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The New York State School of Clay-Working and Ceramics



ALFRED, NEW YORK

1915--1916

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CALENDAR

First Semester 1915--1916

		1915
Registration, Entrance Examinations	Wednesday	Sept. 15
Instruction begins	Thursday	Sept. 16
Election Day	Tuesday	Nov. 2
Thanksgiving Day	Thursday	Nov. 25
RECESS	Friday	Nov. 26
Holiday Recess begins	Wednesday evening	Dec. 22
HOLIDAY RECESS		
		1916
Instruction resumed	Wednesday morning	Jan. 5
Mid-year Examinations begin	Wednesday	Jan. 19
Examinations end, Semester ends	Tuesday	Jan. 25

Second Semester 1915--1916

Semester begins	Wednesday	Jan. 26
Spring Recess begins	Tuesday evening	April 11
SPRING RECESS		
Instruction resumed	Wednesday morning	April 26
Memorial Day	Sunday	May 30
Final Examinations begin	Friday	May 26
Examinations end	Friday	June 2
Degrees conferred at University Commencement	Thursday	June 8

First Semester 1916--1917

		1916
Registration, Entrance Examinations	Wednesday	Sept. 20
Instruction begins	Thursday	Sept. 21
Election Day	Tuesday	Nov. 7
Thanksgiving Day	Thursday	Nov. 30
RECESS	Friday	Dec. 1
Holiday Recess begins	Wednesday evening	Dec. 20
HOLIDAY RECESS		
		1917
Instruction resumed	Wednesday morning	Jan. 3
Midyear Examinations begin	Monday	Jan. 22
Examinations end, Semester ends	Friday	Jan. 26

Second Semester 1916--1917

Semester begins	Monday morning	Jan. 29
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FACULTY

BOOTHE COLWELL DAVIS, Ph. D., D. D., LL. D., President
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Professor of Ceramic Technology

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*CLARA C. GREENWOOD,
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MYRTLE MERITT,
Instructor in Modeling and Pottery.

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Foreman of Workshop.

A. L. WHITFORD,
Janitor and Machinist.

*Absent on leave.

NEW YORK STATE SCHOOL OF CLAY-WORKING AND CERAMICS

In the field of applied science and commercial engineering the subject of clay-working is becoming daily more important. To the architect and builder clay offers the most satisfactory fireproof material, to the housewife pottery is indispensable and to the artist clay and clay-wares afford at once a facile means of expression and a prominent feature of home decoration.

The problems which confront the clay-worker are unique. He must learn to win his material economically from the earth, to shape his wares with due regard to both utility and art, to glaze or otherwise finish them in a satisfactory manner and to turn the whole successfully upon a large scale. His education must therefore be comprehensive and complete. He must, in a word, be a specialist, and to this end the New York State School was established.

Chapter 383, Laws of New York State, 1900, provided for the construction and maintenance of the school, and in order to secure the necessary facilities for collateral branches of study Alfred University was chosen as the location.

For this work the University offers great advantages. Laboratories of chemistry and physics, libraries, museums of geology and natural history, workshops for manual training, and all the departments of general culture are available, so that the many and varied requirements of a liberal education are fully met.

The State of New York contains vast deposits of clays and shales at present lying dormant. It also contains large numbers of young men and women who are seeking profitable employment. The work of the school is to bring these together. Neither the science nor the art is neglected. Attention is given to the improvement of methods of manufacture and the reduction of cost so that the resources of the State may be fully developed and that within its borders may be manufactured the clay-wares, both coarse and fine, necessary for its own consumption.

Building and Equipment

The building of the New York State School of Clay-Working and Ceramics has been especially designed for the purposes of the school, and is located on land which was deeded by Alfred University to the people of the state of New York. It is built of red brick and terra cotta with gray trimmings and roofed with brown tile. The main building has a floor space of about thirteen thousand square feet, and a frontage of seventy-five feet.

