

CORNELL UNIVERSITY
OFFICIAL PUBLICATION

VOLUME XI

NUMBER 7

ANNOUNCEMENT OF THE
TWENTY-NINTH SUMMER SESSION
JULY 3—AUGUST 13
1920

MARCH 1, 1920
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 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 1920

In order to get the full number of exercises announced for the Summer Session, it is necessary that all work begin promptly on Monday morning, July 5. Students are urged, therefore, to reach Ithaca in time to be present at the first exercise in each class. If possible, they should register on Saturday, July 3; if not, they should register on Monday during the hours not occupied in class work.

July 3, Saturday,	8 a. m. to 5 p. m. Registration at office of Registrar.
July 5, Monday,	Instruction begins at times and places announced under each course. Registration continued.
July 6, Tuesday evening, and following Tuesdays,	Organ Lecture-Recital, Sage Chapel.
July 8, Thursday evening,	Pianoforte Recital by Mr. Robert Braun, Barnes Hall.
July 9, Friday, before 4 p. m.	Last day for payment of fees at the Treasurer's Office, Morrill Hall.
July 11, Sunday, 11 a. m. and following Sundays,	Preaching in Sage Chapel.
July 11, Sunday evening,	Organ Recital, Bailey Hall.
July 12, Monday evening, and following Sundays,	First lecture in Monday evening course. Continued on following Mondays. Rockefeller Hall.
July 23, Friday, 8 p. m. and July 30,	Concert, Bailey Hall. Artists to be announced.
August 13, Friday,	Summer Session closes.

SUMMER SESSION 1920

OFFICERS

Jacob Gould Schurman, LL.D., President of the University.
David Fletcher Hoy, M.S., Registrar of the University.

ADMINISTRATIVE BOARD OF THE SUMMER SESSION

James Edwin Creighton, Ph.D., Dean of the Graduate School.
Frank Thilly, Ph.D., Dean of the College of Arts and Sciences.
Dexter Simpson Kimball, M.E., Representing the Professional Colleges.

Executive Committee

Robert Morris Ogden, Ph.D., Chairman.
Benton Sullivan Monroe, Ph.D., Secretary.

*STAFF OF INSTRUCTION

Joseph Quincy Adams, jr., Ph.D., Professor of English	English
Arthur A. Allen, Ph.D., Assistant Professor of Ornithology	Ornithology
Albert LeRoy Andrews, Ph.D., Assistant Professor of German	German
Ramiro Arratia, A.B., Instructor in Spanish, Harvard University	Spanish
William C. Ballard, jr., Assistant Professor of Electrical Engineering	Music
Leila Bartholomew, Teacher of Music, Grammar Schools, Ithaca	Music
Carl Becker, B.Litt., Professor of Modern European History	History
Charles C. Bidwell, Ph.D., Assistant Professor of Physics	Physics
George H. Brandes, B.Chem., Assistant in Chemistry	Chemistry
Robert Braun, Director, Braun School of Music	Music
Julian P. Bretz, Ph.D., Professor of American History	History
Leslie N. Broughton, Ph.D., Assistant Professor of English	English
Arthur W. Browne, Ph.D., Professor of Inorganic and Analytical Chemistry	Chemistry
Laura Bryant, Supervisor of Music, Ithaca Public Schools	Music
Earle N. Burrows, M.C.E., Assistant Professor of Civil Engineering	Bridge Engineering
Bruce A. Carey, Conductor, Elgar Choir, Hamilton, Canada	Music
Walter B. Carver, Ph.D., Assistant Professor of Mathematics	Mathematics
Jacob R. Collins, M.S., Instructor in Physics	Physics
Lane Cooper, Ph.D., Professor of English	English
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Ralph T. K. Cornwell, B.Chem., Assistant in Chemistry	Chemistry
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Karl M. Dallenbach, Ph.D., Instructor in Psychology	Psychology
Hollis E. Dann, Mus.D., Professor of Music	Music
Marcelle Delattre-Leyden, Teacher of French, Central High School, Washington, D. C.	French
Forrest L. Dimmick, Assistant in Psychology	Psychology
Henry Grattan Doyle, A.M., Assistant Professor of Romance Languages, George Washington University	Spanish
Alexander M. Drummond, A.M., Assistant Professor of Public Speaking	Public Speaking
Charles L. Durham, Ph.D., Professor of Latin	Latin

*The names of the instructors in the Summer School in Agriculture are given on page 46.

- Ellsworth D. Elston, A.B., Instructor in Geology and Geography and Geology
 Albert B. Faust, Ph.D., Professor of German German
 Jean M. Gélais, Instructor, U. S. Military Academy, West Point
 Swimming and Fencing
 Raymond G. Gettell, A.M., Professor of Political Science, Amherst College
 Government
 Roswell C. Gibbs, Ph.D., Professor of Physics Physics
 David C. Gillespie, Ph.D., Assistant Professor of Mathematics Mathematics
 Clarence A. Graeser, A.M., Professor of Modern Languages, The Citadel,
 Charleston, S. C. French
 G. E. Grantham, Instructor in Physics Physics
 Clement L. Griffin, Assistant in Chemistry Chemistry
 E. E. Halstead, Warren, Ohio Music
 William A. Hammond, Ph.D., Professor of Philosophy Philosophy
 Ralph L. Hankey, A.B., Princeton University French
 Dorothy Harris, A.B., Assistant in Geology Geography and Geology
 Ernest Herman Hespelt, A.M., Instructor in Romance Languages Spanish
 Emily Hickman, Ph.D., Professor of History, Wells College History
 Louis B. Hoisington, Ph.D., Instructor in Psychology Psychology
 Harley E. Howe, Ph.D., Assistant Professor of Physics Physics
 Eugène Louis Huet, L.L., Assistant Professor, Junior College, Detroit, Michigan
 French
 Everett L. Hunt, A.B., Assistant Professor of Public Speaking Public Speaking
 Helen Allen Hunt, Teacher of Music, Boston Music
 Wallie A. Hurwitz, Ph.D., Assistant Professor of Mathematics Mathematics
 James M. Hyatt, A.B., Instructor in Physics Physics
 Stuart D. Jackson, A.B., Instructor in Chemistry Chemistry
 Lee Jenks, Music
 Arthur Edward Johnstone, Teacher of Music, St. Louis Music
 Luther C. Lindsley, A.B., Assistant in Chemistry Chemistry
 William L. Lippincott, B.Chem., Assistant in Chemistry Chemistry
 Asa E. McKinney, A.M., Instructor in Chemistry Chemistry
 James F. Mason, Ph.D., Professor of French French
 David Mattern, A.B., Teacher of Music, Ithaca Public Schools Music
 Benton S. Monroe, Ph.D., Assistant Professor of English English
 Rosario Muñoz de Morrison Spanish
 Josiah Morse, Ph.D., Professor of Psychology and Philosophy, University of
 South Carolina Education
 Carleton C. Murdock, A.M., Assistant Professor of Physics Physics
 Melvin L. Nichols, B.Chem., Instructor in Chemistry Chemistry
 Clark S. Northup, Ph.D., Professor of English English
 Robert M. Ogden, Ph.D., Professor of Education Education
 William R. Orndorff, Ph.D., Professor of Organic and Physiological Chemistry
 Chemistry
 Frances Ottley Music
 Frederick W. Owens, Ph.D., Assistant Professor of Mathematics Mathematics
 Miles A. Pond, Ph.B., Assistant Professor of Civil Engineering
 Descriptive Geometry
 Harry Quayle, Pontiac, Michigan Music
 Harold Lyle Reed, Ph.D., Assistant Professor of Economics, New York Univer-
 sity Economics
 Hugh Daniel Reed, Ph.D., Professor of Zoology Zoology
 Ernest W. Rettger, Ph.D., Assistant Professor of Applied Mechanics Mechanics
 Arthur J. Rider, B.S., M.S., Instructor in Chemistry Chemistry
 Heinrich Ries, Ph.D., Professor of Geology Geology
 G. M. Robison, Ph.D., Instructor in Mathematics Mathematics
 Martin W. Sampson, M.A., Professor of English English
 Nathaniel Schmidt, A.M., Professor of Semitics History
 Ernest W. Schoder, Ph.D., Professor of Civil Engineering Hydraulics
 May Secor, Supervisor of Speech Improvement, New York City Schools Education

Francis R. Sharpe, Ph.D., Professor of Mathematics	Mathematics
Luis N. Sherwell, Teacher of Spanish, Stuyvesant High School, New York City	Spanish
B. F. Stuber	Music
Edward B. Titchener, Ph.D., Professor of Psychology	Psychology
Clarence E. Townsend, M.E., Assistant Professor of Machine Design	Mechanical Drawing
Leonard C. Urquhart, C.E., Assistant Professor of Civil Engineering	Bridge Engineering
Abbott P. Usher, Ph.D., Assistant Professor of Economics	Economics
Georges Alphonse Louis Vattier, Bachelier-és-lettres, Licencié-és lettres, Diplômé d'études supérieures, Professor of French at the Royal Military College, Kingston, Ontario	French
Seth Wakeman, A.M., Instructor in Education	Education
Ray H. Whitbeck, B.A., Professor of Physiography and Geography, University of Wisconsin	Geography
Bernice White, Instructor in Music, Hunter College	Music
Cornelia Williams, Principal, South Hill School, Ithaca	Music
Sudie L. Williams	Music
E. Jane Wisenall, Teacher of Music, High School, Cincinnati	Music
Blanche Woody	Music
Mabel F. Yeomans, A.B., Instructor in Public Speaking	Public Speaking
Benjamin P. Young, Ph.D., Assistant Professor of Zoology	Zoology
James T. Quarles, A.A.G.O., University Organist and Assistant Professor of Music	Organist

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 to 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, museums, laboratories, and shops are open for use.

2. College students in Cornell or other universities who wish to make some scholastic use of the long vacation, especially those whose college studies may for one reason or another have been interrupted. In the case of graduates some of the courses offered may be counted toward an advanced degree. See the Announcement of the Graduate School for details regarding opportunities for advanced work and research during the summer.

Undergraduates may anticipate requirements 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 8 and 9.

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 formal study or teaching.

ADMISSION, ATTENDANCE, REGISTRATION

There are no examinations for admission to the Summer Session. For conditions of admission to courses in the Summer School in Agriculture, see page 48. 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 "Academic Credit for Work," page 8.

All students are required to register at the office of the Registrar. They may register on Saturday, July 3, between 8 a. m. and 5 p. m., or upon the day of their arrival, if they reach Ithaca later than July 5. Registration on July 3 is urged. Registration in advance of the dates here given is not required.

Class exercises begin at 8 a. m., Monday, July 5. Thereafter 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, Room 22, Morrill Hall.

REGISTRATION FEE

A registration fee of \$5 is charged each student who registers for the first time in the Summer Session. This is to be paid only once; registration in a second year or in subsequent years will be without this fee. Matriculated students are not exempted from paying it on their first registration in the Summer Session. This registration fee will be collected with the tuition.

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 Comptroller 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. **Admission to classes is restricted to duly registered students.**

For instruction in swimming and fencing an extra fee is charged. See p. 40.

Instruction in all subjects taught in the Summer School in Agriculture is provided by the State of New York, and is free to **students registered therein who have been residents of the State for at least one year.** See page 48. For all others the tuition 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.

Persons taking courses in the Summer School in Agriculture and in any department of the Summer Session must register in both the Summer School and the Summer Session, paying, however, only one tuition fee and the registration fee mentioned above.

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. The fee in Physics 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 course S 8 and in course S 9 a fee of \$1 must be paid in advance to the Treasurer to cover incidental expenses of the course.

Zoology. Fees are charged for material actually consumed. See the Courses.

Library Deposit. See under Library, page 10.

ACADEMIC CREDIT FOR WORK

In the College of Arts and Sciences. The academic requirements for the degree of Bachelor of Arts are residence for eight terms (four years) and the completion of one hundred and twenty hours of elective work. During the first two years of his course the student must elect twenty-four of his hours under certain restrictions (the underclass requirements), and during his last two years he must elect twenty hours in some one department or group of related departments (the upperclass requirement).

To obtain credit toward the Cornell degree by means of work done in Summer Sessions, a student must have previously satisfied the entrance requirements of the College, and must obtain in advance the Dean's approval of his selection of courses. He may then obtain in any Summer Session credit for the number of hours he passes, between the limits of five and eight hours inclusive, but only for work completed during that session and passed without condition. To obtain credit for a term of residence he must pass a total of at least twelve hours in two or more Summer Sessions, at least five in each. Credit for two terms of residence, but no more, may be secured in this way.

No credit in hours of residence will be allowed a student not passing at least five hours, except that for a course in a foreign language meeting ten periods a week a student may obtain credit of four hours, which he may combine with eight hours secured in another Summer Session to obtain credit for a term of residence.

In Other Colleges of the University. The nature and amount of credit allowed in other colleges at Cornell for work in the Summer Session 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 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 creditable for a degree must be of advanced character in some field or department of knowledge. No credit for residence towards a master's degree will be granted any student who does not register with the Dean of the Graduate School within three days after the opening of the Session, and who does not formally become a candidate for this degree under the direction of a special committee. The latest day for such registration in 1920 is July 8. Upon first registration the student must pay the registration fee of \$5 mentioned on p. 7 and a matriculation fee of \$10.

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.

Any person wishing to become a candidate for an advanced degree and to study during the Summer Session is advised to 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 this way, moreover, it may be possible to secure the advice and guidance of professors in fields of study of which no specific mention is made in the announcements. Not all departments formally offer graduate work.

In certain departments also an invitation is issued to scholars who are beyond the stage of regular graduate study to make use of the resources of the University in these fields for carrying on research.

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 13, 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 \$9 a week upwards. In some cases the cost has been reduced to \$8, but it is not safe to count upon less than this sum.

The price of a single furnished room may be as low as \$2 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 1. Students are cautioned against unauthorized rooming-house agents.

The price of table board runs from \$6 to \$8 in boarding houses. In cafeterias and restaurants, the average cost of meals amounts to about the same sum. Three cafeterias under the management of the University are easily accessible on the campus.

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; otherwise 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 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.

In Sage College, which accommodates 175, the charge for room, table board, and a specified amount of laundry, will be, for the session, from \$63 to \$75 according to the size and location of the room.

In Prudence Risley Hall, which accommodates 151, the charge will be from \$69 to \$75 according to the room occupied.

In both buildings this charge includes lodging Friday night, July 2 (not earlier), breakfast Saturday, July 3, and all meals to and including breakfast Saturday, August 14.

Members of the Summer Session who do not room in Sage College or Prudence Risley Hall may obtain table board at either. The charge is \$7.50 a week.

In Cascadilla Hall a furnished room may be had for the six weeks of the Summer Session at a cost of \$22.50 to \$28.50, this charge including a specified amount of laundry. 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 reasonable rates.

Each of the residential halls is in charge of a warden, who is glad to know the students, to advise them in case of illness or other emergency, and to give them what information they may wish about the University, the town, and the community. The regulation of the social life of the students is in the hands of the wardens.

Rooms and board may be secured in private houses. A list of approved houses may be had by writing the Secretary of the Summer Session after June 1. It is not safe to engage rooms in places not recommended by the University.

Undergraduate women students of Cornell and other colleges are expected to live in the Residential Halls or in other approved lodgings.

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

2. **For Men.** Rooms in Baker Court will be available for men students. For room plans and all information concerning Baker Court, apply to the University Treasurer, Ithaca, N. Y.

Checks for reservation of room, or in payment of board bills, should be drawn to the order of Cornell University.

THE LIBRARIES

The University Library is open on week days from 8 a. m. to 10 p. m., except Saturday, when it is closed at 1 p. m. In this building are the main library, containing about five hundred thousand volumes, and most of the seminary and special libraries. The main reading room affords accommodations for more than two hundred readers, and contains a selected library of over 8,000 volumes of reference works. Below stairs 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.

The Library of the College of Agriculture, in the basement of Stone Hall, is open on week days from 9 a. m. to 5 p. m., except Saturday, when it is closed 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.

SAGE CHAPEL

Religious services, provided for by the Dean Sage Preachership Endowment, are conducted in Sage Chapel throughout the academic year by eminent clergymen selected from the various religious denominations. There will be services in the Chapel on five Sundays during the Summer Session, July 11 to August 8, inclusive.

THE CORNELL INFIRMARY

The Cornell Infirmary is the former mansion of the late Henry Williams Sage, for many years chairman of the Board of Trustees of the University. At his death in 1897, his sons, Dean and William Henry Sage, endowed it and gave it to the University for a students' Infirmary as a memorial to their father. In 1912 a modern fireproof addition was erected with a capacity of sixty-two beds.

The Infirmary, which is in charge of an experienced superintendent, is thoroughly equipped in every way, and is open throughout the University year. It provides suitable rooms, food, and nursing for sick students. It has no medical staff; students employ their own physicians among practitioners in Ithaca or elsewhere.

Students in the University Summer Session and in the Summer School in Agriculture have all the privileges of admission to the Infirmary. They pay no fee in advance, but are liable for regular charges for services rendered.

LECTURES, MUSICAL RECITALS, EXCURSIONS

In addition to the regular class room work there will be public lectures on Monday evenings.

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.

Organ recitals will be given on Tuesday evenings in the Sage Chapel and on Sunday evenings in 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 all members of the Summer Session. Notable for their attractiveness are the excursions to Watkins Glen and to Niagara Falls.

RAILROAD ROUTES

Ithaca is reached by three railroads: the Lehigh Valley; the Delaware, Lackawanna, and Western; and the Central New York Southern. The Ithaca branch of the Lackawanna 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. Trains on the Central New York Southern also connect with the New York Central at Auburn.

Application has been made for special reduced rates for teachers who attend the Summer Session. Owing to uncertainties about the future administration of the railroads, no such rates can be granted prior to March 1. Students coming from a distance are advised to make inquiries about special rates when they buy their tickets.

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.

LATIN

The courses in Latin offered during the Summer Session are primarily intended for:

(1) teachers of Latin in secondary schools who desire an independent presentation of the Latin language, its history, its development, and its use as a colloquial language and as a means of artistic literary expression;

(2) students who have a considerable familiarity with Latin literature and who desire a course in the interpretation of some literary masterpiece not usually read in college courses;

(3) students who are beginning or are continuing their candidacy for the Master's degree.

S 1. The High School Work. Interpretation of a selected text; theories of pronunciation and of syntax; the reading of Latin poetry; Latin composition; and Latin conversation as far as it can be used with success during the high school years. Daily except Sat., 9. G. S. 128. Credit, two hours. Professor DURHAM.

