

OFFICIAL PUBLICATIONS OF CORNELL UNIVERSITY

VOLUME VII

NUMBER 7

ANNOUNCEMENT OF THE TWENTY-FIFTH SUMMER SESSION JULY 6—AUGUST 16 1916

MARCH 1, 1916
PUBLISHED BY CORNELL UNIVERSITY
ITHACA, NEW YORK

This announcement is intended to give detailed information to prospective students in the Summer Session of Cornell University.

For general information concerning the University and the work in its various colleges during the academic year, the requirements for admission, etc., the General Circular of Information should be consulted. This and the other Official Publications of Cornell University are listed on the last page of the cover of this pamphlet. Any one of the informational publications there mentioned will be sent gratis and post-free on application to the Secretary of Cornell University, Ithaca, New York.

CALENDAR

SUMMER SESSION 1916

In order to get the full number of exercises announced for the Summer Session, it is necessary that all work begin promptly on Thursday morning, July 6. Students are, therefore, urged to reach Ithaca in time to be present at the first exercise in each class. If possible, they should register on Wednesday, July 5; if not, they should register on Thursday during the hours not occupied in class work.

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| July 5, Wednesday, | 10 a. m. to 5 p. m. Registration at office of Registrar. |
| July 6, Thursday, | Instruction begins at times and places announced under each course. Registration continued. |
| July 6, Thursday evening, and following Thursdays. | Musical Recital, Bailey Hall. |
| July 10, Monday before 4 p. m. | Last day for payment of fees at the Treasurer's Office, 1 Morrill Hall. |
| July 10, Monday evening, | First lecture in Monday evening course. Continued on following Mondays. Rockefeller Hall. |
| July 11, Tuesday evening, and following Tuesdays. | Musical Recital, Sage Chapel. |
| July 13, Wednesday evening, and following Wednesdays. | Departmental Conferences. |
| August 10, 11, Thursday and Friday, | New York State Examinations for Teachers' Certificates. |
| August 16, Wednesday, | Summer Session closes. |

CORNELL UNIVERSITY, SUMMER SESSION 1916

OFFICERS

Jacob Gould Schurman, LL.D., President of the University.
 George Prentice Bristol, A.M., Director of the Summer Session.
 David Fletcher Hoy, M.S., Registrar of the University.

STAFF OF INSTRUCTION

| | |
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| Arthur Augustus Allen, Ph.D., Assistant Professor of Zoology. | Zoology |
| Ross Peter Anderson, Ph.D., Assistant Professor in Chemistry. | Chemistry |
| Ruth Atkinson, Supervisor of Physical Training, Normal School, Kent, Ohio. | Physical Education |
| Elmer J. Bailey, Ph.D., Instructor in English. | English |
| Dane Lewis Baldwin, M.A., Instructor in English. | English |
| William C. Ballard, M.E., Instructor in Engineering. | Music |
| Homer Guy Bishop, M. A., Assistant in Psychology | Psychology |
| Ernest Blaker, Ph.D., Assistant Professor of Physics. | Physics |
| Albert William Boesche, Ph.D., Professor of German. | German |
| Edwin Garrigues Boring, Ph.D., Instructor in Psychology. | Psychology |
| Julian Pleasant Bretz, Ph.D., Professor of American History. | History and Government |
| George Prentice Bristol, A.M., Professor of Greek. | Linguistics |
| Leslie Nathan Broughton, Ph.D., Instructor in English. | English |
| Thomas Benjamin Brown, A.B., Instructor in Physics. | Physics |
| Arthur Wesley Browne, Ph.D., Professor of Chemistry. | Chemistry |
| Laura Bryant, Director of Music, Ithaca Public Schools. | Music |
| William Benjamin Buck, Assistant in Wood Shop. | Manual Training |
| Earle Nelson Burrows, C.E., Assistant Professor of Civil Engineering. | Engineering |
| Walter Butterfield, Director of Music, Manchester, N. H. | Music |
| Walter Buckingham Carver, Ph.D., Assistant Professor of Mathematics. | Mathematics |
| Emile Monnin Chamot Ph.D., Professor of Sanitary Chemistry and Toxicology. | Chemistry and Toxicology |
| Hamlin E. Cogswell, Mus.M., Director Normal Conservatory of Music, Indiana, Pa. | Music |
| William Wistar Comfort, Ph.D., Professor of Romance Languages. | French and Spanish |
| Jesse H. Coursault, Ph.D., Professor of Education. | Education |
| Hollis Dann, Mus.D., Professor of Music. | Music |
| Hermann C. Davidsen, Ph.D., Assistant Professor of German. | German |
| Alexander M. Drummond, A.M., Instructor in Public Speaking. | Public Speaking |
| Charles Love Durham, Ph.D., Professor of Latin. | Latin |
| Archibald M. Erskine, B.Chem., Assistant in Chemistry. | Chemistry |
| Ellsworth David Elston, A.B., Instructor in Physical Geography. | Physical Geography |
| Georgia Everest, Supervisor of General Art, Pratt Institute, Brooklyn. | Drawing and Art |
| William Silliman Foster, Ph.D., Instructor in Psychology. | Psychology |
| David Kennedy Fraser, M.A., Assistant Professor of Education. | Education |
| Jean Marius Gelas, Instructor in Fencing. | Physical Training |
| Frederick R. Georgia, B.Chem., Assistant in Chemistry. | Chemistry |
| Roswell Clifton Gibbs, Ph.D., Assistant Professor of Physics. | Physics |
| David Clinton Gillespie, Ph.D., Assistant Professor of Mathematics. | Mathematics |
| J. Earl Griffith, Head of Department of Drawing and Art, Central High School, Newark, N. J. | Drawing and Art |
| Clarence Walter Ham, M.E., Assistant Professor of Machine Design. | Industrial Education |

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| William H. Hoerrner, Professor of Music, Colgate University. | Music |
| Leroy Hooper, Foreman of Pattern Shop. | Manual Training |
| Merton Jerome Hubert, M.A., Instructor in Romance Languages and Literatures, University of Cincinnati. | French |
| Helen Allen Hunt, Teacher of Music, Boston, Mass. | Music |
| Wallie Abraham Hurwitz, Ph.D., Assistant Professor of Mathematics. | Mathematics |
| Arthur L. Janes, A.M., Head of Latin Department, New Utrecht High School, New York City. | Latin |
| Arthur Edward Johnstone, Teacher of Music, New York City. | Music |
| Johannes B. E. Jonas, Ph.D., Head of German Department, DeWitt Clinton High School, New York City. | German |
| Ralph Hayward Keniston, Ph.D., Assistant Professor of Romance Languages. | Spanish |
| Dexter Simpson Kimball, M.E., Professor of Machine Design and Industrial Engineering. | Industrial Education |
| William Kirk, M.A., Assistant in Chemistry. | Chemistry |
| Ernest R. Kroeger, Teacher of Music, St. Louis, Mo. | Music |
| Joseph Peter Koller, B.Chem., Assistant in Chemistry. | Chemistry |
| Thomas W. Lingle, Ph.D., Professor of Modern Languages, Davidson College. | South America |
| Gustav Ernst Lundell, Ph.D., Assistant Professor of Chemistry. | Chemistry |
| William Edward Lunt, Ph.D., Professor of Modern European History. | European History |
| Joseph V. McKelvey, Ph.D., Instructor in Mathematics. | Mathematics |
| Samuel Arthur Mahood, M.A., Instructor in Chemistry. | Chemistry |
| James Frederick Mason, Ph.D., Professor of Romance Languages. | French |
| Edith H. Matzke, M.D., Medical Adviser of Women. | Hygiene |
| Daniel Chauncey McCoy, Assistant in Chemistry. | Chemistry |
| Victor Elvert Monnett, A.B., Instructor in Geology. | Geology |
| Benton Sullivan Monroe, Ph.D., Assistant Professor of English. | English |
| Guy Brooks Muchmore, A.B., Assistant Professor of Public Speaking. | Public Speaking |
| Bertyne NeCollins, Teacher of Singing, New York City. | Music |
| William Ridgley Orndorff, Ph.D., Professor of Organic and Physiological Chemistry. | Chemistry |
| Frederick William Owens, Ph.D., Instructor in Mathematics. | Mathematics |
| Miles Albion Pond, Ph.B., Assistant Professor of Civil Engineering. | Descriptive Geometry |
| Paul Russel Pope, Ph.D., Professor of German. | German |
| Frederick Clarke Prescott, A.B., Assistant Professor of English. | English |
| Lawrence Pumpelly, Ph.D., Assistant Professor of Romance Languages. | French |
| James T. Quarles, A. A. G. O., University Organist. | Music |
| Arthur Benning Ray, M.A., Assistant in Chemistry. | Chemistry |
| Hugh Daniel Reed, Ph.D., Assistant Professor of Zoology. | Zoology |
| Ernest William Rettger, Ph.D., Assistant Professor of Applied Mechanics. | Mechanics |
| Fred Hoffmann Rhodes, Ph.D., Instructor in Chemistry. | Chemistry |
| Floyd Karker Richtmyer, Ph.D., Assistant Professor of Physics. | Physics |
| Guillermo Rivera, A.M., Instructor in Spanish, Harvard University. | Spanish |
| Burton T. Scales, M.A., Director of Music, Girard College | Music |
| Francis Joseph Seery, B.M.S., Assistant Professor of Civil Engineering. | Hydraulics |
| Albert R. Shadle, A.M., Assistant in Zoology. | Zoology |
| Francis Robert Sharpe, Ph.D., Assistant Professor of Mathematics. | Mathematics |
| John Sandford Shearer, Ph.D., Professor of Physics. | Physics |
| Alice Sheffer, Principal Fall Creek School, Ithaca. | Music |
| Henry A. Sill, Ph.D., Professor of Ancient History. | History |
| Francis W. Sherwood, M.S., Assistant in Chemistry. | Chemistry |

- Louis L. Silverman, Ph.D., Instructor in Mathematics. Mathematics
 Virgil Snyder, Ph.D., Professor in Mathematics. Mathematics
 Ardra Soule, A.B., Teacher of Physical Training, Hingham, Mass., Physical Education
 Stella Stark, Director of Music, State Normal School, Buffalo, N. Y. Music
 James Sullivan, Ph.D., Principal Boys' High School, Brooklyn, N. Y. History and Education
 John Roscoe Turner, Ph.D., Assistant Professor of Economics. Economics
 Elizabeth Undritz, A.M., Teacher of German, Central High School, Newark. German
 Leonard C. Urquhart, C.E., Instructor in Civil Engineering. Engineering
 Abbott Payson Usher, Ph.D., Assistant Professor of Economics. Economics
 James Elijah Vanderhoef, Foreman in Foundry. Manual Training
 Oscar Diedrich von Engeln, Ph.D., Assistant Professor of Physical Geography. Geography
 Albert Edward Wells, Assistant Professor of Machine Construction. Industrial Education
 Thomas Whitney Benson Welsh, Ph.D., Instructor in Chemistry. Chemistry
 Bernice White, Instructor in Music, Normal College, New York City. Music
 Harry Elmsley Wood, Director of Manual Training, Indianapolis, Ind. Industrial Education
 William K. Wright, Ph.D., Instructor in Philosophy. Philosophy
 Allyn Abbott Young, Ph.D., Professor of Economics and Finance. Economics
 Wesley Daniel Zinnecker, Ph.D., Instructor in German. German

OBJECT OF THE SUMMER SESSION

The primary object of the Summer Session is to advance education by helping those engaged in it. The instruction is adapted to the needs of the following classes:

1. Professors and teachers in colleges and schools, superintendents, and supervisors of special branches of instruction.

The announcements of the different departments show a wide range of work. This work is either advanced and, therefore, suited for specialists who wish to pursue their individual study, or more elementary and adapted to teachers who desire to start in a new field. In addition to the instruction of the class room, the University's libraries, laboratories, and shops are open for use. For superintendents and supervisors, there are also courses in administration, and in general and special methods, besides lectures on educational philosophy and theory.

2. College students in Cornell or other universities who wish to use some of the "long vacation." In the case of graduates some of the work offered may be counted toward an advanced degree. Undergraduates may anticipate work and thereby shorten their course, or may make up existing deficiencies. The conditions for receiving credit, and the amount which may be obtained, are stated on pages 7 and 8.

3. Students entering the University and wishing to obtain surplus credit at entrance, or to complete the entrance requirements. It often happens that students have in June more or less than the requirements for admission to college. The Summer Session affords them the opportunity either to add to their surplus and thus, in some cases, to gain a year in time; or to make up their deficiency.

4. All persons qualified to pursue with profit any course given, whether or not they are engaged in study or teaching.

STATISTICS OF ATTENDANCE, 1915

The whole number enrolled in the Summer Session of 1915 was 1509 (707 men and 802 women), representing 40 states and territories and 25 foreign countries. Of this number 484 were students during the previous winter; 695 were persons engaged in teaching, of whom 57 were teachers in colleges, 19 in normal schools, 230 in high schools, 243 in grammar schools, 30 in private schools, and 81 were supervisors or superintendents.

ADMISSION, ATTENDANCE, REGISTRATION

There is no examination for admission to the Summer Session. Each person must, however, satisfy the instructor in charge of any course (unless it be elementary) that he is qualified to pursue the work. Any duly registered student of the Summer Session may visit such classes as he desires. **Admission to the class rooms is restricted to duly registered students.** Persons wishing to have work done during the Summer Session counted towards a degree, must conform to the regulations stated under the heading "Credit for Work," page 7.

All students are required to register at the office of the Registrar in Morrill Hall. They may register on Wednesday, July 5th, between 10 a. m. and 5 p. m., or upon the day of their arrival, if they reach Ithaca later than July 5th. Registration on July 5th is urged. Class exercises begin at 8 a. m., Thursday, July 6th.

The Registrar's office is open from 9 a. m. to 4 p. m. every day except Saturday, when it is closed at noon.

Students who wish credit for graduate work must register also with the Dean of the Graduate School at his office, Room 22, Morrill Hall.

TUITION FEE

The single tuition fee, with the exceptions noted below, for the entire Summer Session, whether one course or more is taken, is \$30. This must be paid at the office of the Treasurer, Room 1, Morrill Hall, within five days after registration day. In case of withdrawal within five days from the first registration day, for reasons satisfactory to the Treasurer and the Registrar, the tuition paid may be refunded and the charge cancelled. In case of withdrawal within two weeks after the first registration day, one-half the tuition may be refunded. In case of registration after the first three weeks of the session, students must pay two-thirds of the full tuition fee. No student is admitted without the payment of this fee. Sibley College students taking shop work are not exempted. Admission to classes is restricted to duly registered students.

For instruction in swimming and fencing an extra fee is charged. See p. 14.

Tuition in all subjects taught in the College of Agriculture, is provided by the State of New York, and is free to *residents of this State*. For all others the charge is the same as for other work, \$30. Free tuition does not include any instruction outside the College of Agriculture, nor are students receiving free tuition permitted to attend classes outside the College of Agriculture.

On payment of \$30 a person may take work in both the College of Agriculture and any other department.

Beginning in 1917 a registration fee of \$5 will be charged each student entering the Summer Session for the first time.

LABORATORY FEES

Chemistry. A fee is charged for material actually consumed, and such deposit must be made with the Treasurer as the instructor may prescribe.

Physics. In this department the fee is at the rate of \$1 for every five hours a week of work in the laboratory. The entire amount must be paid to the Treasurer at the beginning of the session.

Geography and Geology. In courses B and D in geography a fee of \$1 each must be paid in advance to the Treasurer to cover incidental expenses of the course.

Shopwork. The fee for shopwork is at the rate of \$1.50 for every fifty hours spent in the shops. This must be paid in advance to the Treasurer. Students registered in Sibley College during the previous year are not required to pay this fee.

Library Deposit. See under Library, page 10.

ACADEMIC CREDIT FOR WORK

In the College of Arts and Sciences. The requirements for the degree of Bachelor of Arts are residence for eight terms (four years), and the completion of one hundred twenty hours ("points") of elective work. A student who

has satisfied the entrance requirements of the College, and has afterward completed in two or more Summer Sessions at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in Summer Sessions be accepted as the equivalent of more than two terms of residence. The maximum amount of credit towards the A.B. degree which is allowed for the work of any one Summer Session is seven hours.

In Other Colleges of the University. The nature and amount of credit allowed in these for Summer Session work may be learned from the statements under the announcement of each course.

In the Graduate School. Graduate work at Cornell is not expressed in terms of courses or hours. A graduate of any college whose requirements for a first degree are substantially equivalent to those for the first degree at Cornell may be admitted to resident study in the Graduate School. He may be admitted to candidacy for an advanced degree upon the recommendation of the professors under whom he proposes to work. The conferring of the degree itself does not depend primarily on the completion of any prescribed number of courses or of a fixed term of residence. It involves the writing of a thesis and the passing of a special final examination. The minimum period of residence for the Master's degree is one academic year or its equivalent, and for the Doctor's degree three years.