To this has been added a fireproof wing measuring about 36 by 57 feet and three stories in height.

In the main basement are located a full battery of kilns, the heavy machinery for the manufacture of brick, tile, hollow blocks and roofing tile, the slip-making plant, cylinders for glaze preparation, and a workshop fitted with modern appliances for pottery and porcelain manufacture. There are also rooms for mold making and drying.

In the sub-basement are located the heating plant and fuel storage and a damp cellar.

On the principal floor are the executive offices, the technical laboratory, a lecture room, a room for furnaces, the chemical laboratory and balance room and a special kiln room for the Art department. On the second floor is the

department of Design and Applied Art and on the third floor a lecture room and a studio for advanced work.

The motive power is supplied by two Otto gas engines of 36 and 8 horse power, respectively.

The school maintains a complete technical library for reference and for the encouragement of independent reading and research. It also encourages membership and activity in the New York State Students' Branch of the American Ceramic Society, which was chartered at Alfred in 1915, replacing the former local ceramic society which had been active for a number of years.

Courses Offered

The courses of study which lead to a degree extend over a period of four years and embrace the science, technology and art special to clay-working. The ceramic work is elective as to the particular branch of clay-working to be followed.

The course in Ceramic Engineering is designed to qualify men to occupy positions as superintendents, scientific experts and ceramic chemists.

The course in Applied Arts is intended to fit the student for the designing and producing of artistic pottery.

Benefits of the School

The demand for trained clay-workers has grown to considerable proportions during the last few years. Capital is becoming more and more interested in the development of clay lands and shale banks: nor is there any likelihood that this interest will decrease.

On the other hand the number of men who have studied in schools is very small compared with the openings to be filled. Hitherto, no student who has passed through the

school successfully has remained unemployed, and the director is continually in receipt of applications for persons qualified to fill responsible positions. Every effort is made by the faculty to place the students in communication with manufacturers desiring to offer them employment.

The student successfully pursuing the technical course will be able, presuming that his personal capacity is good, to take up the practical work of manufacturing clay wares. He will have had experience with every description of clay, and with the minerals and oxides used in preparing bodies and glazes. He will have acquired a knowledge of machinery and kilns which he will find of the greatest value; in short, he will be a trained man as regards the problems of clay-working.

Students who conscientiously pursue the course in applied art will be able to design and make artistic pottery, preparing their own clays and compounding their own glazes, if necessary.

Physical Training

The aim of the work in physical training is to bring the whole body to its normal condition, to acquire ease and precision in movement, and to develop the health and strength of the student.

GYMNASIUM. The gymnasium is on the lower floor of Babcock Hall. It is equipped with chest weights, dumb bells, wands, Indian clubs, horizontal and parallel bars, rings, poles and floor mats. A dressing-room with individual lockers, a well equipped bathroom with shower baths, and two handball courts are provided. The gymnasium is in charge of the physical director. All students, unless excused by the director on the advice of a physician, are required to do two semester hours of work during the freshman year

and one during the sophomore year, under the direction of the instructor in physical training.

ATHLETIC FIELD. The athletic field embraces over three acres of level land. All intercollegiate contests in football, baseball, and track athletics are held on this field. The field affords a running track (one-sixth of a mile). Appropriate apparatus for field sports is provided.

OUTDOOR SPORTS, including tennis, are in the immediate charge of the athletic association, which has a football team playing under intercollegiate rules, a baseball nine, and a basketball team. For tennis there are excellent courts and an annual tournament is maintained. Athletics, however, are not carried to extremes. The committee on athletics from the faculty, and the graduate manager exercise general supervision, for it is the purpose of the university to give due attention to the physical welfare of its students, and at the same time keep the physical in proper relation to the intellectual and moral development.