In this course the solution of the problems of the high school teacher will be the fundamental object. A familiar work, e. g., a book of Caesar or of Virgil or an oration of Cicero, will be used as a text.

The interpretative part of course 1 may be taken by students who have not completed the usual entrance requirements. Such students may by extra work under the guidance of the professor in charge prepare themselves to take the entrance examination for one unit of entrance credit in Latin.

S 2. Seneca's Letters. Selections from the letters to Lucilius with a consideration of their philosophical content and of the history and influence of Stoicism. Daily except Sat., 10. G. S. 128. Credit, two hours. Professor DURHAM.

S 3. Seminary in Epigraphy. Primarily for graduate students who are candidates for the Master's degree. The study of Latin inscriptions particularly as sources for the financial and administrative history of Rome. Hours to be arranged. University Library, Greek and Latin Seminary Room. Professor DURHAM.

Those who wish to begin their candidacy for the degree of Master of Arts are requested to correspond in advance with Professor Durham and to bring with them at the opening of the Summer Session such credentials of undergraduate work leading to the degree A.B. as will entitle them to admission to the Graduate School.

GERMAN

Courses S 1, S 2, S 3, afford the earnest student an opportunity to gain a working knowledge of German by concentrated effort.

Course S 4 is intended for teachers and for students who have had the equivalent of four years of German.

S 1. First Year German. Oral training, grammar, composition, reading. Daily except Sat., 8 and 11. G. S. 183. Assistant Professor ANDREWS. 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. 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. ANDREWS will be in Room 178, T Th, 10, to give special assistance to members of this class.

S 2. Second Year German. Review of grammar and reading. Daily except Sat., 9 and 12. G. S. 177. Assistant Professor ANDREWS. Credit, four hours. Entrance credit, one unit (second unit).

Prerequisite: one year of high school German or its equivalent

S 3. Third Year German. Oral training, grammar, composition, reading. Daily except Sat., 8 and 12. G. S. 190. Professor FAUST. Credit, four hours. Entrance credit, one unit (third unit).

Two recitations will be held daily except Saturday with a sufficient interval to enable the student to prepare for the second recitation.

Prerequisite: two years of high school German or its equivalent.

S 4. The German Drama of the Nineteenth Century. Daily except Sat., 10. G. S. 190. Professor FAUST. Credit, two hours.

Lectures in German and readings mainly in the works of Kleist, Grillparzer, Hebbel, and Gerhart Hauptmann.

FRENCH

S 1. Elementary Course. Daily except Sat., 8 and 12. G. S. 290. Credit, four hours. Professor GRAESER.

Entrance credit, one unit.

The object of this course is twofold: first to give beginners a thorough drill in the essentials of French pronunciation, grammar, and reading; second, to offer to teachers an opportunity of studying the methods of presentation of these subjects to beginners.

S 2. Intermediate Course. Daily except Sat., 8 and 12. G. S. 221. Credit, four hours. Mr. HANKEY.

Entrance credit, one unit. Prerequisite course S 1 or its equivalent.

S 3. Advanced Course. Daily except Sat., 8 and 12. G. S. 142. Credit, four hours. Assistant Professor HUET.

Entrance credit, one unit. Prerequisite course S 2 or its equivalent.

S 4. **Advanced Translation.** Daily except Sat., 9. G. S. 290. Credit, two hours. Prerequisite course S 3 or its equivalent. Mr. HANKEY.

S 5. **Elementary Composition and Conversation.** Daily except Sat., 11. G. S. 290. Credit, two hours. Prerequisite course S 3 or its equivalent. Professor GRAESER.

S 6. **History of French Literature.** Daily except Sat., 10. G. S. 283. Credit, two hours. Professor VATTIER.

Lectures on French literature since the Middle Ages, with outside reading and reports. This course is given in French.

[S 9. **Literature of the Nineteenth Century.** Daily except Sat., 11. G. S. 283. Credit, two hours.] Not given in 1920.

Lectures on French literature from 1850 to 1900, with outside reading and reports.

S 10. **French Poetry.** Daily except Sat., 10. G. S. 277. Credit, two hours. Professor MASON.

Lectures on contemporary French poetry and "explications de textes," with outside reading and reports.

S 14. **Advanced Composition and Conversation.** Daily except Sat., 8. G. S. 283. Credit, two hours. Professor VATTIER.

This course is conducted in French.

S 16. **French Phonetics.** Daily except Sat., 9. G. S. 283. Credit, two hours. Professor MASON.

An introduction to the study of phonetics. Considerable attention is given to phonetic transcription and to the use of phonetics in the teaching of French.

S 17. **Contemporary French Drama.** Daily except Sat., 12. G. S. 283. Credit, two hours. Professor VATTIER.

Lectures on the contemporary drama, with outside reading and reports. This course is given in French.

S 24. **French Criticism.** Daily except Sat., 10. G. S. 183. Credit, two hours. Assistant Professor HUET.

Lectures on contemporary French criticism with outside reading and reports.

[S 26. **Old French Texts.** Daily except Sat., 11. Library, French Seminary Room. Credit, two hours.] Not given in 1920.

A linguistic and literary study of selected old French texts.

S 30. **The Teaching of French.** Daily except Sat., 11. G. S. 227. Credit, two hours. Professor MASON.

French Readings. Madame Delattre-Leyden will give readings in French daily except Saturday at 2.15 P. M. in the Drawing Room of Sage College.

French Lectures. A series of lectures in French dealing with French national life will be given by the members of the instructing staff in French on Wednesday evenings at 8 o'clock in Goldwin Smith, Room 290.

La Maison Française. The Sill Cottage on the Campus has been reserved for students of French. Abundant opportunity for conversation in French will be afforded. Madame Delattre-Leyden will be in charge of La Maison Française and also of a special table at Sage College where only French will be spoken.

SPANISH

S 1. **Elementary Course.** Daily except Sat., 8 and 12. G. S. 277. Credit, four hours. Mr. HESPELT.

Entrance credit, one unit.

S 2. **Intermediate Course.** Daily except Sat., 8 and 12. G. S. 281. Credit, four hours. Mr. SHERWELL.

Entrance credit, one unit.

S 3. **Advanced Course.** Daily except Sat., 8 and 12. G. S. 124. Credit, four hours. Mr. ARRATIA.

Entrance credit, one unit.

S 4. **Modern Authors.** Daily except Sat., 9. G. S. 281. Credit, two hours. Mr. HESPELT.

Rapid translation of modern plays and novels, with special attention to idiom and style. Outside reading and reports.

S 5. **Elementary Composition and Conversation.** Daily except Sat., 11. G. S. 281. Credit, two hours. Mr. SHERWELL.

S 7. **Advanced Composition and Conversation.** Daily except S., 11. G. S. 277. Credit, two hours. Mr. ARRATIA.

Special attention will be devoted to free composition and correspondence. The course will be conducted in Spanish.

S 10. **Masterpieces of Spanish Literature.** Daily except Sat., 9. G. S. 277. Credit, two hours. Assistant Professor DOYLE.

A brief survey of Spanish literature through a study of representative works. Lectures, outside reading, reports, and discussions.

S 25. **Spanish-American Literature.** Daily except Sat., 12. G. S. 242. Credit, two hours. Assistant Professor DOYLE.

A study of the main currents of the poetry and prose of Spanish-America. Lectures, outside reading, and discussions.

S 30. **The Teaching of Spanish.** Daily except Sat., 10. G. S. 281. Credit, two hours. Assistant Professor DOYLE.

A course for the discussion of materials and methods in the presentation of Spanish in the secondary schools. Special attention will be given to phonetics, the teaching of pronunciation, composition, and translation, the choice and use of texts, the planning of junior and senior high-school courses, and auxiliary materials.

Spanish Lectures and Readings. A series of lectures and readings in Spanish by members of the instructing staff will be given during the session.

La Casa Española. A house at 322 Wait Avenue, across the road from Prudence Riskey Hall, has been reserved for women students of Spanish, and there will be a special table at Prudence Riskey Hall, at which only Spanish is spoken. The group will be in charge of SEÑORA MUÑOZ DE MORRISON and there will be a large opportunity, not only for Spanish conversation, but for Spanish games and entertainments.

ENGLISH

Courses S 1 and S 2 taken together will be considered the equivalent of the first term of course 1 or of course 3 in the regular University session. Courses S 1 and S 11 taken together will be considered the equivalent of the second term of course 1 or of course 3. But courses S 1, S 2, and S 11 taken together will not be considered the equivalent of both terms of course 1 or of course 3.

Courses in brackets are not given in the summer of 1920, but may be expected in the summer of 1921.

S 1. Composition. Daily except Sat., 8. G. S. 156. Credit, two hours. Assistant Professor BROUGHTON.

A practical drill intended for those who lack proficiency in writing; discussion of the elements and forms of discourse; frequent exercises, mainly expository; personal conferences at hours to be appointed.

S 2. Introductory Course in Literature. Daily except Sat., 9. G. S. 164. Credit, two hours. Professor NORTHUP.

Primarily a study of five of The Idylls of the King: The Coming of Arthur, Lancelot and Elaine, The Holy Grail, Guinevere, and The Passing of Arthur; and of the first, fifth, sixth, and seventh books of The Ring and the Book; and supplementary reading in Tennyson and Browning.

[S 4. **Advanced Composition.** Daily except Sat., 11. G. S. 164. Credit, two hours.

The planning, writing, and criticism of essays and of other exercises in composition, accompanied by a study of general principles of writing and of questions of English usage. The work of the class will be supplemented by personal conferences. Open only to students who have had course S 1 or its equivalent.]

S 5. Teachers' Course. Daily except Sat., 10. G. S. 156. Credit, two hours. Professor NORTHUP.

Lectures, readings, reports, and discussions. Designed for those who are teaching or who expect to teach English in schools. The organization of the high school course in English; methods of treating the works named by the Conference on Uniform Entrance Requirements in English; the teaching of literature in general; supplementary reading for pupils and teacher; the use of the school library and the public library; stage productions; the place of language and grammar in the high school; problems of oral and written composition; the relation of composition to literature and to other subjects in the curriculum.

S 6. Nineteenth Century Poetry. Daily except Sat., 8. G. S. 160. Credit, two hours. Professor SAMPSON.

A study of the poetry of Wordsworth and of Coleridge.

[S 7. **Nineteenth Century Poetry.** Daily except Sat., 8. G. S. 164. Credit, two hours.

A study and discussion of the most important poems of Byron, Shelley, and Keats; brief survey of the literary and historical background of the period; significant revolutions in thought, in literary criticism, and in the art of poetry.]

S 8. Modern Prose. Daily except Sat., 11. G. S. 164. Credit, two hours. Professor COOPER.

The nature of prose, and the principles of structure and style; essays and extracts from the works of Stevenson, Pater, Ruskin, and Newman, or other nineteenth-century English authors, and from available translations of continental writers. *Theories of Style* (Macmillan, 1907) will be used as a basis for the course.

S 9. History of the English Drama. Daily except Sat., 9. G. S. 160. Credit, two hours. Professor ADAMS.

An historical survey of the English drama from its origin to the close of the Elizabethan period, with a reading of typical plays.

S 10. Shakespeare. Daily except Sat., 11. G. S. 156. Credit, two hours. Professor ADAMS.

A study of a limited number of tragedies—including *Hamlet* and *Macbeth*, required by the College Entrance Examination Board—with stress upon the art of Shakespeare as a playwright.

S 11. American Literature. Daily except Sat., 12. G. S. 156. Credit, two hours. Assistant Professor BROUGHTON.

A study of the American poets of the nineteenth century with particular attention to Bryant, Poe, Whittier, Longfellow, Lowell, Holmes, and Emerson. Text: Page, *Chief American Poets*.

[S 12. **Victorian Literature.** Daily except Sat., 12. G. S. 164. Credit, two hours.

Lectures, readings, reports, and discussions of the leading characteristics and literary tendencies of the nineteenth century; the Romantic movement; the literary reflection of social changes; the relation of science and politics to literature; the development of the various types of literature; illustrative readings in the works of Tennyson, Browning, Arnold, Swinburne, Morris, Rossetti, Dickens, and Thackeray, with a glance at some other writers.

This course does not cover the ground of course S 2.]

[S 13. **The English Novel.** Daily except Sat., 12. G. S. 164. Credit, two hours.

A brief historical survey of the novel in English is followed by detailed study and discussion of the novelists of the nineteenth century. This course may serviceably supplement course S 12.]

[S 14. **Modern Drama.** Daily except Sat., 10. G. S. 160. Credit, two hours.

Reading and discussion of characteristic plays of some of the more important recent dramatists—Ibsen, Strindberg, Björnson, Tchekhov, Shaw, Galsworthy, and others; consideration of the modern theatre; current theories of drama.]

S 15. Dramatic Structure. Daily except Sat., 10. G. S. 160. Credit, two hours. Professor SAMPSON.

An advanced course designed for those who have completed two or more college courses in English, or whose reading serves as an equivalent for freshman and sophomore work.

A study of the principles of dramatic construction, based upon Greek, Elizabethan, and modern drama. Reading of about thirty representative plays.

Readings. Daily except Sat., 11. G. S. 160.

Professor Sampson will read aloud a number of the plays discussed in Course S 15. Attendance is optional, and open to others than those taking S 15. No credit will be given.

S 16. The English Language. Daily except Sat., 9. G. S. 162. Credit, two hours. Assistant Professor MONROE.

A study of essential features in the growth and development of the mother-tongue. Among the topics considered are: language and grammar in general; some misconceptions about the life of language; the relationships of English; phonetics, with practical exercises; the English vocabulary; inflections; native resources and foreign influences; modern English grammar; syntax; disputed usages; the bearing of historical grammar on present forms and usages, spoken and written.

Recitations, lectures, collateral reading. The course does not require previous knowledge of Old or Middle English.

[S 17. Recent English Poetry. Daily except Sat., 11. G. S. 160. Credit, two hours.

A study of the poetical work of Robert Bridges (the classical tradition of English poetry), Rudyard Kipling (the romance of the modern world; imperialism), and W. B. Yeats (neo-romanticism; the Celtic revival); readings from other contemporary work, including the "new poetry" and the poetry of the War.

Texts: Robert Bridges, *Poetical Works* (one volume, Oxford edition); Kipling, *Collected Verse*; Yeats, *Poetical Works*, vol. i.]

S 18. Old English. Daily except Sat., 11. G. S. 162. Credit, two hours. Assistant Professor MONROE.

This course is intended for students who, lacking the opportunity hitherto, now wish by earnest effort to acquire some knowledge of English in its early form. Lessons in grammar are followed as soon as possible by the reading of easy prose of the time of Alfred the Great.

The course may be taken by undergraduates; and, with additional reading, by graduates as a part of their work for the master's degree. The time of meeting may be changed to suit the convenience of the class.

S 19. Principles of Literary Criticism. Daily except Sat., 10. G. S. 164. Credit, two hours. Professor COOPER.

The principles of literary art, studied in connection with masterpieces from ancient and modern poets. The first book employed will be *Methods and Aims in the Study of Literature* (Ginn); other works on method will be discussed, and suggestions will be given about subsequent reading and teaching.

Elizabethan Literature. For graduates only. Hours and place to be arranged. Professor ADAMS.

Students desiring to pursue graduate work in the field of Elizabethan literature should consult Professor Adams at the beginning of the session.

Problems and Methods in Research. For graduates only. Hours to be arranged. G. S. 171. Professor COOPER.

The work will be adapted to the special needs and aims of the graduate students who apply. Application may be made to the instructor in advance by letter, or, otherwise, as soon as possible after the opening of the Summer Session.

Middle English Literature. For graduates only. Hours and room to be arranged. Professor NORTHUP.

A study of some of the leading tendencies in late Middle English literature. The special topic for this session will be the life and works of John Lydgate.

PUBLIC SPEAKING—ORAL ENGLISH

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

S 1. Public Speaking. Daily except Sat., 9. G. S. 21. Credit, two hours. Assistant Professor DRUMMOND.

A practical training for speaking in public. Original speeches and selections; extemporaneous speeches. Methods of preparation 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.

S 2. Voice Training. Daily except Sat., 10. G. S. 21. Credit, one hour. Assistant Professor HUNT.

This course consists of exercises 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.

S 3. Course for High School Teachers. Daily except Sat., 8. G. S. 21. Credit, two hours. Miss YEOMANS.

This course includes training in speech-making, story-telling, debate, and methods of teaching. Students taking course S 3 are advised to elect other courses in the department. In such cases the work will be adjusted to the needs of the individual; for example, those taking Course S 1 may spend less time upon speech-making and more upon other phases of the work. If desired, the instructor will assist members of the class in planning high school courses.

S 4. Oral Reading. Daily except Sat., 12. G. S. 21. Credit, two hours. Miss YEOMANS.

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.

S 5. The Production of School Plays. Daily except Sat., 11. G. S. 26. Credit, two hours. Consent of instructor necessary for admission. Assistant Professor 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.

PHILOSOPHY

The courses in philosophy are intended to be of general, rather than of technical interest, and may be taken by all students. Candidates for the degree of Master of Arts who have chosen philosophy as a major or a minor subject will find it advisable to take some of these courses as a basis and preparation for more advanced study. Such students will be given individual guidance in regard to their reading.

S 1. The Development of Modern Philosophical Thought. Daily except Sat., 8. G. S. 225. Credit, two hours. Professor CREIGHTON.

This course will trace the development of the general philosophical ideas upon which modern civilization rests. It will not undertake a systematic account of philosophical systems, but will attempt a more general survey of the modern period, and will emphasize especially the connection of philosophy with literary, scientific, political, and social movements. It may be taken by students who have already had a course in the history of philosophy.

S 2. Logic. Daily except Sat., 9. G. S. 225. Credit, two hours. Professor CREIGHTON.

An introductory course in deductive and inductive logic, including practice in the analysis of logical arguments and in the detection of fallacies.

S 3. History and Philosophy of the Fine Arts. Daily except Sat., 10. G. S. 225. Credit, two hours. Professor HAMMOND.

An Introduction to the Philosophy of Aesthetics, including an outline of the history of the plastic and graphic arts.

S 4. Greek Civilization. Daily except Sat., 12. G. S. 227. Credit, two hours. Professor HAMMOND.

A history of the chief Greek systems of philosophy and their survival in the Roman Empire and in Christian civilization. Particular attention will be given to the Greek ideals of life as expressed in their literature, art, and political theory and practice.