Not all work done by a graduate student is graduate work in the strict sense of the term. Graduate work to be considered as work for a degree must be of advanced character in some field or department of knowledge.

The residence requirements for the degree of Master of Arts may be fulfilled in whole or in part by attendance during the Summer Session of the University. For this purpose, two Summer Sessions will be regarded as the equivalent of one term, and four Summer Sessions as the equivalent of one year. Candidates for this degree who are in residence during Summer Sessions only are also required to continue their studies during the year under the direction of the chairman of the special committee in charge of their work.

The graduate work offered in the summer of 1916 may be learned from the departmental announcements. Not all departments offer graduate work.

Any person wishing to become a candidate for an advanced degree and to study during the Summer Session should write to the professor whose work he expects to take, and also to the Dean of the Graduate School, asking for a blank form of application for admission to the Graduate School. It is much better to make these arrangements before coming to Ithaca, thus avoiding delay and interruption of study after the Summer Session has begun.

In order to secure credit for work done in the Summer Session a student must register with the Dean of the Graduate School, Room 22, Morrill Hall, at the opening of the Session.

Certificates for Work Done. Students of the Summer Session who are not matriculated in the University may receive certificates of attendance and of work satisfactorily performed. Application for them must be made before August 15, and the applicant must leave at the office of the Registrar a large sized envelope stamped and directed to his home address. The certificate will then be forwarded by mail. The regulations of each department for the granting of a certificate must be met.

COST OF LIVING

The cost of board and furnished room in Ithaca during the Summer Session runs from \$6 a week upwards. In some cases the cost has been reduced to \$5, but it is not safe to count upon less than this sum.

The price of a single furnished room may be as low as \$1.50 a week. The prices advance with the size and location of the rooms.

Rooms are engaged with the understanding that they will be occupied for the entire session, unless otherwise agreed upon by both parties. Table board is usually engaged by the week, or, if so stated, by the day.

A list of desirable rooms in private houses may be had on application after June 1st. Students are cautioned against unauthorized rooming house agents.

The price of table board runs from \$4.50 to \$6 in boarding houses. In cafeterias and restaurants, the average cost of meals would amount to about the same sum.

RESIDENTIAL HALLS—ROOMS—BOARD

1. For Women. The University has three residential halls for women in which board and rooms may be obtained during the Summer Session by registered students only.

Rooms in these buildings will be reserved in the order of application. Each application for a room must be accompanied by a deposit of \$5.00 or the application will not be entered. If the room assigned is occupied by the applicant the amount of this deposit is held until the end of the session to cover the return of keys, damage to building or furniture other than the ordinary wear and tear, and to insure the completion of the lease. The deposit is refunded if the applicant gives formal notice to the manager on or before June 15 that she wishes to withdraw her application altogether.

In Sage College, which accommodates 175, the charge for room, table board, and a specified amount of laundry, will be, for the session, from \$48 to \$60 according to the size and location of the room.

In Prudence Risley Hall, which accommodates 144, the charge will be from \$54 to \$57 according to the room occupied.

In both buildings this charge includes dinner on Wednesday, July 5, lodging Wednesday night (not earlier), and all meals to and including dinner Thursday, August 17.

Members of the Summer Session who do not room in Sage College or Prudence Risley Hall may obtain table board at either building. The charge is \$5.50 per week.

In Cascadilla Hall a furnished room may be had for the six weeks of the Summer Session at a cost of \$10 to \$18. This building is furnished like the others but has shower baths and not tubs. In this building the University maintains a cafeteria restaurant where meals may be had at very reasonable rates.

For room plans and all information relative to these halls, apply to Thomas Tree, Manager of Residential Halls, Sage College, Ithaca, N. Y.

Checks for reservation of room, or in payment of board bills, should be drawn to the order of Thomas Tree, Manager of Residential Halls.

2. For Men. Founders Hall, one of the new group of residence halls, is available for men students. Founders Hall will not be kept open unless the

demand for rooms is sufficient to warrant it. Rooms may be reserved in Founders Hall by men students in the Summer Session. For all information regarding Founders Hall, write or apply to The Treasurer, Cornell University.

THE LIBRARIES

The University Library is open on week days from 9 a. m to 10 p. m., except Saturday, when it closes at 1 p. m. In this are located the main library, containing about four hundred thousand volumes, and most of the seminary and special libraries. The main reading room affords accommodations for over two hundred readers, and contains a selected library of over 8,000 volumes of reference works. Adjacent to it is the periodical room in which are kept the current numbers of about five hundred journals in various fields of knowledge. These rooms are open to all students. Students properly qualified are allowed the use of the seminary rooms and of the books in them. The main collection is primarily a library of reference for use in the building. Students are, however, to a limited extent, allowed to take out books for home use. Persons wishing this privilege must make a deposit of \$5, which will be refunded upon the return of all books taken out. Special libraries of chemistry, located at present in the University Library, and of anatomy and physiology, located in Stimson Hall, are open to students in these departments.

The Library of the College of Agriculture, in the basement of the Agronomy building, is open on week days from 9 a. m to 5 p. m., except Saturday, when it closes at 1 p. m. In it will be found a large collection of bulletins and reports of experiment stations, reference books on agriculture and country life, agricultural periodicals, and the like. The entomological library, in the Department of Entomology on the fourth floor of the main building, is one of the most complete of its kind in the United States. Nearly all the departments in which instruction is given have well-selected departmental libraries.

LECTURES, MUSICAL RECITALS, EXCURSIONS

In addition to the regular class room work there will be public lectures on Monday evenings. In 1916 these lectures will treat some recent discoveries in Science and their applications.

There are also lectures of general interest each week in connection with the various departments. Notice of these will be given in the University Calendar.

Musical recitals will be given on Tuesday and Thursday evenings alternately in the Sage Chapel and Bailey Hall.

Wednesday evenings are devoted to the departmental conferences which are open to all interested. Notice of these will be given from week to week.

In connection with the work of several departments excursions are made to many points of interest. Some of these are open to members of the Summer Session. Notable for their attraction are the excursions to Watkins Glen and to Niagara Falls.

RAILROAD ROUTES AND RATES

Ithaca is reached by either the Lehigh Valley or the Lackawanna railroad. By the latter, a branch leaves the main line at Owego. Through trains run from New York and Buffalo on the Lehigh, and through sleeping cars run daily

from New York on both roads. From Philadelphia, and from Baltimore, Washington, and the South via the Baltimore & Ohio, the Philadelphia & Reading connects with the Lehigh at Bethlehem. On the Lehigh, through trains for Ithaca connect with the New York Central at Auburn, and with the Pennsylvania (Northern Central) and the Erie at Elmira.

From some important points in the Middle and Atlantic Coast States summer excursion tickets may be purchased to Ithaca. From central and western states it may be possible to buy excursion tickets to Niagara Falls, in case an excursion rate to Ithaca is not available.

Persons interested should, some time in advance of their departure, make inquiry of the railroad agent at their home town. If full information cannot be obtained in this way, write to the Director of the Summer Session, Ithaca, New York.

COURSES OF INSTRUCTION

Most of the courses offered consist of five exercises a week, each week day except Saturday. The number of actual hours of class work in any course may be found by multiplying the number of weekly exercises by six.

The word "hour" used in speaking of University credit means the equivalent of one class exercise a week for a half year or one semester. One hundred and twenty such "hours" are required of candidates for the A.B. degree.

(G. S. = Goldwin Smith Hall.)

EDUCATION

Courses A, B, and C, will be found especially helpful to college graduates who are preparing for examinations in professional subjects as outlined in the New York State Syllabus and Course of Study for the renewal of the College Graduate Certificate Limited. The State Education Department will hold an official examination for such candidates at Ithaca, August 10 and 11. Since it is permissible to do so, those who can should prepare for examination in two subjects this summer and for the remaining two a year later.

A. Principles of Education. Lectures, discussions, prescribed readings. Professor COURSAULT. Daily except Sat., 10. G. S. 256. Credit, two hours.

The purpose of this course is to give an understanding of the fundamental principles which should guide in educational practice. It culminates in a study of the principles that should guide in the selection of the course of study and in the teaching of both knowledge and appreciation. Some of the other topics considered are: the relation of the individual to society; how the individual acquires purposes and ideas; the development of character, and of knowledge and appreciation of the world; the natures and values of the sciences, history, and the fine arts; the nature of social development; the school as a social institution.

B. History of Education. Lectures, discussions, text-book, and prescribed readings. Professor COURSAULT. Daily except Sat., 11. G. S. 256. Credit, two hours.

The purpose of this course is to give a better understanding and appreciation of present educational practices and tendencies by tracing historically the more important movements which have made the present educational situation. Educational practices are not regarded as mere facts, but as the solutions of problems which arose in carrying out social purposes and which determined, from stage to stage, the growth of the school. The development of the curriculum, methods of teaching, and the social control of the school, mark the main lines of the course.

C. Educational Psychology. Lectures, discussions, and readings. Assistant Professor FRASER. Daily except Sat., 8. G. S. 256. Credit, two hours.

The lectures present a system of functional psychology, as applied to education with particular reference to such topics as nervous plasticity, habit, attention and interest, instinctive response, the nature of educational training and discipline, association, perception, observation, memory, imagination, conception, judgment and reasoning. Where feasible, psychological experiments that apply to the

work in hand are described or performed. Students will need for class room use Whipple's Questions in General and Educational Psychology (Cornell Study Bulletins for Teachers, No. 3, C. W. Bardeen, Syracuse, N. Y.), and will find it advisable for outside reading to purchase Kirkpatrick's Fundamentals of Child Study, and Colvin's The Learning Process, The Macmillan Co. Students who have had no previous work in psychology are advised to take Psychology course A also.

D. School Hygiene. Lectures, discussions, and readings. Credit, two hours. Assistant Professor FRASER. Daily except Sat., 9. G. S. 256. Credit, two hours.

This course is designed to afford immediate practical assistance to all teachers, to enable them to secure and maintain hygienic conditions of instruction and to coöperate intelligently in the vitally important movement for the conservation of public health. The course has also been designed to supply superintendents with a program of work which they may follow in extending a knowledge of school hygiene among their own teachers. Attention will be paid to the school-house site and grounds, the form and size of the schoolroom, illumination, heating and ventilating, sanitation, school desks, the hearing and vision of school children, the hygiene of the mouth, throat, and nose, the hygiene of reading and of writing, school diseases and accidents, sex hygiene, fatigue and overpressure, and the nature, value, and methods of medical inspection. The work will be illustrated by numerous demonstrations, and opportunity will be given for practice in conducting special tests of the sense-organs. Students will need for class-room use Dresslar's School Hygiene, The Macmillan Co.

[**E. Mental and Physical Tests of School Children.** Laboratory exercises, lectures, readings, and discussions.] Not given in 1916.

F. High School Education and Administration. Daily except Sat., 10. G. S. 245. Principal SULLIVAN.

The following topics will form the basis for lectures, reading, discussion and reports: the history of high school education in this country; our system contrasted with that of European countries; the aims of secondary education in general and in each subject of the curriculum; the curricula of typical general and special high schools in different parts of the country; present day tendencies toward change; the organization and management of large city high schools and small suburban high schools; the relation to the local and state boards of education, to the superintendent, the parents, the pupils, the employers, and the colleges; the equipment; the selection of teachers; departmental organization and management; program making; examinations and promotion; extra scholastic activities of the students; the treatment of backward and delinquent pupils.

The course is designed for those now teaching in high schools and for those who look forward to becoming high school teachers or supervising officers.

Texts: Brown's The American High School (Macmillan), and Hollister's High School Administration (Heath) should be in the hands of each student.

H. Industrial Education. Lectures on the Problems of Industrial Education by Professor KIMBALL and others. Daily except Sat., 12. G. S. 142. For full statement of this course see page 16.

K. Hygiene. Lectures and personal conferences. Daily at hours to be arranged. Dr. MATZKE, Medical Adviser of Women, Cornell University.

A number of lectures will be given in Stimson Hall. These are open to all students in the Summer Session. Individual appointments will be made for consultation and examination at the office of the Medical Adviser in Sage College. These consultations are open to all women teachers registered in the Summer Sessions.

L. Physical Education for Women. Daily by appointment. Sage College Gymnasium. Miss ATKINSON and Miss SOULE.

I-a. Open to students attending the physical training classes for the first time. A general course in the methods of Physical Education for teachers in the grades and in the high school.

The course will include posture training, school and personal hygiene, means for promoting proper physical growth and development, and the relation of proper nutrition and physical well-being to mind action. Particular attention will be paid to free-hand and light apparatus games, rhythmic movements and their relation to music and physical education, gymnastic stories, and singing games and folk dances.

Daily except Friday and Saturday, hours to be arranged. Miss ATKINSON.

I-b. Advanced work in same material as I-a. May be elected by those having had previous training at Cornell or elsewhere, or by those desiring to take courses I-a and I-b simultaneously.

University credit, one hour.

Daily except Friday and Saturday, hours to be arranged. Miss ATKINSON.

II-a. A course designed to furnish practical material for teachers of the lower grades and to meet the need of those who have not had previous instruction in the following: æsthetic movements and simple dancing steps, folk dancing and singing games.

Daily except Friday and Saturday, hours to be arranged, Miss SOULE.

II-b. Open to those who have taken work equivalent to II-a and to special students in Physical Education who desire to take both II-a and II-b. The course is designed to furnish material for teachers of upper grades and in high schools. Aesthetic movements; folk dancing; aesthetic, solo and group dances.

University credit, one hour.

Daily except Friday and Saturday, hours to be arranged. Miss SOULE.

III. Gymnasium Play-Hour. Review of work in all courses, and games for all students in the department. Required of all students registered in the Physical Education Department. Open to visitors. Friday, in Armory or out of doors, hour to be arranged. Miss ATKINSON.

A gymnasium dress, consisting of bloomers, middy blouse, ballet or gymnasium slippers, is required of all students taking the work. These articles may be purchased in Ithaca or brought from home according to individual preference.

M. Swimming and Fencing.

Instruction in swimming and life saving, and fencing for individual training and for teaching, will be given at hours to be arranged for each applicant by appointment.

For this instruction a special charge is made: for swimming, \$10; for fencing, \$5, including outfit.

Gymnasium costume, and slippers (without heels) will be advisable for fencing.

For women, Sage College Gymnasium. 10-12 a. m., 3-6 p. m. For men, Armory Gymnasium, by appointment. Mr. GELAS.

DEPARTMENT COURSES FOR TEACHERS

In addition to the courses described above there are in the various departments courses arranged specially for teachers. They are described under the announcement of each department. All the work of the Session is arranged primarily to meet the problems of teachers. Even in the elementary courses, in foreign languages, for example, selection and presentation of subject matter receive attention and illustration.

INDUSTRIAL EDUCATION

Manual Training, Trade Instruction, Drawing, and Handicraft

Industrial education means more than the mere teaching of shop work and drawing. It suggests a scheme of education which will make it worth while for all children to remain in school, and which will provide for the children of the masses and for those who enter the great manufacturing and constructive industries something equivalent to what the state is doing for those who enter the professional and managing activities of the country.

We are all aware that many boys and girls do not have opportunity to enter employments that contribute to their development in any sense of the word, either physically, morally, or intellectually, but drift about from one unskilled occupation to another, gaining little or nothing in efficiency.

It is believed that the right sort of handwork and drawing, combined with suitable book work, will give these children the proper training to prepare them to enter some branch of actual industrial work.

Many manual-training teachers are taking this broader view of their work and its relation to other school work, and are endeavoring to fit themselves for the field of industrial education. Some of these teachers are weak on the technical side; others fail to grasp the pedagogical phase of the work.

The growth of industrial education is significant. The program of every institute, convention, and association of school men now gives a prominent place to the subject. Legislative action on industrial and agricultural education is under discussion in nearly every state. A great national movement along lines of education for efficiency is under way. Manual training, cooking, sewing, drawing, etc., have become more than subjects within a school curriculum; they are a part of a new system of education.

For such reasons the University offers in the Summer Session strong courses in education, handwork, and drawing.

Equipment. The shops and drawing rooms of Sibley College are among the largest and best equipped in the country. They are being used regularly by 1200 students and can accommodate 1500. They are at the disposal of the students of the Summer Session, who have the further advantage of seeing the regular instruction given to Sibley College students. They include a machine shop, a foundry, a blacksmith shop, a woodworking shop, and many drawing rooms, lecture rooms, etc. The shops are exceptionally well supplied with machines and tools for complete instruction in the various subjects.

A portion of the equipment has been rearranged and adapted for the special needs of teachers of manual training, drawing, and arts and crafts.

Teachers. The faculty of this department is made up as follows: 1. Teachers of shop work and drawing selected from the regular faculty of Sibley College. Every one of these men is a trained specialist and an experienced teacher. 2. Teachers of handicraft and drawing selected from the teaching corps in cities noted for their excellent handicraft work. 3. Professors in the University who will adapt their usual presentation of subject matter to the needs of teachers in schools of manual training and industrial education.

