topics there mentioned the foundation of the British empire is considered. This course may be elected independently of course 34.

[36. **English History during the Eighteenth Century.** First term, credit three hours. Professor LUNT.

This 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 the course.] Not given in 1914-15.

[37. **English History since the Eighteenth Century.** Second term, credit three hours. Professor LUNT.

A continuation of course 36 to the present. It may be elected independently of course 36.] Not given in 1914-15.

[40. **Selected Topics in the History of England during the Thirteenth and Fourteenth Centuries.** First term, credit two hours. Professor LUNT.

A course of research. The topics considered 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.] Not given in 1914-15.

50. **American History to 1783.** Second term, credit three hours. Professor HULL. M W F, 10, 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; the War of Independence.

51. **The Origin of State and Local Governments, to 1780.** First term, credit two hours. Prerequisite course 52. Professor HULL. T Th, 11, Goldwin Smith 234. Lectures, readings, and reports.

52. **American History, 1783 to 1846.** First term, credit three hours. Professor HULL. M W F, 10, Goldwin Smith C.

A general course from the Revolution to the Wilmot Proviso. 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. Textbook, lectures, readings, and reports.

53. **American History, 1846 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. Textbook, lectures, and readings.

54. **Economic History of the Colonies, 1600 to 1788.** First term, credit three hours. Professor HULL. T Th S, 9, Goldwin Smith 234.

Colonization and settlement as business enterprises; the agricultural conquest of the coast; the competition between slave, indentured, and free labor; the commerce of the British Empire and its relation to the American Revolution. Textbooks, readings, reports, and lectures.

55. **Economic History of the United States, 1789 to 1890.** Second term, credit three hours. Professor HULL. T Th S, 9, Goldwin Smith 234.

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

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.** First term, credit three hours. Prerequisite course 53 or the equivalent. Professor BRETZ. M W F, 10, Goldwin Smith 234.

This course deals with the political, constitutional, and military history of the years 1860-1865. The work will consist of readings and investigation of special topics with some lectures.

**58. Constitutional History of the United States to 1860.** Second term, credit two hours. Prerequisite courses 52 and 53. Professor HULL. T Th, 11, Goldwin Smith 234. Lectures, readings, and reports.

**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. Professors HULL and BRETZ. First meeting, Thursday, October 1, 4 p. m., Library, American History Seminary Room.

**[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, archæology, philology, epigraphy, paleography, diplomatics, sphragistics, numismatics, heraldry, genealogy, chronology, geography. Not open to underclassmen.] Not given in 1914-15.

**72. Historical Geography.** Throughout the year, credit one hour a term. Professor BURR. S, 12, Library, European History Seminary Room.

A thorough study 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.

**73. Paleography and Diplomatics.** Second term, credit one hour. Professor BURR. S, 11, Library, European History Seminary Room.

The reading of manuscripts and the interpretation of documents. Attention is devoted chiefly to the paleography of Latin and 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 one hour. Professor BURR. S, 9, 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, 8-10, Library, European History Seminary Room. Professor BURR with aid from his colleagues. Open only to seniors and graduates who are specializing in history.

**77. Introduction to the Literature of History.** A general survey, period by period, of the sources and literature of history. F, 3 (or as may be arranged). First meeting, Friday, October 9, European History Seminary Room. Professors SCHMIDT, SILL, BURR, LUNT, CATTERALL, HULL, BRETZ. For graduates only.

## POLITICAL SCIENCE

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



An introduction to economics including a survey of business organization and corporation finance; principles of value, money, banking, and prices; international trade; free trade and protection; wages and labor conditions; the control of railroads and trusts; socialism; principles and problems of taxation. Section assignments made at the first lecture.

**52. Elements of Economics.** Throughout the year, credit two hours a term. Assistant Professor TURNER. Lectures M, 9, repeated T, 9, Goldwin Smith A. Recitations 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. American Government.** First term, credit three hours. Assistant Professor SABY. M W, 10, Goldwin Smith 142. Recitation hour to be arranged.

A general introduction to the study of political science with special reference to American government and politics. Lectures, textbook, class discussions.

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

A study of the political institutions of the leading European countries with special reference to their relations to present political problems in the United States. Lectures, textbook, class discussions.

**54a. Municipal Administration.** First term, credit three hours. Prerequisite course 53a. Assistant Professor SABY. M W F, 11, Goldwin Smith 264.

A study of the functions and problems of city government; the administration of public health and safety; charities and corrections; public works and finance; commission form of government. Lectures, textbook, and reports.

**54b. State Administration.** Second term, credit three hours. Prerequisite course 53a. Professor ORTH. M W F, 12, Goldwin Smith 256.

A study of the government of the American State; its relation to local government; the powers and functions of administrative boards and commissions; judicial control.

Lectures, readings, and reports. Each student will be required to make a somewhat 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. M W F, 9, Goldwin Smith 256.

An introductory course upon social science or sociology, its field and methods, with special 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. M W F, 9, Goldwin Smith 256.

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.

**56a. Elements of Business Law.** First term, credit two hours. Professor ORTH. T Th, 11, Goldwin Smith B. Lectures, textbook, quizzes.

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

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. Government Control of Industry.** Second term, credit two hours. Prerequisite course 56a. Professor ORTH. T Th, 11, Goldwin Smith B. Lectures, reports, quizzes.



A scrutiny of the policy of governmental control of industry from the legal and political point of view, emphasis being laid on the development of the police power and its application to the regulation of private enterprise.

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

A lecture each Wednesday by a non-resident lecturer and each Monday by a member of the department. The course has been arranged by a committee of Alumni who are actively engaged in civic and social work and who are cooperating in this way with the department. It will follow the same general plan as last year, but the speakers and most of the subjects treated will be changed. Among the subjects presented in 1914-15 will be the Citizen and the Immigrant in America, the Citizen and his Neighborhood, the Citizen and Commercial Organizations, the Citizen and the City Plan.

The course will be under the general charge of Professor WILLCOX. Readings, reports, and essays will be required.

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

**59. Financial History of the United States.** Second term, credit two hours. Prerequisite course 51. Assistant Professor BLAKEY. T Th, 11, Goldwin Smith 269.

A study of public and quasi-public finance from colonial times to the present. Special attention will be paid to money, currency, banking, tariffs, taxes, expenditures, panics, and war financing.

**60. The American Party System.** First term, credit two hours. Prerequisite 53a. Professor ORTH. T Th, 12, Goldwin Smith 256.

A study of the evolution of the American political party; its relations to the machinery of government; election laws; the development of state control over the machinery of party. Lectures, readings, and reports.