PSYCHOLOGY

S 1. Psychology. Lectures: M T W Th, 9. Professor TITCHENER. Recitations: F, 9, Dr. DALLENBACH, Dr. HOISINGTON, and Mr. DIMMICK. G. S. Room C. Credit, two hours.

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 as indicated by experiment,

beginning with 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.

Textbook: Titchener, Textbook of Psychology.

S 2. **Attention and Memory.** Daily except Sat., 10. G. S. Room C. Credit, two hours. Dr. DALLENBACH and Dr. HOISINGTON.

The first half of the course deals with Attention. The elementary phenomena, the development, the conditions, the kinds, and the levels of attention will be considered; then the experimental investigations will be reviewed; and finally the laws of attention will be applied to advertising, to conjuring and sleight of hand, to testimony, to efficiency, and to learning.

The second half deals with Memory. The chief topics to be treated are: the general nature of memory; the learning curve; the conditions of impression, association, retention, recall, and recognition; unusual memories and their conditions; "cramming" and efficient study; recitation and examination; teaching and the presentation of material; mnemonic schemes and the "training" of memory; the formation and breaking of habits.

Demonstrations and class-experiments will be made throughout the course. No textbook will be prescribed. Readings will be assigned in standard texts to be found in the Library.

S 4. **Qualitative Laboratory.** M W F, 2.00-4.30. Psychological Laboratory, Morrill Hall. Credit, two hours. Dr. DALLENBACH, Dr. HOISINGTON, and Mr. DIMMICK.

The purpose of this course is to furnish the student training in psychological method, 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, workshops, 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 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 may carry out experiments upon the more complex processes of association and action. The textbook is Titchener's *Experimental Psychology*, vol. i, *Qualitative Student's Manual*.

S 5. **Quantitative Laboratory.** Three afternoons (to be arranged), 2.00-4.30. Psychological Laboratory, Morrill Hall. Credit, two hours. Dr. DALLENBACH, Dr. HOISINGTON, and Mr. DIMMICK.

This course aims to furnish such training in the psychophysical methods and in the handling of instruments of precision as will be adequate preparation for research problems. The student will make experimental determinations of the stimulus limens, will attempt verifications 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 special fields may be undertaken in so far as time permits. The textbook is 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 S 6.

S 6. Experimental Problems. Hours and credit to be arranged. Psychological Laboratory, Morrill Hall. Dr. DALLENBACH and Dr. HOISINGTON.

Courses S 1 and S 4, or their equivalents, are prerequisites for this course. The work will consist of the original study of certain experimental problems, and will involve both observation and manipulation of instruments. Completed investigations may be published in *The American Journal of Psychology*.

S 7. Perception: Advanced Course. Daily except Sat., 11. G. S. Room C. Professor TITCHENER and Mr. DIMMICK.

This course presupposes courses S 1 and S 4 or their equivalents. Perception will be treated as the central problem of current systematic psychology. The lectures will be illustrated by experimental demonstrations and supplemented by references for reading. A knowledge of French and German is desirable.

EDUCATION

Courses S 1, S 2, and S 3, 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 Department of Education will hold an official examination for such candidates at Ithaca, August 19 and 20.

By a ruling of the State Department of Education exemption from examination may be had in any of the subjects above mentioned for which the candidate has secured credit in the Summer Session.

S 1. Educational Psychology. Daily except Sat., 10. G. S. 256. Credit, two hours. Professor OGDEN.

A study of the learning process and its application to educational theory and practice; the original nature of man, reflex action and instinct; the acquisition of habits; attention, memory, association and thinking; fatigue, individual differences and social cooperation. The textbook used in this course will be Gordon's Educational Psychology.

S 2. Principles of Education. Daily except Sat., 11. G. S. 256. Credit, two hours. Professor MORSE.

The nature and significance of education; biological and psychological foundations; the school as a social institution; educational ideals and values; the curriculum, administration, and general methods. The textbook used in this course will be Bobbitt's *The Curriculum*.

S 3. History of Education. Lectures, recitations, and prescribed readings. Daily except Sat., 9. G. S. 256. Credit, two hours. Professor MORSE.

The purpose of this course is to give an understanding of present educational values and practices through an historical consideration of their origin and development. Throughout the course, therefore, attempt will be made not only to outline the problems and their solutions, but to correlate education with the life and the social, psychological, and economic conditions of the times. Only such theories and practices as later proved themselves influential will be considered.

The topics treated are to a great extent those emphasized in the syllabus for the New York State Teachers' Certificate: education in primitive and barbaric societies; Greek and Roman education; the rise of the school as an institution; scholasticism, humanism, and realism; the rise of science; the 'psychological' movement; the origin and nature of specifically modern tendencies in education.

Textbook: Graves, Student's History of Education.

S 7. Mental Tests. Lectures, reading, and laboratory. Lectures, M W F, 12. G. S. 256. Laboratory, T Th, 2-4.30. G. S. 248. Credit, two hours. Mr. WAKEMAN.

A general consideration of the psychology and the practice of mental tests. The lectures will deal with the historical development of tests; the principles underlying their formation and application; the single tests and the test systems; a detailed study of the principles and use of the Stanford Revision of the Binet-Simon Scale; the bearing of tests upon the problems of psychological theory (nature and distribution of intelligence, the correlation of abilities, etc.); the use of the tests in schools, for the diagnosis of defective and exceptional abilities, vocational guidance, and the like.

The laboratory work is intended to give practice in the administering of tests both to individuals and to groups. The principal single tests as well as the recognized series tests will be used. The results of the laboratory testing will serve as a basis for a part of the lecture course.

Textbook: Terman, The Measurement of Intelligence.

Laboratory manual: Whipple, Manual of Mental and Physical Tests, Simpler Processes (Vol. I).

S 8. Exceptional Children. Lectures and prescribed reading. Lectures, T Th, 12. G. S. 256. Credit, one hour. Mr. WAKEMAN.

A general course dealing with the frequency, causes, and consequences of mental deficiency and with social and educational treatment of defective, delinquent, superior, backward, and psychopathic children.

Textbook: Terman, The Intelligence of School Children.

Course S 7 is required as a prerequisite, or as a parallel course with S 8. By special permission of the instructor, however, the above requirements may be waived in the case of students who are specially qualified to pursue the work.

S 9. Advanced Work in Education. Hours and credit to be arranged. G. S. 248. Professor OGDEN, Professor MORSE, and Mr. WAKEMAN.

As a prerequisite for this course one of the courses S 2, S 3, or S 7, or an equivalent, is necessary. The work may consist either of essays and reports upon some special topic, or of laboratory practice of an advanced grade. A seminary will be held if application is made by a sufficient number of advanced students.

S 10. The Theory and Methods of Speech Improvement. Lectures, model lessons, clinical demonstrations, and teachers' conferences. Daily except Sat., 2-3.30. G. S. Room B. Miss SECOR.

This course covers the analysis, classification, and correction of speech defects, such as stammering, stuttering, lingual protrusion, lateral emission, aphonia, defective phonation, foreign accent, and hoarse voice. The Martin Methods now employed in the Public Schools of New York City will be used.

This work will be of special help to prospective specialists in the correction of speech defects, high school teachers of English, teachers of physical training and mental deficiencies, kindergartners, and school nurses.

Several outings will be conducted Saturdays on which occasions teachers' conferences will be held for the purpose of discussing problems relative to the organization and administration of a Speech Improvement department.

Immigrant Education

In co-operation with the New York State Department of Education arrangements are being made for a course to interpret the meaning of Americanization, to furnish persons interested in Americanization a definite background for further study and practice, to develop competent teachers to give the immigrant instruction in the English language and to familiarize him with American customs, laws, and standards of living. The University of the State of New York will certify the attendance and satisfactory completion of the course. School authorities will give preference to those holding this certificate when considering applicants for work with foreign-born adults. Further information may be had by addressing Professor R. M. Ogden, Goldwin Smith Hall 246, Ithaca, N. Y.

For additional courses in Education open to students of the Summer Session, see p. 66.

TRAINING COURSE FOR PSYCHOLOGICAL EXAMINERS

By recent legislative enactment of the State of New York, special classes for defective children must be formed whenever ten or more such cases are found in any school district. A similar law is operative in New Jersey, and like requirements are being made in other states. Not only is there a considerable consequent demand for teachers trained in the examination and instruction of defectives, but with the increasing recognition of the extent and importance of individual differences in endowment, there is increasing recognition of the usefulness of familiarity with the methods and interpretation of psychological examinations not only for the mentally backward and subnormal, but also for the normal and supernormal, and in other fields than that of education.

To assist in meeting these various needs, the departments of Education and Psychology call special attention to courses in Introductory, Experimental, and Educational Psychology, and to the courses on Mental Tests and Exceptional Children. The latter have been expanded to give a thorough training in administration of tests and evaluation of results. Students who wish to enter these courses with a view to educational and other field service, are advised to register for such additional courses in Psychology as may be helpful in providing an adequate understanding of psychological principles and methods of investigation. Advice in the selection of courses with regard to the individual needs of the student may be had by consulting Professor R. M. Ogden, Goldwin Smith Hall 246, either in person or by letter.

HISTORY

S I. Greek and Roman History. Daily except Sat., 11. G. S. 134. Professor NATHANIEL SCHMIDT.

A survey of the history of the Greeks from the earliest times to Augustus, and of the Romans to the fall of the Empire. Lectures, collateral reading, and examinations.

S 2. Oriental History. Daily except Sat., 12. G. S. 134. Professor NATHANIEL SCHMIDT.

A survey of the history of the ancient Egyptian, Babylonian, Assyrian, Medo-Persian, Hittite, and Aegean civilizations. Lectures, collateral reading, and examinations.

S 3. Modern European History. Daily except Sat., 10. G. S. 242. Credit, two hours. Professor CARL BECKER.

The history of Europe since 1815, with special emphasis on international relations.

S 4. The French Revolution. Daily except Sat., 11. G. S. 242. Credit, two hours. Professor CARL BECKER.

A survey of the institutions of France under the Old Regime and of the history of the Revolution from 1789 to 1795.

S 7. American History. The expansion of the United States across the Alleghany Mountains, 1750-1848. Daily except Sat., 8. G. S. 234. Credit, two hours. Professor BRETZ.

This course deals with the exploration of the trans-Alleghany country, the movement of population into the West, Indian wars and relations with foreign powers on the frontier, territorial acquisitions, land policy, industrial development of typical communities, and in general with the social life of the new communities between the Alleghanies and the Mississippi. The plan is to supplement in some detail the customary treatment of American History and to emphasize the characteristic features of westward expansion.

S 8. American History. The Period of Civil War and Reconstruction, 1846-1875. Daily except Sat., 10. G. S. 234. Credit, two hours. Professor BRETZ.

The course covers the political, social, and constitutional history of the period indicated. Special attention is given to new historical literature, biographies, memoirs, and published source material. The problems of the decade before the war, of the war, and of reconstruction are treated in the light of the present. The controversy over slavery is followed to its conclusion, and attention is paid to the new national and industrial life created by the war. The problems of reconstruction and the political results of the policy of reconstruction are discussed in some detail.

American History. Seminary. Sat., 9-11. For students qualified for research. Consult Professor BRETZ. G. S. 235.

[American History, 1815-1850.

A general treatment of the period indicated above, with the emphasis upon expansion and upon the social conditions resulting from the occupation of the Mississippi Valley. Attention will be paid to the development of political parties and party practices. The work will consist of lectures, discussions, and reference readings.] Not given in 1920.

[American History, 1865-1914.

This course treats briefly the period of the Civil War and Reconstruction and emphasizes the subsequent period of industrial growth and territorial expansion. Special attention is devoted to the changes effected by the war in political theory and in constitutional development. Other matters considered are the Spanish-

American War and the problems arising from our insular possessions, the new nationalism, and the extension of popular government.] Not given in 1920.

S 17. **Contemporary History** and its teaching in the secondary schools. Daily, except Sat., 12. G. S. 234. Credit, two hours. Professor HICKMAN.

This course deals with such subjects of twentieth century history as are of interest to teachers of secondary students in Modern European, English, and American History and to teachers who expect to teach the courses in world history prescribed by the new syllabus in History issued by the University of the State of New York.

GOVERNMENT AND SOCIAL SCIENCE

S 1. **American Government.** Daily except Sat., 9. G. S. 227. Credit, two hours. Professor GETTELL.

The organization and activities of the government of the United States, including the federal, commonwealth, local, and municipal systems. Attention is also given to the government of our dependencies and to the position of the United States in foreign affairs. This course is intended especially for teachers of Civics.

S 2. **Social and Political Institutions.** Daily except Sat., 10. G. S. 227. Credit, two hours. Professor GETTELL.

A study of the nature and evolution of the most important social and political groupings and of their activities and interrelations. Especial attention is given to the family, the church, the industrial, commercial, and labor institutions, and to the state. The relation of state to individual, and of state to state, in both theory and practice is given consideration, and the proper scope of state activities is discussed.

ECONOMICS

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 subjects; (3) students seeking broad preparation for the teaching of economics in secondary schools. For the first group, Course S 1 covers the subject matter usually included under elementary economics. For Cornell students Course S 1 substitutes for both terms of Economics 52 and will also serve in lieu of Course 51 as a prerequisite to admission to various advanced courses in Economics. 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.

S 1. **Principles of Economics.** Twice daily except Sat., 10 and 11. G. S. 264. Credit, four hours. Assistant Professor USHER.

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

S 2. **Money and Credit.** Daily except Sat., 8. G. S. 264. Credit, two hours. Assistant Professor REED.

A study of the principles governing the mechanism of exchange: how the general level of prices is determined; effects of a changing price level upon investment operations; foreign and domestic exchange; the history of bimetallism in the United States; the present status of the gold standard; recent tendencies toward inflation.

It is recommended, but not required, that Theory and History of Banking be taken in connection with this course.

S 3. Theory and History of Banking. Daily except Sat., 9. G. S. 264. Credit, two hours. Assistant Professor REED.

The work of the commercial bank; national and state banking systems; the Central Banks of Europe; development and work of the American Federal Reserve System; the money market and organized speculation; financial readjustments occasioned by the European war.

This course and Money and Credit cover the field usually surveyed in college courses in Money and Banking. If possible, students in Theory and History of Banking should also take Money and Credit.

S 4. General Problems of Economic History. Credit two hours. Assistant Professor USHER. Time and place to be arranged.

The topics studied will include: The generalizations of the German Historical School, stages in the evolution of industry, forms of medieval and modern commercial organization, the origin of property in land, the decay of the Three Field System, systems of economic policy. The problems of theory involved will be emphasized. For graduates only.

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.

In the following list, courses S 1 to S 6 (2) are the equivalent to those having the same number in the Announcement of the College of Arts and Sciences for 1919-1920.

Courses S 1, S 2, S 3 are planned for those teachers in the 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. University credit for S 1, S 2, S 3, three hours each.

S 1. Solid Geometry. Daily, 11. White 1. Assistant Professor GILLESPIE. (Office hour, 10, White 3.)

S 2. Advanced Algebra. Daily, 9. White 21. Assistant Professor CARVER. (Office hour, 11, White 22.) White 6. Assistant Professor HURWITZ. (Office hour, 11, White 8).

S 3. Trigonometry. Daily, 10. White 6. Assistant Professor HURWITZ. (Office hour, 11, White 8). White 5. Assistant Professor CRAIG. (Office hour, 9, White 4).

Students taking S 6 (1) or S 6 (2) are requested to take no other University work during the session without special permission.

University credit for S 6 (1), S 6 (2), six hours each.

S 6 (1). **Analytic Geometry and the Calculus.** (First term's work). Daily, 8 and 11. White 27. Professor SHARPE. (Office hour, 9, White 29).

S 6 (2). **Analytic Geometry and the Calculus.** (Second term's work). Daily 8 and 11. White 2. Assistant Professor OWENS. (Office hour, 9, White 4). White 24. Dr. ROBISON. (Office hour, 9, White 23).

Course for Teachers

Selected Topics in Algebra and Geometry. Daily except Sat., 10. White 21. Assistant Professor CARVER (Office hour, 11, White 22).

The course is intended to meet the needs of teachers in the secondary schools. A fair knowledge of plane geometry and elementary and intermediate algebra will be presupposed; besides, some knowledge of solid geometry, advanced algebra, and trigonometry will be helpful but not essential. The course is not pedagogical; but is designed to give teachers a clearer insight into and a larger grasp of the subject matter of school mathematics.

Advanced Courses

S 62. **Projective Geometry.** Daily, 9. White 1. Credit, three hours. Assistant Professor GILLESPIE (Office hour, 10, White 3). The principles underlying projective forms of the first and second degrees will be developed. Although no knowledge of mathematics beyond plane geometry will be presupposed, additional training is highly desirable.

S 42. **Analysis.** Daily, 11. White 5. Credit, three hours. Assistant Professor CRAIG (Office hour, 9, White 4). The subject matter will be taken either from elementary differential equations or advanced calculus to suit the requirements of the class. Prospective students are advised to correspond with the instructor.

Reading and Research Courses

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.

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

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

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

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

Functions of a Complex Variable. Assistant Professor CRAIG.

PHYSICS

Teachers may enter any course that they are prepared to pursue with profit and are entirely at liberty to take portions of courses if such an arrangement is to their advantage.

COURSES IN INTRODUCTORY AND GENERAL PHYSICS

Those who have not had college physics are advised to take course S 3.

S 3. Introductory Experimental Physics. Credit, six hours. This course is intended to furnish a basis for all following courses as well as to give a fairly complete survey of general physics. Teachers and others familiar with the elements of the subject may find the course useful and instructive.

Lectures: The lectures are accompanied by experimental demonstrations. Kimball's College Physics will be used for reference. Daily except Sat., 8, to be followed by an informal discussion at 9. Rockefeller A. Professor GIBBS.

Recitations: Practice in the solution of problems related to the lectures and laboratory work. M W F, 12. Rockefeller 108. Mr. COLLINS.

Laboratory: Three two-hour laboratory periods a week. Section A, M, 2-4 and T Th, 10-12; Section B, W F, 10-12 and Th, 2-4. Rockefeller 220. Mr. COLLINS.

S 4a. General Physics. Recitations. Heat, Magnetism, and Electricity. The work in this course will presuppose a knowledge of introductory physics such as may be obtained in a first course in college physics. Credit, two hours. Daily except Sat., 12. Rockefeller 105. Assistant Professor HOWE.

S 10. Physical Experiments. This course may with profit be taken by teachers of elementary physics who wish a teaching familiarity with introductory laboratory work.

The fundamental physical laws and constants are studied, partly from the qualitative, partly from the quantitative point of view. The work may be varied to suit the needs of the student, since the instruction is in all cases individual.