Admission. The courses are open to men and women, and will meet the needs of: (a) teachers and supervisors of industrial arts, handwork, and drawing who wish to perfect themselves in technical skill and professional study; (b) men or women who have teaching experience, or who possess technical ability and wish to qualify as teachers of these subjects; (c) teachers in the State of New York who wish to qualify for the state examination in drawing and manual training as outlined by the State Department of Education; (d) school superintendents, principal of schools, and teachers who wish, through the lectures and conferences, to acquaint themselves with the methods and practices of industrial education.

Daily Program. The shops and drawing rooms are open daily (until noon on Saturday). The lectures for this department are given between the hours of 12 and 1 every day except Saturday. Conferences will be held during the Session on Wednesday evenings. The University Library is available for reading and original work by students who desire to examine the books, pamphlets, and reports referred to in the lectures and conferences.

Courses of Study. It is believed that some knowledge of the principles of education, a definite understanding of tool processes, and the ability to express ideas adequately through the art of drawing are the professional qualifications which make for efficient teaching of subject matter coming under the head of industrial education. With this aim the department offers three definite courses of instruction: 1. Education; 2. Handwork; 3. Drawing.

I. Education

H. Problems of Industrial Education. Lectures and conferences. Daily except Sat., 12-1. G. S. 142. Professor KIMBALL, and others.

A discussion of the development of industry and the rise of manufacturing methods, with particular reference to the effect of the same on education. Manufacturing methods have changed so radically and have influenced our educational outlook to such an extent that teachers of all branches of industrial education, and no less all supervising officers, need some knowledge of these matters if they are to attempt to prepare young people for industry.

The first part of the course deals, therefore, with the industrial background and the problems on which modern industrial education must be based. Among the topics treated will be the influence of machinery, in general, upon manufacturing methods, the economic problems of production and the related problems of factory legislation and factory welfare work.

In the latter part of the course a survey will be made of the several methods by which modern educators have endeavored to meet these new industrial conditions educationally and of the efforts that are being made by private interests through independent schools and through schools closely identified with industry.

Messrs. WOOD and GRIFFITH who are members of the staff will give a number of illustrated lectures showing the work of several large city school systems and the work will be further supplemented by lecturers drawn from various educational activities where these problems are being considered.

II. Handwork

2. **Manual Training for the Lower Grades.** A course of handwork adapted to the first six years of the elementary school. No set course of study in handwork suitable for this grade will be given, but instead the various materials, suitable for elementary handwork will be made use of and the various methods by which problems can be made will be discussed, demonstrated and used. This will enable those taking the course to have a large variety of experiences and will equip them with such first-hand information as will make them well fitted to select the type of work best suited to the special communities in which they work. In the lessons on stenciling, for example, instead of giving a problem in stenciling of the general type, there will be discussions, demonstrations and practice in stenciling by the direct method, by the indirect method; with water dyes, with spirit dyes, with water colors, with oil paints, and with crayons; by brush method, by spray method; on paper, textiles, and wall surfaces. There also will be given an opportunity to carry out a definite problem with the processes and material best suited to the individual's needs. Work in stick printing, block printing, construction in paper and cardboard, weaving, reed and raffia work, book binding, blue printing and Vandyke printing, thin wood work, and chair caning will be handled in a similar manner in order that it may meet the particular needs of the regular grade teacher, be of help to the special teacher of art and manual training who wishes to become familiar with the problem of handwork in the elementary grades, or of aid to the craft worker who wishes to broaden his experience. Daily except Sat., 2-4. Mr. WOOD.

3. **Wood Work for the Elementary Schools.** This is a course employing a comprehensive set of bench tools adapted to the upper grades of the grammar schools. Each model is considered with reference to form, fitness, and decoration. Methods of presentation and execution. This course is intended to equip a capable but inexperienced person for a position as teacher. Daily, 8-11. Mr. HOOPER.

4. **Wood Working for Secondary Schools.** A course which aims to prepare for the teaching of wood work in the secondary schools. It includes the study of joinery, furniture making, structural design, and decoration. Concrete problems involving the principles of the work will be suggested by the teacher and carried out by the class. The individual will have considerable latitude in the choice of the particular project and in its design and decoration. Particular attention will be paid to design. Daily except Sat., 2-5. Mr. HOOPER.

5. **Shop Lectures and Conferences.** Lectures and conferences on the organization and supervision of manual training, methods, materials, equipments, costs, and courses of study; also practical talks and demonstrations on subjects of importance to the manual training teacher, such as woods and wood construction, lumber and forestry, wood finishing, etc. T Th, 4-5. Mr. WOOD.

6. **Foundry Work for Secondary and Trade Schools.** The course begins with instruction in tempering the sand and making green sand moulds for small work. Following this come exercises in core making, and an explanation of loam work. Machine, floor, and sweep mouldings are briefly described. Castings are made in cast iron, and the students are taught to operate the cupola furnace. Mr. VANDERHOEF.

7. **Forging for Secondary and Trade Schools.** Systematic instruction in the use of each tool as it is taken up, the study of each material worked, with an explanation of its various grades, the proper method of treatment for each, and the discussion of the methods of making large forgings. The ground covered includes instruction in the building and care of fires, heating, drawing, forming, bending and twisting, upsetting, upsetting while bending, upsetting for square corners, punching, bolt making, welding, including careful instruction in scarfing for the various welds, the making and use of heading tools, chain making, the making and fitting of braces, the construction of hooks and ring bolts, riveting, and the use of threading tools. Training is also given in the use of the power hammer. The work in steel includes drawing, forming, welding, and tempering, and spring and tool making.

This course will not be given unless a sufficient number apply to Professor Kimball on or before July 8th.

8. **Machine Work for Secondary and Trade Schools.** The different measuring tools and devices, with the advantages, methods of use, and limits of accuracy of each are considered. Each cutting tool is taken up, its cutting angles and general adjustments are discussed, together with the feeds and cutting speeds suitable for each material worked and for each machine. The course includes instruction in centering, squaring, straight and taper turning and fitting, outside and inside screw cutting, chucking, reaming, finishing and polishing, drilling, tapping, mandrel making, grinding and lapping, boring, brass turning and finishing, ornamental turning, planing flat and V surfaces, fitting, the use of the milling machine, gear cutting, tool making, including taps, drills, reamers, milling cutters, and cylindrical gauges. Mr. WELLS and Mr. BUCK.

III. Drawing and Art Training

9. **Freehand Drawing for Elementary and Secondary Schools.** A course to meet the needs of the public school teacher. A complete course of study, in detail, from the first grade through high school is first considered. Then each subject of that course is carefully developed and worked out. This will include methods of drawing in such phases of the subject as the teacher must meet and in the common mediums such as pencil, water color, crayon, and charcoal. Theory and practice will be closely correlated. The study of design and color, perspective, and the pose, for their public school value, combined with talks on methods of presenting these subjects receive thorough attention. Sketching from nature, including out-of-door work for characteristic growth of trees, forms a part of the course. The relation of art to hand work is considered and the study of design is made applicable to constructive problems. Daily except Sat., 9-12. University credit, two hours. Sibley 208. Mr. GRIFFITH and Miss EVEREST.

Although the above course forms a complete unit in itself, the following course is designed as supplementary.

9-a. Design, Fine and Applied Art. (Open only to students who have completed course nine or its equivalent.) Design is considered from a more advanced point of view and applied to color problems, book plates, title pages, constructive problems, printing, and the like. Stenciling and block printing on velvets and other textiles together with the introduction of interwoven silk on these textiles will be taught; also leather tooling and coloring of leather. Advanced out-of-door sketching will supplement that started in course nine. Manuscript printing, done direct with quill or lettering pen together with illumination will be considered as outgrowths of the study of printing. Costume design and household decoration, as far as they are applicable to the grammar or the high school, will be considered in their application. Throughout the course illustrated lectures to develop art appreciation will be given. All subjects will be considered from the standpoint of both the secondary and the more advanced schools. A small laboratory fee (not to exceed one or two dollars) will be charged, to cover cost of material furnished. Daily except Sat., 8-11. Sibley 202. University credit, two hours. Mr. GRIFFITH and Miss EVEREST.

Students who have completed courses 9 and 9-a may continue their study, if so desired.

10. Mechanical Drawing for Secondary Schools. This course is designed for those who wish to teach mechanical drawing in secondary schools and for those who feel the need of a more complete knowledge of this subject to assist them in teaching shop work. Some of the topics covered are use of instruments, lettering, orthographic and isometric projection, inking, tracing, conventions, and working drawings. Students familiar with these topics may elect a more advanced course. Sibley 102. Assistant Professor HAM.

PSYCHOLOGY

A. Introduction to Psychology. G. S. Room C. Credit, two hours. Lectures: M T W Th, 9. Recitations: F, 9. Dr. FOSTER.

This course furnishes a general introduction to the study of the normal human mind from the experimental point of view. It opens with a brief discussion of the nature of a "scientific" psychology, of the problems which such a psychology is called upon to face, and of the methods at its disposal for their solution. It then sets forth in order the facts and laws of mental life which have been revealed by experiment, beginning with the mental elements, sensation, image, and affection; it passes by way of attention, perception, association, and memory to the highly complex processes of imagination, voluntary action, and thought. Throughout the work use will be made of the unique collection of demonstrational apparatus which composes the equipment of a special laboratory in Goldwin Smith Hall. The beginning student is thus enabled to confirm in his own experience the statements made in the textbook and in the lectures.

Readings will be prescribed in Titchener's *Beginner's Psychology* (Macmillan) and questions based upon the text and lectures will be answered by the student each week in writing. Supplementary readings in Titchener's *Textbook of Psychology* will be recommended to members of the class who desire to pursue more intensive study.

B. The Psychology of Memory and Learning. G. S. 245. Credit, one hour. T Th, 11. Dr. FOSTER.

A brief account of the psychology of memory and allied processes, and of their meaning in common life. The course will begin with the necessary preliminary study of attention, image, and idea. The later lectures will deal in greater detail with the results of the experimental investigation of association, retention, and recall, and will discuss the laws of memory, the explanation and systematic bearing of the facts discovered, and the practical bearing of the facts upon such matters as rules for teaching and learning, mnemonic systems, the formation and breaking of habits, recitation, examination, and "cramming." Demonstrations involving the more recent and precise apparatus and technique of the memory-methods will be introduced. Reading will be prescribed in Titchener's Textbook of Psychology, and the student will be occasionally referred to Meumann's Psychology of Learning (trans. by Baird).

C. The Psychology of the Unusual Mind. G. S. 245. Credit, one hour. M W F, 11. Dr. BORING.

Primarily a lecture course. No knowledge of psychology is presupposed. Emphasis will be laid upon the relation of the abnormal to the normal mind and upon the occurrence of the abnormal in every day life. The lectures will treat of the minds of exceptional and defective persons, including the feeble-minded and geniuses; of mental derangements, such as hallucinations, illusions, hysteria, sleep, dreams, hypnotism, and telepathy; and of the disorders of sensation, perception, feeling, and memory, occurring in the insanities. The course will conclude with a discussion of the inheritance of mental traits in relation to eugenics. The presentation will be as systematic as possible, and will seek always to distinguish between the observed fact and its theoretical interpretation.

D. Introductory Laboratory. Psychological Laboratory, Morrill Hall. Credit, two hours. M W F, 2.00-4.30. Drs. FOSTER, BORING, and Mr. BISHOP.

The aim of this course is to furnish the student training in psychological methods, and to give him a first-hand acquaintance with the contents of his own mind. The laboratory consists of twenty-seven rooms on the upper floors of Morrill Hall, including dark rooms, work-shops, and offices. The equipment on the side of apparatus is especially complete, embracing besides the standard pieces for qualitative experiments a great variety of special instruments. The entire equipment of the research laboratory is also available for demonstrations. Experiments will be performed in vision, audition, and the other departments of sense, in feeling, attention, perception, and idea, and toward the end of the work the student will be in a position to carry out experiments upon the more complex processes of association and action. The textbook will be Titchener's Experimental Psychology, vol. i, Qualitative Student's Manual.

E. Quantitative Laboratory. Psychological Laboratory, Morrill Hall. Credit, two hours. M W F, 2.00-4.30. Drs. FOSTER, BORING, and Mr. BISHOP.

This course aims to furnish training in psychological method and in the handling of instruments of precision which will be adequate preparation for research problems. Lectures will be given on the general theory of mental measurement, and appropriate reading will be assigned. Thereafter the student will make experimental determinations of the stimulus *limens* and attempt verifica-

tions of Weber's Law in various departments of sense, and will perform at least one experiment by each one of the chief psychophysical methods. Quantitative experiments in memory, action, the time-sense, or in other chosen fields may be undertaken in so far as time permits. The text-book will be Titchener's *Experimental Psychology*, vol. ii, *Quantitative Student's Manual*.

Laboratory partnerships must be formed if the work of this course is to be pursued with profit. If, therefore, a partner cannot be found, the student is recommended to register in course F.

F. Advanced Work in Psychology. Psychological Laboratory, Morrill Hall. Hours and credit to be arranged. Drs. FOSTER and BORING.

As a prerequisite for this course, Course D or its equivalent is necessary. The work may consist either of essays and reports upon some special topic, or of laboratory practice at a higher level than that of Course D.

PHILOSOPHY

A. History of Modern Philosophy. Daily except Sat., 9. G. S. 231. Credit two hours. Dr. WRIGHT.

A series of lectures and informal discussions furnishing an outline of the history of philosophical thought during the modern period; the various movements and systems interpreted in relation to scientific, social, religious, and educational tendencies contemporary with them. Emphasis will be placed upon the philosophers of the more brilliant periods, such as the Renaissance and Enlightenment, and some notice will be given to the changed logical and ethical standpoints that have arisen in recent times in consequence of the doctrine of evolution, and of altered social and economic conditions. Readings will be assigned in the standard histories of philosophy and in the writings of the philosophers themselves, to be found in the Library, and no regular text-book will be used. No prerequisites.

[**B. Philosophy and Psychology of Religion.** Daily except Sat. Credit, two hours.] Not given in 1916.

C. Practical Problems in Social and Political Morals. Daily except Sat., 12. G. S. 227. Credit, two hours. Dr. WRIGHT.

An introduction to social and political ethics, commencing with a brief outline of the beginnings and growth of morality among primitive races and the course of moral development among the ancient Hebrews and Greeks and during the medieval and modern periods. This will furnish the background for the discussion of some of the moral problems in social and political life at the present time, such as the respective rights and duties of the individual citizen, the state, the industrial corporation, the labor union, the family, and woman. The ethical merits of individualism and socialism as proposed solutions of such problems will be considered, as well as the possibility of a compromise between them. The practical aspects of these problems will be emphasized, and the necessity for studying them in a scholarly manner, in the light of historical development and of fundamental ethical principles in order to gain an intelligent understanding of them, will be insisted upon. The meetings of the class will consist chiefly of informal recitations and discussions, supplemented by occasional lectures. Dewey and Tufts' *Ethics* will be used as a text-book, and references to other literature, to be read in the library, will be given from time to time. Each mem-

ber of the class will be expected to prepare a term paper upon some ethical topic considered in the course. Short papers also may be required from time to time. No prerequisites.

While the above courses are primarily for undergraduates, they may also be taken by graduate students, who, if credit is desired, will be expected to undertake additional reading of a more advanced character, and to prepare a special paper under the supervision of the instructor. Arrangement will be made by the instructor for occasional personal conferences with graduate students regarding their work.

ENGLISH

A. Composition. Daily except Sat., 8. G. S. 156. Credit, two hours. Mr. BALDWIN.

A practical drill intended for those who lack proficiency in writing: frequent short themes and several longer papers, expository, descriptive, and narrative; discussion of the elements and forms of discourse; weekly personal conferences at hours to be appointed. This course and course B (see below), taken together, will be considered the equivalent of the first term of course 1, or course 3, in the regular University session.

B. Introductory Course in Literature. Daily except Sat., 10. G. S. 164. Credit, two hours. Dr. BROUGHTON.

A study of Tennyson and Browning with special attention to the *Idyls of the King* and the *Ring and the Book*.

This course and course A (see above), taken together, will be considered the equivalent of the first term of course 1, or course 3, in the regular University session. Texts: Oxford editions.

C. Shakespeare. Daily except Sat., 9. G. S. 156. Credit two hours. Mr. BALDWIN.

Designed mainly for high school teachers of English. A study of three or four of the greater tragedies, with comment on textual difficulties and discussion of important problems of character and plot. Stress will be laid on one play, the choice of which will depend on the preference of the class. Text: Bradley's *Shakespearean Tragedy*.