Fees per Semester

Athletic Fee.....	\$2 00
Reading Room Fee.....	1 00
Extras, for use of instruments and laboratory materials:	
Gymnasium fee (all Freshmen).....	1 00
Surveying	4 00
Chemistry Breakage Deposit, per year, Chem. 1.....	2 00
Chemistry Breakage Deposit, per year, Chem. 2, 3, 4, 5..	5 00
Elementary Chemistry.....	4 00
Blowpipe Analysis and Mineralogy.....	4 00
Qualitative Analysis.....	5 00
Quantitative Analysis, Advanced Quantitative Analysis or Clay Analysis.....	5 00
Physics 1, Laboratory.....	1 50
Advanced Physics, Laboratory.....	2 50
Shop Fee.....	4 00
Graduation Fee.....	5 00

No tuition is charged to students who are prepared to enter the regular courses, but no student is entitled to free tuition in any college class not forming part of a course in the School of Ceramics nor are students registered in the college entitled to free tuition in the School of Ceramics in respect of any subject for which college credit is given.

Bills will be presented by the third Friday of the semester, and must be paid at the office of the treasurer by the fifth Friday of the semester.

Rooms and Board

Rooms and board for women can be had at Ladies' Hall, and rooms for men at Burdick Hall, at the following rates:

Rooms, furnished, per semester.....	\$10 00 to \$24 00
Board, per week.....	4 00

All rooms are fitted with gas fixtures for heating and lighting. Gas is paid for according to amount used at 35 cents per thousand.

Board is furnished to men at Burdick Hall on the co-operative plan.

Rooms and board, including fuel, can be obtained in private families at from \$3 to \$5 per week. Board in clubs, organized and managed by the students themselves, varies from \$2.90 to \$3.50 per week, according to the means and inclinations of the members.

Estimated Annual Expenses

Excluding cost of clothing and travel, one can go through a college year by close economy upon \$215 and by exercising care, upon \$240. An allowance of \$275 is comfortable, and \$350 is liberal.

Board, \$2.00 to \$4.00 per week.....	\$104 00 to \$144 00
Rooms, \$10.00 to \$24.00 per semester.....	20 00 to 48 00
Gas, \$4.00 to \$7.00 per year.....	4 00 to 7 00
Laundry, per year.....	12 00 to 20 00
Books	10 00 to 25 00
Lyceum dues, etc.....	2 00 to 10 00
Incidentals and extras.....	25 00 to 35 00

Total for year..... \$177 00 to \$289 00

Self-Support

Many of the graduates have been persons of very limited means who worked their way through college. While the school cannot guarantee work to all applicants, enterprising students can usually find employment in the town with satisfactory compensation for all the time they can profitably spare from their studies. Some earn enough to meet the greater part of their expenses. Students should distinctly understand that when they attempt entire self-support they should lengthen their term of study.

Terms and Vacations

The school year consists of two terms, or semesters, of about eighteen weeks each. There is a vacation at the holidays of about two weeks; a short recess at Easter time; and a summer vacation of about fifteen weeks.

Class Exercises

The class exercise period is one hour in length; in laboratory work, however, the class exercise continues through two or more hours, as the case may be. There are no class exercises on Saturday or Sunday. The schedule of recitations is fixed by the faculty. Any student failing to receive credit for ten semester hours in any given semester will be subject to dismissal.

Unit or Measure of Credit

One class exercise per week for one term or semester, is taken as the unit or measure of credit, and is termed a semester hour. In each course leading to a degree one hundred and forty semester hours are required.

The work of students in each subject is graded as A, excellent; B, good; C, fair; D, poor; E, conditioned failure; F, failure.

Absences and Excuses

It is expected that no student will be absent from any class period except in case of necessity. Reasons for absence from classes are submitted to a committee of the faculty known as the Committee on Absences. All excuses are granted with the understanding that the work missed will be made up to the satisfaction of the instructor. Unexcused absences in excess of twice the number of recitations per week will lower the grade one letter. Each absence occurring within three days preceding or following a recess shall count two, and each unexcused absence in excess of the number of recitations per week shall count two. Two unexcused tardinesses count as one unexcused absence. Absences, excused or unexcused, in excess of three times the number of recitations per week will be considered sufficient reason for suspension from the course.