Credit, one or two hours. Three two-hour periods a week for one credit hour. Daily except Sat., 9-11, and as arranged. Rockefeller 220. Mr. COLLINS.

S 11b. General Physics. Recitations. Heat and Light. Theory and problems covering thermometry, change of state, kinetic theory, thermodynamics, and physical and geometrical optics. It is recommended that Physics S 12 be taken simultaneously with Physics S 11b. Prerequisites, Physics 3 or its equivalent and the differential and integral calculus. Daily except Sat., 8. Rockefeller 105. Credit, two hours. Mr. GRANTHAM.

S 12. Physical Measurements. Primarily for teachers and students who wish a thorough introduction to the theory and methods of physical measurements and observations either as a preparation for graduate study or as an extension of previous work in Physics. The methods of setting up and adjusting apparatus, the study of sources of error and their elimination, methods of computation, the interpretation of results both analytically and graphically, are given special emphasis.

The instruction is individual and the topics covered may be adjusted to meet the needs of the student. Credit, one to four hours. Prerequisites: the equivalent of eight hours of college Physics (unless Physics S 11b be taken simultaneously) and a knowledge of the elements of calculus. One to four two-and-one-half hour periods each week. M W F, 10-12.30 (or 9-11.30 by special arrangements) and T Th, 2-4.30. Rockefeller 252. Assistant Professor BIDWELL and Mr. HYATT.

S 14. **Physical Measurements.** Students of whom Physics 14 is required in the regular academic year may substitute therefor Physics S 12.

INTERMEDIATE COURSES

The sequence of courses outlined below is intended to run through three summer sessions. The schedule for the next three summers is

1920	S 20 and S 22b
1921	S 21 and S 23a
1922	S 22a and S 23b

These courses are of the same general character as the corresponding courses given in the fall and spring terms but include somewhat fewer topics. The selection of these topics will be influenced by the interests and needs of the class. Either half of the divided courses, S 22 and S 23, may be taken without the other.

To profit by these courses a student should have a knowledge of calculus and should have completed courses in general physics covering the principal topics of the subject and of a grade substantially equivalent to that of Physics S 4a, and should have had courses in physical measurements substantially equivalent to Physics S 12. If he has not had sufficient laboratory experience he may complete this requirement by taking Physics S 12 simultaneously. A student who contemplates electing any of these courses is advised to correspond with the department about his preparation for the work.

Courses S 20 to S 25 may be taken for credit toward a master's degree in physics, subject to the requirements of the graduate school. (See Announcement of the Graduate School).

S 20. **Heat.** Thermometry; equations of state; heat transfer; change of state; an elementary study of the kinetic theory of gases; thermodynamics and the laws of thermal radiation. Credit, two hours. Daily except Sat., 12. Rockefeller C. Assistant Professor BIDWELL.

[S 21. **Light.**] Not given in 1920.

[S 22a. **Electricity and Magnetism.** Properties of static fields; direct current phenomena; gaseous, electrolytic, and metallic conduction; chemical and thermal electromotive forces.] Not given in 1920.

S 22b. **Electricity and Magnetism.** Electromagnetism; theory of the galvanometer; variable current phenomena; electric oscillations. Credit, two hours. Daily except Sat., 8. Rockefeller C. Assistant Professor MURDOCK.

[S 23a. **Properties of Matter.** Dynamics of solids and gravitation.] Not given in 1920.

[S 23b. **Properties of Matter.** Elasticity, surface tension; dynamics of fluids; viscosity.] Not given in 1920.

S 25. **Advanced Laboratory Practice.** This course is open to students who have had Physics S 12 (4 hours credit) or its equivalent. It is intended to meet the requirements of the following students: those wishing to take up special topics for detailed study; those taking courses S 20, S 22b, or S 48 and desiring to supplement that work in the laboratory; those who wish to develop their laboratory technique in preparation for research. Credit varies with the amount of

work done. The laboratory will be open daily except Sat., 9-12. Rockefeller 301. Assistant Professor MURDOCK.

ADVANCED COURSES

Courses S 48, S 51, and S 52 are intended to meet the needs of students who desire in a brief period to make an intensive study of the more important and fundamental fields of theoretical physics. It may be expected that one of these courses will be offered each summer.

Subject to the requirements of the graduate school (See Announcement of the Graduate School) these advanced courses may be taken for credit toward a doctor's degree in physics.

S 48. **Theoretical Physics.** Optics. A mathematical treatment based on Drude's "Theory of Optics." Daily except Sat., at 8. Assistant Professor HOWE.

[S 51. **Theoretical Physics.** Mechanics.] Not given in 1920.

[S 52. **Theoretical Physics.** Electricity and Magnetism.] Not given in 1920.

S 75. **Special Topics for Investigation.** Students who are prepared to profit by the use of the library and laboratory facilities of the department in the study of some special topic or in investigation will be given an opportunity to do so. This work may be taken in connection with or independently of any of the above courses and will be under the direction of one or more members of the staff with whom frequent conferences should be arranged. Credit varies with the nature and amount of work done.

For further information regarding opportunities for research and investigation during the Summer of 1920 see the Announcement of the Graduate School.

ANNOUNCEMENTS

On each Wednesday evening a conference will be held at which some phase of modern physics will be discussed. Whenever feasible, experimental demonstrations will be shown and every effort will be made to give opportunity for open and free discussion.

Professor MERRITT will be in Ithaca during a considerable portion of the summer and will be glad to advise and assist a limited number of physicists who may desire to utilize the equipment of the department for research. In all cases preliminary arrangements should be made with Professor MERRITT before coming to Ithaca to begin such work.

CHEMISTRY

The courses announced below correspond entirely or in part with courses given during the regular sessions of the University. For regular students the requirements for admission to the various courses will be the same as during the year.

Teachers may be admitted to any course for which their general training or experience may be considered to prepare them. Every effort will be made to meet the individual needs of teachers by arranging and modifying the work as far as possible so as to fulfil the particular requirements in each case.

Courses in brackets are not given in 1920.

S 1. Introductory Inorganic Chemistry. a. Lectures, daily except Sat., 12. Rockefeller. Professor BROWNE and Mr. GRIFFIN. 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. Morse Hall. Mr. MCKINNEY and Mr. LINDSLEY. 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 the methods of laboratory instruction, quantitative experiments, and the blowing of simple glass apparatus.

c. Recitations. T Th F, 8. Morse C. Mr. MCKINNEY. 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.

S 6. 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, Morse C. Laboratory, daily except Sat., 1.30-4.30. Mr. RIDER and Mr. LIPPINCOTT. Credit, three hours. An elementary course for those who have had the equivalent of course S 1. 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. Morse C. Laboratory, M W F, 8-11. Credit, two hours. Mr. RIDER and Mr. LIPPINCOTT.

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 apparatus ordinarily employed in analytical work.

Advanced work (see course S 14) may be taken by students who complete this course before the close of the session.

S 7. Qualitative Analysis. Lectures and recitations, daily except Sat., 8. Rockefeller 109. Laboratory, daily except Sat., 1.30-4.30, and M W F, 9-12. Mr. RIDER and Mr. LIPPINCOTT. 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 S 6A; and (2) a comparative study in the laboratory of different methods of detecting and separating the bases.

S 12. Quantitative Analysis. Lectures, daily except Sat., 8. Morse D. Laboratory, daily except Sat., 9-1. Mr. NICHOLS and Mr. BRANDES. Credit, four, five, or six hours.

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

S 14. Quantitative Analysis, Advanced Course. Laboratory practice at hours to be arranged. Credit, one, two, three, or four hours. Mr. NICHOLS and Mr. BRANDES.

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

[S 16. **Electrochemical Analysis.** Laboratory practice. Credit, one hour.]

[S 19. **Qualitative and Quantitative Gas Analysis.** Lectures. Credit, two hours.]

[S 20. **Technical Gas Analysis.** Laboratory. Open to those who have taken or are taking Course S 19. Credit, two hours.]

[S 24. **Opticochemical Methods.** Lectures. Morse 119. Laboratory practice. Credit, three hours.]

[S 25. **Opticochemical Methods.** Advanced Course. Laboratory. Credit, one or more hours.]

S 30. Organic Chemistry.

A. Aliphatic compounds. Lectures and recitations. Daily, 8. Morse 119. Laboratory practice at hours to be arranged. Credit, four to six hours. Professor ORNDORFF, Mr. JACKSON, and Mr. CORNWELL.

B. Aromatic compounds. Lectures and recitations. Daily, 12. Rockefeller. Laboratory practice at hours to be arranged. Credit, four to six hours. Mr. JACKSON and Mr. CORNWELL.

This course presupposes a knowledge of elementary chemistry. 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.

S 31. Organic Chemistry.

A. Aliphatic compounds. Lectures and recitations. Daily, 8. Morse 119. Credit, three hours. Professor ORNDORFF and Mr. CORNWELL.

B. Aromatic compounds. Lectures and recitations. Daily, 12. Rockefeller. Credit, three hours. Mr. JACKSON and Mr. CORNWELL.

These lectures and recitations are the same as those of Course S 30. Course S 30 should be taken in preference to Course S 31 whenever it is possible.

S 32. Organic Chemistry, Shorter Course. Aliphatic and aromatic compounds. Lectures and recitations. Daily, 8, Morse 119; daily, 12, Rockefeller, 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. JACKSON, and Mr. CORNWELL.

The lectures and recitations of this course include all of those of Course S 30 A, and the first half of those of Course S 30 B. Course S 32 presupposes a knowledge of elementary chemistry, and is designed more particularly for students registered in the Colleges of Medicine and Agriculture.

S 34. **Advanced Organic Chemistry.** Laboratory practice at hours to be arranged. Credit, two or more hours. Professor ORNDORFF, Mr. JACKSON, and Mr. CORNWELL.

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.

S 37. **Methods of Organic Analysis.** Laboratory practice with occasional lectures. Hours to be arranged. Credit, two or more hours. Professor ORNDORFF, Mr. JACKSON, and Mr. CORNWELL.

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.

[S 48. **Selected Topics in Advanced Inorganic Chemistry.** Lectures. Credit, one hour.]

[S 50. **Introductory Physical Chemistry.**

A. Lectures. Credit, three hours. A systematic presentation of modern chemical theory. The subject matter includes: an 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. Credit, three hours. A continuation of Part A. The subject matter includes the phase rule and its applications; thermo-chemistry; electro-chemistry; photochemistry; application of the principles of physical chemistry to actual practice.]

[S 51. **Physical Chemistry Laboratory.** A. Laboratory practice. Credit, three hours. B. Laboratory practice. Credit, three hours.]

[S 54. **Colloid Chemistry.** Credit, two hours. Lectures.]

[S 57. **Laboratory Practice in Physical Chemistry.** Credit, one to three hours. Laboratory periods to be arranged.]

[S 65. **Chemical Microscopy, Elementary.** Lectures, demonstrations, and laboratory practice at hours to be arranged. Credit, two hours.]

[S 66. **Chemical Microscopy, Advanced.** Laboratory practice at hours to be arranged. Credit, three hours.]

S 96. **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.

For courses in agricultural chemistry see pages 51, 52, of this announcement.

ZOOLOGY AND ORNITHOLOGY

S 1. **General Zoology.** Lectures, daily except Sat., 9. McGraw 5. Laboratory, daily except Sat., 2-5.30. McGraw 2a. Credit, six hours. Professor REED and Assistant Professor YOUNG.

A general survey of the animal kingdom, the life processes, adaptations, reaction to environmental stimuli, the relations of animals, and the principles of zoology. Observations upon living animals both in the laboratory and in nature

will constitute a portion of the course. An example of each animal group will be studied as a part of the laboratory work. The course is the equivalent of course I, given during the academic year.

Laboratory fee, \$6.

S 2. Teachers' Course. This course is adapted to the needs of those who are teaching or preparing to teach zoology and presupposes a training equivalent to that given in course S 1. The work includes the study of various forms of animals not included in general courses and instruction in the collection and preparation of material for class use. Opportunity will be given for learning the fundamental principles of making permanent preparations of class material.

The laboratory work will be supplemented by field work in which attention is given to the natural habitat of animals and methods of collecting and preserving them for future use.

Hours to be arranged. Credit, one or more hours. Professor REED and Assistant Professor YOUNG.

Petrunkevitch's *Morphology of Invertebrate Types*, Macmillan & Co., and Guyer's *Animal Micrology*, Chicago University Press, will be found very valuable as reference books for this work. Laboratory fee, \$3.

Persons expecting to take this course should notify the department in advance.

S 3. Ornithology. Credit, three hours. Lectures, M W, 11. McGraw 5. Laboratory, M W, 2-5. Field work, T Th, 5.30-8 a. m. Laboratory fee, \$2. Assistant Professor ALLEN.

A course designed to give an introduction to the study of birds and a knowledge of the common species. The lectures will discuss such subjects as classification, migration, coloration, song, nest-building, eggs, care of young, methods of attracting birds, economic importance, etc. The laboratory practice with bird skins will give an intimate knowledge of all the common birds of Eastern North America and familiarity with the use of a manual. The aim of the field work is the identification of birds in their haunts and observations upon their habits. Each student should be provided with Chapman's *Handbook of Birds of Eastern North America* and with field or opera glasses.

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 Secretary 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 for 1920 as listed in the following paragraphs.

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; also educational methods in geography.

The environs of Cornell University are rich in phenomena of geographic and geologic interest. Field excursions, consequently, 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 S 1, S 8, and S 10.

LECTURE COURSES IN GEOGRAPHY AND GEOLOGY

S 1. Physical Geography. M T W Th, 9. Lecture Room, McGraw Hall, first floor, south end. Professor WHITBECK. Credit, two hours.

An introductory course in physical geography including the continents and the atmosphere; theories of the origin of the earth; its motions and their consequences; the growth of the continents; the uplift and denudation of the land; the work of the atmosphere, ground water, streams, and glaciers; the glaciation of North America; the influence of geographical environment upon plant and animal life and man's response to his physical surroundings.

The lectures in physical geography are fully illustrated by lantern slides, wall and globe maps. Students registering in this course are advised to take also the related courses S 8 and S 10, and if possible S 5.

S 2. Commercial and Industrial Geography. M T W Th, 11. Geological Lecture Room. Professor WHITBECK. Credit, two hours.

The course will consist of lectures, readings, discussions, and a written report on a selected topic. Considerations will be given to such topics as: geographic factors influencing the development of industry and commerce, natural resources, importance of transportation. The following parts of the world will be treated: the United States, the Caribbean Region, the West Coast of South America, the East Coast of South America, the British Empire, France, Germany, Russia, Southeastern Europe, Italy, China, Japan, India. The course will be helpful to teachers of geography in the grades and high schools. Smith's *Commerce and Industry* or his *Industrial and Commercial Geography* will be useful.

S 3. The Teaching of Geography in Elementary Schools. T Th, 8. Physical Geography Laboratory. Professor WHITBECK. Credit, one hour.

Lectures and discussions dealing with: the major aims in teaching geography; reasons for the ineffectiveness of much geography-teaching; where to lay the emphasis; preparation of a list of minimum essentials in place-geography; consideration of the problem and type study methods; the use of supplementary materials; map studies; field trips; etc.

S 5. Geology. A General Introductory Course. M T W Th, 10. Geological Lecture Room. Professor RIES. 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; development of the life of the earth.

The lectures will be illustrated with lantern slides, models, maps, and specimens. Students registering for this course are urged to take the laboratory course S 9, and, if possible, course S 10.

S 6. Mineral Resources. M T W Th, 12. Credit, two hours. Professor RIES.

A general course descriptive of the more important mineral resources of the United States, with briefer reference to commercially important foreign resources. Among the topics discussed are: distribution, uses, manufacture, production by countries, commercial interdependence.

LABORATORY AND EXCURSION COURSES IN BOTH GEOGRAPHY AND GEOLOGY

S 8. Physical Geography, Laboratory Course. T Th, 2-4. Physical Geography Laboratories. Mr. ELSTON. Credit, one hour.

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 of the topographic, regional, and life relationships (human, animal, and plant) 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 must be paid to the Treasurer at the beginning of the session to cover laboratory maintenance.

S 9. Geology, Laboratory Course. W F, 2-4. General Geology Laboratory. Credit, one hour. Mr. ELSTON.

This course is designed to supplement course S 5. 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 must be paid to the Treasurer at the beginning of the session to cover laboratory maintenance.

S 10. Geography and Geology, Field Course. This course should be elected by all those registering in course S 1 or S 5 and is required of all those who desire entrance credit in physical geography. With courses S 1 and S 8 it affords a comprehensive course in physical geography; with courses S 5 and S 9 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, 2, 3, 5, 6 are required of all students in the course, and in addition for one hour's credit they must make either 10, or two of 7, 8, and 11.

Meeting place and time announced in mimeographed outlines or by bulletin. Meet for first excursion, Monday, July 12, at East Ithaca Station, 2.00 p. m.

Excursions 1-6, Monday afternoons; 7, 8, 11, all day Saturday; 10 starts on 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 Professors Ries and Whitbeck, 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 S 10

Monday Afternoons

1. **Eagle Hill.** To become acquainted with the lie of the land about Cornell, to learn the place names of the broader physiographic features, studying, enroute, 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 12.

2. **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 19.

3. **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 a return by trolley; if so, expense 15c to 20c may be paid at the time. July 26.

5. **Terminal Moraine. North Spencer.** By train or auto truck. Expense about \$1.25. 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. August 2.

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. August 9.

All-Day Excursions

7. **Taughannock Gorge and Falls.** By boat. Expense about \$1. 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 17.

8. **Enfield Gorge and Falls; and Connecticut Hill.** By auto-truck. Expense about \$1.50. To study the relations of preglacial and hanging valleys and the postglacial 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. In the afternoon, a ride to the top of Connecticut Hill, the highest point in the region. July 24.

Longer Excursions

10. **Niagara Falls and Gorge.** By train and trolley cars, if railroad conditions permit. Expense between \$16 and \$20. Overnight at Niagara Falls. July 31.

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 a 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 50c in coin or money order.

11. **Watkins Glen.** By auto-truck. Expense about \$2. August 7.

Watkins Glen is considered one of the most beautiful scenic spots 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 related to the Cayuga valley. Ride across the dissected upland country to the south and west between Ithaca and Watkins.

PHYSICAL EDUCATION

Students desiring to elect courses offered by the Department of Physical Education in the College of Agriculture should correspond with or consult Mr. Laurence S. Hill, Caldwell Hall 282. For descriptions of courses see p. 58; for courses in Rhythmic Gymnastics see p. 45.