D. Modern English Grammar. M W F, 8. G. S. 162. Credit, one hour. Dr. BAILEY.

A study of the grammatical structure of the modern English sentence, with special reference to the textbooks ordinarily used in primary and secondary schools. Discussion of the terminology adopted in recent treatises, consideration of problems in sentence structure, and drill in syntax. Credit gained in this course may not be used to meet the underclass English and history requirement in the University. Text: Leonard's *Grammar and its Reasons*.

[**Nineteenth Century Poets.** A study of some of the greater English poets of the past century, with particular reference to the significance of their work as a whole. Reading and discussion of numerous poems of Wordsworth, Byron, Shelley, and Keats.] Not given in 1916.

E. Wordsworth and Coleridge. Daily except Sat., 12. G. S. 162. Credit, two hours. Dr. BROUGHTON.

A study and discussion of the most important poems of Wordsworth and Coleridge, including a brief survey of preparatory influences and poetry in the eighteenth century, but with particular reference to the significance and interpretation of the works of these two poets as a whole. Texts: Oxford editions.

F. Advanced Composition. Daily except Sat., 9. G. S. 164. Credit, two hours. Assistant Professor MONROE.

A course intended for students who have had course A or its equivalent and for persons of some maturity who wish further training in expression. A review of the principles of writing, with study of some notable essays on the theory of style. Regular practice in exposition, narration, and description. Personal conferences at hours to be appointed.

G. Nineteenth Century Prose. Daily except Sat., 9. G. S. 160. Credit two hours. Assistant Professor PRESCOTT.

A study of representative works of Carlyle, Newman, Arnold, and Stevenson, with reference both to thought and to style. Study and discussion of selected essays of the Nineteenth Century in literature and style, designed to give, especially to teachers, a sound theory of composition.

H. Teachers' Course. Daily except Sat., 11. G. S. 156. Credit, two hours. Dr. BAILEY.

Designed for those who are teaching English, or who expect to teach the subject. Methods of treating the novels, the poems, and the essays named by the Conference on Uniform Entrance Requirements in English; discussion of related topics in composition.

J. The English Language. Daily except Sat., 10. G. S. 164. Credit, two hours. Assistant Professor MONROE.

A study of some significant features in the growth and development of the mother-tongue: vocabulary, sounds and pronunciation, inflections, syntax, native resources, foreign influences, the bearing of historical grammar on modern forms and usages spoken and written. Recitations and lectures, collateral reading and reports.

K. American Literature. Daily except Sat., 12. G. S. 156. Credit, two hours. Dr. BAILEY.

Introductory lectures on the colonial and revolutionary periods; discussion of nineteenth century authors. Text: Page's Chief American Poets.

L. Poetry and Versification. Daily except Sat., 11. G. S. 160. Credit, two hours. Assistant Professor PRESCOTT.

A study of poetical principles, as exemplified in English poetry. Consideration of the nature of poetic material, content, and structure: types of poetry; discussion of metrical forms in verse and stanza; occasional composition in verse. Open only to students who have had a year's work (or its equivalent) of English in college.

PUBLIC SPEAKING—ORAL ENGLISH

In all the courses described below, individual instruction will be given by appointment. In this way the particular needs of each student, however varied they may be, can be met. No fees will be charged for this special instruction.

A. Public Speaking. Daily except Sat., 11. G. S. 21. Credit, two hours. Mr. DRUMMOND.

A practical training for speaking in public. Original speeches and selections; extemporaneous speeches. Methods of preparing will be discussed and illustrated. High school teachers will find the methods applicable to their work. Regular students passing this course will be admitted to the work of the second term in Public Speaking, course 1.

B. Voice Training. Daily except Sat., 8. G. S. 21. Credit, one hour. Special work may be arranged with the instructor for one hour additional credit. Assistant Professor MUCHMORE.

This course consists of exercises, both physical and mental, for the development of pure tone, flexibility, melody and strength of voice, clear enunciation, and for relief from high, strained tones, harshness, throatiness, and speakers' sore-throat. Private appointments will be given each student, in which the voice will be tested, and, if needed, special exercises prescribed. The course necessarily includes training for poise and ease of action. The relation of the voice in conversation, teaching, and public speaking to health is emphasized.

D. Oral Reading. Daily except Sat., 10. G. S. 21. Credit, two hours. Assistant Professor MUCHMORE.

This course is designed especially to help teachers of literature, but is open to all students. The first part of the course will be devoted to the elements of reading: attention, individualization, and sequence of ideas. The second part will be given to the oral interpretation of literature, with special emphasis on the spirit rather than the form. Each member of the class will receive private appointments, and will prepare individually at least one selection. Regular students who pass this course will be admitted to the second term in Oral Reading, course 10.

E. The Production of School Plays. M W F, 9. G. S. 26. Credit, one hour. Consent of instructor necessary for admission. Mr. DRUMMOND.

The course is intended to give teachers sufficient knowledge of play-production to meet the growing demand in the schools for dramatics that have an educational value. There will be consideration of choice of plays, elements of training, staging of plays, and other practical phases of production. Reading of plays to insure sufficient familiarity with suitable dramatic literature will be required. One act plays will be rehearsed.

FRENCH

Courses A, B, C, afford the student an opportunity of gaining a working knowledge of French and also a chance to make a rapid review of the subject. The other courses are intended for teachers and graduate students. The members of the Department will be very glad to supervise the work of graduate students in any special field of investigation.

A. First Year French. Grammar, reading, composition, and conversation. Daily except Sat., 8 and 12. G. S. 283. Professor MASON. University credit, four hours. Entrance credit, one unit.

The object of this course is two-fold: first, to give beginners a thorough drill in the essentials of French pronunciation, grammar, and reading; second, to offer

to teachers an opportunity to study the methods of presentation of these subjects to beginners. By supplementary reading after the Summer Session the beginner can prepare himself for the fall examinations in Second Year French, or he may complete the work for the second unit by taking in the University a special course three hours a week.

B. Second Year French. Grammar review and reading. Daily except Sat., 8 and 12. G. S. 281. Mr. HUBERT.

University credit, four hours. Entrance credit, one unit.

C. Third Year French. Daily except Sat., 8 and 12. G. S. 277. University credit, four hours. Entrance credit, one unit. Assistant Professor PUMPELLY.

D. French Literary Criticism. Daily except Sat., 9. G. S. 283. Professor MASON. Credit, two hours.

A detailed study of the more important periods of French literary criticism. Lectures and presentation of papers. This course is primarily for graduate students. Students electing this course are expected to devote their entire time to it.

E. An Introduction to French Philology. Lectures and Explications de Textes. Daily except Sat., 10. G. S. 281. Assistant Professor PUMPELLY. Credit, two hours.

The fundamental principles of Old French phonology and morphology will be treated in the lectures. The Explications de Textes, based on the *Chanson de Roland* (Ed. Gaston Paris, Ginn & Co.) will be used as illustrative material for the lectures, and will consider in detail the laws governing the derivation of French from Vulgar Latin. Constant attention will be paid to the application of a knowledge of Old French philology to the teaching of modern French. Students who elect this course are expected to devote their entire time to it.

F. History of French Literature. Lectures in French and in English. Outside reading and reports. Daily except Sat., 11. G. S. 283. Mr. HUBERT. Credit, two hours.

G. Old French Texts. Daily except Sat., 9-11. French Seminary Room, Library. Professor COMFORT. Credit, two hours. Prerequisite course E.

A literary study of selected Old French texts, such as *la Vie de Saint Alexis*, *Aucassin et Nicolette*, *le Voyage de Charlemagne*, *Eric et Enide*, *Yvain*. Students who elect this course are expected to devote their entire time to it. This course will probably be given in alternate years.

SPANISH

A. First Year Spanish. Grammar, pronunciation, composition, translation. Wagner's Spanish Grammar. Daily except Sat., 8 and 12. G. S. 225. Assistant Professor KENISTON. University credit, four hours. Entrance credit, one unit.

The object of this course is to afford to those who have had no Spanish an opportunity to acquire the essentials of the grammar, to lay the foundations for the spoken and written use of the language, and to learn to translate easy Spanish readily.

B. Second Year Spanish. Grammar review, conversation, composition, reading. Coester's Spanish Grammar. Daily except Sat., 8 and 12. G. S. 126. Mr. RIVERA. University credit, four hours. Entrance credit, one unit.

This course will be conducted, as far as feasible, in Spanish.

C. Third Year Spanish. Translation and reading of modern authors. Daily except Sat., 8 and 12. G. S. 221. Professor COMFORT. University credit, four hours. Entrance credit, one unit.

Open also to those who have had one year of college Spanish. Especial emphasis will be laid on modern Spanish idioms and on the accurate rendition of prose and verse into English.

D. Spanish Composition and Conversation. Daily except Sat., 11. G. S. 221. Mr. RIVERA. University credit, two hours.

Intended for students who have had at least two years of preparatory school Spanish or one year of college Spanish and who desire further practise in correspondence and in the oral use of the language. It may be profitably taken in connection with Course C. The course will be conducted largely in Spanish.

E. Old Spanish. Lectures and study of early texts. Daily except Sat., 9. G. S. 282. Assistant Professor KENISTON. University credit, two hours.

This course is designed to offer to graduate students the fundamental principles of Spanish phonology and morphology and some acquaintance with early Spanish literature. Textbooks: Ford's Old Spanish Readings (Ginn & Co.); Poema del Cid (text only) ed. R. Menéndez Pidal. Students who elect this course are expected to devote their entire time to it.

GERMAN

Courses A, B, C, afford the earnest worker an opportunity to gain a working knowledge of German by highly concentrated effort, and a chance to make a rapid review of previous reading.

The other courses are intended for teachers and for students of considerable proficiency in the subject. They present opportunity for advanced study in language, grammar, and literature, and also are intended to give direct practical assistance in all the various problems which confront the teacher. Students are urged and encouraged in every possible way to use German in and out of the class room. See particularly under Deutsches Haus, page 29.

A. First Year German. Oral training, grammar, composition, reading. Daily except Sat., 8 and 12. G. S. 183. Professor POPE. University credit, four hours. Entrance credit, one unit.

This course affords an opportunity for those who have had no German to acquire a practical working vocabulary, to master the essentials of grammar, to learn to read easy German, and to begin conversational work in the language. As far as possible the language of the class room will be German. Two recitations will be held daily except Saturday with sufficient time between the two for the preparation of the second lesson. Textbook: Zinnecker's "Deutsch for Anfänger." After successfully completing this course, students can, by supplementary reading during the summer, prepare themselves for the fall entrance examination in second year German, or they may take the second year German course during the first term of the regular college year. Dr. POPE will be in Room 182, T Th, 9, to give special assistance to members of this class.

This course also affords teachers of German an opportunity for observation of methods of teaching.

B. Second Year German. Oral and written use of the language based on the reading of German texts. Review of important topics of grammar in connection with the reading. Two recitations will be held daily except Saturday with sufficient time between the two for the preparation of the second lesson. Text-books: Storm's *Immensee* (ed. by Elmer & Neumarker, Chas. E. Merrill Co.), and Hillern, "*Höher als die Kirche*" (ed. Heuser, Chas. E. Merrill Co.).

Prerequisite: one year of high school German or its equivalent. Those who do not present certificates showing the completion of one year's work in German will be required to take a test at the beginning of the course. This course is equivalent to the second year of high school German and its completion entitles the student to a second unit of entrance credit in German. University credit, four hours. Daily except Sat., 8 and 12. G. S. 177. Dr. JONAS. The instructor will be in room 178, T Th, 9, to afford special assistance to members of this course.

C. Third Year German. Reading and translation of German texts accompanied by exercises in grammar, composition, and conversation. Two recitations a day will be held, with a sufficient interval to enable the student to prepare for the second recitation. Text-books: Joynes-Wesselhoeft's *German Lesson Grammar*, Storm's "*Pole Poppenspüler* (Scribner edition); Riehl's "*Der Fluch der Schönheit*;" Freytag's "*Die Journalisten*." Prerequisite: two years of high school German or its equivalent. The completion of this course entitles the student to the third unit of entrance credit in German. Daily, 8 and 12. G. S. 134. Dr. ZINNECKER. University credit, five hours.

The instructor may be consulted T Th, 9 in room 178.

D. Advanced Course in Modern German Grammar. Daily except Sat., 11. G. S. 236. Professor BOESCHE. Credit, two hours.

The aim of this course is entirely practical. It is intended to serve the need of teachers of German who feel that without a thorough and fairly scientific knowledge of grammar there can be no competent teaching of its elements. The most troublesome and important questions in modern German accidence and syntax will be discussed with greater thoroughness than is found in even the larger general works on the subject. The inflection of pronouns and adjectives, the use of cases, the employment of *haben* and *sein* as auxiliaries, the subjunctive, moods and tenses in indirect discourse, and the order of words will be among the topics treated.

[**History of the German Language.** A study of the development of modern German with constant attention to the practical needs of teachers. The course aims particularly at the explanation of modern German accidence and syntax in the light of our knowledge of past stages of the language.] Not given in 1916.

E. Advanced Composition and Conversation. Daily except Sat., 8. G. S. 190. Assistant Professor DAVIDSEN. Credit, two hours. This course will aim to train the students to write and to speak correct German. It will be conducted in German. Papers, based upon pictures and works of literature discussed orally in class, will be handed in regularly and corrected by the teacher. A few extra hours will be set aside for instruction in elementary phonetics.

[**Studies in the Style and Technique of the Nineteenth Century Prose Writers.** Assistant Professor DAVIDSEN.] Not given in 1916.

[**Comparative Studies in the German Drama.** Assistant Professor DAVIDSEN.]
Not given in 1916.

F. Nineteenth Century Prose Writers. Daily except Sat., 9. G. S. 183.
Assistant Professor DAVIDSEN. Credit, two hours, with one hour more for extra work assigned.

Two distinct subjects will be treated in this course; first, the characteristic elements of German prose style; second, the technique of the German "Novelle", particularly the so-called "Rahmenerzählungen", "Erinnerungs-, Bekenntnis- and Chroniknovellen". The study of style will be based on works of Heine, Kleist, Stifter, Keller, Liliencron; that of technique on works of Goethe, Hoffmann, Hauff, Grillparzer, Storm, Heyse, and C. F. Meyer.

The work will be mostly conducted in German. Extensive reading will be required, mostly of ordinary difficulty and largely of works read in schools and colleges.

G. Lessing's Life, Writings, and Influence. Daily except Sat., 10. G. S. 236. Professor BOESCHE. Credit, two hours. This course will deal chiefly with Lessing, the revolutionizing critic and "liberator". A fair degree of fluency in reading German will be presumed. Any edition of Lessing's works may be used. A good low priced edition will be obtainable in Ithaca.

[**Life and Works of Goethe.**] Not given in 1916. May be expected in 1917.

[**Life and Works of Schiller.**] Not given in 1916. May be expected in 1918.

H. Training Course for Teachers. Daily except Sat., 10. G. S. 190. Dr. JONAS. Credit, two hours, with an extra hour for work assigned.

The aim of this course is to aid the teacher of modern foreign languages in the practical solution of class room problems by a study and demonstration of methods used by progressive teachers in Europe and in this country.

Among the topics to be treated are the following: a brief history of the teaching of German in the United States; the Report of the Committee of Twelve; the reform movement in the teaching of foreign languages in Germany and other European countries; the educational value of German; the aim of the teaching of German in the high school; the question of introducing German into our elementary schools; the bearing of certain results of modern psychology on the instruction in modern languages; the place of phonetics; standard pronunciation; the inductive method of teaching grammar; the treatment of special topics in grammar and syntax; drill and habit-formation; "living" grammar; the Gouin method; use of connected texts and of detached sentences in elementary language work; the relation of oral work to written exercises; the building up of a vocabulary; the amount and proper selection of reading matter for the different years of the course; the place of translation in connection with reading; reading without translation; dramatization of stories; the treatment of poems; the historical and geographical background of the reading matter, leading to a sympathetic understanding of the life of the German people; the use of pictures and other illustrative materials; formal prose composition and free composition; the use of German journals and magazines; helpful adjuncts to class room work, such as the use of a pupils' library, a German "Verein," and international pupils' correspondence; the preparation of the teacher and aids to self-improvement.

The New York State Syllabus, the requirements of the College Entrance Examination Board, and the present syllabi for the teaching of modern foreign languages in the elementary and high schools of the city of New York will also be studied.

In order to help the teacher in the selection of textbooks to be used with beginners, an exhibit of the most recent grammars and elementary readers will be made, and a number of these will be critically studied by the students.

J. Middle High German. Daily except Sat., 10. G. S. 183. Professor POPE. Credit, two hours.

This course is intended to enable the student to read mediæval German literature in its original form, to give him the historical point of view in dealing with modern German grammar, and to serve as an introduction to the study of Germanic philology. Selections from the Nibelungenlied, from the court epics, and a number of the poems of the minnesingers, especially Walther von der Vogelweide, will be read. The grammatical treatment will constantly have in mind the explanation of modern German and is intended to serve the practical needs of teachers.

Textbooks: Pauls Mittelhochdeutsche Grammatik; Bachmanns Mittelhochdeutsches Lesebuch.