**[61. Jurisprudence.** Second term, credit three hours. Prerequisite 53a, excepting for law students, to whom the course is open. Professor ORTH. Lectures, textbook, and reports.

A study of the classification and development of the principles of law, dwelling especially upon the growth of English and American legal institutions.

This course alternates with 78b.] Not given in 1914-15.

**62. Business Management.** Repeated in second term, credit one hour. 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 S, 20, Sibley College.

**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 special reference to its economic significance and effects and to 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 revision of the American banking system. Practical work is required in the analysis of the controlling conditions of the money market, of organized speculations 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. Assistant Professor USHER. M W F, 12, Goldwin Smith 264.

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.

**65b. Social and Economic Problems of the 19th Century in England.** Second term, credit three hours. Prerequisite course 51, previously or concurrently. Assistant Professor USHER. M W F, 12, Goldwin Smith 264.

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.

**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.

**67. Problems in Market Distribution.** Throughout the year, credit two hours a term. W F, 11, Goldwin Smith 245. Assistant Professor TURNER.

First term: lectures, discussions and assigned readings on the origin, growth and change of middlemen and other intermediaries between the producer and the consumer.

Second term: merchandising, selling, and advertising.

**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, Australia, 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, expenditure and debt, with particular reference to problems of American taxation.

**71. Investments.** Throughout the year, credit two hours a term. Prerequisite course 51; course 58 should precede or may accompany this course. Dr. SMITH. T Th, 9, Goldwin Smith 245.

**73. Insurance.** Second term, credit three hours. Prerequisite courses 51 and 58; or 58 may be taken at the same time. Assistant Professor BAUER. Not given in 1914-15.

**76a. Elementary Statistics.** First term, credit three hours. Prerequisite course 51. Professor WILLCOX. T Th S, 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. Prerequisite course 51. Professor WILLCOX. T Th S, 9, Goldwin Smith 256. Laboratory, W, 2-4, Goldwin Smith 259.

A continuation of course 76a, dealing mainly with the agricultural and industrial statistics of the United States. Mature students 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.

**78a. International Law and Diplomacy.** First term, credit three hours. President SCHURMAN and Assistant Professor SABY. M W F, 11, Goldwin Smith 256. Lectures, textbook, and reports. Open to juniors and seniors in Arts and Sciences, to students in Law, and to approved upperclassmen in other colleges.

While this course aims to present a systematic view of the rights and obligations of nations in times of peace and war, it particularly emphasizes our contemporary international problems and the participation of the United States in the development of international law.

**78b. Constitutional Government.** Second term, credit three hours. Pre-requisite course 53a. Professor ORTH. M W F, 11, Goldwin Smith 256. Lectures, textbook, and reports.

A study of the development of the American constitutional system.

**[79a. History of Political Thought.** First term, credit two hours. Assistant Professor SABY.

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, textbook, and assigned readings.] Not given in 1914-15.

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

A general survey of the more important modern political movements. Ideas and ideals underlying the present political unrest. The different political ideas that have at different times striven for supremacy in American political life. Lectures, textbook, 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. Assistant Professor USHER.] Not given in 1914-15.

**[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. Assistant Professor USHER.] Not given in 1914-15.

**82. Public Utilities: Problems of Accounting, Valuation and Control.** Second term, credit three hours. Assistant Professor BAUER. F, 2.30, Goldwin Smith 269.

This course will center about the accounting problems connected with the regulation of public service corporations, considering especially, with critical analysis, the systems of uniform accounting prescribed by the Interstate Commerce Commission and the New York and other state Public Service Commissions, and the principles of valuation adopted for rate making purposes. Open to graduates and by permission to especially qualified seniors.

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

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.

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

A study of the chief problems of current economic theory. The works of the chief contemporary authorities will be critically studied with a view to disclosing the basis of existing divergences in point of view.

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

90. **Research in Statistics.** Throughout the year, credit to be arranged. Professor WILLCOX.

92. **Research in Finance.** Throughout the year, credit two or three hours a term. Professor YOUNG. T, 2.30, Political Science Seminary.

Individual or coöperative 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 to 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 a term. Professor ORTH. Hours and room to be arranged.

A research course for advanced students in public law and political science.

95. **Seminary in Political Science and Public Law.** Throughout the year, credit two hours a term. Professor ORTH. W, 2.30, Political Science Seminary.

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

99. **General Seminary.** Throughout the year, credit two hours a term. Conducted by members of the department. 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 Room.

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 Room.

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

2. **General Bibliography.** Second term, credit two hours. Librarian HARRIS. T Th, 12, Library, room to be announced.

The materials and forms 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-binding; form notation; systems of classification and cataloguing; general bibliographical aids. Lectures and reference readings.

## MUSIC

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

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. Hours to be arranged. 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. First term, Th, 7.15 p. m.; second term, M W, 7.15 p. m., Sage Chapel.

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 thirty 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 composition for chorus and orchestra. This course is offered as advanced training for students who play some orchestral instrument sufficiently well to participate creditably in the performance of the music studied. The orchestra gives several concerts during the year and accompanies the advanced choir at the Sunday Vesper service in Sage Chapel.

10. **Harmony.** Prerequisite course 3 or the equivalent. Throughout the year, credit two hours a term. Mr. QUARLES. T Th, 3.30, Sage Chapel.

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. QUARLES. T Th, 2.30, Sage Chapel.

14. **Appreciation of Music.** No preliminary training required. Throughout the year, credit one hour a term. Mr. QUARLES. M W, 3.30, Sage Chapel.

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

Courses 1, 3, 5, and 7, Tuesday, September 22; Wednesday, September 23; Thursday, September 24; Friday, September 25; and Saturday, September 26, 3.30 to 5.30, Sage Chapel.

Courses 10 and 12, Tuesday, September 22; Wednesday, September 23; and Thursday, September 24, 11 to 12.30, Sage Chapel.

## MATHEMATICS

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 time. For further information regarding time and place of these examinations, students should apply to the department.

All students taking any of the courses from 1 to 8 inclusive should go to White 5 on one of the registration days at the beginning of each term, for assignment to sections.



Whenever possible, course 1 should be taken either before or at the same time with course 3. Of the other courses, 1 to 8 inclusive, no two may without special permission be taken during the same term.

1. **Solid Geometry.** Repeated in second term, credit three hours. T Th S, 11.

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. Daily exc. S, 9.

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

3. **Plane Trigonometry.** Repeated in second term, credit three hours. M W F, 11.

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. Daily 11.