Swimming and Fencing.

Instruction in swimming and life saving; and in 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.

DRAWING

S 3. **Mechanical Drawing for Secondary Schools.** Sibley 102. Assistant Professor TOWNSEND.

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.

S 4. Mechanical Drawing. M W F, 8-11, and daily except Sat., 2-5. Sibley 203. Assistant Professor TOWNSEND.

A course in drawing for beginners, covering use of instruments, orthographic and isometric projection, inking, tracing, convention, working drawings.

S 5. Machine Sketching and Drawing. M W F, 8-11, and daily except Sat., 2-5. Sibley 203. Assistant Professor TOWNSEND.

A more advanced course in mechanical drawing for those who have the equivalent of course S 1. Sketching of machine parts, machine drawing from sketches, empirical design. This course is an application of the work in course S 1 to such machine designing as can be done without a knowledge of mechanics.

S 6. Descriptive Geometry. Lectures, daily except Sat., 9. Recitations and drawing, daily except Sat., 10-12. 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 that given in the regular C.E. course 1, and the student will receive four 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. The morning and afternoon sessions make it possible to readjust the above schedule so as to accommodate nearly all who may wish to take either course.

SHOP WORK

S 7. Pattern Making. Use of woodworking tools; elements of pattern making. Daily, 8-11 or 9-12. Daily except Sat., 2-5. Mr. ———.

S 10. Machine Work. Instruction in the operation of various standard machine tools; use of measuring and hand tools; fitting and assembly. Daily, 8-11 or 9-12. Daily except Sat., 2-5. Mr. ———.

These courses will be given provided registration is large enough to justify operation of the shops.

MECHANICS OF ENGINEERING

Text-books: Church's Mechanics of Engineering and Examples in Mechanics, supplemented by other printed notes and problems.

Classes are held in Lincoln Hall, Room 24; Office, Room 35.

Course S 20 is the equivalent of M 5 of Sibley College, or C.E. 20 of the College of Civil Engineering. Course S 21 is the equivalent of M 6 of Sibley College, or C.E. 21 of the College of Civil Engineering.

For a detailed description of these courses see the Announcement of the College of Civil Engineering, Courses 20 and 21.

S 20 includes Statics of a material point and of rigid bodies, and kinetics of rigid bodies. Prerequisite Integral Calculus.

Eleven recitations and two computing periods (of two and a half hours each) a week. Recitations at 8 and 11. Computing periods to be arranged. Assistant Professor RETTGER.

S 21 includes strength of materials (that is, mechanics of materials). Prerequisite, the equivalent of Course S 20.

Recitations at 9 and 12. Computing periods to be arranged. Mr. CORNELL.

The two courses S 20 and S 21 are so arranged as not to conflict. Students may therefore take part of S 20 and part of S 21 at the same time, and thus make up almost any deficiency in Mechanics.

A student taking either course for the first time is not permitted to take any other work unless permission to do so is granted him by the instructor in charge or by the class adviser of his college.

The courses are open to students from other universities subject to the same requirements for admission as made for Cornell students. Such students should bring with them official credentials from their universities showing that they have met the requirements for admission to the courses in question.

For further information concerning the Mechanics of Engineering, for the coming Summer Session, write to Professor E. W. Rettger, 321 Mitchell Street, Ithaca, N. Y.

STRUCTURAL ENGINEERING AND HYDRAULICS

The following courses are the same as those given in the College of Civil Engineering during the college year. For further information about the content of any course or about the assigned hours communicate with Professor E. N. BURROWS.

C.E. 71. Structural Design and Bridge Stresses. Credit, four hours. Prerequisite, Mechanics 20. One-fourth of the course includes structural details, i. e., the design of a wooden roof truss and of other timber joints. The remainder 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 14 and 29. Assistant Professor BURROWS.

S 71. Structural Design. Credit, three hours. Prerequisite, Mechanics 20 and first term 71. This is an elementary course in Steel Design. Lectures, computations, and drawing. Complete design, detail drawings, bill of material, and estimate of weight of a steel roof truss, a through and deck plate girder bridge. This course is the same as second term C.E. 71. At hours to be assigned. Lincoln Hall 14. Assistant Professor BURROWS.

S 72. Reinforced Concrete Arch. Seniors and graduates. Elective. Credit three hours. This course may be substituted for engineering design, course 91f. Prerequisite, courses 20 and 21, and the first part of course 71. The design of an arch of reinforced concrete including its abutments and centering. The general form and proportions are determined by two preliminary investigations. The final investigations of the arch ring are made in accordance with the elastic theory, the live loading for maximum unit-stresses in the arch ring, as well as the direction and magnitude of abutment thrusts, being determined by means of

influence lines. The design is supplemented by several illustrated lectures on the different types of concrete arch bridges of recent construction, their principal details, methods of erection, and influence on design. Textbook: Hool's Reinforced Concrete Construction, Vol. III. Lectures, computation, and drawing. Assistant Professor BURROWS.

S 75. Bridge Design. Elective. Seniors and graduates. Credit, three hours. Prerequisite, course 71. Computations and drawing for the complete design of a riveted railroad bridge of six or seven panels, the stresses for which were computed in connection with the previous study of bridge stresses. The computations to determine the sections of all members and 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 drawing consists of general detail plans showing the location of all rivets as well as the composition and relation of all members and connections. The final reports are to give a full list of shapes and plates, and a classified analysis of weight for the span. Textbook: Merriman and Jacoby's Roofs and Bridges, Part III. Computation and drawing. Assistant Professor BURROWS.

S 77. Concrete Construction. Credit, three hours. Prerequisite, courses 20 and 21. Concrete materials, properties of plain concrete, its making and deposition. Elementary theory of reinforced concrete as applied to columns, rectangular beams and slabs, T-beams and beams reinforced for compression. Direct stress combined with flexure. Laboratory work includes the making and testing of columns, beams, and bond specimens. Recitations, laboratory, and computing periods. Assistant Professor URQUHART.

S 78. Concrete Design. Elective. Seniors and graduates. Credit, three hours. Prerequisite, course 77. This course may be substituted for Engineering Design, Course 91. Applications of the theory of reinforced concrete to the design of the various types of retaining walls. Selective problems in the design of reinforced concrete structures such as buildings, sewers, etc. Reports and drawings. Assistant Professor URQUHART.

C.E. 40. Hydraulics. Credit, three hours. Sibley College will accept this for course M 12. Prerequisite C.E. 20, or Sibley M 5 and 6. Four recitations and three computing periods a week. Six or more demonstration lectures are given in recitation periods. Professor SCHODER.

Hydrostatics, including stability of gravity dams, immersion and flotation, gas volumes and pressures. Flow of liquids through orifices, nozzles, Venturi meters, pipes, and over weirs. Time required to fill and empty tanks and canal locks. Simple, compound branching, and looping pipes. Elementary power calculations in common pumping and fire protection problems. Flow of water in open channels.

MUSIC

The courses offered by the Department of Music are primarily intended for the training of supervisors of music in public schools, normal schools, and colleges. A special course is offered for the training of directors of instrumental music in the schools.

Students are admitted to the Department of Music only on application to Professor Hollis Dann. Conditions of admission, application blank, and other important information concerning the courses may be found in the special announcement of the Department, which will be sent on application.

Admission of students in other departments of the Summer Session cannot be promised in advance, and is possible only to such classes as are not filled by the students taking Music exclusively.

First year courses are designated A; Second year B; Third year C; Fourth year D; Advanced courses E.

Sight Reading—A. Daily except Sat., 11.55 (two sections). Miss BARTHOLOMEW and Miss OTTLEY.

Sight Reading—B. Daily except Sat., 10.05 and 11.55 (two sections). Mr. QUAYLE.

Sight Reading—C. A home-study course.

Dictation—A. Daily except Sat., 9.10 (two sections). Miss BARTHOLOMEW and Mr. QUAYLE.

Dictation—B. Daily except Sat., 9.10 (two sections). Credit, two hours—Miss WHITE and Miss OTTLEY.

Dictation—C. M W F, 9.10. Credit, one hour. Miss WISENALL.

Material and Methods—B. Daily except Sat., 11.00, Miss BRYANT.

Material and Methods—C. Daily except Sat., 10.10, Professor DANN.

High and Normal School Music—D. Daily except Fri. and Sat., 12.00, Professor DANN.

Practice Teaching—C. Daily except Mon. and Sat., 10.05, Miss WOODY; 11.00, Miss WHITE.

Practice Teaching—D. Daily except Sat., 9.10, Miss BRYANT.

Elementary Theory—A. Daily except Wed. and Sat., 2.15, Miss OTTLEY.

Harmony—A. Daily except Sat., 10.05, Miss WISENALL.

Harmony—B. Daily except Sat., 11.55. Credit, two hours. Miss WISENALL.

Melody—C. M W F, 11.55. Credit, one hour. Mr. JOHNSTONE, Assistant Professor BALLARD.

Melody—D. M W F, 11.00. Credit, one hour. Mr. JOHNSTONE, Assistant Professor BALLARD.

Chorus—A and B. Daily except Sat., 8.00. Mr. CAREY and Miss COLWELL.

Advanced Chorus.—Daily except Sat., 8.00. Professor DANN.

Conducting—C. T Th, 9.10. Mr. CAREY.

Conducting—D. Daily except Fri. and Sat., 10.05 (two sections). Mr. BRAUN and Mr. CAREY.

School Orchestra—C. M T Th, 2.15. Mr. MATTERN.

Violin Classes.—(Elective.) Hours to be arranged. Mr. MATTERN and Mr. STUBER.

Community Orchestra.—(Elective.) M, 7.30 p. m. Mr. MATTERN.

Orchestra, Material and Methods—E. Daily except Sat., 11.00. Mr. MATTERN.

Band and Orchestra Technique.—(Elective). Daily, except Sat., 11.55. Mr. STUBER.

Song Interpretation—B. T F, 2.15. Mr. JOHNSTONE.

Rote Songs and Voice Training—B. M Th, 2.15. Miss BRYANT and Miss COLWELL.

Voice Training—D. T Th, 11.00, F, 11.55. Mrs. HUNT, and Miss COLWELL.

Principles and Practice of Teaching—D. A home-study course.

History of Music and Current Events—C. A home-study course.

History of Music and Current Events—D. A home-study course.

Musical Appreciation I. M T Th, 3.00. Miss S. L. WILLIAMS.

Musical Appreciation II.—(Elective.) W, 2.15. Mr. JOHNSTONE.

PROGRESSIVE SERIES OF PIANO LESSONS (Elective)

I. Elementary.

Daily except Sat., hours to be arranged. Mr. BRAUN.

II. **Intermediate.** Daily except Sat., hours to be arranged. Credit, two hours. Mr. BRAUN.

III. **Advanced.** Daily except Sat., hours to be arranged. Credit, two hours. Mr. JOHNSTONE.

NORMAL COURSES IN PIANO TEACHING

I. Daily except Sat., 11.00. Mr. BRAUN.

II. Daily except Sat., 11.55. Mr. BRAUN.

PHYSICAL EDUCATION

Singing Games, Rhythms, and Folk Dances. 1. Observation of children's classes; daily health exercises; stories; rhythms; singing games and elementary folk dances; their application to the teaching of music. Classes of children in attendance daily.

Daily except Sat., 10.05-10.55 and 11.00-11.45 (two sections).

2. Teacher's course in connection with course 1, classified according to grades; methods of teaching.

Hours to be arranged. Miss ———.

STATE COLLEGE OF AGRICULTURE

OFFICERS

- Jacob Gould Schurman, A.M., D.Sc., LL.D., President of the University.
Albert Russell Mann, A.M., Dean of the College of Agriculture and Director of the Experiment Station.
George Alan Works, Ph.B., M.S.A., Professor of Rural Education, in charge of the Summer School.
Cornelius Betten, Ph.D., Professor, Secretary, and Registrar.

STAFF OF INSTRUCTION

- Robert M. Adams, B.S., A.B., Assistant Professor of Farm Crops.
Floyd E. Andrews, Foreman of the Instruction Plant, Poultry.
Arthur Augustus Allen, Ph.D., Assistant Professor of Ornithology.
Charles Ethan Allen, B.A., M.D., Instructor in Histology and Anatomy, Albany Medical College, and Professor of Physiology, Albany College of Pharmacy.
Albert Reiff Bechtel, B.S., A.M., Instructor in Botany.
Cora E. Binzel, Acting Professor of Rural Education.
O. T. Brim, M.A., formerly Professor of Rural Education, Rock Hill, S. C.
Julian E. Butterworth, A.B., Ph.D., Professor of Rural Education.
Fred Albert Carlson, B.S., Instructor in Soils.
George Walter Cavanaugh, B.S., Professor of Agricultural Chemistry.
Peter Walter Claassen, M.A., Ph.D., Assistant Professor of Biology.
Anna Botsford Comstock, B.S., Assistant Professor of Nature-Study.
Otis Freeman Curtis, A.B., Ph.D., Assistant Professor of Botany.
Ralph Wright Curtis, M.S.A., Professor of Landscape Art.
John D. Detweiler, B.A., M.A., Instructor in Nature-Study.
Emery N. Ferriss, Ph.B., Ph.D., Acting Assistant Professor of Rural Education.
Helen Gleason, Head of Clothing Department, University of Missouri.
Julia Gleason, Instructor in Home Economics.
Jeanne Maclean Gray, B.A., State Supervisor of Physical Education, Pennsylvania.
L. A. Hausman, M.A., Ph.D., Instructor in Biology.
Arthur John Heinicke, B.S.A., M.A., Ph.D., Assistant Professor of Pomology.
Gustave F. Heuser, Ph.D., Assistant Professor of Poultry Husbandry.
Laurence S. Hill, B.S., Director of Physical Education, Public Schools, Albany, N. Y.
Hugh Cecil Hockett, B.S.A., Assistant in Entomology.
F. Beatrice Hunter, B.S., Instructor in Home Economics.
Emma Johnson, B.S., Assistant State Leader of Junior Extension.
Paul J. Kruse, A.B., Ph.D., Professor of Rural Education.
David Lumsden, Assistant Professor of Floriculture.
William Foster Lusk, B.Ph., M.S.A., Professor of Rural Education.
Nancy Hill McNeal, Ph.B., Assistant Extension Professor of Home Economics.
M. S. Markle, Ph.D., Professor of Botany, Earlham College.
Edward Gardner Misner, B.S., Ph.D., Assistant Professor of Farm Management.
Helen Monsch, B.S., M.A., Assistant Professor of Home Economics.
Winifred Moses, B.S., Assistant Professor of Home Economics.
Ralph Simpson Nanz, B.S., Instructor in Botany.
E. Laurence Palmer, A.B., M.A., Ph.D., Assistant Professor of Rural Education.
Harold A. Pratt, Instructor in Floriculture.
John M. Reed, B.A., Acting Director of Physical Education, Rensselaer Polytechnic Institute.
Frank Elmore Rice, A.B., Ph.D., Assistant Professor of Agricultural Chemistry.
Louis Michael Roehl, B.S., Supervisor of Farm Shop Work.
Flora Rose, B.S., M.A., Professor of Home Economics.
George H. Russell, Assistant in Nature-Study.
Dwight Sanderson, B.S. in Agr., Professor of Rural Organization.

Henry William Schneck, B.S., M.S.A., Assistant Professor of Vegetable Gardening.
Thomas Oxnard Sprague, B.S., Assistant in Pomology.
Samuel Newton Spring, B.A., M.F., Professor of Forestry.
Roland Maclaren Stewart, A.B., Ph.D., Professor of Rural Education.
William Alonzo Stocking, M.S.A., Professor of Dairy Industry.
Jay R. Traver, A.B., Assistant in Nature-Study.
Martha Van Rensselaer, A.B., Professor of Home Economics.
Frank B. Wann, Instructor in Botany.
Karl McKay Wiegand, B.S., Ph.D., Professor of Botany.
Wilford Murray Wilson, M.D., Professor of Meteorology.
George Alan Works, B.Ph., M.S.A., Professor of Rural Education.
William Joseph Wright, B.S., M.S., Extension Professor of Rural Education.

COURSES IN THE COLLEGE OF AGRICULTURE

The New York State College of Agriculture provides courses of instruction under the rules and regulations that follow:

1. **Admission.** The summer school in the College of Agriculture is designed to meet the needs of persons engaged in educational work. Admission is limited to the following groups:

a) Teachers, supervisors, superintendents, extension workers, and others concerned with activities of an educational nature regardless of previous academic education.

b) Students who have satisfactorily completed at least two years of work in Cornell University or some other institution of equal standing.

c) High School graduates who desire to fit themselves for immediate professional educational work.

Applicants for admission should send evidence of meeting these requirements to the Secretary of the College of Agriculture in advance of registration. The submission of this evidence will not constitute an obligation to attend, but is suggested merely as a means of avoiding delay at the time of registration.

2. **Tuition and Fees.** Tuition in any of the courses following is free to admitted students who are residents of New York State and who have been so for at least one year. Others will pay a tuition fee of \$30, whether one subject or more is taken. For the time and place of payment, see page 7.

In some of the courses a fee to cover the cost of materials used will be charged. An incidental fee of five dollars is charged all students in physical education.

Fee cards must be procured from the instructor at the first exercise, and returned to him receipted within five days.

3. For special announcement regarding Physical Education see p. 58.

4. **Academic Credit for Work.** For the requirements for the degree B.S. (eight terms, 120 hours, etc.), see the Announcement of the College of Agriculture.

ANIMAL HUSBANDRY

S 1. **Principles and Practice of Feeding Animals.** Credit, two hours. Lectures, M W F, 10. Practice, T Th, 10-12.30. Animal Husbandry Building.

The general principles of animal nutrition and the practice of feeding animals, based on Henry's Feeds and Feeding as a text. The discussion of the practice of feeding horses, cattle, sheep, and swine will occupy most of the time given to laboratory work, which will also include the study of feeding standards, the study of about forty home-grown and commercial feeds, the formulation of rations, and the like.

S 2. **Principles of Animal Breeding; Elementary Judging.** Credit, three hours. Lectures, daily except Sat., 9. Laboratory, T Th, 2-4.30. Animal Husbandry Building.

A general discussion of the principles of heredity as applied to the breeding of animals, with a study of animal form; origin and formation of breeds; crossing

and grading, with an outline of the methods of registration and the study of records and pedigrees. Demonstrations, essays, and reports will be required in addition to the lectures.

The laboratory work will include practical handling of animals and methods of scoring and judging. Types and several breeds, particularly of dairy cattle, will be illustrated.