[Richard Wagner. Lectures in English on Wagner's theory of the music drama, the sources of his operas, his place in German literatures and music, and his influence on modern culture, with illustrative recitals.] Not given in 1916.

Deutsches Haus

In order to give greater opportunity for hearing and speaking German, a large residence has again, as in the last two years, been rented for the exclusive occupancy of women students in German. It is five minutes' walk from Prudence Risley Hall, where meals will be taken, and in one of the most beautiful parts of the town. Miss Elizabeth Undritz will have charge of the house and of the table.

As the number that can be accommodated is limited, prospective students are asked to communicate at once with Professor H. C. Davidsen, Highland Avenue.

LATIN

The courses in Latin during the Summer Session are intended primarily for teachers and prospective teachers in secondary schools.

Courses A and B will have direct bearing on the work of the schools, and will be under the charge of an eminent educator who has had long experience in the field of secondary instruction. Course C will be devoted to a theoretical consideration of the Latin language with especial reference to the syntax of the classical period. An advanced reading course, course D, will be devoted to the life, the works, and the influence of Seneca as illustrated by his letters to Lucilius and by selections from his essays.

Qualified students may begin or may continue their work in candidacy for the degree of master of arts, and courses C and D are reckoned as graduate courses for candidates for the degree A.M. Correspondence in advance concerning graduate work is invited, and prospective graduate students should confer with Professor Durham immediately after their arrival in Ithaca.

A. The Teaching of Latin in Secondary Schools. Daily except Sat., 11 G. S. 128. Mr. JAMES. Credit, two hours.

This course is designed for those who intend to teach or are teaching Latin in secondary schools. Among the subjects that will be considered are: what a high school pupil should get from the study of Latin; essentials and non-essentials in each term of the course; simpler and fewer rules of syntax; the direct method, its advantages and disadvantages and the extent to which it can safely be used; co-ordination of Latin with other secondary school subjects; simplification of Latin grammatical nomenclature and its uniformity with modern foreign languages and with English; class room equipment.

A detailed outline will be worked out for the ground which should be covered in a four years' course in Latin. This plan will contain the forms, syntax, composition, translation, and general information which should be taught during each half-year, and considerable emphasis will be placed upon the methods of presentation which are peculiar to each of these topics in the work of each term.

The experience of members of the class and the individual problems of each teacher will receive attention. This and the following course are designed to give a comprehensive treatment of teaching secondary Latin.

B. Latin Composition. Daily except Sat., 10. G. S. 137. Mr. JAMES. Credit, two hours.

A course for teachers of Latin in the theory and practice of Latin composition and its teaching. The composition will be both oral and written, prepared and unprepared. The subject will be approached through the English, and emphasis will be placed on the translation of ideas rather than of words.

C. The Latin Language and Latin Syntax, with particular reference to the classical period. Credit, two hours. Daily except Sat., 8. Goldwin Smith 128. Professor DURHAM.

D. Seneca. The letters to Lucilius and Selections from the essays. Credit, two hours. Daily except Sat., 9. Goldwin Smith 128. Professor DURHAM.

The Field of Latin Studies. A series of conferences on the scope and nature of such studies as vulgar Latin, Latin epigraphy, palaeography and the transmission of manuscripts, textual criticism, metrical clausulæ, the nature of Latin accentuation, the relation of Latin to the Romance languages, Latin versification and the reading of Latin poetry, etc. Goldwin Smith 128. Professor DURHAM.

SCIENCE OF LANGUAGE

A. Introduction to the Study of Language. Daily except Saturday, 12. Goldwin Smith 137. Professor BRISTOL. Credit, two hours.

In this course the instructor will take up for discussion some of the underlying principles of all language phenomena with the special aim of illustrating facts and problems common to work in ancient and modern foreign tongues. The possibility of mutual assistance in language teaching will be constantly discussed, as well as uniformity in terminology. The course deals with comparative grammar only so far as the laws of this science explain phenomena which teachers are called on to treat and explain. Individual experiences of the class will be compared.

Graduate students may take this course as a part of work for the A.M. degree, if they make the request at the beginning of the course. A certain amount of reading in connection with the regular work will then be assigned them.

The following topics are likely to be the most essential to teachers in this field: The elements of phonetics; simplification of the confused phraseology now in use. Illustrations of these phenomena in English as a help to the teacher of foreign language. The resemblances and the differences in Latin, German and English forms and syntax. Linguistic relations between these languages. The different ways in which Latin has entered into the modern languages of Europe, English in particular. The Greek in modern tongues. What is "life" in language? How are languages growing to-day? What shall the teacher say to new words? What is "translation," and how shall it be employed best in school? What should be the principal aim of language study in school?

HISTORY AND GOVERNMENT

A. American Government and Politics. Daily except Sat., 8. G. S. 234. Credit, two hours. Professor BRETZ.

A study of the more important questions of government and politics at the present time. Among the topics discussed are the power of the courts to declare legislation unconstitutional and the problems arising from the exercise of that power; the amendment of constitutions, state and federal; citizenship and naturalization; the interpretation of the Fourteenth and Fifteenth Amendments; problems arising from our insular possessions; the treaty-making power of the United States; and other matters of current significance. While some attention will be paid to the structure of government the emphasis will be upon its operation. The work consists of reading specially assigned references and discussion in class.

[**American History, 1850-1875.**] Not given in 1916.

B. American History. The Middle Period, 1815-1860. Daily except Sat., 10. G. S. 234. Credit, two hours. Professor BRETZ.

This is a general course covering the principal topics in the period indicated. As an aid to those teaching American History attention will be directed to the best historical literature and the results of the more recent study of the field will be discussed. J. S. Bassett's Short History of the United States will be used as a text, and special use will be made of William E. Dodd's Expansion and Conflict.

D. Greek and Roman History. Daily except Sat., 9. G. S. 134. Credit, two hours. Professor SILL.

A general view of the rise, the progress, the achievements and the decline of Greek and Roman civilization. The lectures will deal especially with the most significant features of this development, including the civilization of Crete, the rise of Ionia, Greek colonial expansion, the Greek victory over Persia, Athens in the age of Pericles, the Macedonian conquest, the Hellenistic age, the Roman unification of Italy, Roman imperialism, Hellenism at Rome, the Roman revolution, the Augustan age, the Roman Empire in the second century after Christ, and the decadence of the ancient world.

[**E. English History to 1485.** A survey of the salient aspects of political, constitutional, economic, and social development. The lectures deal with the land and the people; the development of a Teutonic civilization; the changes

wrought in the social and legal frame-work by the imposition of feudalism; the foundation of the English constitution; the gradual rise of representative institutions; the relations with the continent; the introduction and spread of Christianity; the growing power of the church and the conflict between church and state; life in town and country; the growth of commerce and industry and the rise of the middle class; intellectual currents and the birth of modern England.] Not given in 1916.

F. English History. 1485-1916. Daily except Sat., 10. G. S. 242. Credit two hours. Professor LUNT.

A continuation of course E to the present. The lectures deal with the part played by England in the international rivalries of the sixteenth century, the reformation, the economic and social changes under the Tudors, the struggle between crown and parliament under the Stuarts, the foundation and expansion of the empire, the growth of cabinet government, the economic revolution, parliamentary reform, parties and politics, and other similar topics.

G. Medieval History. Daily except Sat., 11. G. S. 245. Credit, two hours. Professor LUNT.

A survey of the history of Europe from the barbarian invasions to about 1300 A.D. Such topics will be considered as the later Roman Empire, the early Germans, the migrations, Christianity and the church, the rise of Mohammedanism, the Frankish kingdom, the empire of Charlemagne, the empire and the papacy, the crusades, feudalism, life in town and country, intellectual development.

H. Seminary in English History. One two-hour session each week, at a time to be arranged. First meeting Monday, July 10, 2-4 P. M. in the European Seminary Room of the University Library. Professor LUNT.

A course of research intended primarily for graduate students. The purpose is to give practice in the application of the principles of historical criticism of the medieval period and the study of problems which arise out of the chronicler's narrative. The work used this year will be the *Historia Maior* of Matthew Paris. The course is so organized that it may be taken in consecutive years without repetition of work. A reading knowledge of easy Latin is presumed.

J. European History since 1814. Daily except Sat., 11. G. S. 242. Credit, two hours. Professor SILL.

A survey of the internal development and the external relations of the leading countries in Europe during the past hundred years. The period between 1814 and 1848 will be treated in introductory lectures; more extensive consideration will be given to the establishment of the German Empire, to the unification of Italy, and to the Eastern Question; and as much attention as possible will be given to the political, economic, social, and intellectual history of recent years.

K. South America; Social, Political and Economic. Daily except Saturday, 9. G. S. 234. Professor LINGLE.

A general survey of South America and its several countries with reference to their history and civilization, their economic development and outlook, their commercial and diplomatic relations with each other, with the United States and other countries. An attempt will be made to answer many of the questions of the student, the traveller, and the tradesman regarding these matters and to stim-

ulate further investigation of the natural resources, industrial development, and present day tendencies in South American countries.

L. Methods of Teaching History and Civics in the High School. Daily except Sat., 12. G. S. 242. Principal SULLIVAN.

The following topics will form the basis for lectures, reading, discussions, and reports: educational value and scope of history; the definition and aims of history teaching; relation of history to the other subjects of the curriculum, particularly geography; the use of the text-book; notebooks; notes and outlines; maps; charts; blackboard work; reference books and library work; sources; tests; examinations; reports; pictures; lantern slides; local history; lesson planning; reviews and criticisms of texts; elimination of the unimportant; curricula in history of typical general and special high schools in this country and Europe; reports of the Madison Conference, the Committees of Seven and Five of the American Historical Association; committees now at work; future tendencies; relation of history to civics and constitutional history; civics as a separate subject; report of the Committee of Five of the American Political Science Association; relation of the high school curricula to the elementary school curricula in history; report of the Committee of Eight; class room management in history; the preparation of the teacher; organization of subject matter; the recitation; departmental organization and teaching. The class will be organized in small groups for some practice teaching.

Bourne's *Teaching of History and Civics*, (Longmans); and Johnson's *Teaching of History* (Macmillan), should be in the hands of each student.

ECONOMICS AND SOCIAL PROBLEMS

The following courses are designed to meet the needs of three classes of students in the Summer Session: (1) those desiring regular college credit for general economics; (2) students with special interests in economic and social subjects; (3) students seeking broad preparation for the teaching of economics in secondary schools. For the first group, Courses A and B together cover the subject matter usually included under elementary economics. For Cornell students, Courses A, B, and either C, D, or E substitute directly for the six hours of Economics 51 of the regular year, or Courses A and D for the first term, and A and B for the second. Courses A and B substitute for both terms of Economics 52, or Course A for the first term and C for the second term. Graduate students wishing to pursue special investigations will be afforded assistance by members of the Summer Session staff of instruction, and by other members of the Department of Political Science of the University who may be in residence in Ithaca during the summer.

A. Principles of Economics. Daily except Sat., 11. G. S. 264. Credit, two hours. Professor YOUNG.

A general introduction to economics, covering the fundamental principles of value and the distribution of wealth, together with the elements of money and banking.

B. Economic Problems. Daily except Sat., 8. G. S. 264. Credit, two hours. Assistant Professor TURNER.

A consideration of important present-day economic problems, including such topics as the tariff and international trade, labor legislation, trade unions, industrial combinations, railway regulation, taxation, etc.

C. Corporation Finance and the Trust Problem. Daily except Sat., 10. G. S. 231. Assistant Professor TURNER.

A study of the modern business corporation. The following topics will be given special attention: the nature of a corporation together with its advantages and disadvantages compared with the partnership and joint stock company; problems of finance and promotion; stocks and bonds, what they are, the basis of their issue and the principles of their valuation; questions of capitalization; financial reports, the balance sheet and income statement; reorganization and receiverships; the problem of regulation.

D. Money and Banking. Daily except Sat., 10. G. S. 264. Credit, two hours. Professor YOUNG.

The theory of money and credit; banking operations, the world's money markets; foreign exchange; national and state banking systems; European banks, the Federal Reserve system; the problem of rural credits.

E. General Problems of Industrial History. Daily except Sat., 9. G. S. 264. Credit, two hours, Assistant Professor USHER.

Stages of industrial development; the craft guilds of the middle ages; the rise of capitalism; development of the factory system; the problems of the wage-earning class.

F. The Economic Background of Modern World Politics. Daily except Sat., 11. G. S. 234. Credit, two hours. Assistant Professor USHER.

State policies and their influence upon national wealth; the influence of trade routes upon national growth; the effect of the Industrial Revolution upon continental industries; the rise of Germany and the development of German policy; the economic aspect of modern imperialism.

MUSIC

A special description of the department of Music is published and may be had on application.

Sight Reading—A. This is an elementary course. For entrance the student must possess sufficient aptitude and ability to pursue the subject with profit, a singing voice of acceptable quality, and the ability to sing familiar hymn and folk tunes with a fair degree of accuracy and facility.

In order to complete this course the student must be able to sing at sight with facility, using the Latin syllables, simple music such as that taught in the first four grades of the public schools.

Daily except Saturday, 9:15, (two sections), Miss WHITE, Miss STARK.

Sight Reading—B. This course requires singing individually at sight, with and without syllables, music such as that taught in the first seven grades of the public schools.

Daily except Saturday, 9:15 (two sections), Mr. SCALES, Prof. HOERRNER.

Sight Reading—C. The student is required to sing at sight without accompaniment, reading words and music simultaneously, the music used in the upper

grades of the public schools and in the high school, including music such as that found in *Art Songs* by Will Earhart.

University credit, one hour.

Daily except Saturday, 11:15 (two sections), Mr. SCALES, Prof. HOERRNER.

Proficiency in sight singing is of great advantage to the student entering the Supervisor's Course. Students planning to enter are strongly advised to acquire the ability to sing simple music at sight, using the syllable names, before making application for admission.

Dictation—A. (Study of tone and rhythm). The subject matter of music is presented first to the sense of hearing. In this course the student gains the power to think tones and to sense rhythms, and gains the ability to recognize and write simple melodic phrases in all keys.

Each student is required to complete the oral and written dictation work of the first four years in music as outlined in the *Complete Manual for Teachers* by Hollis Dann, including singing from memory all sequential studies.

Daily except Friday and Saturday, 10:15 (two sections), Miss WHITE, Miss STARK.

Dictation—B. This course deals with the problems of tone and rhythm included in the first six years in the public schools.

Each student is required to complete the oral and written dictation, including all sequential studies, as outlined for the first six years in the *Complete Manual for Teachers*.

University credit, two hours.

Daily except Friday and Saturday, 10:15, Mr. BUTTERFIELD.

Dictation—C. This course includes the advanced study of tone and rhythm and requires considerable skill and facility in the recognition and application of all tonal and rhythmic problems, including the writing from hearing of melodies of moderate tonal and rhythmic difficulty in both the major and minor modes.

Members of this class will complete the course in dictation as outlined in the *Complete Manual for Teachers* by Hollis Dann, including the first twenty-six lessons of the Supplementary Material, pages 188 to 206, and the singing of all sequential studies, major, minor, and chromatic.

University credit, two hours.

Daily except Saturday, 9:15, Mr. BUTTERFIELD.

Elementary Principles and Practice of Teaching—A. The aim of this course is to acquaint the student with the elementary principles of teaching, and to furnish practical training in the art of teaching. The text book used is *The Art of Teaching* by Dr. Emerson E. White. Prospective students are advised to study carefully this book before beginning the course.

Classes of children will be in attendance.

University credit, one hour.

Daily except Saturday, 11:15, Miss SHEFFER.

Material and Methods—B. This course is devoted to the study and demonstration of material and methods for the Kindergarten and first four years in music. Special attention is given to the selection, presentation, and interpretation of rote songs for the primary grades, the presentation of the different tonal

and rhythmic problems as they are taken up in successive years, the selection and use of material for the different grades, etc.

University credit, two hours.

Daily except Saturday, 11:15, Miss BRYANT.

Material and Methods—C. This course is open to students who have completed Material and Methods—B, and is devoted to the teaching and supervising of music in the upper grades, from the fifth to the eighth, inclusive. The work of each year is taken up in detail and the problems which confront the grade teacher and supervisor are carefully considered.

University credit, two hours.

Daily except Saturday, 10:15, Professor DANN.

On Friday of each week at 10:15 the lesson in methods will consist of a demonstration with a class of children from the Ithaca public schools. Students will thus have the opportunity of observing the practical application of methods to classes of children representing the several grades in the public schools.

High and Normal School Music—D. This is an advanced course to which only fourth year and more advanced students are admitted. The many difficult problems which confront the music teacher in the high and normal school are carefully studied.

Some of the topics for special consideration are: the school chorus, glee clubs, classification of voices, grading and classification of high school students in music, bibliography of choral music suitable for high and normal schools, preparation for teaching in normal and training schools, elective courses, credits for the study of music both in and outside of the high school, etc.