Selected topics of algebra and plane trigonometry. For students who fail in the first part of course 5a or 6a below.

b. **Second term.** Credit six hours. Sec. 1, daily, 9. Sec. 2, daily, 11. 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 equivalent. Credit five hours first term, six hours second term.

a. Analytic geometry, preceded by a brief review of selected topics from algebra and trigonometry. First term, daily except Saturday.

b. Differential calculus; and c. integral calculus. Second term, daily.

6. **Analytic Geometry and Calculus.** For students in Sibley College. Prerequisite courses 1, 2, and 3, or their equivalent. Credit six hours each term.

a. Analytic geometry, preceded by a brief review of selected topics from algebra and trigonometry.

b. Differential calculus.

c. Integral calculus.

7. **Analytic Geometry and Calculus.** Throughout the year. Prerequisite courses 1, 2, and 3, or their equivalent. Credit five hours each term. Daily except S, 10.

a. Analytic geometry. b. Differential calculus. c. Integral calculus.

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 equivalent.

First term. Sec. 1, M W F, 8. Sec. 2, T Th S, 8.

Second term. Sec. 1, M W F, 9. Sec. 2, T Th S, 9.

Students wishing to take any of the following courses are asked to meet in White 5 on Thursday, September 24, at 3.30 p. m., to arrange their schedules.

9. **Descriptive Geometry.** First term, credit three hours. Professor SNYDER. White 24.

Prerequisite course 7 or its equivalent. The usual methods of graphical representation will be explained and applied to orthographic, parallel, and central projection. Much of the work will be drawing, but each step will be established by the methods of elementary and of analytic geometry.

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

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.] Not given in 1914-15.



13. **Modern Algebra.** Second term, credit three hours. Professor SNYDER. White 24.

Prerequisite course 7 or its equivalent. The topics to be discussed include determinants, linear dependence, elimination, and symmetric functions, with an introduction to invariants under linear transformations.

21. **Elementary Differential Equations.** Throughout the year, credit two hours a term. Prerequisite course 7 or its equivalent. Mr. Burgess. T Th, 9, 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. Dr. McKELVEY. Hours to be arranged, White 21. Lectures and recitations.

24. **Infinite Series.** Second term, credit three hours. Dr. SILVERMAN. White 6.

Tests for convergence of series; uniform convergence; improper integrals; divergent series.

25. **Theory of Functions of a Complex Variable.** Throughout the year, credit three hours a term. Mr. ———. Hours and room to be arranged. Lectures and recitations.

The elements of the theory of functions of one complex variable will be presented from the points of view of Cauchy, Riemann and Weierstrass.

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. **Differential Equations of Mathematical Physics.** Throughout the year, credit three hours a term. Dr. HURWITZ. White 6.

The derivation of the differential equations, with appropriate boundary conditions, which arise in certain problems of mathematical physics; the mathematical properties of solutions and the physical meanings of these properties. No previous work in solving differential equations is required, but Mathematics 22 or its equivalent is essential.

28. **Calculus of Variations.** Throughout the year, credit two hours a term. Assistant Professor GILLESPIE. Hours and room to be arranged.

The treatment of the case in which the integrand contains one unknown function, and its first derivative, and one independent variable. An introduction to mechanics from the standpoint of the calculus of variations.

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.

39. **Line Geometry.** First term, credit three hours. Assistant Professor RANUM. White 9.

Null systems, complexes and congruences of lines, applications to mechanics.

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.

44. **Mechanics.** Throughout the year, credit three hours a term. Dr. OWENS. White 2.

A study of the fundamental principles of the subject, with applications to numerous problems.

46. **Potential Functions; Spherical Harmonics. Fourier's Series.** Throughout the year, credit two hours a term. Assistant Professor SHARPE. White 27.

## 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, 11, 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.

## PHYSICS

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 21, 1914, at 9 a. m. in Lecture Room C. Similar examinations in connection with courses 8, 9, 10 and 14 will be held in Lecture Room C at 2 p. m. on the same day.

2. **Introductory Experimental Physics.** Repeated in second term, credit five hours. Three lectures and two class-room periods each week. Lectures: T Th S, 9; M W F, 11, Rockefeller A: Professors NICHOLS, MERRITT, and SHEARER, and Assistant Professor GIBBS. Class-room work: Assistant Professor GIBBS, and Messrs. BUCKLEY, HOWES, MALLORY, RODGERS, SWISHER, THOMPSON, and WEEKS. Hours to be assigned. Required of candidates for B. Chem., C. E., and B. S.

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

3. **Introductory Experimental Physics.** Repeated in second term, credit six hours. Three lectures and three class-room periods each week. Lectures: T Th S, 9; M W F, 11, Rockefeller A: Professors NICHOLS, MERRITT, and SHEARER, and Assistant Professor GIBBS. Class-room work: Assistant Professor GIBBS, and Messrs. BUCKLEY, HOWES, MALLORY, RODGERS, SWISHER, THOMPSON, and WEEKS. Hours to be assigned. Required of students in Sibley College.

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

5. **Introductory Physics.** Class-room work. One section, first term only, credit two hours. Open only to students repeating the course. Assistant Professor GIBBS. Hours to be assigned.

6. **Introductory Physics.** Class-room work. Repeated in second term, credit four hours. Prerequisite, course 2 or course 3. Messrs. ——— and ———. M T W Th as assigned. Required of candidates for B. Chem.

7. **Introductory Physics.** Class-room work. Second term, credit three hours. Prerequisite course 2 or course 3. Messrs. ———, ———, and ———. Hours to be assigned. Required of students in Civil Engineering.

8. **General Physics.** Theory. Repeated in second term, credit two hours. Prerequisite, Physics 3 (or 1 and 5), and Mathematics 6. Messrs. BIDWELL, BROWN, GIBSON, KENNARD, KING, MAYER, and POWER. First term: M W, T Th, or W F, 10. Second term: T Th, 10. 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. First term, T Th, 10; Second term, 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. May be elected by students who are taking or have completed 2 or 3 or 6 or 7. Assistant Professor BLAKER, and Messrs. MAYER, GIBSON, and POWER. 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 2 and 7, or 2 and three hours of 10, or the equivalent. May be taken by students that are taking courses 8 and 9. Assistant Professors RICHTMYER, and Messrs. BIDWELL, BROWN, GIBSON, KENNARD, KING, MAYER, PIDGEON, POWER, and ROBINSON. M 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.

15. **Photometry and Illumination.** Laboratory work, first term, credit one to four hours. Prerequisite course 14. Assistant Professor RICHTMYER. Hours to be arranged.