BACTERIOLOGY

S 1. Bacteriology. Credit, two hours. Lectures, T Th, 9. Dairy Building 222. Laboratory, M W F, 2-5. Dairy Building 122. Professor STOCKING.

A general course in bacteriology covering the general characteristics of bacteria, methods of study, and their relation to the sanitary and economic phases of agriculture. It is especially designed for teachers of agriculture, botany, and biology. This course is given by the Department of Dairy Industry. Laboratory fee, \$3.

BOTANY

The courses in botany are planned to meet the needs of high school and college teachers, as well as to furnish information for persons not intending to teach.

The work will consist of lectures, laboratory work, and field work. The lecture and class-room work will be supplemented by lantern slides, charts, microscopic, museum, and herbarium material. It is likely that some round table discussions will be arranged.

The region about Ithaca is especially rich in plant life. Rarely, if ever, is a locality found that is better adapted for summer field work in botany. The richness of the fungous and the algal floras, as well as the great number of mosses, liverworts, ferns, and flowering plants, render field work here especially attractive and valuable. Special attention is given to the field botany, although other phases of the work are not ignored.

The country in the vicinity of the University is very diversified; marshes, fields, woodlands, ravines, and bogs all being accessible for day trips. Many short field trips will be taken and three longer all-day trips. The all-day trips will occur on Saturdays and will entail an extra expense of \$1.00 to \$2.00 for each. Women will find the bloomer or knickerbocker costume desirable for field work.

In addition to the laboratory fee in each course a deposit of \$2.00 will be required from each student to whom a vasculum or other special apparatus is assigned.

S 1. Elementary Botany. Credit, three hours. Lectures, M W, 8. Laboratory, M W, 9-1, F, 8-1, with additional reading or field work. Botanical Laboratory, Agronomy Building. Assistant Professor MARKLE and Mr. WANN.

Representative plants from all the larger plant groups will be studied. Emphasis will be placed on structure and life history with particular attention to evolutionary relationship. Some attention will be given to the economic aspects of the different groups, and to their adaptation to surroundings. Field work will replace laboratory hours to a limited extent and some all-day trips will be required.

This is a general course planned as an introduction to the study of botany and as a preparation for advanced courses. It is intended also to cover certain

phases of college entrance requirements and of general secondary school botany. Laboratory fee, \$3.50.

S 2. Elementary Morphology of Seed Plants. Credit, one hour. Lectures, T, 2-3. Laboratory, T, 3-5.30, Th, 2-4.30, with some additional reading. Botanical Laboratory, Agronomy Building. Assistant Professor MARKLE and Mr. WANN.

A study of the variation in form and structure of roots, stems, leaves, flowers, fruits, and seeds, together with the terminology concerned, and the advantages of these variations. Modified plant parts, pollination, and seed dissemination will receive attention. Fundamental internal structure will be treated briefly. Laboratory and field studies, conferences, recitations, and reading.

The course is arranged somewhat after the plan of Gray's *Lessons in Botany* and is designed as a preparation for systematic field botany and for persons desiring a general knowledge of the common plants. It also covers certain phases of secondary school botany. Identification is not a feature of this course. Laboratory fee, \$2.

S 3. General Plant Physiology. Credit, three hours. Prerequisite: chemistry and elementary botany. Lectures and recitations, daily except Sat. 8. Agronomy Building 192. Laboratory, M W, 9-1. Assistant Professor CURTIS.

This course is designed to acquaint the student with the general principles of physiology. Topics such as water relations, photosynthesis, digestion, respiration, mineral nutrition, and nitrogen relations are studied in some detail, followed by discussions of the more general growth relations and responses. In the laboratory experiments will be performed which may be used by teachers as experiments demonstrating many of the important life processes.

S 4. Identification, Classification, and Ecology of the Higher Plants. Credit, two hours. Prerequisite: some training in structural botany taken previously or in connection with this course. Lectures, Th, 8. Laboratory or field, T, 8-1, Th, 9-1. Botanical Laboratory, Agronomy Building. Professor WIEGAND.

A comprehensive study of the wild flora about Ithaca, with reference to the practical recognition of species and varieties as well as to the floral and foliar characteristics of these species and to the grouping of them into genera, families, and more comprehensive groups. The course consists of field and laboratory work, but is supplemented by general discussions and lectures on the broader questions of classification, nomenclature, distribution, and habitat. The ecological association and modifications of the various species and varieties will be noted. The course is intended to supply teachers and others with a general knowledge of the flora. Some all-day trips are required. Supplementary instruction will be given in the preservation of material for the museum and for the herbarium.

If necessary this course will be divided as follows: A. For those beginning this type of work. B. For students who already possess some knowledge of the flora. Laboratory fee, \$2.50.

S 5. Trees and Shrubs. Credit, two hours. Prerequisite: some training in structural botany, taken previously or in conjunction with this course. Lectures, W, 2. Laboratory or field work, M, 2-5, W, 3-5, F, 2-5 Agronomy Building. Mr. BECHTEL.

A course intended for those who desire more concentrated work on the woody plants of our flora than can be obtained in course S 4. The aim is to familiarize

the student with as many as possible of the trees and shrubs in the Cayuga Lake flora, their floral and foliar characters, their structure, methods of growth, habits, and distribution. Much of the work will be in the field, supplemented by laboratory practice, lectures, and demonstrations. Some all-day trips are required. Laboratory fee, \$2.50.

S 8. Identification and Classification of Lichens, Liverworts, Mosses, and Ferns. Credit, one hour. Prerequisite: a general knowledge of structural botany. Laboratory and field work, T Th, 2-5, with some additional work by appointment. Botanical Laboratory, Agronomy Building. Mr. NANZ.

An introduction to the four groups of plants indicated by the title of the course. The student will become acquainted with the general structural characteristics of different members of these groups, and will receive practice in tracing the various species through the keys. The field work is planned to acquaint students with the flora of our ravines and swamps which are especially rich in lichens, liverworts, mosses, and ferns. Material will be collected, identified, and mounted in standard packets, and will become the property of the student. Some all-day trips are required. Laboratory fee, \$2.

BIOLOGY

S 1. General Biology. Credit, three hours. Lectures, daily except Sat., 11. Roberts Hall 392. Laboratory and field work, M W F, 2-4.30; other sections by special arrangement. Roberts Hall 302. Assistant Professor CLAASSEN and Dr. HAUSMAN.

This is an elementary course designed to acquaint the general student and the prospective teacher with the principal ideas of biology through selected practical studies of the phenomena on which biological principles are based. Laboratory fee, \$2.50.

S 2. Protozoology. Credit, one hour. One lecture and two laboratory periods to be arranged. Biological laboratory, third floor Roberts Hall. Dr. HAUSMAN.

This course is designed to acquaint the student with the general life phenomena and ecology of the protozoa, and to afford practice in the preparation of cultures and the identification of the common species.

CHEMISTRY

S 85. Agricultural Chemistry, General Course. Credit, two hours. Prerequisite Introductory Chemistry. Lectures, daily except Sat., 9, Morse Hall 119. Professor CAVANAUGH.

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

S 86. Agricultural Chemistry, Introductory Laboratory Course. Credit, two hours. Prerequisite Chemistry 6 (qualitative and quantitative analysis), or its equivalent. M T W Th, 2-5. Caldwell Hall 250. Assistant Professor RICE.

Methods for making tests and the simpler analyses of plant materials, feedstuffs, soils, fertilizers, insecticides, and fungicides, with the end in view of giving the student a clear knowledge of their chemical composition and behavior. Recitations are held during laboratory periods.

S 72. Chemistry of Foods and Food Products. Credit, two hours. Prerequisite Introductory Chemistry; should be preceded also by a course in Organic Chemistry. Lectures, daily except Sat., 11. Morse Hall 119. Professor CAVANAUGH.

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

S 102. Chemistry of Foods, Elementary Laboratory Course. Credit, two hours. Prerequisite Introductory Chemistry; should be preceded also by a course in Organic Chemistry. M T W Th, 2-5. Caldwell Hall 250. Assistant Professor RICE.

The chemistry of proteins, fats, carbohydrates, potable water, baking powders, jellies, syrups, butter, oleomargarine, olive oil, salad oils, cheese, milk, food preservatives, artificial coloring, flavoring extracts, habit-forming agents, tooth powders, and so forth. Recitations are held during laboratory periods.

S 103. Chemistry of Foods and Food Products. Laboratory Course. Credit two hours. Prerequisite, Chemistry 6 and 32 (or, preferably, Chemistry 7, 12, and 30). M T W Th, 2-5. Caldwell Hall 250. Assistant Professor RICE.

This is designed as a beginning laboratory course for students expecting to take further work in the chemistry of foods. The conventional "complete" analysis of carbohydrate foods is made. Examination and analysis of proteins, fats, carbohydrates, soaps, baking powders, jellies, syrups, butter, oleomargarine, olive oil, salad oils, cheese, milk, artificial coloring, flavoring extracts, and so forth.

S 116. Special Topics and Research. Students desiring special advanced work in soils, fertilizers, insecticides, fungicides, foods, dairy products, feeding stuffs, condimental stock feeds, etc., or those taking research should register for this course. One to three hours may be taken. Consult Professor CAVANAUGH or Assistant Professor RICE not later than registration day.

DAIRY INDUSTRY

S 1. Dairy Industry. Credit, one hour. Lecture, T, 10. Dairy Building 222; Laboratory, T Th, 2-4.30. Dairy Building 132. Professor STOCKING.

A general course dealing with phases of dairy work of special interest to dairy farmers. The course will include work in testing dairy products, methods of producing and handling market milk, care of dairy utensils, cooling, factors influencing keeping quality, relation of bacteria to value of market milk, determination of percentage of fat and production of individual cows, relative value of milk with different percentages of fat for manufacturing butter and cheese. Modifications will be made to adapt the course to the needs of the students.

ENTOMOLOGY

S 4. Elementary Morphology of Insects. Credit, three hours. Laboratory open daily except Sat., 8-5; Sat., 8-1. Twenty-one hours of laboratory work a week required. Roberts Hall 391. Mr. HUCKETT.

An introductory laboratory course required of all students who plan to do advanced work in entomology. Laboratory fee, \$2.

S 5. Elementary Systematic Entomology. Credit, two hours. Fifteen hours of laboratory work a week required. Must be preceded or accompanied by course S 4. Laboratory open daily except Sat., 8-5; Sat., 8-1. Roberts Hall 391. Mr. HUCKETT.

Practice in the identification of insects and in the method of phylogenetic study as illustrated by their wing venation. With course 4, required of all students who plan to do advanced work in entomology. Laboratory fee, \$3.

Members of the summer session may attend, in Roberts 392, Professor Matheson's long-term course in General Entomology (Course 3: Lecture, W F, 9) without credit.

FARM CROPS

S 10. Farm Crops. Credit, two hours. Lectures and laboratory, M W F, 10. Laboratory T Th, 2.30. Assistant Professor ADAMS.

This is a general course in farm crops with special reference to potatoes, beans, corn, and the vegetable garden. Topics to be considered are: varieties, preparation of soil, fertilizers, planting, culture, harvesting, seed selection, and marketing. This course is not the equivalent of any of the courses offered during the regular college year.

FARM MANAGEMENT

[S 1. Farm Cost Accounting. Credit, two hours. Lectures, T Th, 10. Laboratory, M W F, 2. Farm Management Building.

Farm inventories, single enterprise accounts, complete farm accounts, and other farm records. Special emphasis is given to the interpretation of results and their application in the organization and management of the farm.]

[S 2. Farm Management. Credit, two hours. Lectures, daily except Sat., 8. Farm Management Building.

Types of farming, farm organization, and other phases of farm management.] These courses will not be given in 1920.

FLORICULTURE

S 1. Garden Flowers. Credit, one hour. Lectures, M W, 8. Laboratory, F, 2-4.30. Greenhouses. Assistant Professor LUMSDEN and Mr. PRATT.

This is designed as an elementary course to be of value for home flower garden or school garden work. It is outlined so as to acquaint students with the most valuable material for this line of work, and to cover methods of propagation and culture.

S 2. Indoor Flower Growing. Credit, one hour. Lectures, T Th, 11. Laboratory, T, 2-5. Greenhouses. Mr. PRATT.

The propagation and culture of plants suitable for winter gardens in school rooms, including a study of containers, soils, fertilizers, insecticides, are the basis of this course. The selection of varieties of bulbs and their methods of culture indoors are also considered, as is also the method of propagation and general care of species of plants suited for indoor culture.

S 3. Arrangement for Annuals and Herbaceous Perennials in the School Garden. Credit, one hour. Lectures, T Th, 10; Laboratory, M, 2-4.30. Greenhouses. Assistant Professor LUMSDEN.

A study of the principles and methods governing the selection of site and the arrangement of plant materials in the school garden; the planning and planting of flower borders to give a continuous display of bloom throughout the school year. Individual problems will be handled and aesthetic taste in color arrangement studied.

FORESTRY

S 1. The Tree and the Forest. Credit, one hour. Lectures, T Th, 10. Field work, M, 2-4.30. Forestry Building 122. Professor SPRING.

This course lays emphasis on simple means of identification of the principal forest trees. It includes a study of the characteristics of forest trees and forests, identification of and notes on the commercial use of a few of the principal kinds of wood; the life history of the forest and other facts fundamental to the right use of forests.

S 2. Forests and Forestry. Credit, two hours. Lectures, M T W F, Field Work, Th, 2-4.30. Forestry Building 122. Professor SPRING.

Topics to be considered are: the nature and scope of forestry; its branches and the methods employed in perpetuation of forests; the economic usefulness of forests to the nation, including influence on stream-flow and the relation of the forest to recreation; brief description of the forest regions of the United States; what is being done in Federal, State, and private forestry.

So far as possible the lectures of each week will be followed by practical observation lessons in the field, which will afford opportunities to see the application of the principles discussed in the lectures.

HOME ECONOMICS

The courses in Home Economics are planned to meet the needs of teachers in rural schools and colleges and extension workers. For entrance requirements see p. 48. The courses in methods of teaching are given in the Department of Rural Education and description of these courses will be found under that heading.

S 3A. An Introductory Course in Foods, Part I. Credit, five hours. Lectures, daily except Sat., 8. Home Economics Building 245. Practice, daily except Sat., 9-1. Home Economics Building 200. Assistant Professor MOSES.

This course parallels the regular course in foods and will be accepted as equivalent to the first term's work in Foods 3. Laboratory fee, \$15.

S 3B. An Introductory Course in Foods, Part II. Credit, four hours. Prerequisite S 3, Part I. Lectures, daily except Sat., 9. Home Economics Building 245. Practice, daily except Sat., 10-1. Home Economics Building 205. Assistant Professor ———.

This course parallels the regular course in foods and will be accepted as equivalent to the second term's work in Foods 3. Laboratory fee, \$15.

Courses for establishing a fundamental knowledge of foods. The lectures will include a discussion of the composition and characteristics of foodstuffs; sources and methods of manufacture of foods; principles of selection and methods of preparation of foods; preservation of foods; conservation of foods; comparative nutritive and economic values of various foods. Laboratory practice will be given in applying scientific principles to food-preparation.

S 4. Dietetics. Credit, three hours. Lectures and recitations, daily except Sat., 9. Home Economics Building 100. Laboratory practice, T Th, 2-5.30. Home Economics Building 200. Written reviews for those wishing credit in the course, Sat., 9. Professor ROSE and Assistant Professor MONSCH.

This course will include a discussion of the fundamental principles of nutrition as they apply to the human being; the practical means of applying scientific principles in planning dietaries; special problems of nutrition, as the feeding of infants and children. The laboratory work will consist of exercises in estimating the comparative cost and nutritive value of various foods; in planning and judging various types of dietaries, in preparing typical meals. Open only to students who have had course S 3 or its equivalent. This course does not parallel the regular course and is not accepted as a substitute from regular students. Laboratory fee, \$7.50.

S 31. Nutrition of School Children. Credit, two hours. Prerequisite S 4 or its equivalent. Lectures and recitations, M W, 11. Home Economics Building 100. Laboratory practice, M W F, 2-5. Home Economics Building 205. Open only to students expecting to teach. Assistant Professor MONSCH.

The nutrition of the school child and ways of improving it will be considered. Laboratory work will be conducted among groups of children of school age. Laboratory fee, \$5.

S 6. Home Economics in the Rural Schools. Credit, two hours. Lectures and laboratory practice, daily except Sat., 11-1. Home Economics 270. Assistant Professor McNEAL.

A course planned to give teachers in the rural schools material on which to base practical instruction in Home Economics. A few of the essential phases of cooking, sewing and sanitation will be studied with reference to their use in the schools of the village or open country. Laboratory fee, \$5.

S 60. Clothing and Textiles, Introductory Course. Credit, three hours. Practice, daily except Sat., 8-10.30. Home Economics Building 300. Lectures, M W F, 12. Home Economics Building 100. Number of students limited to fourteen. Miss JULIA GLEASON.

This course includes hand and machine sewing, the use of commercial patterns, drafting and designing of patterns, household mending, and simple embroidery. A cooking apron, a combination suit, a lingerie blouse, and a petticoat are made. The work consists of demonstrations, discussions, and practice. Students provide all materials subject to the approval of the instructor. Estimated expense, \$10 to \$12. Laboratory fee, \$3.

S 61a. Dressmaking, Survey Course. Credit, two hours. Prerequisite course S 60 or its equivalent. Practice, daily except Sat., 8-10.30. Home Economics Building 300. Miss HUNTER.

This course includes the designing and making of patterns, and the designing and making of a simple afternoon dress in cotton, a wool skirt, and an over-blouse. Each student prepares her own dress form.

The work consists of demonstrations, discussions, and practice. Students provide all dress materials subject to the approval of the instructor; estimated cost of dress materials, \$10. Laboratory fee, to cover cost of laboratory materials, \$3.

S 70A. Constructive Costume Design. Credit, two hours. Prerequisite S 60 or its equivalent and elementary design. Practice, daily except Sat., 2-5. Home Economics Building 300. Miss HUNTER.

This course includes a study of the fundamental principles of design as expressed in modern costume. Students develop these principles by means of paper, materials, and blackboard sketching. Designing is done with flat patterns and through draping. Open only to students expecting to teach. Estimated expense, \$8.

S 80. Elementary Millinery. Credit, two hours. Prerequisite S 60 or its equivalent. Practice, daily except Sat., 10.30-1. Home Economics Building 305. Miss HELEN GLEASON.