University credit, two hours.

Daily except Friday and Saturday, 12:15, Professor DANN.

Practice Teaching—D Open to fourth year students only. No visitors. Practical use of material for all grades, and application of methods of teaching.

Each student will be given frequent opportunity for practice teaching under supervision of the instructor. Classes of children of different grades will be in attendance.

No student can complete the course for supervisors until he is able to demonstrate his mastery of the subject matter and methods by actual teaching. It is highly important that each student shall have had some experience in teaching in the public schools before entering this class. **A year's experience as a grade teacher is invaluable and almost indispensable.**

University credit, one hour.

Daily except Saturday, 9:15, Miss BRYANT.

Rudiments of Music—A. This course provides instruction in the elements of music. The following are taken up for study: clefs, signification and origin; names of pitches as established by the G-clef and F-clef; construction of major scale (without key-signature); measure signatures, note-values, rhythms; normal harmonic and melodic minor scales; key-signatures; notation of chromatic scale with each key-signature; intervals; triads; music terminology, etc.

Daily except Saturday, 12:15, Mr. SCALES.

Harmony—B. Triads and their inversions in major and minor tonalities. Connection of the triads in four-part writing. Theory of consonances and dissonances. The dominant seventh and its inversions.

University credit, two hours.

Daily except Saturday, 12:15, Mr. BALLARD.

Melody and Harmony—C. The principles of melody construction. Normal rhythms and voice progressions. Melody-writing, stepwise and with simple skips. The phrase, the period. Secondary chords of the seventh and their inversions.

University credit, two hours.

Daily except Saturday, 12:15, Mr. JOHNSTONE.

Melody and Harmony—D. Melody writing in major and minor with special reference to harmonic suggestion. Harmonization of melodies. Melody-writing in two parts. Figured basses. Transposition, modulation.

University, credit, one hour.

Monday, Wednesday and Friday, 11:15, Mr. JOHNSTONE.

Chorus. Required of all regular students excepting those who have completed the course for supervisors. Five periods a week are devoted to chorus singing and to instruction in the technical and interpretative elements of choral music. Topics for special consideration are: position, breathing, tone production, vowel study, interpretation, and the preparation and performance of choral music. Cantatas and choruses suitable for high and normal schools will be sung by the chorus at the concerts given by the Department of Music.

Daily except Saturday, 8:00, Professor DANN.

Choral Conducting—D. Open to fourth year students only. The routine and technique of choral conducting. Each member of the class is required to prepare and conduct choral selections under the supervision of the instructor.

Monday and Tuesday, 10:15, Professor HOERRNER.

Additional hours to be arranged.

Orchestral Conducting—D. Open to fourth year students only. A school orchestra will be organized from the Ithaca schools. A large repertoire of music suitable for school orchestras will be collected for the benefit of the members of the class, who will have the opportunity of observing and participating in the work of organizing, conducting, and developing the school orchestra. Any student who plays an instrument of the symphony orchestra is requested to bring his instrument.

Wednesday and Thursday, 10:15, Mr. COGSWELL.

Voice Training—A and B. (Elective). Class lecture lessons. Individual and class instruction.

Daily except Wednesday and Saturday, 2:15, Mrs. NECOLLINS.

Voice Training—D and E. Class lecture lessons. Individual and class instruction and demonstration. The foundation of singing, breath control; free vocal emission and aural appreciation; phrasing, accent, rhythm, and diction in artistic rendition; all leading to a strong vocalized declamation without unnecessary effort or complication.

Monday, Tuesday and Thursday at 2:15; Friday at 12:15, Mrs. HUNT.

Principles and Practice of Teaching—D. This is a home-study course. Texts, *The Art of Teaching* by Dr. E. E. White and *The Theory and Practice of Teaching* by David P. Page. A careful study of these books is recommended. Each fourth year student will write a review of these books, enumerating the leading principles of teaching, specifying those which apply especially to the teaching of music, describing the practices which seriously impair the teaching process, and specifying those practices or habits which materially strengthen the teacher's work and influence. The student will also state what portions of either book he finds most helpful and will briefly compare the two books. **The paper must be presented in the student's handwriting, at the office of the Department of Music, not later than Friday, July 7, and must comprise not less than 1000 and not more than 1500 words.**

History of Music and Current Events—C. This is a home-study course. An elementary examination in the history of music and current events for all C students will be given at 2:15 p.m. on July 6. (See History of Music D.)

History of Music and Current Events—D. A general knowledge of the history of music and a fair degree of familiarity with current events, especially in the world of music, is required. An examination will be given to the fourth year class covering only important and well known facts concerning the development of classical, romantic, and modern music, the great composers and their principal works, contemporary composers and their best known compositions, current events. Whatever special preparation is necessary must be made by means of home study. Hamilton's *Outlines of Music History* is suggested as a text book in the History of Music, and *Musical America* as a text for the study of current musical events. **The examination at the 1916 Session will be held at 2:15 p.m., Thursday, July 6.** At least one question will have to do with general current events outside the subject of music.

Musical Appreciation—E. Open to advanced students only. Musical artworks analyzed with a view to forming a basis for intelligent criticism. The modern Player-piano as an aid in musical appreciation; as an art instrument; its recent applications to pedagogy; its special technique.

Tuesdays and Thursdays, 11:15, Mr. JOHNSTONE.

Musical Composition—E. Open only to those who have completed Melody C, and Melody and Harmony D. This course includes instruction in the development of musical ideas (motives, themes); the logical sequence of keys; balance of parts of a composition (elementary form); essentials of good melody; song writing; the unity of text and music in rhythm and in content; song accompaniments.

University credit, one hour.

Monday, Wednesday and Friday, 9:15, Mr. JOHNSTONE.

Orchestral Technique—E. Open to advanced students only.

The Orchestra. Its instruments considered separately and in combination; the 23 part symphony orchestra, its sections and parts; smaller combinations—16, 14, 12, and 10 parts and piano; theory and mechanism of the instruments, the transposing instruments; the nature and idiomatic quality of the different parts; positions on the violin; the difficulties encountered in connection with

different instruments; tuning and seating the orchestra; suitable music, methods of ordering, etc.

University credit, one hour.

Wednesday and Friday, 2:15, Mr. COGSWELL.

NORMAL COURSES IN PIANO TEACHING (Elective)

I. Elementary and Intermediate. On completion of Course I the student will receive an intermediate certificate of qualification to teach the Elementary and Intermediate Courses of the Progressive Series.

University credit, two hours.

Daily except Saturday, 3:00, Mr. KROEGER.

II. Advanced. Teachers who complete Course II will receive a certificate of qualification to teach the Advanced Course of the Progressive Series.

University credit, two hours.

Daily except Saturday, hour to be arranged, Mr. KROEGER.

Before receiving the teacher's certificate in either Course, the student is required to pass the Standard Examinations of the Progressive Series, both Theoretical and Practical.

The examination may be deferred, however, until the completion of further home study and practice, and may be taken either at the close of the Summer Session, or during the intervening year, or at the close of another Summer Session.

Regular students who desire to become familiar with the system may take the Normal Course without taking the Practical Examinations in Piano Playing.

MATHEMATICS

In addition to the courses noted below, each teacher will have a daily office hour for consultation with students. It is urged that this opportunity be utilized by all concerned.

Courses A, B, and C are planned for those teachers in secondary schools who wish to review these subjects. They are equivalent to the advanced entrance requirements of Cornell University and of the College Entrance Examination Board. They presuppose a ready knowledge of elementary algebra (through quadratic equations), and of plane geometry.

Credit, A, B and C, three hours each.

A. Advanced Algebra. Daily, 9. White 24. Professor SNYDER. (Office hour 11, White 25). Daily, 10. White 2. Assistant Professor OWENS. (Office hour, 11, White 3).

B. Solid Geometry. Daily, 10. White 27. Assistant Professor SHARPE. (Office hour, 9, White 29).

C. Trigonometry. Daily, 11. White 27. Assistant Professor SHARPE. (Office hour, 9, White 29).

Courses E and F are equivalent, respectively, to the first and second terms of Course 6 in Mathematics, regularly given during the academic year. Course E presupposes A, B and C; Course F presupposes E. Students taking E or F are requested to take no other University work during the summer, without special permission.

University credit for E or F, six hours.

E. Analytic Geometry and the Calculus. Daily, 8 and 11. White 1. Assistant Professor GILLESPIE. (Office hour, 9, White 3).

F. Analytic Geometry and the Calculus. Daily, 8 and 11, in three sections: White 21. Assistant Professor CARVER. (Office hour, 9, White 22).

White 25. Dr. SILVERMAN. (Office hour, 10, White 8).

White 25. Dr. McKELVEY. (Office hour, 10, White 8).

Courses G1 and G2 will be given in alternate years; together they furnish an adequate introduction to the geometry of algebraic curves and surfaces.

G1. Projective Geometry. Daily, 9. White 2. Credit three hours. Assistant Professor OWENS. (Office hour, 11, White 3).

In this course the principles underlying projective forms and constructions of the first and second degrees will be carefully developed. Particular attention will be paid to the application of these principles to elementary geometry, so as to make the work helpful to teachers of this subject. No knowledge of mathematics beyond plane geometry will be presupposed.

[**G2. Plane Algebraic Curves.** A knowledge of elementary analytic geometry and of as much projective geometry as is given in Course G1 will be presupposed. Systems of conic sections and the properties of the cubic curve will first be studied, then applied to a comprehensive study of linear and quadratic transformations. They will be interpreted in terms of motion, similarity, and reciprocal radii, as employed in elementary geometry]. Not given in 1916.

H. Analysis. Daily, 11. White, 6. Credit, three hours. Assistant Professor HURWITZ. (Office hour, 10, White 8). A knowledge of the calculus is presupposed. The content of the course will vary from year to year, according to the needs and desires of the students.

Correspondence from possible applicants for the course will be welcome. The subjects to be treated will generally be selected from the following list; elementary differential equations, theory of algebraic equations, theory of limits and logical foundations of the calculus, theory of point-sets, infinite series, theory of functions of a complex variable.

Mathematics for Teachers

K1. Elementary, Intermediate, and Advanced Algebra. Daily except Sat. White 6. Credit, two hours. Assistant Professor HURWITZ. (Office hour, 10, White 8.)

K2. Plane and Solid Geometry. Daily except Sat., 10. White 24. Credit, two hours. Professor SNYDER. (Office hour 11, White 26).

These courses are designed especially to meet the needs of teachers in the secondary schools; they are not concerned so much with the subject matter of courses A, B, and C, but rather with topics which supplement them. No knowledge of advanced mathematics will be presupposed. In the course in Algebra the subject treated will include the use of axioms, irrational numbers, imaginary and complex numbers, the factor theorem, equivalence of systems of equations, and the use of graphs. In the course in geometry the specific topics to be considered are geometric constructions, use of axioms, the incommensurable cases, and the use of limits. In each class, K1 and K2, one hour each week will be devoted to general discussion of topics handed in by members of the class.

In addition to the preceding courses, the teachers of mathematics offer the following opportunities to graduate students. Instruction will consist of conferences by appointment, direction of reading, and proposing definite problems for research.

M. Algebraic Geometry including birational transformations, involutions and algebraic series, resolution of singular points. Professor SNYDER.

N. Applied Mathematics. Problems in Hydrodynamics, Heat, Electricity, and Elasticity. Assistant Professor SHARPE.

O. Functions of a real variable, point-sets, calculus of variations. Assistant Professor GILLESPIE.

P. Foundations of geometry and problems in synthetic geometry. Assistant Professors CARVER and OWENS.

Q. Advanced Analysis. Problems in the theory of functions, differential equations, and integral equations. Assistant Professor HURWITZ.

PHYSICS

All work in physics is given in Rockefeller Hall. Courses are given under the same numbers as during the regular academic year. Regular University students may take work under the same conditions as prescribed for the regular University terms and credit will be allowed as indicated below.

All courses are open to teachers who can take them with profit. Those who have not had college physics are advised to take courses 2 and 10. Those who have had college physics may take courses 8, or 9, and 14, and the lectures in course 2 may be attended even if not taken for credit. Teachers are entirely at liberty to take portions of courses when such an arrangement is to their advantage. Every effort will be made to adapt the work to the needs of students and to give opportunity to profit from the exceptional equipment of the laboratory.

2. Lectures with Experiments and Recitations. This course is intended to furnish a basis for all following courses as well as to give a fairly complete survey of general physics for those not intending to take up work depending directly on physics. The equipment for lecture demonstration is unusually complete and has been given careful attention by many members of the staff. Teachers and others familiar with the elements of the subject may find the course useful and suggestive.

The lectures will be given daily at 8 and will be followed by an informal discussion or recitation at 9. Kimball's College Physics will be used for reference.

Daily 8-10, Rockefeller B. Credit, five hours.

Professors SHEARER and GIBBS.

3. Problems. An additional course in problem work based on course 2 may be arranged if six or more students apply before the third day of instruction. This can only be taken with 2, and the two courses cover the work required of first year mechanical engineering students.

Total credit for 2 and 3, six hours. Assistant Professor GIBBS.

7. Required recitations for Civil Engineers. This course will be given if eight or more students apply before the third day of instruction.

Daily except Sat., 8. Credit, three hours.

8. **Recitations in General Physics.** Theory and problems. This course includes work in mechanics, properties of matter, magnetism, and static electricity. It is to be accompanied by experiments in laboratory course 14. The course is intended to follow a first college course in general physics including lectures, demonstrations, and discussions. Course 8 is required of the engineering students of Sibley College in the first term of the sophomore year.

Credit, two hours. Prerequisite, either physics 2 and 3, or 2 and 10, and mathematics 5 or their equivalents. Daily except Sat., 9. Room 105. Assistant Professor RICHTMYER.

9. **Recitations in General Physics.** Theory and problems, continuation of course 8. Subjects treated include current electricity, quantity, capacity, induced electromotive force. Required of engineering students in Sibley College during second term of sophomore year. Daily except Sat., 8. Room 105. Mr. BROWN.

10. **Physical Laboratory.** This course is one primarily designed for teachers of elementary physics and for those students who have had or are taking a lecture course covering thoroughly elementary physical principles in the various branches. In general, the simpler forms of apparatus are used but of such a grade as to adapt them to the needs of careful investigators. The apparatus available affords study in units and their relations, statics, kinetics, molecular physics, light, sound, electricity, and magnetism. The work may at the beginning of the term be arranged for each individual, covering as many or as few of the general divisions of the subject as seems desirable. The work may be varied to meet the needs of the students as the work progresses, since in all cases individual instruction is given. Each student will thus have the opportunity to devote his energies to his chosen part of the subject. Occasional discussions of general interest may be held covering such subjects as methods of making observations and of using them to the best advantage, accuracy of results, computations, errors, the interpretation of data by means of curves, the theory of particular experiments, and other topics as they may occur.

University students having the requisite requirements for admission to course 10 in physics as given in the Courses of Instruction for the year 1915-16 may elect this course, following the schedule prescribed for regular work during the academic year.

One to five three-hour periods a week. Daily except Sat., 10-1. Assistant Professors BLAKER and RICHTMYER, and Mr. POWER. Credit, one to three hours.

12. For course 12 of the academic year, see course 14.

14. **Physical Experiments.** Theory and method of physical measurements. The work presupposes a thorough course in elementary physics. It consists of setting up and adjusting apparatus and of performing fundamental experiments; a study of approximations, errors, and methods of computation; and interpretation of results, both analytically and graphically.

The apparatus available renders it possible to make accurate measurements in the different branches of general physics. A few of the subdivisions that may be covered are force, work, power, efficiency, uniformly accelerated linear and angular motions, moments of inertia, coefficients of expansion of solids, liquids, and gases, vapor tension and vapor density, the usual determinations in heat; the study of thermometers, their calibration and comparison, a thorough study

of the analytical balance, including a determination of its errors and limitations. In sound, studies may be made in resonance and interference. The work in light comprises a study of lenses, the grating, the adjustment, and the use of the spectrometer, and photometry of various light sources. The equipment in electrical and magnetic apparatus is such as to afford special facilities for the determination of electrical and magnetic constants and for work in electrical measurements such as the measurement of current, electromotive force, resistance, self and mutual induction, capacity, study of the magnetic properties of iron, and the use of standard instruments of a theoretical and a practical nature.

The work, being individual, may be planned to meet the requirements of the student and may cover as many or as few topics as seem desirable. Reports on the work done covering theory and results are to be submitted for criticism. Credit from one to four hours. Prerequisite courses 2 and 7, or 2 and three hours of 10 or the equivalent.

One to five three-hour periods a week. Daily except Sat., 10-1. Assistant Professors BLAKER and RICHMYER, and Mr. BROWN.

25. Advanced Laboratory Practice. Special laboratory work in physics, open to those students who have had course 14 or its equivalent and who desire to take up special subjects for detailed study, putting much more time on individual problems than is advisable in course 14. It is intended for those teachers who desire at some time to do advanced laboratory work in research, and for teachers in laboratory physics in colleges. Such problems in research as can be completed in the time available may be undertaken by special arrangement.