A study of candle power and distribution of intensity of various artificial light sources. 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.

17. **Practice Course for Teachers.** Second term, credit three hours. Prerequisite, Physics 2, and two hours of 10, or the equivalent. Students expecting to teach high school physics should take at least Physics 6 or 7 in addition. Attention will be given to the choice and arrangement of subject matter in a high school course, and to the selection of experiments suitable for demonstration and laboratory work where a limited equipment is available. Opportunity will be offered for practice in repairing apparatus and in constructing simple pieces of apparatus. Assistant Professor GIBBS.] Not given in 1914-15.

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 and Miss SEVERANCE. Lecture, T, 4, and one three-hour laboratory period weekly; M Th F, 2-5, or W Th, 9-12, Rockefeller, 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, Photographic Laboratory.

[20. **Heat.** First term, credit five hours. Prerequisite courses 2, 7, and four hours of 10. Assistant Professor BLAKER.] Not given in 1914-15.

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 14 and 25 may be taken with 20-24.

21. **Light.** Second term, credit three hours. Prerequisite courses 2, 7, and four hours of 10. Assistant Professor BLAKER. M W F, 10, Rockefeller C.

[22. **Electricity and Magnetism.** Second term, credit five hours. Prerequisite courses 1, 6, and 10. Assistant Professor BLAKER.] Not given in 1914-15.

23. **Properties of Matter.** First term, credit five hours. Prerequisite courses 2, 7, and four hours of 10. Assistant Professor BLAKER. M T W Th F, 10, Rockefeller C.

24. **Sound.** Second term, credit two hours. Prerequisite courses 2, 7, and four hours of 10. Assistant Professor BLAKER. T Th, 10, Rockefeller C.

25. **Advanced Laboratory Practice.** Either term or throughout the year. Credit one to three hours a term. Prerequisite courses 2 and 7, or 10, and at least four hours of 14. Assistant Professor BLAKER. One to three three-hour periods a 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 study of the fundamental principles of photometry, the various spectrophotometric methods will be taken up in such detail as will best suit individual needs. 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. BOWN. 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. BOWN. Daily 9-1.

Similar to course 34 but of wider scope. The character of the work will be varied to meet individual needs. Primarily for graduates.

36. **Advanced Alternating Currents.** Throughout the year, credit one or more hours a term. 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.** Second term, or throughout the year, 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 1914-15 a considerable part of the course will be devoted to the subject of electric waves and wireless telegraphy.

41. **Fluorescence and Phosphorescence.** First term, credit one hour. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS.

42. **History of Physics in the 19th Century.** Second term, credit one hour. Prerequisite course 1. Professor NICHOLS. S, 12, Rockefeller B.

43. **Photometry and the Physics of Illumination.** First term, credit two hours. Prerequisite courses 1, 6 or 10, and 14. Professor NICHOLS.

Lectures on the theory of artificial illumination and on methods of determining the temperature, efficiency, and quality of sources of light. Not given in 1914-15.

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

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. Not given in 1914-15.

52. **Theoretical Physics.** Electricity and magnetism. Throughout the year, credit four hours a term. Professor MERRITT. Hours to be arranged. Primarily for graduates.

54. **Thermodynamics.** Throughout the year, credit two or three hours a term. Prerequisite courses 1, 6 or 10, and 14, and Mathematics 1. Physics 20 is advised, though not required, as a preliminary course. Professor TREVOR. Hours to be arranged.

## 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; M W F, 12, Professor BROWNE and Mr. DAVIS. Second term, M W F, 11, M W F, 12, Professor BROWNE 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, BENNETT, and HOVEY.

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 examinations 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. Dr. LEMON, and Messrs. LEE, RAY, ELLEY, SMITH, ERSKINE, COOLEY, and GULICK. Lectures, T Th, 12. Laboratory sections: M W F, 2-5; T Th S, 8-11; T Th S, 9-12. Morse L. R. 1.

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. Dr. LEMON, and Messrs. LEE and ERSKINE. 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 7, 12, and 30. Dr. 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). Assistant Professor LUNDELL and Messrs. O'BRIEN and MILLER. Lectures, first term, T Th, 9, Morse L. R. 3; second term, T Th, 8, Morse L. R. 2.

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). Assistant Professor LUNDELL, and Messrs. O'BRIEN, MILLER, and COOLEY.

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.** First term, credit two hours. Prerequisite course 6 (or 7 and 12). Assistant Professor 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). Assistant Professor LUNDELL and Mr. COOLEY.



Laboratory sections: First term, T Th, 2-5.30; second term, T Th, 2-5; 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 2 and 6. Dr. ANDERSON and Messrs. ENGELDER and ———. Lectures, T Th, 9, Morse, L. R. 3. Laboratory sections, M T W Th F, 2-5; T F, 10-1.

The lectures deal with the construction and with the use in chemical analysis of the spectroscope, colorimeter, polariscope, and refractometer.

**18. Assaying.** First term, credit three hours. Prerequisite course 6 (or 7 and 12), and if possible a course in mineralogy. Assistant Professor LUNDELL and Mr. COOLEY. Lecture F, 10, Morse 2. Laboratory, M W, 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 2. 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 analyses of gases.

**20. Technical Gas Analysis.** Laboratory. Repeated second term, credit two hours. Prerequisite course 6 (or 7) and Physics 2. Open to those who are taking course 19. Dr. ANDERSON, and Messrs. ENGELDER, ———, and ———. 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, 10-12.30; 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 Honigsmann, Bunte, Orsat, Winkler, and Hempel; the complete analysis of flue gas, illuminating gas, producer 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 Bodländer gasbaroscope. Within certain limits the work may be selected to suit the requirements of the individual student.

**21. Gas Analysis.** Advanced course. Repeated in second term, credit one to four hours. Prerequisite courses 1, 6, (or 7 and 12), 19, and 20; Physics 2, 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, Mr. MAHOOD, and Messrs. ROSE, KENNEDY, and SHERWOOD. 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 and 10.

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 carbons of compounds 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. KENNEDY and SHERWOOD. 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. Mr. MAHOOD and Messrs. ROSE, KENNEDY, and SHERWOOD. Lectures and oral and written reviews, M W F, 12, Morse L. R. 3. Laboratory, T or Th, 2-5, Morse 1.

**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. An attempt is made to acquaint the student with the classical researches in organic chemistry.

**34. Advanced Organic Chemistry.** Laboratory practice. Throughout the year, credit two to six hours a term. Open to those who have had course 30 and are taking 33. Professor ORNDORFF, Mr. MAHOOD, and Messrs. ROSE, KENNEDY, and SHERWOOD. 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 required to repeat some extended and important piece of work, and to compare his results with those published.