This course considers the methods of manipulation in the construction of hat frames out of wire, buckram, willow, and crinoline; the use and renovation of old materials; the preparation of trimmings; the study of color, shape, and trimmings as to suitability, becomingness, and income; comparison with commercially-made hats. Students provide all materials for hats; estimated cost, \$6 to \$10. Laboratory fee, to cover cost of laboratory materials, \$3.

S 90. Textiles. Credit, two hours. Practice, M W F, 2-5. Home Economics Building 400. Miss HELEN GLEASON.

This course includes: (a) a simple history of the processes of manufacture, spinning, weaving, and finishing of cotton, wool, silk, and linen; (b) an intensive study of fabrics with a view to their appropriateness in clothing, and an analysis of weaves and making of textile cards; (c) microscopic identification and chemical testing of fabrics; (d) simple dyeing; (e) stain removal. Estimated expense. \$5. Laboratory fee, \$2.

S 120 a. Household Management. Credit, two hours. Lectures, daily except Sat., 8. Home Economics Building 100. Written reviews for those desiring credit in the course, Sat., 8. Professor VAN RENSSELAER.

Lectures will discuss division of income, household accounts, factors in cost of living from the housekeeper's standpoint, domestic service, household equipment, means for saving labor, and general management of the house. This course parallels the lectures in the regular course in Household Management and will be accepted as equivalent to the lectures of that course.

S 160. Extension in Home Economics. Credit, two hours. Prerequisite, graduation from accredited courses in Home Economics or the equivalent. Lectures, M W F, 10. Home Economics Building 265. Practice, T Th, 2-5. Home Economics Building 265. Professor VAN RENSSELAER and others.

This course will include a study of the plans for extension work in New York State and in other typical states; legislation, both State and Federal, promoting extension work; programs for developing county extension work; state and other agencies already at work and the possibilities of co-operating with them. Problems in the formation of councils, working committees, project groups, office organization, and management; ways of securing funds; publicity work. Opportunity will be given for work and observation in the field. Laboratory fee, \$5.

S 161. Projects for Extension Workers in Home Economics. Credit, two hours. Prerequisite, courses in food study, dietetics, and clothing construction. Lectures, T Th, 10. Home Economics Building 265. Practice, M W F, 2-5. Home Economics Building 265. Professor ROSE and others.

A course designed to give to the extension worker practice in organizing home economics projects for individuals or groups. Special attention will be paid to projects for nutrition classes, and school lunches. Suitable subject-matter for club programs. Study groups and extension schools will be outlined; material for field use will be collected; recent subject-matter on nutrition and clothing will be reviewed. Opportunity will be given for observing project work in the field. Laboratory fee, \$5.

The following sequence of subjects is recommended for persons desiring to train themselves for extension positions:

1. Rural Education S 2 (educational psychology); see p. 66.
2. Rural Organization S 1; see p. 69.
3. Home Economics S 160.
4. Home Economics S 161.

The person desiring to prepare herself for extension work in Home Economics should have a pleasing personality, executive ability, maturity of judgment, adaptability; should have good fundamental training in Home Economics; should be interested in people; and should have good health.

LANDSCAPE ART

S 3. **The Arrangement and Planting of Home and School Grounds.** Credit, one hour. Lecture, F, 8. Laboratory, T Th, 2-4.30. Landscape Art Building. Professor CURTIS.

An introductory course of illustrated lectures to explain some fundamental principles and of field trips to identify and explain the use of important landscape plants. The purpose of this course is to give the students a point of view in landscape work and, in addition, to offer some specific suggestions for the solution of simple problems.

METEOROLOGY

S 1. **Meteorology and Climatology.** Credit, two hours. Lectures and discussions, daily except Sat., 10. Roberts Hall 292. Professor WILSON.

This course is adapted to the needs of teachers and students of subjects in which weather and climate are important factors, particularly teachers of physical geography and general agriculture. It is designed to acquaint the student with the laws governing the primary and secondary circulation of the atmosphere and with the development, progression, and conditions that attend cyclones, tornadoes, and other atmospheric phenomena.

Attention is given to the principles and practice of weather forecasting from weather maps and from local observations.

S 2. **Meteorology and Climatology, Laboratory Course.** Credit, one hour. T Th, 2-5, or other two periods to be arranged. Must be accompanied by Course S 1. Dairy Building 341. Professor WILSON.

The work consists in the study of the principal weather and climatic elements with the aid of maps, charts, and instruments. The various meteorological instruments will be studied, as well as the methods of taking and recording the observations.

NATURE-STUDY

S 1. General Nature-Study. Credit, two hours. Lectures, M W F, 10. Field and laboratory observations, T Th, 10-12; 2-4.30. Roberts Hall 302. Assistant Professors COMSTOCK and PALMER, Mr. RUSSELL, and Miss TRAVER.

The object of this course is to train teachers in making personal observations along several lines of nature-study and to give them a foundation for carrying on the work independently. As many as possible of the laboratory periods will be spent in the fields in the study of birds, trees, and plants. Special attention will be given to observing the relation of insects to flowers of field and garden. The lectures will supplement the field and laboratory work, and will also present practical methods for conducting nature-study in the grades.

S 3. Nature-Literature. Credit, one hour. Lectures, M W, 12. Only those who have had course S 1 are eligible. A course on nature-study, reference books, and nature-literature. Assistant Professor COMSTOCK.

S 4. Friends and Enemies of the Garden. Credit, two hours. Lectures, T Th, 8. Laboratory and field work, M W F, 9-11. Mr. DETWILER.

This course is designed especially as an aid to teachers of gardening. It deals with common garden insects and their natural foes. The laboratory periods are devoted to a personal study of the life histories of insects and methods are employed that may be used in nature-study lessons supplementary to school gardening.

S 5. The Nature Essayists and Poets. Credit, one hour. Lectures and conferences, T, 12. Place to be announced.

PHYSICAL EDUCATION

Object. Legislation requiring that physical training shall be taught in public schools has created a demand for teachers and supervisors of this subject. There is also need for teachers who can supervise health education, for playground supervisors, and for coaches and athletic directors. In order to assist persons who desire to prepare for work of this kind, the New York State College of Agriculture has designed a schedule of carefully graded courses requiring four summer schools for completion. This arrangement of work enables students, teachers, and supervisors to enter upon a complete and systematic study of physical education until the summer school certificate has been earned. It also enables them to engage in teaching during the year and thus acquire necessary experience.

Tuition. See page 48. Admission to classes is restricted to the duly registered students. All students registered for physical education are required to pay an incidental fee of \$5.

Advanced Standing. Students desiring advanced standing in physical education will be required to send a certified copy of the courses in which they wish to receive credit, with a statement of the amount and character of work accomplished, to Laurence S. Hill, in care of the College of Agriculture, Ithaca, N. Y., at least one week before the session opens, or to pass an examination in those subjects in which they wish to receive credit. Examinations for this purpose will be conducted in Roberts Hall, July 5, at 9 o'clock.

Certificates. At the end of each summer session a certificate of attendance is issued to all students completing satisfactory work. See page 9. Students desiring to receive the summer school certificate in physical education will be

required to complete the work as outlined for the four summer schools or their equivalent. No certificate will be awarded to any student who has not attended at least two full sessions. No student will be admitted to the courses without approval of his program. Students doing satisfactory work will be recommended for temporary certificates. Upon the completion of the four years of work, they will be recommended for a permanent certificate in such states as grant these certificates.

Admission. See page 48.

Playground Teachers and Directors:—

For those desiring to equip themselves as playground teachers and directors the following courses are essential:

- Physical Education S 1. Hygiene.
- Physical Education S 4. School Yard Athletics.
- Rural Education S 2. Educational Psychology.
- Physical Education S 20. Physical Diagnosis.
- Physical Education S 33. Pageantry.
- Physical Education S 8. Track and Field Athletics.
- Physical Education S 35. Swimming.
- Physical Education S 30. First Aid.

Activities: Games of low and high organization; apparatus; rhythmic steps; folk dancing; English and American country dancing; special features, organized games, and general practice.

Athletic Coaches:—

For those desiring to equip themselves as athletic coaches, the following courses are essential:

- Physical Education S 30. First Aid.
- Physical Education S 29. Special Methods.
- Physical Education S 31. Mechanotherapy.
- Physical Education S 2. First Year Practice.
- Physical Education S 32. Fourth Year Practice.
- Physical Education S 4. School Yard Athletics.
- Physical Education S 6. Soccer.
- Physical Education S 7. Base Ball
- Physical Education S 8. Track and Field Athletics.
- Physical Education S 9. Hockey and Tennis.
- Physical Education S 10. Football.

Class-room teachers who wish to become acquainted with playground activities and their direction and supervision, should confer with Mr. Hill regarding the proper courses to meet their special problems.

Costumes. Women *must* provide themselves with all-white middy blouses (no colored collars), black or dark blue bloomers, black cotton stockings, black ties, and white tennis shoes.

Men *must* provide themselves with quarter-sleeve tennis or gymnasium shirts, long Y. M. C. A. trousers (blue with white stripe), and white tennis shoes.

Residential halls, rooms, board. See page 9. It is suggested that women students in Physical Education apply for rooms in Sage College, in which one of the gymnasiums is located. Rooms are reserved in the order of application.

FIRST YEAR

S 1. Hygiene. Credit, two hours. Daily, 8. McGraw Hall. Mr. MERNER. The course will consist of lectures, lantern slide and chart exhibits, and practical demonstrations of method. The general laws of health will be discussed, including the essentials of sanitary science, personal hygiene, community hygiene, home hygiene, and the public health movement in general. The recognized divisions of educational hygiene will be considered with special emphasis upon the scope and methods of school medical inspection, school nursing, control of communicable diseases in the schools, operation of school clinics, organization of health clubs, location and treatment of children mentally or physically exceptional or defective, the approach to nutritional problems of school children; and the development of a system of records in the administration of the foregoing lines of health activity.

The work of the school nurse will be considered in detail, and the training in practical methods will be of a character to render correlation or actual amalgamation of the duties of the school nurse and the teacher of physical training effective where such fusion may seem desirable.

Special attention will be given to the consideration of rural health problems as they present themselves to a community health leader or organizer. The health problems peculiar to high schools and gymnasiums will also be indicated, with certain aspects of school sanitation of special significance in the daily routine of the worker in health education.

S 2. First Year Practice. Credit, two hours. Daily except Sat., p. m., 9-11, 3.30-4.30. Gymnasium.

This course includes elementary practice in calisthenics' schoolroom tactics, Swedish gymnastics, rhythmic steps, Indian clubs, wands, dumb-bells, apparatus, umbling, aesthetic and athletic dancing, and games of low and high organization.

S 3. Histology and Anatomy. Credit, two hours. Lectures and laboratory, daily, 11-1. McGraw Hall. Dr. VAN WAGENEN.

In this course the various tissues and organs of the human body will be studied briefly in their minute structure in the laboratory. This work will be supplemented by lectures illustrated with charts and lantern slides. Demonstration of specially prepared microscopic sections including a brief consideration of embryology will be included.

Anatomy in its gross aspect will be presented through the medium of charts, models, diagrams, lantern slides, museum preparations, and living models, the chief purpose being to familiarize the student with the anatomy of the body as it presents itself to the teacher of physical training.

S 4. School Yard Athletics. Credit, one hour. Daily except Sat., 2.30. Gymnasium and Athletic Field. Mr. KUHNERT.

(a) Group Athletics:

In this course the general idea of group athletics, the badge test, organizations, and athletic meets, with special reference to rural districts, will be taken up and practical demonstrations given.

(b) Conduct of Playgrounds; Construction and Equipment.

This course deals with play programs, how to organize a playground staff, how to plan and construct a playground, its equipment, the field house and the details concerned in playground management, administration of municipal recreation,

legislation, budget-making, the relation of recreation executives to the community and various activities.

SECOND YEAR

Rural Education. Course S 2. Daily except Sat., 8. See page 66.

S 12. **Second Year Practice.** Credit, two hours. Daily except Sat. p. m., 9-11, 3.30-4.30. Gymnasium.

Second year or intermediate practice includes wands, tactics, Indian clubs, dumb-bells, Swedish gymnastics, tumbling, apparatus, singing games and story plays, aesthetic and athletic dancing, and games of low and high organization.

S 13. **Physiology.** Credit, one hour. Daily, 11. McGraw Hall. Dr. ALLEN.

This course will cover the general phases of physiology that are of interest to the teacher of physical training.

S 14. **Public Speaking.** Credit, two hours. Daily except Sat., 12. G. S. 26. Assistant Professor HUNT.

Training in correct and effective speech; with particular attention to tone and distinctness of utterance. Brief speeches before the class.

S 15. **Anatomy.** Review. Credit, one hour. Daily, 2.30. McGraw Hall. Dr. VAN WAGENEN.

THIRD YEAR

Rural Organization. Course S 1. Daily except Sat., 8. See page 69.

S 20. **Physical Diagnosis.** Credit, one hour. Daily, 9. McGraw Hall. Dr. ALLEN.

The course is designed to familiarize the student with methods of physical examination and the modern diagnostic procedures available. The normal will first be demonstrated and then the various departures from the normal will be indicated and discussed. The diagnosis of the diseases and physical defects of school children will be covered from the practical aspect and with the aim of giving the student a working knowledge of the conditions she will actually face in daily routine as a school nurse or as a teacher of physical training.

Rural Education S 4. Daily except Sat., 10. See page 66.

S 22. **Third Year Practice.** Credit, two hours. Daily except Sat., p. m., 11-1; 3.30-4.30. Gymnasium.

This course includes advanced work in Swedish gymnastics, tactics, apparatus, Indian clubs, wands, folk dancing, highly organized games such as volley ball, captain ball, and basketball, aesthetic and athletic dancing, and games of low and high organization.

S 24. **Kinesiology.** Credit, one hour. Daily except Sat., 2.30. Gymnasium Lecture Hall. Miss GRAY.

This course deals with the principles and mechanisms of bodily movements. The mechanism of representative types of exercise is studied for the purpose of determining, as far as possible, their immediate and permanent effects upon health.

FOURTH YEAR

S 29. **Method and Practice of Teaching Physical Education.** Credit, two hours. Daily, 8. Demonstrations. Daily except Sat., 2.30. Gymnasium. Mr. HILL.

This course will include the theory of teaching gymnastics and calisthenics, simple gymnastic positions, and movements, miscellaneous exercises, gymnasium tactics, and apparatus work; the pedagogical principles involved in calisthenics or drills, the physiological principles, general order of exercises in a drill, factors which should guide in the selection of exercises; how to write a drill and how to plan gymnastic lessons for use in the elementary schools; the principles of posture, normal and abnormal.

The methods of teaching physical training, observation, and criticism, and the actual presentation of assigned work will be included in this course. Work adapted to rural schools will receive special emphasis. Practice under schoolroom conditions with children of various grades will be offered.

S 30. **First Aid.** Credit, one hour. M W F, 10. Gymnasium Lecture Hall. Dr. ALLEN.

The principles and methods of first aid will be fully discussed and demonstrated, stress being placed upon the actual practice by the student of the various procedures under the direct supervision of the instructor. The course will completely cover the requirements of the Red Cross First Aid Certificate.

S 31. **Mechanotherapy.** Credit, one hour. Daily, 10. Gymnasium Lecture Hall. Miss WATERMAN.

(a) Prescription of exercise: diagnosis, selection, and arrangement of exercise, commensurate with patient's age, strength, general constitution, and mode of living. Exercise for the correction of postural and structural defects.

(b) Massage: principles and application of massage; object of treatment; physiological effects; general rules.

S 32. **Fourth Year Practice.** Credit, two hours. Daily except Sat., p. m., 11-1; 3.30-4.30.

Work in special features; tactics, apparatus, English country dancing, American country dancing, Indian clubs, highly organized games, interpretative and athletic dancing, wands, are taught in this course, which is for advanced students.

The courses as outlined under First, Second, Third, and Fourth years are required of candidates for the certificate.

Electives

S 33. **Pageantry.** Credit, one hour. Daily, 2.30. Gymnasium. Miss PARSONS.

Lectures and demonstrations on pageantry. The history of pageantry; its educational and community value; the relation of history, poetry, song, folk lore, and drama to pageantry; the writing, directing, and producing of a pageant; grouping and pageant acting; costuming; the production of a pageant, if conditions permit. The production of small festivals and school celebrations for various occasions. The class will plan original scenes and episodes. Interpretative dancing, offered in the fourth year, will be closely allied with this course.

S 35. **Swimming.** Daily, except Sat. Hour to be arranged.

Instruction in swimming, life saving, and resuscitation. The various swimming strokes will be demonstrated and taught. The course is open to a limited number. Special fee, \$10.00.

The course in Speech Improvement offered in the Department of Education is open to students in Physical Education. See p. 24.

COURSES IN ATHLETICS

(Required of candidates for the certificate)

It is not possible for students to complete the following athletic courses in any one summer. Students are asked to choose wisely and extend the work of the afternoon program over three or more years.

S 6. **Soccer.** Credit, one hour. Daily except Sat., 4.45. Girls' Athletic Field. Mr. HUTCHINSON.

Full instruction is given in soccer, a game similar to field hockey, in which the same formation is used. The game is extremely popular, especially in rural communities.

S 7. **Base Ball.** Credit, one hour. Daily, 3.30. Athletic Field. Mr. REED.

Theory and field practice. Batting; bunting; fielding; base running; position play; offensive team play; defensive team play; battery strategy; training a school team; base sliding; drawing throw to first, second, or third; hit and run; positions infielders should play; discussion of rules.

S 8. **Track and Field Athletics.** Credit, one hour. Lectures and practice, daily except Sat., 4.45, Schoellkopf Field. Miss GRAY and Mr. REED.

The work consists of the theory and practice of the various track and field events for men and women, such as hurdling, standing and running broad jump, standing and running high jump, racing start, short and long distance running, shot put, baseball throw, and basketball throw. The duties of officials are thoroughly explained, studied, and practiced; meets are organized and run.

S 9. **Hockey and Tennis.** Credit, one hour. Alternating days, 4.45. Girls' Athletic Field. Miss WATERMAN.

Full instruction is given in field hockey, a popular athletic game, which affords exhilaration as well as plenty of vigorous exercise. A definite explanation and a thorough study of each rule is made, the advantages and disadvantages of certain plays are fully discussed and demonstrated, and actual participation in competitive games is experienced. In tennis the various strokes, methods of serving and receiving are taught, as well as the advantages of matches and tournaments.

S 10. **Football.** Credit, one hour. Daily except Sat., 4.30. Gymnasium and Schoellkopf Field. Mr. REED.