Examinations

Final examinations are held at the close of each semester in addition to occasional written tests during the semester. Fees will be charged for all examinations taken by those not regular members of classes, or at other times than those appointed for the class examinations.

ADMISSION

Candidates for admission to the freshman class must be at least fifteen years of age and must present certificates of good moral character. The particular requirements for entrance are explained below. Preparatory work is estimated in "units." The "unit" represents a course of five recitations weekly throughout an academic year of the preparatory school. Fifteen "units" or an equivalent must be offered.

Entrance Requirements

ENGLISH. Three units. The candidate must be familiar with elementary rhetoric, both as a science and an art, and must be proficient in spelling, punctuation, idiom and division into paragraphs. Preparation must include the work in English prescribed by the various college associations.

Each student must be able to pass an examination upon ten books selected from the list prescribed by the college entrance associations. The following ten are recommended: Shakespeare's *Julius Caesar*, and *The Merchant of Venice*; *The Sir Roger de Coverly Papers*; Goldsmith's *The Deserted Village*; Scott's *Ivanhoe*; Hawthorne's *The House of the Seven Gables*; Irving's *Sketch Book*; Ruskin's *Sesame and Lilies*; Lowell's *The Vision of Sir Launfal*; Longfellow's *Courtship of Miles Standish*.

In addition to the above a thorough study of each of the works named below is required. The examination will be upon subject matter, form and structure.

Shakespeare's *Macbeth*; Milton's *L'Allegro*, *H Penseroso* and *Comus*; or Tennyson's *Idylls of the King*; Burke's *Speech on Conciliation with America*, or Washington's *Farewell Address* and Webster's *Bunker Hill Oration*; Macaulay's *Life of Johnson*, or Carlyle's *Essay on Burns*.

FOREIGN LANGUAGES. 4 units. Latin grammar and composition; Caesar, four books of the *Gallie War*; Cicero, six orations; Virgil, six books of the *Aeneid*, or equivalents; or four units from not more than three of the following: Latin, Greek, German, French, Spanish.

MATHEMATICS. 2 units. Elementary Algebra, including fundamental operations, factoring, fractions, ratio, proportion, radicals, quadratics; Plane Geometry, including the straight line, angle, circle, proportion, similarity, and areas.

SCIENCE. 1 unit. Biology, Botany, Physiology, Zoology, Physical Geography, Physics or Chemistry. Any one may be offered.

ELECTIVE. 5 units in addition to the above subjects. Candidates may substitute one unit of science and one unit of advanced mathematics for two units of foreign language.

Summary

English	3 units
Mathematics	2 units
Foreign Languages	4 units
Science	1 unit
Elective	5 units

Admission is gained either on certificate or on examination, as follows:

Admission on Certificate

REGENTS' CREDENTIALS. The credentials of the University of the State of New York are accepted instead of an examination in the subjects required for admission, so far as

they cover these requirements. (For description of subjects, see *Entrance Requirements*.)

PRINCIPAL'S CERTIFICATE. Certificates are also received from principals of preparatory or high schools outside of New York state, provided such schools are known to the faculty for thoroughness of instruction. Such certificate must specify, in connection with each subject, the extent to which it has been pursued, by giving the text-book used, the method of instruction, the amount of time given to it, the date of the final examination, the degree of the applicant's proficiency, and must clearly show that the student has met the requirements in every detail. The school furnishes blank forms for such certificates upon application of principals of approved schools.

Principals of preparatory schools who desire to have their students admitted on certificate are invited to correspond with the director.

Admission on Examination

Candidates who fail to present satisfactory certificates must pass a written examination in the required subjects. Examinations in all subjects required for admission are held at Alfred at the beginning of the year. Candidates must report at the director's office and obtain permits for examination. The result of the examination may be obtained from the director.