**35. The Coal Tar Dyestuffs.** First term, credit one hour. Open to those who have had course 30 and have had or are taking 33. Professor ORNDORFF.

The methods of making the dyestuffs are discussed, also their properties, constitution, and relations to each other, the treatment being scientific rather than technical.] Not given in 1914-15.

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

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

**37. Methods of Organic Analysis.** Throughout the year, credit two to six hours a term. Prerequisite course 30. Professor ORNDORFF and Mr. MAHOOD. Hours to be arranged. The laboratory is open daily, Morse 10.

Designed for students who desire practice in the qualitative and quantitative analysis of commercial organic products such as alcohols, ethers, organic acids, glycerin, formalin, acetates, coal tar distillates, petroleum products, soaps, acetanilid, etc.

## INORGANIC CHEMISTRY

**46. Inorganic Chemistry.** Advanced course. Throughout the year, credit two hours a term. Prerequisite course 30, and open to those who have completed or are taking courses 50 and 51. Professor DENNIS.

The chemical elements are discussed in the order in which they occur in the Periodic Law of Mendeléeff, and special attention is paid to the group properties of the elements and to the relations of the groups to one another. The rare elements and the rare earths are treated in as great detail as are the more common elements.] Not given in 1914-15.

**47. Advanced Inorganic Chemistry.** Laboratory practice. Either term, credit 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 precede or accompany this course. First term, Professor BROWNE. Second term, Dr. WELSH. T Th, 11, Morse L. R. 3.

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.

**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. F, 11, Morse L. R. 3.

The preparation, properties, and reactions of a large number of gases are discussed, and in many cases 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 graduates student in chemistry, and is open to seniors in mechanical engineering who intend to specialize in gas power work.

## PHYSICAL CHEMISTRY

**50. Introductory Physical Chemistry.** Throughout the year, credit three hours a term. Prerequisite course 30, and Physics 2, 6, and 10. Assistant Professor BENNETT and Messrs. GILBERT and LEIGHTON. 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. Assistant Professor BENNETT and Messrs. GILBERT and LEIGHTON. Two laboratory periods a week M T, 2-5; Th F, 2-5. 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.] Not given in 1914-15.

**53. Colloid Chemistry.** Lectures. Throughout the year, credit two hours a term. Professor BANCROFT. T Th, 10, Morse L. R. 4.

The theory of colloid chemistry and its application in the arts. Open to candidates for the degree of Bachelor of Chemistry if they have taken course 50; to others only by special permission.

**55. Theoretical Electrochemistry.** Lectures. Throughout the year, credit three hours a term. Professor BANCROFT. M W F 10, Morse L. R. 4.

The historical development of the subject with special reference to the theory of the voltaic cell. For advanced students in chemistry or physics.

**56a. Applied Electrochemistry.** Lectures. Throughout the year, credit two hours a term. Prerequisite course 6 (or 7 and 12). Assistant Professor BENNETT and Mr. DAVISON. 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, but not obligatory, to take 56b along with this course.

**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. Assistant Professor BENNETT and Mr. DAVISON. 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 up to six hours a term. Prerequisite courses determined in each case by the professor in charge. Professor BANCROFT, Assistant Professor BENNETT, and Messrs. GILBERT, DAVISON, and LEIGHTON. 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. COLE. 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 and its accessories; microchemical methods as applied to chemical investigations.

**66. Microchemical Analysis.** Either term, credit three or more hours. Prerequisite course 65. Professor CHAMOT and Mr. COLE. 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.

**68. Microscopy of Metals and Alloys.** Second term, credit two hours. Prerequisite courses 50 and 65. Laboratory practice at hours to be arranged. Professor CHAMOT and ———.

An introduction to the methods employed in microscopic examinations of metallurgical products and other opaque materials. Practice in grinding, polishing, and etching specimens, and in the use of metallographs.

### 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 89. Recitations, at hours to be assigned. The laboratory will be open T W 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 89.

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.

**72. Microscopical Examination of Foods.** First term, credit two hours or more. Prerequisite course 65. Professor CHAMOT and Mr. COLE. 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 89.

This course is planned to meet the needs of those specializing in sanitary chemistry and will include a discussion of the natural purification 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. Lectures, Morse 89. Hours to be arranged.

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.

### AGRICULTURAL CHEMISTRY

**85. Agricultural Chemistry.** Either term, credit four hours. Prerequisite course 1. Professor CAVANAUGH and Messrs. RICE and FLYNN. Lectures, T Th S, 11. One recitation a week: First term: T, 8; Th, 9; F, 9. Second term: M, 8; T, 10; W, 8; Th, 8; F, 8 and 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, feed-stuffs, 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. 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.** For seniors who are candidates for the degree B. Chem. Credit one hour. Morse L. R. 3.

## RESEARCH

**96. Research for Undergraduate Students.** Throughout the year. Morse. Seniors who are candidates for the degree B. Chem. 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 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 lectures 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 attention will be given to life histories of representative plants in the different groups; also to the form and structure of the reproductive organs, the phenomena of fertilization, the general features of plant anatomy, and 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.

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 and Messrs. ——— and ———. One lecture, M, 11, and five laboratory hours a week. 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. ———. 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. ———. 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. Professor ROWLEE and ———. Lectures, 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. Professor ROWLEE and Mr. ———. Lectures, F, 9. Laboratory, 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. Professor ROWLEE and Mr. ———. Lectures, T, 10. Laboratory and field work, M afternoon and T morning. Sage College, Histological 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. Professor ROWLEE and Mr. ———. Lectures, 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 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 course 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 a 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 along with this course. See course 14a.

**12. Taxonomy of the Pteridophytes, Bryophytes and Algae.** Throughout the year, credit three hours a term. Mr. ———. Lectures, F, 11. Laboratory work, F afternoon and S morning. Sage College, Botanical Lecture Room and Laboratory. Open to graduates.

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

**13. 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. Thesis required.

**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. ———. 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. ———. Hours by appointment. Open to graduates.

Monograph of some genus or limited number of genera, or monographic study of development. A thesis presenting the results of the investigation will be required. Reports weekly.

**14c. Research in Plant Pathology.** Professor ATKINSON and Mr. ———. 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 on 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 dealt with in different years, students may take this course more than once.

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

Not less than four hours a week. May form the basis of major or minor work 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 who 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 who are engaged in research.