Among the fields of special interest for which facilities are available may be mentioned: measurement of very low and of very high temperatures; properties of materials at high and low temperatures; measurement of light and illumination including spectrophotometry, radio-active measurements, etc.

Credit varies with the amount of work done. The laboratory will be open daily from 10 to 1, excepting Saturday, and at other hours as may be arranged. Directed by members of the staff in each special field.

44. X-Ray Laboratory. A special course in X-Ray photography and fluoroscopy will be offered for those qualified for the work. This will include operation of induction coils, transformers, various tubes, measurement of radiation and developing plates. The course is intended for those expecting to operate such apparatus in private or hospital practice as well as for students interested mainly in the physics of Roentgen ray. Plates and paper to be furnished by the students. Hours by appointment. Professor SHEARER.

CHEMISTRY

The courses announced below correspond entirely or in part with regular University courses. In numbering these summer courses, 200 has in each case been added to the number of the corresponding course given during the regular sessions of the University.

The recitation and laboratory work will be arranged, within reasonable limits, to meet the individual requirements of teachers registered in the respective courses. For students wishing to obtain University credit, the requirements for admission to the courses will be the same as during the regular University sessions.

For teachers not intending to have their work apply toward a Cornell degree, these requirements will not be rigidly enforced.

201. Introductory Inorganic Chemistry. a. Lectures daily except Sat., 12, Rockefeller A. Professor BROWNE and Mr. MCCOY. The lectures deal with the fundamental theories and laws of chemistry and with the more common elements and their compounds. They are profusely illustrated by experiments. The course is primarily designed to meet the needs of teachers in secondary schools, and to that end emphasis is laid upon methods of lecture presentation and experimental demonstration. Students other than teachers must, before registering, satisfy the department that they are properly prepared to carry on the work.

b. Laboratory work, M W, 8-12, and T Th F, 9-12. Dr. WELSH and Mr. KIRK. A series of experiments designed to illustrate the fundamental laws of chemistry and to acquaint the student with the properties of the principal elements and their compounds. For the benefit of teachers who may take the course especial attention will be given to methods of laboratory instruction, qualitative experiments, and the blowing of simple glass apparatus.

c. Recitations. T Th F, 8. Rockefeller 108. Dr. WELSH. The recitations deal with the subject matter of the lectures and with the experimental work in the laboratory; thorough drill in the solution of chemical problems.

Credit for a, b and c, six hours.

206. Elementary Qualitative and Quantitative Analysis. This course is divided into two parts, either of which may be taken without the other. Credit, two, three, or five hours.

A. Qualitative Analysis. Lectures, M W F, 11, Rockefeller C. Dr. RHODES. Laboratory, daily except Sat., 1.30-4.30. Dr. RHODES and Mr. RAY. An elementary course for those who have had the equivalent of course A. A study in laboratory and class room of the methods for detecting and separating the principal bases and inorganic acids. This is followed by the analysis of various substances, either in solution or in solid form, the composition of which is unknown to the students. Considerable emphasis is laid upon the writing of equations expressing the reactions involved in the work.

B. Quantitative Analysis. Elementary. Lectures, T Th, 11, Rockefeller C. Laboratory, M W F, 8-11. Credit, two hours. Assistant Professor LUNDELL and Mr. KOLLER.

An introduction to quantitative methods and the chemistry upon which these methods are based. Lectures, explanatory of the methods used, are first given; each student then performs simple analyses which involve the use of the apparatus ordinarily employed in analytical work.

Advanced work (see course 214) may be taken by students who complete this course before the close of the session.

207. Qualitative Analysis. Lectures and recitations, M W F, 11, Rockefeller C; T Th, 8, Rockefeller C. Dr. RHODES. Laboratory work, daily except Sat., 1.30-4.30, and M W F, 8-11. Dr. RHODES and Mr. RAY. Credit, one to six hours.

This course comprises: (1) A study in class room and laboratory of the methods for detecting each of the important acids in the presence of the others, together with the reactions involved, followed by the analysis of more complex

mixtures than those assigned in course 206A; and (2) A comparative study in the laboratory of different methods of detecting and separating the bases.

212. Quantitative Analysis. Lectures, daily except Sat., 8. Rockefeller 109. Assistant Professor LUNDELL. Laboratory, daily except Sat., 9-1. Assistant Professor LUNDELL and Mr. KOLLER. Credit, four, five, or six hours.

A longer elementary course in which extended practice in volumetric and gravimetric analysis is offered.

214. Quantitative Analysis, Advanced Course. Laboratory practice at hours to be arranged. Credit, one, two, three, or four hours. Assistant Professor LUNDELL and Mr. KOLLER.

This course comprises instruction in certain gravimetric, volumetric, and electrolytic methods of analysis, and in the methods of combustion analysis. The work includes the analysis of iron ores, iron and steel, slags, paints, lubricants, coal and coke, cements and cement materials, alloys, ores of copper, lead, zinc, mercury, manganese, tin, etc.

216. Electrochemical Analysis. Laboratory practice at hours to be arranged. Assistant Professor LUNDELL and Mr. KOLLER.

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.

217. Opticochemical Methods Lectures, daily except S., 12, Rockefeller 300b. Laboratory practice at hours to be arranged. Credit, three hours. Assistant Professor ANDERSON and Mr. ERSKINE.

The lectures deal with the construction and with the use in chemical analysis of the spectroscope, colorimeter, polariscope, and refractometer. The laboratory instruction includes the following work: the observation and mapping of emission spectra of various elements in the Bunsen flame, the oxy-hydrogen flame, the electric arc, and the electric spark; the qualitative analysis of mixtures and minerals with the aid of the Krüss spectroscope and the direct vision spectroscope; the observation and mapping of absorption spectra; the examination and identification of rare earths and of organic dyes in solution, by means of their absorption spectra; the calibration of spectroscopes; spectrum photography with the Hilger wave-length spectrometer and with the Steinheil grating spectrograph; and practice in the use of colorimeters, polariscopes, and refractometers of various types.

[219. Qualitative and Quantitative Gas Analysis. Lectures, daily except S., 12. Credit, two hours. Assistant Professor ANDERSON.

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 gas-analytical work.] Not given in 1916, but will be given in 1917.

[220. Technical Gas Analysis. Laboratory practice, at hours to be arranged. Credit, two hours. Assistant Professor ANDERSON and Mr. ERSKINE.

The analysis of gas mixtures with the apparatus of Honigmann, Bunte, Orsat, Winkler, and Hempel; the complete analysis of flue gas, illuminating gas, generator gas, acetylene, and air; the determination of the heating power

of gaseous, liquids, 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.

Courses 219 and 220 should be taken at the same time.] Not given in 1916, but will be given in 1917.

230. Organic Chemistry.

A. Aliphatic compounds. Lectures and recitations. Daily except Sat., 8, Caldwell 143. Laboratory practice at hours to be arranged. Credit, four to six hours. Professor ORNDORFF, Mr. MAHOOD, and Mr. SHERWOOD.

B. Aromatic compounds. Lectures and recitations. Daily except Sat., 10, Caldwell 282. Laboratory practice at hours to be arranged. Credit, four to six hours. Mr. MAHOOD and Mr. SHERWOOD.

This course presupposes a knowledge of elementary chemistry, and Part B must be preceded or accompanied by Part A. The two parts of the course may be taken together, or Part A may be taken one summer and Part B the following summer.

231. Organic Chemistry.

A. Aliphatic compounds. Lectures and recitations. Daily except Sat., 8, Caldwell 143. Credit, three hours. Professor ORNDORFF and Mr. SHERWOOD.

B. Aromatic compounds. Lectures and recitations. Daily except Sat., 10, Caldwell 282. Credit, three hours. Mr. MAHOOD and Mr. SHERWOOD.

These lectures and recitations are the same as those of Course 230. Course 230 should be taken in preference to course 231 whenever it is possible.

232. Organic Chemistry, Shorter Course. Aliphatic and aromatic compounds. Lectures and recitations. Daily except Sat., 8, Caldwell 143; 10, Caldwell 282, during the first three weeks of the session, and 8 only during the remainder of the session. Laboratory practice at hours to be arranged. Credit, four hours. Professor ORNDORFF, Mr. MAHOOD, and Mr. SHERWOOD.

The lectures and recitations of this course include all of those of Course 230A, and the first half of those of Course 230B. Course 232 presupposes a knowledge of elementary chemistry, and is designed more particularly for students registered in the Colleges of Medicine and Agriculture, although it may be elected by any suitably prepared student desiring a course in Organic Chemistry shorter than 230 or 231.

234. Advanced Organic Chemistry. Laboratory practice at hours to be arranged. Credit, two or more hours. Professor ORNDORFF, Mr. MAHOOD, and Mr. SHERWOOD.

The course in the preparation of organic compounds is here continued, the preparations, however, being more difficult, and requiring more skill and experience on the part of the student.

237. Methods of Organic Analysis. Laboratory practice with occasional lectures. Hours to be arranged. Credit, two or more hours. Professor ORNDORFF and Mr. MAHOOD.

This course comprises the qualitative and quantitative analysis of pure organic compounds, and of such commercial products as alcohols, ethers, organic acids, glycerol, formalin, acetates, soaps, turpentine, rosin oils, etc.

248. Selected Topics in Advanced Inorganic Chemistry. Lectures, M W F, 10, Rockefeller C. Credit, one hour. Dr. WELSH. Experimental lectures dealing with various topics in the field of general and inorganic chemistry, and covering some of the more important recent advances.

250. Introductory Physical Chemistry.

A. Lectures daily except Sat., 8, Rockefeller 155. Credit, three hours. Assistant Professor BRIGGS and Mr. ENGELDER. A systematic presentation of modern chemical theory. The subject matter includes: a historical review of chemical theory up to 1800; atomic and molecular theory; gases, liquids, and solids; the theory of solution; colloid chemistry and adsorption; reaction velocity catalysis, and equilibrium in homogeneous systems; application of physico-chemical principles to actual practice.

[B. Lectures daily except Sat. Credit, three hours. Assistant Professor BRIGGS and Mr. ENGELDER. A continuation of Part A. The subject matter includes: the phase rule and its applications; thermochemistry; electrochemistry; photochemistry; application of the principles of physical chemistry to actual practice.]

Part B will not be given in 1916; Part A will be given only on condition that at least eight students shall have communicated to the Department of Chemistry before June 20th their intention to register in the course.

251. Physical Chemistry Laboratory.

A. Laboratory practice daily except Sat., 9-1. Credit, three hours. Assistant Professor BRIGGS and Mr. ENGELDER. Open to those only who have taken or are taking Course 250A or its equivalent. With the data obtained in the laboratory as a basis, detailed reports covering each of the following topics are written: calibration of volume-measuring apparatus; molecular weight determination by vapor density, boiling point, and freezing point methods; vapor pressure; viscosity; distillation of liquid mixtures.

[B. Laboratory practice, daily except Sat., 9-1. Credit, three hours. Assistant Professor BRIGGS and Mr. ENGELDER. Open to those only who have taken or are taking Course 250B or its equivalent. The course is a continuation of Part A. The following topics are considered: dissociation; solubility; reactions; reaction velocity and catalysis; indicators; thermochemistry; diffusion; colloids and adsorption; photochemical reactions; phase rule studies of inversion points, solid-liquid, liquid-liquid, compounds.]

Part B will not be given in 1916; Part A will be given only on condition that at least eight students shall have communicated to the Department of Chemistry before June 20th their intention to register in the course.

265. Chemical Microscopy, Elementary. Laboratory practice at hours to be arranged. Credit, two hours. Professor CHAMOT.

The aim of this course is to familiarize the student with the use of the microscope and its accessories, and with microchemical methods and apparatus as applied to chemical investigations.

Registration in this course is limited to 10 students.

266. Chemical Microscopy, Advanced. Laboratory practice at hours to be arranged. Credit, three hours. Professor CHAMOT.

Practice in the examination and analysis of inorganic substances containing the common elements and acids, with reference to rapid qualitative methods and the analysis of minute amounts of materials.

269. **Elementary Sanitary Chemistry.** Lectures, recitations, and laboratory practice. Credit, five hours. Lectures daily except Sat., 9. Stimson. Recitations and laboratory at hours to be arranged. Mr. GEORGIA.

The course is planned to serve as an introduction to the methods and objects of chemical science as applied to the problems of public health. The work during the Summer Session of 1916 will comprise: the analysis of foods and food accessories.

Course 269 is the equivalent of the second term of course 69 given during the regular University session, and presupposes a knowledge of qualitative and quantitative analysis, and of organic chemistry.

296. **Research.** Credit, one to six hours. Senior chemists, and others by special permission, may elect research under the direction of some member of the staff of instruction.

GEOGRAPHY AND GEOLOGY

Illustrated Special Announcement. A special announcement, with many photographic illustrations showing typical features of the Cornell environment and the work of excursion classes in the field is published for the department and may be had, post-free, on application to the Director of the Summer Session. The text of this special announcement is devoted largely to an explanation of the advantages of the Cornell region for outdoor study of both geography and geology. As the special announcement was issued in 1914 it should be noted that there are changes in the courses as listed in the following paragraphs for 1916.

Equipment and Purpose. The lecture rooms and laboratories are in McGraw Hall. It is the purpose in this department to meet, primarily, the needs of teachers in grammar schools, high schools, normal schools, and colleges. A second aim is to provide courses of practical and cultural value to college students. The work embraces lectures, laboratory, and field instruction in physical and industrial geography, and in the elements of geology.

The environs of Cornell University are rich in phenomena of geographic and geologic interest. Consequently field excursions are made an especially important part of the work of this department in the Summer Session.

The laboratories are well equipped with apparatus and illustrative material for instruction. This material includes teaching and reference collections of minerals, rocks, fossils, maps, photographs, models, and more than five thousand lantern slides.

For entrance credit ($\frac{1}{2}$ unit) in physical geography, a student is required to attend, complete all required work, and pass the examinations in courses A, H, and J.

LECTURE COURSES IN GEOGRAPHY AND GEOLOGY

A. **Physical Geography.** An introductory course in physical geography covering most of the subjects treated in the modern texts, but touching more fully on the general concepts and the theoretical side of the subject than is pos-

sible in high school work. Some of the topics treated are the general form of the earth, origin, and distribution of relief features, processes and progress of the physiographic cycle and the resultant development of land forms, configuration of the ocean basins, nature and effects of the continental glaciation, and the bearing of these various phenomena on life relationships. Students interested are advised that special courses in meteorology are offered in the College of Agriculture, Summer Session. See announcement of that college.

The lectures in physical geography are fully illustrated by lantern slides, wall and globe maps. Readings will be assigned in Tarr and Martin's "College Physiography." Students registering in this course are advised to take also the related courses, H and J, and if possible E. M T W Th, 9. Geological Lecture Room. Assistant Professor VON ENGELN. Credit, two hours.

B. Commercial and Industrial Geography. M T W Th, 11. Geological Lecture Room. Assistant Professor VON ENGELN. Credit, two hours.

The course will comprise a study of vocations as affected by geographic conditions. Consideration will be given to the location, nature, and relative importance of commercial routes as governed by the character of the products to be exchanged; to the distribution and magnitude of leading industries in relation to climatic and topographic factors and to the occurrence of agricultural, forest, mineral, and fish resources. Basic products will be given first attention but the significance of certain highly specialized commodities will also be noted. The possibilities of a geographic survey of the local community by school classes will be discussed and students will prepare outlines for their particular region. Special topics for individual study and report will be assigned. The course should be especially helpful to teachers of regional, commercial, and industrial geography in grammar and high schools.

E. Geology. A general introductory course. M T W Th, 10. Geological Lecture Room. Mr. MONNETT. Credit, two hours.

Among the topics discussed are: origin of the earth; geological evolution of continents and ocean basins; the significance, areal distribution, and structural features of the great rock groups, as well as the forces modifying them; vulcanism, earthquakes, and similar phenomena.

Especial attention will be given to the geological evolution of life forms and the methods of determining geological facts. The lectures will be illustrated with lantern slides, models, maps and specimens. Students registering for this course are urged to take the laboratory course I, and, if possible, course J.

LABORATORY AND EXCURSION COURSES IN BOTH GEOGRAPHY AND GEOLOGY

H. Physical Geography, Laboratory Course. The members of this class will make a systematic study of the Physiographic Regions of the United States using contour maps, models and the experimental laboratory of the department in a laboratory study of the subject. By such study the topographic, regional, and life relationships (human, animal and plant) of the geography of the United States will be correlated and presented as an orderly whole. The course will prove of worth to grade teachers of geography who wish to obtain a broader basis for their

work in the subject, as well as for those who expect to teach geography in the high schools.