Conditioned Students

No student can enter the freshman class conditioned in more than two academic subjects. These conditions must be removed within one year.

Admission to Advanced Standing

Students from other schools, having a course equivalent to that of the New York State School, may enter at the point from which they take dismissal, upon presentation of satisfactory certificates of standing and character, including an honorable dismissal.

Senior Thesis

There is required of each candidate for a degree a thesis, for which a credit of two hours in each semester of the Senior year is given. The title of the thesis must be chosen in the field of Ceramics not later than November 1, and must be approved by the director. The thesis shall embody the results of actual independent research, and must be submitted for approval not later than May 1. A typewritten copy must be deposited with the director.

Graduation

While no student will be permitted to graduate with a smaller credit than one hundred and forty semester hours, four full years of resident work will be required in either course. Upon students who satisfactorily complete the course in Ceramic Engineering, Alfred University will confer the degree of Bachelor of Science in Ceramic Engineering, and upon students who satisfactorily complete the course in Applied Arts the degree of Bachelor of Science in Applied Arts.

COURSES OF STUDY

All the studies in the courses leading to a degree are required for all the four years. Credit is given of one hour for each hour spent in lectures or recitations and of one hour for each laboratory period of two or three hours as required.

Course in Ceramic Engineering

First Year		Semester Hours
Mathematics 4, Algebra.....	3	
Chemistry 1, General Chemistry, Lecture and Laboratory....	3	
German	3	
English 1, English Comp. and Rhetoric.....	3	
Ceramics 1, Lecture and Laboratory.....	2	
Industrial Mechanics 1, Elementary Drafting.....	1½	
Industrial Mechanics 5, Wood Working.....	1	
Physical Training 1.....	1	
Ethics 1.....	½	
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Second Year		
Mathematics 5, Analytical Geometry.....	3	
Physics 1, General Physics.....	5	
Chemistry 2, Qualitative Analysis.....	3	
German	3	
Ceramics 2, Lecture and Laboratory.....	4	
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Third Year		
Mathematics 6, Calculus.....	3	
Chemistry 3, Quantitative Analysis.....	3	
Chemistry 6, Physical Chemistry.....	2	
Ceramics 3, Lecture and Laboratory.....	4	
Ceramics 4, Ceramic and Industrial Calculations.....	2	
Geology 1 and 3, General and Economic Geology.....	2	
Industrial Mechanics 2, Drafting, Advanced.....	1	
	<hr/>	17

Fourth Year

Mathematics 7, Surveying.....	2
Chemistry 4 and 5, Tech. Cer. Chem.; Gas and Fuel Analysis..	3
Ceramics 5, Lecture, Glass.....	2
Ceramics 6, Physical-Chemical Measurements.....	2
Ceramics 7, Lecture and Laboratory, Limes, Plasters and Cements	3
Ceramics 10, Thesis.....	2
Industrial Mechanics 4, Machine and Kiln Design.....	1½
Industrial Mechanics 8, Machine Shop Practice.....	1½

Course in Applied Arts

First Year		Semester Hours
Drawing 1, Studio Practice.....	2	
Modeling 1, Studio Practice.....	2	
Design 1, Lecture and Studio.....	2	
Ceramics 1, Lecture.....	1	
English 1, English Composition and Rhetoric.....	3	
Modern Language.....	3	
Chemistry 1, General Chemistry, Lecture and Laboratory....	3	
Physical Training 1.....	1	
Ethics 1.....	½	
	<hr/>	17½

Second Year		
Drawing 2, Studio Practice.....	3	
Modeling 2, Studio Practice.....	2½	
Design 2, Lecture and Studio.....	3	
Ceramics 2, Lecture and Laboratory.....	4	
English 3.....	2	
Modern Language.....	3	
Physical Training.....	½	
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Third Year