## BIOLOGY

**1. General Biology.** Throughout the year, credit three hours a term. Lectures, M W, 9, or T Th, 9, Agricultural College Main 131. Practice M T W Th or F, 2-4.30; T Th F S, 8-10.30; M T W Th F S, 10.30-1. Agricultural College, Main 302. Professor NEEDHAM, Assistant Professor JOHANNSEN, 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, heredity and variation, natural selection and adaptation, segregation and mutation, the life cycle, metamorphosis and regeneration, and the responsive life of organisms. Laboratory fee, \$2.50 a term.

## ENTOMOLOGY, LIMNOLOGY, AND NATURE STUDY

The work of this department is continued throughout the year, there being a third term of sixteen weeks during the summer.

### INTRODUCTORY ENTOMOLOGY

**[2. The Ecology of Insects.** Summer term, credit three hours, one lecture and two practical exercises. Professor NEEDHAM.] Not given in 1914.

**General Entomology.** See Entomology in College of Agriculture, course 3.

**4. Elementary Morphology of Insects.** Repeated in second term, and in the summer 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, and in the summer term, credit two hours. Must be preceded or accompanied by course 4. May advantageously be preceded by course 10. Laboratory and field work. Monday and Wednesday afternoon, or other hours by special arrangement. Agricultural College, Main 301. Assistant Professor BRADLEY and Mr. WENDELKEN.

Practice in the identification of insects, and in the methods of phylogenetic study as illustrated by 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.

### SYSTEMATIC ENTOMOLOGY

10. **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 or F, 2-5 and S, 9-12. 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.

11. **Advanced Systematic Entomology.** Repeated in second term, credit three or more hours. Prerequisite courses 4, 5, and 10. Assistant Professor BRADLEY and Mr. WENDELKEN. Laboratory work by appointment, Agricultural College, Main 301.

A training course in the identification and interpretation of obscure characteristics of insects. Laboratory fee, \$2 an hour.

12. **Taxonomy of Insects.** Throughout the year, credit four hours a term. Prerequisite courses 3, 4, 5, 10, 11, and 20, or the equivalent. Professors NEEDHAM and RILEY, Assistant Professors JOHANNSEN and BRADLEY, Miss STRYKE, and Mr. LLOYD, and cooperating specialists. Lectures, F, 8. Laboratory hours to be arranged.

This course will continue through a number of terms, but the work of each term may be elected independently. The course is intended primarily for graduate students who desire a systematic survey of one or more of the order of insects.

A. **Physopoda, Mallophaga, Heteroptera.** First term 1914-15. Assistant Professors JOHANNSEN and BRADLEY. B. **Homoptera.** Second term 1914-15. Assistant Professors BRADLEY and JOHANNSEN. Special attention will be given to scale insects and plant lice. C. **Myriapoda and Arachnida.** Summer term, 1914-15. Miss STRYKE. [D. **Diptera and Siphonaptera.** First term, 1915-16. Assistant Professor JOHANNSEN.] [E. **Lepidoptera.** First term 1915-16. Miss STRYKE.] [F. **Neuropteroids.** Third term 1915-16. Professor NEEDHAM and Mr. LLOYD.] [G. **Coleoptera.** Assistant Professors BRADLEY and JOHANNSEN. Not given in 1914-15.] [H. **Orthoptera, Euplexoptera, and Thysanura.** Not given in 1914-15.] [I. **Hymenoptera.** Assistant Professor BRADLEY. Not given in 1914-15.]

[13. **Classification of the Coccidae.** Second term, credit two hours. Prerequisite courses 4, 5, 10, and 11. Assistant Professor BRADLEY. Laboratory work by appointment, Agricultural College, Main 301.

Designed to familiarize the student with the more injurious species of scale insects, the methods of preparing specimens for study, and the systematic arrangement of species. Laboratory fee, \$3.] Replaced in 1914-15 by course 12B.

14. **Literature of Systematic Entomology.** First term, credit three hours. Prerequisite course 3 or 5, or Zoology 5. Assistant Professor BRADLEY. Lectures, M, 8, 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, \$1.00.

**19. Research in Systematic Entomology.** Throughout the year, credit three hours or more a term. Prerequisite courses 3, 4, 5, 10, 11, 14, and 20. Professor NEEDHAM and Assistant Professors BRADLEY and JOHANNSEN. 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.

### INSECT MORPHOLOGY

**20. Morphology and Development of Insects.** First term and summer term, credit two hours. Prerequisite courses 3 (first term), 4, and 5. Laboratory work to accompany or to follow this course is offered under course 21. Professor RILEY. T Th, 10, Agricultural College, Main 392.

**21. Histology of Insects.** First term and summer term, credit three or more hours. A laboratory course to accompany or follow the first term of course 20. Prerequisite courses 3 (first term), 4, 5, and 20. Professor RILEY. Agricultural College, Main 391. Laboratory fee, \$1.50 an hour.

**27. German Entomological Reading.** First term, credit one hour. Professor RILEY. W, 7-9 p. m., Agricultural College, Main 392.

Open only to advanced students in entomology or zoology. Text: Schröder's *Handbuch der Entomologie*.

**28. French Entomological Reading.** Second term, credit one hour. 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*.

**29. Research in Morphology of Insects.** First term and summer term, credit three or more hours. Prerequisite courses 3, 4, and 5. Professors NEEDHAM 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.

### PARASITOLOGY AND MEDICAL ENTOMOLOGY

**30. Animal Parasites and Parasitism.** First term, credit two hours. Must be preceded or accompanied by Zoology 1. 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.

**[31. The Relations of Insects to Disease.** Second term, credit two hours. Prerequisite course 3 or 30. Professor RILEY and Mr. COUTANT.

Causation and transmission of diseases by insects and other arthropods. Laboratory fee, \$2.] Not given in 1914-15.

**32. Advanced Work in Parasitology.** First term and summer term, credit two or more hours a term. Prerequisite courses 30 and 31. Professor RILEY and Mr. COUTANT. Laboratory work and conferences, by appointment, Agricultural College, Main 391.

Special work adapted to the needs of the individual student. Those planning to work along the lines of the relations of insects to disease, or of parasites of insects, should take course 21 before or along with this course.

## LIMNOLOGY

**50. General Limnology.** Second term and summer term, credit two hours a term. Open only to students who have taken or are taking course 3 and Biology 1. Professor NEEDHAM and Mr. LLOYD. Lectures, Th, 8, College of Agriculture, Main 392. Laboratory, Th, 2-4.30, College of Agriculture, 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.

**59. Research in Limnology.** Throughout the year, credit three or more hours a term. Prerequisite course 50 or the equivalent. Professors NEEDHAM and RILEY. Laboratory and field work by appointment. College of Agriculture, Main 492, and Biological Field Station.