Theory and field practice. Training and demonstrations; discussion of preliminary and fundamental football; pre-seasonal conditioning; falling on the ball; how to hold a ball; punting; place; drop kicking, and goal kicking from touchdown; use of the straight arm; judging and catching punts; kick off—different formations used; positions of play and how to play them; system of signals; generalship; offensive and defensive tactics; teamwork; formations and plays; systems of coaching; discussion of rules.

Basketball. Theory and Practice. This course is offered as part of the Third Year Practice Course S 22.

Technique of basket shooting, shooting from the foul line, catching and passing the ball, how to select forwards, centers, and guards; training, formations used, different styles of play, team work, systems of signals, discussion of rules.

Men and women take most of the practical work in common, except the heavier forms of gymnastics and athletics.

S 40. General Course in Calisthenics and Recreation for the Class-room Teacher. Credit, one hour. Daily except Sat., 8. Gymnasium. Miss NORTON.

Drill in giving response and rhythmic commands, securing responses, graded marching tactics, free gymnastics, mimetic exercises, rhythmical steps, and supervised recreational activities. The various divisions of the State syllabus of physical training and contents will be considered.

POMOLOGY

S 1. General Fruit Growing. Credit, three hours. Prerequisite Botany S 1 or its equivalent. Lectures and recitations, daily 11. Roberts Hall 292. Laboratory, M W, 2-4.30. Roberts Hall 202. Professor HEINICKE.

A study of the methods of propagation and early care of commercial fruits, including the growing of seedlings, cuttings, and layers; principles of budding, grafting, pruning, and planting; soils, varieties, and planting plans for the orchard; cover crops, cultivation, fertilization, spraying, pruning, and thinning, as practiced in orchard management; picking, grading, packing, storing, and marketing of fruit. This course considers the apple, pear, quince, cherry, plum, apricot, peach, nuts, and small fruits.

POULTRY HUSBANDRY

S 1. The Care and Management of Poultry. Credit, two hours. Lectures, M W F, 9. Poultry Building 375. Laboratory, M F, 2-4.30. Poultry Building. Assistant Professor HEUSER.

Designed to assist teachers in vocational schools. The course consists of 36 lectures and preliminary examinations and 18 laboratory practice periods. Emphasis will be placed on the teaching and the presentation of the subject to meet high-school conditions, including a general discussion and practical application of the principles of incubation; brooding; rearing, feeding; breeding for constitutional vigor; egg production and fancy; marketing, housing, and general poultry farm management. Laboratory fee, \$3.

S 3. Feeding Practice. Credit, one hour. Must be accompanied by course S 1. Practice, three 30-minute periods a day, including Sunday, for five weeks: morning, 7.30-8.15; noon, 12.45-1.30; night, 4.30-5.00. Poultry Building. Mr. ANDREWS.

Practice in feeding for egg production and for fattening; includes preparation for market, record-keeping, and general care and management of fowls. Assigned reading and a written examination will be required. Laboratory fee, \$1.

S 4. Incubating Practice. Credit, one-half hour. Must be accompanied by course S 1. Practice, three 30-minute periods a day, including Sunday, for approximately three weeks; morning, 7.30-8.15; noon, 12.45-1.30; night, 4.30-5.00. Poultry Building. Mr. ANDREWS.

PHYSICAL EDUCATION PROGRAM—1920

Hour	First Year	Second Year	Hour	Third Year	Fourth Year
8:00- 9:00	Special Course for Teachers of the One-Room School (S40)		8:00- 9:00	Rural Organization (R. O. S1)	Special Methods (S29)
8:00- 9:00	Hygiene (S1)	Ed. Psychology (R. E. S1)	9:10-10:00	Physical Diagnosis (20)	First Aid (S30), M. W. F.
9:15- 9:35	Gymnastics Ia, T. Th. S. Tactics, M. W. F.	Tactics T. Th. S. Gymnastics II, M. W. F.	10:10-11:00	Principles of Teaching (R. E. S2)	Special Lectures, T. Th. S. Mechanotherapy (S31)
9:40-10:00	Rhythmic Steps, M. W. F. Dumb-bells, T. Th. S.	Wands, M. W. F. Singing Games, T. Th. S.	11:15-11:35	Gymnastics III, M. W. F. Tactics, T. Th. S.	Tactics, M. W. F. Indian Clubs, T. Th. S.
10:05-10:25	Gymnastics Ib, M. W. F. Wands, T. Th. S.	Indian Clubs, M. W. F. Dumb-bells, T. Th. S.	11:40-12:00	Apparatus, Men Apparatus, Women	Apparatus, Men Apparatus, Women
10:30-10:50	Rhythmic Steps, M. W. F. Apparatus, T. Th. S.	Apparatus M. W. F. Tumbling, T. Th. S.	12:05-12:25	Indian Clubs, M. W. F. Wands, T. Th. S.	English Country Dancing, M. W. F. American Country Dancing T. Th. S.
10:50-11:05	Tumbling, M. W. F. Apparatus, T. Th. S.	Apparatus, M. W. F. Tumbling, T. Th. S.	12:30-12:50	Folk Dancing, M. W. F. Basket Ball, T. Th. S.	Wands, M. W. F. Interpretative Dancing, T. Th. S.
11:10-12:00	Histology and Anatomy (S3) Lecture and Laboratory	Physiology (S13)	12:50- 1:00	Folk Dancing, M. W. F. Basket Ball, T. Th. S.	Special Features, M. W. F. Interpretative Dancing, T. Th. S.
12:00- 1:00	Histology and Anatomy (S3) Lecture and Laboratory	Public Speaking (S14) Hour for luncheon	1:00- 2:30	Hour for luncheon	
1:00- 2:30		Anatomy Review (S15)	2:30- 3:30	Kinesiology (S24)	Demonstration School (S29)
2:30- 3:30	Schoolyard Athletics (S4)		3:30- 4:30	Dancing	Pageantry (S33) Dancing
3:30- 4:00	Games	Games	3:30- 4:30	Base Ball (S7)	Base Ball (S7)
4:00- 4:30	Dancing	Dancing	4:00- 4:30		Games, M. W. F.
4:45- 5:30	Track Athletics (S8)	Soccer (S6) or Hockey and Tennis (S9)	4:45- 5:30	Soccer (S6) or Hockey and Tennis (S9)	Soccer (S6), or Hockey and Tennis (S9)
4:30- 5:30	Football (S10)	Football (S10)	4:30- 5:30	Football (S10)	Football (S10)

The letter and number in parenthesis after the name of the course refer to the course as announced in the Summer School Announcement.

Practice in operating incubators; disinfecting, keeping record, testing eggs, and general management of the hatch. Assigned reading and a written examination will be required. Laboratory fee, \$1.

S 5. Brooding Practice. Credit, one-half hour. Must be accompanied by Course S 1. Practice, three 30-minute periods a day, including Sunday, for approximately three weeks; morning, 7.30-8.15; noon, 12.45-1.30; night, 4.30-5.00. Poultry Buildings. Mr. ANDREWS.

Practice in feeding, brooding, and caring for young chicks; keeping of temperature, food, and growth records. Assigned reading and a written examination will be required. Laboratory fee, \$1.

ORNITHOLOGY

Courses in ornithology as announced on page 36 are open without tuition charge to students registered in the College of Agriculture Summer School.

RURAL EDUCATION

Courses S 2, S 4, S 9, S 10, S 16, S 17, S 18, S 19, and S 22 are open to all students. Courses S 7, S 14, and S 20 are limited to students in vocational education. Persons should consult with the instructors in charge of these courses before registering for them.

S 2. Educational Psychology. Credit, two hours. Section I, daily except Sat., 8. Caldwell Hall 100. Section II, daily except Sat., 10. Farm Management. Professor STEWART and Mr. BRIM.

The original nature of man, reflexes, instincts, and inborn capacities; laws of learning and habit formation; acquisition of motor control; practice and improvement; memory; transfer of training; mental fatigue; individual differences.

Section I is open only to students in Physical Education.

S 4. Principles of Teaching. Credit, two hours. Daily except Sat., 10. Caldwell Hall 100. Professor STEWART.

A consideration of the problems of teaching in the light of the principles of education involved, such as motivating study, cultivating interest, organizing materials, selecting and solving problems, drilling, planning class work, questioning, measuring results.

This course is planned primarily for students in Physical Education. Other students should consult the instructor in charge of the course before registering.

S 6. Agriculture in the High School. Credit, two or three hours. Students should consult the instructor before registering for this course. Lectures and discussions, daily except Sat., 11. Laboratory, T Th, 2.00-4.30. Caldwell Hall 282. Professor LUSK.

This course deals with the purposes of vocational education, organization of subject matter, selection of texts, equipment, home projects, and extension activities of the agricultural instructor, with special reference to the department of vocational agriculture in the New York State high school.

S 7. Home Economics in the High School. Credit, three hours. Lectures and discussions, daily, 8-10. Home Economics 270. Professor BINZEL.

This course includes lectures, discussions, observation of teaching, and teaching. Problems treated: plant and equipment; text books; references; illustrative material; critical study of and preparation of courses of study; home project; school lunch; budgets; relation of home economics department to school and community; review and direct application of educational theories to presentation of subject-matter.

S 9. The Organization of Junior Project Work. Credit, two hours. Lecture and demonstrations, M T Th F, 9. Caldwell Hall 100. Laboratory, W, 2-4.30. Professor WRIGHT and Miss JOHNSON.

This course is designed for those who wish to prepare themselves for leadership in Junior Extension work. Topics receiving consideration are: purpose of Junior Project Work, cooperating agencies, county organization, types of projects, enrollment, supervision, demonstration, exhibits, cash and labor records, school fairs and achievement days, and final reports. Field and inspection trips not to exceed \$10 in cost will constitute a part of the course.

Those who plan to prepare themselves for positions as County Junior Extension Leaders or as Directors of Agriculture should consult with the State Leader of Junior Extension regarding subject-matter courses to be pursued.

S 10. Educational Measurement. Credit, two hours. Daily except Sat., 9. Caldwell Hall 282. Professor KRUSE.

The place, the means, the method, and typical results of measurement in education in preparation for intelligent reading of current pedagogical and psychological literature; cooperation in giving tests; conducting of educational experimentation; and development of tests, scales, and standards for rural schools. Rural school survey work conducted by the Department will furnish the specific problems and materials of the course.

S 14. Organization of Teacher-Training for Vocational Agriculture. Credit, two hours. Daily except Sat., 10. Caldwell Hall 282. Professor LUSK.

This course is designed for those preparing for teacher-training work in college departments of agricultural education. It deals with the study of agricultural college and high-school curricula in agriculture with respect to the technical preparation of teachers of secondary agriculture, the professional needs of the high-school teacher of agriculture, practice teaching, graduate needs to be met by such departments, and the content of a special methods course in agricultural education.

S 16. Rural Secondary Education. Credit, two hours. Daily except Sat., 3. Caldwell Hall 143. Assistant Professor FERRISS.

A course dealing with basic problems of modern secondary education in its adaptation to rural conditions. Special consideration is given to the junior high school as a practicable form of high-school organization for the rural community. Other guiding topics are: the scope and functions of the secondary school, present demands upon the rural secondary school, the rural senior high school, prevocational and vocational work, educational and vocational guidance, needed forms of extension work in the rural high school, selection of subject-matter and planning of the curriculum.

S 17. The Principalship of the Rural High School. Credit, two hours. Daily except Sat., 8. Caldwell Hall 282. Assistant Professor FERRISS.

A course designed primarily for principals of rural high schools and those preparing for principalships. It deals with such practical problems as: the pre-

liminary organization of the work of the school; the keeping of school records; the testing, grading, and promotion of pupils; school government and problems of discipline, direction and control of pupil activities, pupil guidance, and the supervision of pupils' study; aims and methods of supervision, teachers' meetings, measurement of teachers' efficiency; the problem of school exercises, the principal and the community.

S 18. State and County Educational Administration. Credit, two hours. Daily except Sat., 9. Caldwell Hall 143. Professor BUTTERWORTH.

Principles of State direction; types of state educational organization; the county unit; district, township, and community types of control; problems of federal leadership; functions of educational executives; sources of school funds; unit costs; budget making.

S 19. Administrative Problems of District and County Superintendents. Credit, two hours. Daily except Sat., 11. Caldwell Hall 143. Professor BUTTERWORTH.

Tendencies in rural school organization; the rural teacher; the school plant; pupil accounting; consolidation; standard rural schools; community cooperation; the superintendent as the rural school leader; or similar problems according to the needs of the class.

S 20. Administration and Supervision of Vocational Agriculture. Credit, two hours. Daily except Sat., 8. Caldwell Hall 143. Professor WORKS.

This course is designed for persons who are engaged in supervision of vocational agriculture or those planning to enter such work. It treats administration and supervision of agricultural education under the Vocational Educational Act, State legislation, related Federal legislation, curricula. Visits to schools in New York and adjacent states are required as a part of the course.

S 22. Supervision of Rural Schools. Credit, two hours. Daily, except Sat., 2. Mr. BRIM.

This course will consider (a) the purpose and scope of supervision, (b) its major problems, (c) the available means and methods, (d) and the bearing of these upon the problem suggested by the class. The following topics are suggested: the relation of the supervisor to other educational agents or agencies; rural school standards; curriculum, organization, and program; methods of teaching and study; text books; equipment; classification of pupils and improvement of teachers in service; also the methods of supervision such as visits, conferences, demonstrations, surveys, and standard tests.

RURAL ENGINEERING

S 41. Farm Shop Work. Credit, two hours. S, 8-1, and two other periods to be arranged. Mr. ROEHL.

A study of equipment for school and home farm shops. Practice in doing ordinary farm repair work, in metalworking, ropework, belt lacing, harness repairing, and soldering, with such repair tools and equipment as the average farmer may reasonably be expected to have; such construction work as may be done by the farmer with a kit of farm woodworking tools.

RURAL ORGANIZATION

S 1. The Social Problems of Rural Communities. Credit, two hours. Lectures, reports, and discussions, daily except Sat., 8. Roberts Hall 292. Professor SANDERSON.

An introductory study of the social problems of rural communities as a basis for the social organization of rural life. Students will make individual studies of selected communities.

S 3. The Organization of Agriculture in the United States. Credit, one hour. T Th S, 10. Place to be announced.

A discussion of the organization of the agricultural work of the federal, state, and county governments, and of farmers' organizations.

S 7. Social Studies for Rural High Schools. Credit, one hour. M W F, 10. Animal Husbandry B. Professor SANDERSON.

A consideration of a course of study in rural social problems for country high schools. Open to those who have had course 1 or equivalent work or to high school teachers upon approval of instructor.

SOIL TECHNOLOGY

S 1. Soils. Five periods. Credit, two hours. Lectures, M W F, 11. Caldwell Hall 143. Laboratory and demonstrations, T Th, 2-4.30. Mr. CARLSON.

This course is not open to regular students in the college nor will students taking this course be permitted to apply it toward credit on any regular course of the department. It is designed primarily for students preparing for high-school agriculture.

A practical, fundamental course in soils. The subject will be handled with special reference to the needs of those expecting to teach soils in secondary schools. The lectures will include a discussion of the formation and classification of soils, tilth, soil moisture, soil biology, soil amendments, manures and fertilizers, and practical soil management. The laboratory practice will supplement the class work.

VEGETABLE GARDENING

S 1. Vegetable Gardening. Credit, three hours. Lectures, M W, 9, T Th F, 8. Poultry Building 325. Laboratory, T Th, 9-12. Vegetable Gardens, East Ithaca. Assistant Professor SCHNECK.

This course is planned primarily to meet the requirements of those interested in school and social service work in vegetable gardening, as well as of the amateur gardener.

A study of the principles and practices of gardening as applied to the culture of vegetables in the home and school garden.

The location, planning, and management of a garden; seed and seed handling; growing early plants; special requirements of the various vegetable crops; and insects and diseases will receive consideration.

The laboratory work includes actual practice in the garden. Each student is assigned a plot on which he will plant and, throughout the course, care for the

vegetables which are best suited for school and amateur gardens. Laboratory exercises are planned to show the application of principles and practices discussed in the lectures. Laboratory fee, \$2.

S 2. **Advanced Vegetable Gardening.** Credit, one hour. Prerequisite, Course S 1. Lectures and laboratory, T Th, 2-5. Poultry Building 325 and Vegetable Gardens, East Ithaca. Assistant Professor SCHNECK.

Lectures on the origin, history, and botany of vegetables. Lectures and laboratory studies of different vegetable types and varieties, their characteristics, and adaptation to different conditions. Important varieties of all the different vegetables are grown in the garden giving an abundance of material for study. Preparing and judging exhibits. Special study of training, blanching, harvesting and storing of different vegetables. One or two trips will be made to study the most successful home and school gardens of Ithaca. Laboratory fee, \$1.50.

ZOOLOGY

The work in the department of Zoology as announced on page 35 is open, without tuition charge to students registered in the College of Agriculture Summer School.

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CORNELL UNIVERSITY OFFICIAL PUBLICATION

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

[Entered as second-class matter, December 14, 1916, at the post-office at Ithaca, New York, under the act of August 24, 1912.]

The Register (for the year 1918-1919, published January 1, 1919), price 50 cents.*

Samples of entrance and scholarship examination papers, price 15 cents.*

Directory of Faculty and Students, Second Term, 1919-1920, price 10 cents.*

A Guide to the Campus, price 50 cents.*

Any of the following informational pamphlets will be sent gratis and post-free on request. The date of the last edition of each is given after the title.

General Circular of Information for Prospective Students, December 15, 1919.

Announcement of the College of Arts and Sciences, May 15, 1919.

Announcement of Sibley College of Mechanical Engineering and the Mechanic Arts, February 15, 1919.

Announcement of the College of Civil Engineering, February 1, 1920.

Announcement of the College of Law, February 1, 1919.

Announcement of the College of Architecture, July 1, 1919.

Announcement of the New York State College of Agriculture, June 15, 1919.

Announcement of the Winter Courses in the College of Agriculture, August 1, 1919.

Announcement of the Summer Term in Agriculture, March 15, 1918.

Program of the Thirtieth Annual Farmers' Week (February 9-13, 1920), January 15, 1920.

Announcement of the New York State Veterinary College, February 15, 1920.

Announcement of the Graduate School, January 1, 1920.

Announcement of the Summer Session, March 1, 1920.

Summary of the Work of the Associate Alumni of Cornell, April 15, 1919.

Annual Report of the President, October 1, 1919.

Pamphlets on prizes, special departmental announcements, etc.

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