Drawing 3, Studio Practice.....	3
Modeling 3, Studio Practice.....	3
Design 3, Lecture and Studio.....	3
Ceramic Craft 2, Lecture and Studio.....	2
Artistic Anatomy, Lecture and Studio.....	2
History of Art, Lecture.....	2
Industrial Mechanics 1, Elementary Drafting.....	1½
Ceramics 8, Laboratory.....	2
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	18½

Fourth Year

Drawing 4, Studio Practice.....	2
Modeling 4, Studio Practice.....	3
Design 4, Lecture and Studio.....	3
Composition, Lecture and Studio.....	2
Chromatics, Studio Practice.....	2
Ceramics 9, Laboratory.....	2
Ceramics 10, Thesis.....	2
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SHORT COURSES

Short courses of two years each are offered and are intended to meet the needs of persons who are unable to qualify for a course leading to a degree. Applicants must be at least 18 years of age and must give evidence of ability to receive instruction.

While these courses are carefully planned so as to make the best possible use of the time available, it is hoped that no student will rest content with a short course if the requirements for entrance to a four years' course can possibly be met. No subject for which credit is given in a short course can be applied to remove entrance conditions to a full course.

Short Course in Clay-Working

First Year

	Semester Hours
Mathematics	3
Chemistry 1, General Chemistry, Lecture and Laboratory....	3
English 1.....	3
Ceramics 1.....	2
Ceramics 2.....	4
Industrial Mechanics 1.....	1½
Industrial Mechanics 5.....	1
Physical Training 1.....	1
Ethics 1.....	½
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Second Year

Chemistry 2, Qualitative and Quantitative Analysis.....	3
Physics	5
Ceramics 3.....	4
Ceramics 4.....	2
Industrial Mechanics 2.....	1½
Industrial Mechanics 4.....	1½
Industrial Mechanics 8.....	1½
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	18½

For particulars of the courses see the description of the courses in Ceramic Engineering.

Short Course in Normal Art

First Year	Studio Hours
Drawing 1, Studio Practice (same as in Applied Arts).....	6
Design 1, Lecture and Studio (same as in Applied Arts).....	6
Modeling 1, Studio Practice.....	6
Public School Drawing 1, Studio Practice.....	6
Mechanical Drawing, Studio Practice.....	6
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Second Year

Drawing 2, Studio Practice (same as in Applied Arts).....	9
Public School Drawing 2, Studio Practice.....	6
Normal Training, Lecture and Studio.....	9
History of Art, Lecture and Recitations.....	6
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	30

For detailed information as to the courses in Mathematics, Modern Languages and English see the College Catalogue of Alfred University.

DEPARTMENTS OF INSTRUCTION

Description of Courses

CERAMICS

Professor Binns

Professor Montgomery

1. Lectures on the origin, properties and uses of clays and other ceramic materials. Types of ware and methods of manufacture. Elementary glaze composition.

Laboratory practice in the operations involved in manufacture. The preparation and use of forms, molds and dies. Making saggers, jiggering, pressing and casting pottery. Making brick and tile. The general use of the machine equipment.

First year. One hour lecture and two hours laboratory. *Two hours.*

Professor Binns, Professor Montgomery.

2. Lectures on the occurrence, classification and identification of clays. The manufacture of all classes of ceramic products. The theory and practice of drying and burning. The compounding of clay mixtures, and the production and use of glazes and colors. The glaze formula.

Laboratory practice in clay testing. The measurement of the physical properties of clays and the compounding of bodies and glazes. Kiln firing.

Second year. Two hours lecture and six hours laboratory. *Four hours.*

Professor Binns.

3. Lectures on the winning and preparation of clays. The technology of the ceramic industries. The mineralogical, chemical and physical changes which take place in clays, bodies and glazes during their preparation, drying and burning. The theory and practice of pyrometry.

Laboratory practice in the production and application of slips, engobes, enamels, glazes and colors. The production, decoration and firing of finished wares.