## NATURE STUDY

**60. Natural History.** Either term, credit one hour. Professor NEEDHAM, Mr. ALEXANDER, and assistants. Field work only, with morning sections 8-10.30 or 10.30-1 daily, and afternoon sections 2-4.30 daily except S.

This course comprises a series of studies of the sources of our living in nature. Weekly field trips will be made about the University Campus and farm and vicinity to seek out the wild relatives of our cultivated crops and domesticated animals, and to study the natural resources of our environment.

**Nature Study Pedagogy and Literature.** See Nature Study in College of Agriculture, course 61.

**Nature Study in Field and Laboratory.** See Nature Study in College of Agriculture, course 62.

**Nature Study. Advanced Course.** See Nature Study in College of Agriculture, course 63.

**Nature Study Conference.** See Nature Study in College of Agriculture, course 65.

## SEMINARIES

**Seminary.** Throughout the year. M, 4.30-5.30, College of Agriculture, Main 392.

The work of an entomological seminary is conducted by the Jugatae, an entomological club which meets for the discussion of the results of investigation. Attendance at the meetings may be counted as laboratory work.

**79. Journal Club.** First and second terms, credit one hour a term. Professors NEEDHAM, RILEY, and HERRICK, and Assistant Professor BRADLEY. College of Agriculture, Main 392.

Reviews and discussions of current literature relating to the work of the department. Required of graduate students.

## ZOOLOGY

**1. General Zoology.** First term, credit five hours. Assistant Professor REED, Dr. 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 1914-15.

5. **Systematic Vertebrate Zoology and Ecology.** Throughout the year, credit three hours a term. Assistant Professor REED, Dr. WRIGHT, and Mr. HARPER. Lectures, M, 8, McGraw 5. Laboratory, sec. 1, M W, 2-4.30, McGraw 7; sec. 2, T Th, 2-4.30, McGraw 7.

Lectures on the natural history of vertebrates dealing with such topics as 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.

Ornithology and ichthyology. 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 to museums and economic methods. Field work in ecologic methods, life histories, etc.] Not given in 1914-15.

7. **Mammalogy and Herpetology.** Throughout the year, credit three hours a term. Prerequisite course 5. Drs. WRIGHT and ALLEN. Lectures, M W, 9, McGraw 5. Laboratory, F, 2-4.30, or S, 8-10.30, McGraw.

A study of mammals, amphibians, and reptiles following the method of course 6. Given alternately with course 6.

11. **Advanced Work and Research.** Throughout the year. Laboratory open from 8-5, daily exc. S. Assistant Professor REED, Dr. WRIGHT, and Dr. ALLEN.

## PHYSIOLOGY AND BIOCHEMISTRY

3. **Elementary Human Physiology.** Repeated in second term, credit three hours. First term, M W F, 10, Professor SIMPSON and assistants. Second term, Section A, M W F, 10, Professor SIMPSON and assistants; section B, M W F, 12, Assistant Professor DRESBACH and assistants. In registering for this course in the second term students are required to specify the section they desire to attend.

An introductory course for students of the biological sciences; also for students who expect to teach physiology in the secondary schools. 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.** Repeated in second term, credit two or more hours. Professor SIMPSON, Assistant Professor DRESBACH, and assistants. Five hours a week, hours and days for first term to be arranged; in second term, 2½ 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 after 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.

7. **Seminary.** Second term, credit one hour. A seminary in physiology and biochemistry is held at which current literature is discussed, and at which the results of original investigations carried on by workers in the laboratories are presented for criticism. Students are required to attend these meetings and

to take part in the discussions, and each student is expected to give a communication on at least one occasion during the term.

8. **Advanced Work and Research in Physiology.** Throughout the year. Professor SIMPSON, Assistant Professor DRESBACH, and assistants. Daily, Stimson Hall, Advanced Laboratory.

In connection with this course a weekly or fortnightly seminary is held.

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 topic in biochemistry.

18. **Laboratory Work in Biochemistry.** Second term, credit three hours. Prerequisite Chemistry 32. Hours to be arranged. Stimson Hall, Biochemical Laboratory. Assistant Professor HUNTER and Mr. GIVENS.

Foods, tissues, digestion, excretion, and metabolism; the concluding part of the course is devoted to modern methods of quantitative urine analysis.

20. **Advanced and Research Work in Biochemistry.** Throughout the year. Assistant Professor HUNTER and 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 is 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 the equivalent. Mr. KINGERY. Two periods at hours to be arranged, Stimson Hall.

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

4. **Embryology of Vertebrates.** Second term, credit four hours. Prerequisite course 1 or the equivalent. Lectures or recitations, Professor KINGSBURY, M, 11, W, 8, Stimson Hall. Laboratory, Mr. KINGERY, 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. ———. 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. KINGERY.

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 and Structural Geology.** Repeated in second term, credit three hours. Professor RIES and Messrs. MONNETT and HOOK. Lectures, first term, T, Th, 11, second term T Th, 9, room to be announced. Laboratory period, M, T, W, Th, F afternoon or S morning. One all-day or two half-day excursions required.

Planned to give beginners the fundamental principles of this branch of elementary geology; for a knowledge of general elementary geology they should take in addition one or more of the following courses: 2, 11, 21.

### PHYSICAL GEOGRAPHY

2. **Elementary Physical Geography.** Throughout the year, credit three hours a term. Assistant Professor VON ENGELN and Messrs. ELSTON and ———. Lectures, M W, 9, McGraw, Geological Lecture Room. Laboratory W, 2-4-30, or S, 10-12-30.

By special permission a recitation hour may be substituted for the laboratory period but students are urged to register for the laboratory and field work in view of the great geographic interest of the region about Ithaca. All students are required to go on one all-day excursion to Taughannock Gorge and Falls.

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. T Th, 10, McGraw, Geological Lecture Room.

A course for the general student emphasizing the influence of the physiographic features of North America upon the history and industrial development of the various sections. Illustrated lectures.

4. **Commercial and Industrial Geography.** Throughout the year, credit two hours a term. Assistant Professor VON ENGELN.

A study of the geographical features that have led to the origin and development of commerce and the various types of industry in different countries and regions. Description of the production of the leading commercial materials, particular attention being given to those that are less familiar. Lectures illustrated with lantern slides and maps.] Not given in 1914-15.

5. **Glaciers and Glaciation.** Second term, credit three hours. Prerequisite course 2. Lectures, M W, 11, McGraw. Assistant Professor VON ENGELN. Laboratory, T, 2-4-30, McGraw. Assistant Professor VON ENGELN and Mr. ELSTON.