A laboratory fee of \$1.00 must be paid to the Treasurer at the beginning of the session to cover laboratory maintenance. T Th, 2-4. Physical Geography Laboratories. Mr. ELSTON. Credit, one hour.

I. Geology, Laboratory Course. W F, 2-4. General Geology Laboratory. Mr. MONNETT. Credit, one hour.

This course is designed to supplement course E. A study will be made of the more common structural phenomena; of the interpretation and uses of geological maps; of characteristic life forms developed in different geologic periods; and of the more common rocks and minerals. Short field excursions will be made to collect both rock specimens and fossils.

A laboratory fee of \$1.00 must be paid to the Treasurer at the beginning of the session to cover laboratory maintenance.

J. Geography and Geology, Field Course. This course should be elected by all those registering in course A or E, and is required of all those desiring University credit in those courses and also of those who desire entrance credit in physical geography. With courses A and H it affords a comprehensive course in physical geography; with courses E and I it will give a similarly broad training in elementary geology, as the dynamic phases of geology are emphasized on the excursions. Mimeographed outlines of the excursions are to be secured by each student desiring credit.

Students not registered in the course or department are invited to attend these excursions but must conform to the directions of those in charge. Those desiring University or entrance credit must take field notes and hand in written reports. Excursions 1-6 are required of all students in the course, and in addition they must make either two of 7, 8 and 9; or one of 10 and 11 for one hour's credit.

Meeting place and time announced in mimeographed outlines or by bulletin. Meet for first excursion, Monday, July 10th, at Geological Lecture Room, McGraw Hall, 2.30 p. m. Excursions 1-6, Monday afternoons; 7, 8, 9, 11, all day Saturday; 10 Friday and Saturday. On the excursions to which a cost is attached persons wishing to go must register at the department and secure tickets in advance of the date of the trip.

The longer excursions will be under the general charge of Assistant Professor von Engeln with the co-operation and assistance of the other members of the instructing staff. On the excursions stops will be made at points of interest, explanations made, questions asked and discussion invited.

OUTLINE OF EXCURSIONS—Course J

Monday Afternoons

1. **Campus and Vicinity.** To study the action of streams and the progress and form of valley development. Visiting Alumni Field, upper Cascadilla Gorge, and Goldwin Smith Walk. July 10.

2. **Eagle Hill.** To become acquainted with the lay of the land about Cornell, to learn the place names of the broader physiographic features, studying, en route, processes of weathering, and, at the summit, the maturely dissected plateau.

The top of the hill is a vantage point from which a good view of the lake and the land for miles to the north, east, and west may be had. July 17.

3. **Fall Creek and Deadhead Hill.** To study the origin and nature of sedimentary rocks, also processes of erosion, transportation, deposition and cementation. An intimate view of one of the large gorges and its especial features, particularly Ithaca Falls. July 24.

4. **[Shore of Cayuga Lake.** To study shore line phenomena, joint planes, bedding, and stalactite formation. A walk for several miles along the east shore of the Lake. Probably return by trolley, if so, expense \$.15 to \$.20 may be paid at the time.] Omitted 1916.

5. **Terminal Moraine. North Spencer.** By train. Expense about \$.75. Probably leave lower Lehigh Station at 1.35 p. m., return 5.38 p. m. To study a massive morainic loop, the basin in which the former ice tongue rested and the outwash deposits and overflow channels to the south. Truncated valley sides due to glacial erosion. The most striking examples of glacial phenomena in the Cornell Region. July 31.

6. **Six Mile Creek.** To study the effect of glaciation on a stream course. Relations to water supply and power development. A climb into and walk through one of the gorges in Six Mile Creek and an interpretation of its complicated physiographic history. Aug. 7.

All-Day Excursions

7. **Taughannock Gorge and Falls.** By boat. Expense about \$.75. To study the Inlet Plain, its reclamation, the Barge Canal terminal, the position and succession of the Devonian strata along the lake shore and the deep gorge and falls of Taughannock. A sail along the west shore of the lake and a walk through the great gorge to Taughannock Falls, one of the highest straight falls east of the Rockies. Luncheon at the foot of the falls. July 15.

8. **Enfield Gorge and Falls.** By wagon. Expense about \$1.10. To study the relations of preglacial and hanging valleys and the post glacial and interglacial gorges, their origin and features. Joint plane guidance of stream courses. A ride to the head of the gorge, climb through it to the crest of Lucifer Falls. Enfield is perhaps the most picturesque and wildest of the gorges in the Cornell Region. July 29.

9. **East Shore of Cayuga Lake.** Expense about \$1.10. To study the Devonian and Silurian rock exposures along the shores of Lake Cayuga; collection and interpretation of fossils from the various horizons and a study of the stratigraphy in its relation to economic geology and geography notably at the cement and salt plants. In charge of Mr. MONNETT. Aug. 5.

Longer Excursions

10. **Niagara Falls and Gorge.** By special train and trolley cars. Expense between \$8.00 and \$10.00. Over night at Niagara Falls. Aug. 12.

All the important scenic features of Niagara Falls and Gorge are visited and their physiographic history interpreted. As a whole these phenomena constitute a striking record of some of the most interesting chapters in the geologic and

physiographic history of North America. Before the trip a special meeting of those interested will be held in the Physical Geography Laboratory when the relations of the different places will be explained and illustrated by large scale relief model of the Niagara Region. Students are advised to send to Director, U. S. Geological Survey, Washington, D. C., for a copy of Niagara Folio, No. 190, in octavo form, cost \$.50 in coin or money order.

There may be opportunity for members of the class who are interested primarily in industrial and commercial geography to see something of the power development at Niagara, and for the stratigraphic geologist to collect fossils from the great Niagara Gorge section, but the main portion of the class will devote its attention to the dynamic geology and physiographic interest of the region.

11. **Watkins Glen.** By special train. Expense about \$2.00. July 22.

Watkins Glen is considered one of the most beautiful in the country. It has been secured for a state park by New York and all parts of it made accessible. The excursion party will study the gorge, its pot holes and falls in detail; and consider its relations to the Seneca Lake Valley in comparison with the conditions at Ithaca as referred to the Cayuga valley. Train ride across the dissected upland country to the south and west between Ithaca and Watkins.

ZOOLOGY

A. **General Zoology.** An elementary course designed to meet the needs of teachers and those wishing to gain a general knowledge of the subject. The earlier part of the course aims at familiarity with the fundamental principles of animal functions and morphology. In addition the course deals with a comparative study of development and structure, systematic position, habits, and life-histories of animals. The laboratory periods will be devoted to a study of their form and structure. As far as possible every phase of the subject will be illustrated by a study of the living animal. Lectures, daily except Sat., 9. McGraw Hall, Room 5. Five laboratory periods, daily except Sat., 2-5.30. Laboratory fee, \$5.00. Credit, five hours. Assistant Professor REED, and Mr. SHADLE.

B. **Ornithology.** A course concerned with the various phases of bird life. The lectures will discuss such subjects as migration, coloration, molt, habits, nests, eggs, care of young, structure and toponomy, flight, general bird-ecology and ecological groups, bird photography, preparation of study material, economic importance, methods of attracting birds, and geographical distribution. The aim of the field work is the identification of birds in their haunts and observations upon habits. Representatives of the important families of North American birds will be studied in the laboratory with the aid of a manual. Each student should be provided with Chapman's Handbook of Birds of Eastern North America and with field or opera glasses.

Lectures, T Th, 11, McGraw Hall, Room 5. Laboratory is open, daily except Sat., 2-5. Field work in two sections. Credit, three hours for lectures, and two laboratory and two field periods of two and one-half hours each. The lectures may be taken separately or any combination may be made according to the needs of the student. Laboratory fee, \$1.50. Assistant Professor ALLEN.

C. **Advanced Work.** An opportunity for advanced work and research is offered to those who are qualified. The laboratory will be open from 8 to 5 daily except Saturday. Assistant Professors REED and ALLEN.

SHOP WORK AND DRAWING FOR ENGINEERING STUDENTS**Drawing**

For further information regarding course C, apply to Professor Pond; for information regarding the drawing and shop courses apply to Professor Kimball, 205 Sibley.

A. Mechanical Drawing. A course in drawing for beginners, covering use of instruments, orthographic and isometric projection, inking, tracing, conventions, working drawings, M W F, 8-11 and daily except Sat., 2-5. Sibley 203. Assistant Professor HAM.

B. Machine Sketching and Drawing. A more advanced course in mechanical drawing for those who have had the equivalent of course A. Sketching of machine parts, machine drawing from sketches, empirical design. This course is an application of the work in course A to such machine designing as can be done without a knowledge of mechanics. M W F, 8-11 and daily except Sat., 2-5. Sibley 203. Professors KIMBALL and HAM.

C. Descriptive Geometry. Lectures or recitations, daily except Sat., 8. Drawing daily except Sat., 9-12. Lincoln Hall. Assistant Professor POND.

A study of the representation of lines, planes, surfaces, and solids, and their interrelations. Warped surfaces. Tangencies. Intersections, shades and shadows, and perspective. The work is the same as is given in the regular C.E. course 1, and the student will receive five hours credit if he takes the whole course. A three hour course that does not include shades and shadows and perspective, and fulfills the requirements for the Mechanical Engineering students of Sibley College will also be given. The latter will be given from 2-5 p. m. if there are students enough to make up an extra section.

Shop Work

A. Pattern Making. Use of woodworking tools; elements of pattern making. Mr. HOOPER.

B. Foundry Work. Moulding, casting, mixing of metals, operation of cupola, etc. Mr. VANDERHOEF.

C. Forge Work. Forging, welding, tempering, etc. Mr. HEAD.

This course will be given only if the registration is large enough to warrant it.

D. Machine Work. Use of measuring tools; hand and machine tools; fitting and assembling.

Daily except Sat., 8-11, 1-5, and Sat., 8-11. Mr. WELLS and Mr. BUCK.

E. Manual Training. The scope of the foregoing courses in shop work is the same as that of the corresponding courses given to the regular Sibley College students. They are intended for prospective or actual engineering students. In addition to these, special courses are offered in each shop, designed to meet the wants of manual training teachers, and given in close connection with the technical work of manual training. (See pp. 17, 18). Teachers having special needs may have courses laid out to suit their wants. At the same time it is greatly to their advantage to see the work as given to the regular engineering students.

MECHANICS OF ENGINEERING

The courses in mechanics given in the Summer Session are designed primarily for those students in Cornell University who have taken mechanics in regular University classes in the College of Civil Engineering or in Sibley College but who have received a condition therein (that is a mark of 41-59). Students other than those mentioned above must satisfy the professor in charge that they are qualified to take the work before they can be registered in these courses. The courses A and B are considered the equivalent of course 20 in the College of Civil Engineering, or of courses M 5 and M 6 in Sibley College.

Textbooks: Church's *Mechanics of Engineering*, and *Notes and Examples in Mechanics*, supplemented by other printed notes and problems.

A. Mechanics. Statics of a material point and of rigid bodies. Centers of gravity. Chains and cords. Dynamics (kinetics) of a material point. Centrifugal and centripetal forces. Moments of inertia of plane figures and of rigid bodies. Dynamics (kinetics) of rigid bodies.

Lectures, recitations, and problems, two hours daily, 8-10. Credit, five hours. Lincoln Hall 24. Assistant Professor RETTGER.

B. Mechanics. Work and energy; friction; graphical statics of structures and mechanisms; stress and strain; strength and elastic properties of materials in tension, compression, and shearing; torsion; bending moment, safe loading, deflection and resilience in simple and continuous beams.

Lectures, recitations, and problems, two hours daily, 10-12. Credit, five hours. Lincoln Hall 24. Assistant Professor RETTGER.

BRIDGE AND STRUCTURAL ENGINEERING

The following courses are the same as those given during the college year. For further information communicate with Professor Burrows.

C.E. 71. Structural Design and Bridge Stresses. Credit, two or four hours. Prerequisite Mechanics 20. One-half of the course includes structural details, i. e., the design of a wooden roof truss and of other timber joints. The other half of the course includes dead load, live load, wind load, and impact stresses in simple bridge trusses due to uniform live panel loads, locomotive axle loads, and road roller loads. This course is equivalent to first term C.E. 71. Lectures, recitations, computations, and drawing at hours to be assigned. Lincoln Hall 22 and 29. Assistant Professor BURROWS and Mr. URQUHART.

C.E. 71. Bridge Design. Credit, four hours. Prerequisites. Structural Design and Bridge Stresses. Computations and drawing for the complete design of a riveted railroad bridge truss, the stresses for which were computed in connection with the previous work in Bridge Stresses. The computations to determine the sections of all members, of pins, pin plates, splices, and other details as well as of connecting rivets are to be written up in the form of systematically arranged reports. The drawings consist of general detail plans showing the location of all rivets as well as the composition and relations of all members and connections. The final report is to give a full list of shapes and plates and a classified analysis of weights for the span. Lectures, computations, and drawing at hours to be assigned. Lincoln Hall 14 and 22. Assistant Professor BURROWS and Mr. URQUHART.

C.E. 72. Reinforced Concrete Arch. Credit, three hours. Prerequisites Mechanics 20, and that portion of course 71 which deals with elementary graphic statics. The design of an arch of reinforced concrete including the abutments and centering. Lectures, computation, and drawing, at hours to be assigned. Lincoln Hall 14. Assistant Professor BURROWS and Mr. URQUHART.

This course may be substituted for Engineering Design, C.E. (91f).

C.E. 77. Concrete Construction. Credit, three hours. Prerequisite Mechanics 20.

Elementary theory of reinforced concrete, including properties of materials, rectangular beams and slabs. T-beams, beams reinforced for compression, columns, and footings. The "straight line" theory is generally used, but the flexure formulas for ultimate loads are also discussed. The computing work involves the design of a small reinforced concrete building, and three drawings conforming to the best modern practice, are made of the structure designed. Textbook: Hool's Reinforced Concrete Construction, Volume I. Lectures and recitations twice daily for two weeks, computing thereafter four hours daily except Saturday. Assistant Professor BURROWS and Mr. URQUHART.

HYDRAULICS

In the scope and method of treatment, the course in theoretical hydraulics as given in the Summer Session is identical with the course (C.E. 23) given in the fall term, except that no laboratory demonstration lectures are given and the field is covered in slightly fewer lessons. It is intended primarily as a course in systematic tutoring for students in the College of Civil Engineering who have failed to pass off the course during the regular term, and except as noted below, full University credit (five hours) cannot be given to any other persons who may attend this course.

The class meets twice daily (except Saturday) at 8 and 12 o'clock and at 8 o'clock only on Saturday.

Students in the Department of Chemistry or in Sibley College, desiring this course to obtain credit corresponding to Course M12 (2 hours credit) may, with the sanction of the Committee on Summer School Studies of Sibley College, arrange to take a portion of the work of this class corresponding to the Sibley work. The schedule has been arranged so as to have the required Sibley work come at the noon hour session of the class. Registration for the Summer Session class in Hydraulics should be made before the close of the spring term or by letter.

The topics treated in the course are as follows:

Hydrostatics; measurement of pressures; strength of pipes; dams and retaining walls; immersion and flotation; earth pressures; pneumatics of air motors and compressors; barometric levelling; flow of water; orifices; weirs; pipes; fluid friction and loss of head; general application of Bernoulli's Theorem; steady flow in open channels; uses of Kutter's and Church's Diagrams; hydraulics of machinery and motors; water wheels; impulse and reaction turbines; theorem of flow through rotating casing; power, speed and discharge of turbines; theory of testing motors; discharge of centrifugal pumps; flow of gases; etc.

Classes are held in Lincoln 28. Assistant Professor SEERY.

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*It is probable that courses in the College of Agriculture, mainly for teachers, will be offered. In that case a supplementary announcement will be published. This may be had on application to the Secretary of the University.

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:

The Annual Register (for the year 1915-16, published January 1, 1916), price 50 cents.

Book of Views, price 25 cents.

Directory of Faculty and Students, Second Term, 1915-16, 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, December 15, 1915.

Announcement of the College of Arts and Sciences, May 1, 1915.

Announcement of the Department of Chemistry, May 15, 1915.

Announcement of Sibley College of Mechanical Engineering and the Mechanic Arts, January 15, 1916.

Announcement of the College of Civil Engineering, March 1, 1915.

Announcement of the College of Law, June 1, 1915.

Announcement of the College of Architecture, August 1, 1915.

Announcement of the New York State College of Agriculture, July 1, 1915.

Announcement of the Winter Courses in the College of Agriculture, September 1, 1915.

Announcement of the Summer Term in Agriculture, April 15, 1915.

Announcement of the New York State Veterinary College, June 15, 1915.

Announcement of the Graduate School, February 1, 1916.

Announcement of the Summer Session, March 1, 1916.

Annual Report of the President, November 1, 1915.

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

Announcement of the Medical College may be procured by writing to the Cornell University Medical College, Ithaca, New York.

Correspondence concerning the publications of the University should be addressed to

The Secretary of Cornell University,
Ithaca, New York.