Third year. Two hours lecture and six hours laboratory. *Four hours.*

Professor Binns, Professor Montgomery.

4. Recitations on the calculations involved in the mixing and blending of ceramic materials in bodies, glazes and colors. The use of analyses. The designing of series for glaze study. Chemical and physical problems in gas volume relations, heat, combustion and the calorific value of fuels.

Third year. Two hours recitations. *Two hours.*

Professor Montgomery.

5. Lectures on the raw materials, preparation, compounding and manufacture of the various types of glass. The history of glass, its uses, and the methods employed in its decoration.

Fourth year. Two hours lectures. *Two hours.*

Professor Binns.

6. Laboratory practice with occasional lectures in the application of physical chemistry to ceramic problems. Viscosity of slips, deflocculation, colloids and the fineness of grain. Specific gravity and porosity. The use of the electric furnace in the study of dehydration, lag curves, melting points, deformation points, entectics, and the viscosity of fused minerals and mineral mixtures.

Fourth year. Six hours laboratory. *Two hours.*

Professor Montgomery.

7. Lectures on the raw materials, preparation, compounding and manufacture of limes, plasters, natural and Portland cements. The theory of hydraulicity and the reactions involved in manufacture. Methods of testing.

Laboratory practice in the production of lime, plaster and cement and the study of their physical properties.

Fourth year. Two hours lecture and three hours laboratory. *Three hours.*

Professor Montgomery.

8. Laboratory practice for art students. The production of form by molding. The preparation of glazes for decorative pottery.

Third year. Six hours laboratory. *Two hours.*

Professor Binns.

9. Laboratory practice in continuation of course 8. The preparation and use of underglaze colors. Glazes for colors. Colored glazes. The use of the potter's wheel.

Fourth year. Six hours laboratory. *Two hours.*

Professor Binns.

10. Thesis.

Fourth year. Six hours laboratory. *Two hours.*

Professor Binns, Professor Montgomery.

CHEMISTRY

Professor Bole

Professor W. A. Titsworth

Mr. Milligan

CHEMISTRY I. A thorough course in the theory and principles of the science of chemistry, covering Alexander Smith's College Chemistry. It is supposed that students entering this course shall have had high school physics, and

preferably high school chemistry. Lecture and recitations, *two hours*, laboratory *one hour*.

2. **QUALITATIVE ANALYSIS.** The detailed separation of the metals, non-metals and acid radicals. The student is required to apply the theory learned in course 1 and to explain the reason for each reaction. The ionic theory, solubility product, law of concentration, hydrolysis, amphoteric hydroxides, etc., are studied and application made in the separations. A laboratory course consisting of four hours of laboratory work a week throughout the year, with one hour lecture. Text-book, Stieglitz. Prerequisite, course 1 or its equivalent. *Three hours*.

3. **QUANTITATIVE ANALYSIS.** A laboratory course of four hours with a weekly lecture throughout the year. The work embraces the principal methods of gravimetric, volumetric and electro-chemical analysis, and the use of the reference works and the chemical journals. This course gives quantitative application of the laws which are studied qualitatively in course 2. Prerequisites, courses 1 and 2. *Three hours*.

4. **TECHNICAL ANALYSIS.** Lectures and laboratory work. The analysis of silicate and carbonate rocks is carried out in detail. The student is given the opportunity to compare different methods of analysis rather than to follow any specified method. Prerequisites, courses 1, 2 and 3. *Three hours*. I.

5. **GAS AND FUEL ANALYSIS.** One hour lecture and four hours laboratory. The complete analysis of flue, illuminating and natural gases is carried out in the laboratory. The study of the various fuels is taken up and different samples are analyzed by the student. The student is taught to use the Orsat & Hempill apparatus and the Parr Calorimeter. Prerequisites, courses 1, 2, 3, 4. *Three hours*. II.