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

8. **Experimental Physiography.** Throughout the year. For students with requisite preparation. 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 accomplished.

9. **Seminary.** Throughout the year, credit two hours a term. For upper-class and graduate students with requisite preparation. Assistant Professor VON ENGELN. M, 4.30, McGraw, Physical Geography Laboratory.

Preparation and reading of reports upon special topics. 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.

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

## MINERALOGY AND PETROGRAPHY

11. **Elementary Mineralogy.** First term, credit three hours; if taken after course 12, credit two hours. Professor GILL and Mr. VANDERMEULEN. Lectures M W, 8, McGraw Geological Lecture Room. Laboratory sections to be arranged.

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

12. **Crystallography.** Second 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 hours to be arranged. Professor GILL and Mr. VANDER MEULEN.

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.** First term, credit three hours; if taken after course 11, credit two hours. Prerequisite course 12. Lectures, T Th, 8, McGraw, Geological Lecture Room. Laboratory hours to be arranged. Professor GILL and Mr. VANDER MEULEN.

For students wishing to become acquainted with the commoner minerals and with 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. VANDER MEULEN. One laboratory period Saturday morning, McGraw, Mineralogical Laboratory.

15. **General Lithology.** Second term, credit one hour. Prerequisite courses 1 and 11. Professor GILL. Lectures or recitations, alternate S, 9; laboratory, alternate W, 2-5.30; McGraw, Mineralogical Laboratory.

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

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

Special 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.

An elementary review of the geologic history of the earth and its inhabitants; covering, accordingly, with course 1 the major topics usually included under Elementary Geology. Frequent field excursions take the place of laboratory work as soon as the weather permits. One all day excursion to Rochester.

22. **Stratigraphic Geology.** First term till Christmas recess, credit two hours; credit second term three hours. Prerequisite course 1 or the equivalent. Professor HARRIS. Lectures, M W 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.** Repeated in second term, credit three hours. Prerequisite a three hour course in biology (one that includes invertebrate zoology). Professor HARRIS and Mr. OLSSON. 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 and Dr. SHELDON. 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 equivalent. Professor HARRIS and Mr. OLSSON. Field work, daily, 8-5.

Area for investigation summer 1914: central and eastern New York in Silurian and Ordovician, probably also reaching the east coast Southern Tertiaries.



## ECONOMIC GEOLOGY

30. **Building Stones and Clay Products.** First term, credit two hours. Professor RIES and Messrs. HOOK and DAVIS. Lectures, T, 9. Laboratory, 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 and DAVIS. Lectures, M W, 1. Laboratory, 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.

32. **General Economic Geology.** Throughout the year, credit three hours a term. Prerequisite courses 1 and 11 or their equivalent. Professor RIES and Mr. SOMERS. 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. Field trips may be substituted for a portion of the laboratory work.

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, M W F, 9. 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. Lectures 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. Hours to be arranged. Abstracts and discussions of current literature, and preparation of papers on special subjects. Prerequisite course 32.

38. **Experimental Economic Geology.** Prerequisite course 32 and Chemistry 1, or the equivalent. Professor RIES and Mr. HOOK. McGraw. Laboratory experiments demonstrating some of the general principles of ore deposition.

## MILITARY SCIENCE AND TACTICS

1. **Military Training and Instruction as Infantry.** Required of all first year men. M W F, 4, 45. Practical instruction outdoors in fair weather three hours a week; indoors in winter months, one hour a week. Theoretical instruction, winter months, two hours a week, covering our military policy and military history, the value of military training, infantry drill regulations, theory of target practice, camp sanitation, field service regulations, personal hygiene, theory and functions of various arms, field engineering, and guard duty, practical rifle practice on outdoor and indoor ranges.



2. **Elective Military Training.** Throughout the year, credit two hours a term. M W F, 4.45, Armory. May be substituted for physical culture in second year by all students in four-year courses. Elective for juniors and seniors. Prerequisite course 1. An advanced course covering all phases of practical and theoretical work of the infantry soldier.

3. **Military Science and Tactics.** Second term, credit two hours. Lieutenant BULL. T Th, 12, Goldwin Smith 124. An advanced lecture course.

4. **Band Music.** Practical and theoretical instruction. Throughout the year, credit two hours a term. 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. Qualified students may substitute this course for either the required military drill (course 1), or the required physical culture.

## 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 this 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) on the physiology of exercise, preventive diseases, personal hygiene, etc., attendance upon which is obligatory, and of which notes must be submitted.

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 in physical culture 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. COUSENS. 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 5.00; sophomores at 12.00 or 4.30. Required of freshmen and sophomores.

11. **Advanced Gymnastics.** Throughout the year, credit two hours. Prerequisite course 10 or the equivalent. Miss CANFIELD. M T W Th F, 5.30.

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





## OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

Issued at Ithaca, New York, monthly from July to November inclusive, and semi-monthly from December to June inclusive.

[Entered as second class matter, August 31, 1910, at the post office at Ithaca, New York, under the Act of July 16, 1894.]

These publications include

Catalogue Number (containing lists of officers and students), price 25 cents,  
Book of Views, price 25 cents,

Directory of Faculty and Students, Second term, 1913-14, price 10 cents,  
and the following informational publications, any one of which will be  
sent gratis and post-free on request. The date of the last edition of  
each publication is given after the title.

General Circular of Information for prospective students, February 1, 1914.

Announcement of the College of Arts and Sciences, May 1, 1914.

Announcement of Sibley College of Mechanical Engineering and the  
Mechanic Arts, January 1, 1914.

Announcement of the College of Civil Engineering, February 15, 1914.

Announcement of the College of Law, April 15, 1913.

Announcement of the College of Architecture, June 1, 1913.

Announcement of the New York State College of Agriculture, June 15, 1913.

Announcement of the Winter Courses in the College of Agriculture, July 1,  
1913.

Announcement of the Department of Forestry, July 15, 1913.

Announcement of the Summer Term in Agriculture, April 15, 1914.

Announcement of the New York State Veterinary College, April 1, 1914.

Announcement of the Graduate School, January 15, 1914.

Announcement of the Summer Session, March 15, 1914.

Annual Report of the President, November 1, 1913.

Pamphlets on scholarships, fellowships, and prizes, samples of entrance and  
scholarship examination papers, special departmental announcements, etc.

Correspondence concerning the publications of the University should be  
addressed to

The Secretary of Cornell University,  
Ithaca, New York.