6. **PHYSICAL CHEMISTRY.** Introduction to the concepts of modern physical chemistry. The first semester is taken up with a detailed study of the quantitative laws governing gases, liquids, solids, and substances in solution.

During the second term a study of the phase rules and electro-chemistry is taken up and a detailed study of the laws of chemical equilibrium and applications of the same is carried out. Prerequisites, courses 1 and 2. *Two hours*.

PHYSICS

Professor W. A. Tittsworth

1a. **GENERAL PHYSICS.** A course in general physics for those who have had high school physics, although persons who have not had the high school preparation may be admitted to the class. The student should have studied algebra, plane geometry and plane trigonometry. Special emphasis is laid on the application of principles studied in this course to natural phenomena and the common occurrences of daily life. The lectures are illustrated by demonstrations as far as possible. It is expected that the laboratory course 1b will be taken in connection with this course. First semester, mechanics and heat; second semester, magnetism, electricity, light and sound. *Three hours*.

1b. **GENERAL PHYSICS LABORATORY.** This course is planned to accompany course 1a, but will be open to any who have had a lecture course in general college physics without the corresponding laboratory work. Typical experiments illustrating the principles of physics are performed by the student in a well equipped laboratory. Experiments will also be written up in the laboratory. Nearly thirty experiments will be performed during the year. Two double laboratory periods a week. *Two hours*.

INDUSTRIAL MECHANICS

Professor Crandall

1. **ELEMENTARY DRAFTING.** Open to all regular and special students of the college. Elementary principles, geometric problems, projections, etc. *Two hours, counting one and one-half hours.*

2. **ADVANCED DRAFTING.** Open to those who have completed the first year's work and solid geometry. Descriptive geometry, shades, shadows, and perspective, with their applications. *Two hours, counting one and one-half hours.*

3. **DESCRIPTIVE GEOMETRY.** Taught both by class exercises, in which the student demonstrates the various problems, and by instrumental solution in the drafting room, in which he makes accurate drawings illustrating these problems. This course includes the principles of shades, shadows, and perspective, all developed according to mathematical principles. *Two hours.*

4. **MACHINE OR ARCHITECTURAL DRAFTING.** Prerequisites, courses 1, 2 and 3. This course develops complete sets of working drawings, including bills of materials and estimates of either machine, architectural, or manual training subjects as the student may elect. *Two hours, counting one and one-half hours.*

5. **WOOD-WORKING.** An elementary course the purpose of which is to teach the students the intelligent use of the more common hand tools used in the shop, the care and the proper methods of sharpening them, and the correct method of making the principal joints used in carpentry and cabinet-making. As soon as each kind of joint is thoroughly understood, the student is taught its practical use in making a piece of furniture or apparatus. Special stress is placed on accuracy and neatness of workmanship, so that the student may early learn the necessity of careful, painstaking efforts in order to accomplish good results. *Two hours, counting one hour.*

6. **PATTERN-MAKING.** Prerequisite, course 5 or its equivalent. This course aims to give the student the elements of practical wood pattern-making. Each article made is to be a practical pattern which may be successfully cast in any foundry. The work is made very technical so that the student may become acquainted with actual shop methods so far as it is possible in a school shop. Accuracy and first-class workmanship are essential for success in this course. *Two hours, counting one and one-half hours.*

7. **FORGING.** Prerequisites, courses 5 and 6, or their equivalent. A practical course in the drawing, welding, and bending of iron for any purpose. The management of the fire and the forge is considered of first importance in this course. A large variety of articles in both iron and steel is made during the year, the work in steel coming the latter part of the year. Such tools are made from steel as cold chisels, lathe and planer tools, and special tools for special purposes. At frequent intervals during the year lectures and demonstrations are given on such subjects as the structure and manufacture of steel and iron, welding compounds, commercial shop methods, tempering, annealing, etc. *Two hours, counting one hour.*

8. **MACHINE SHOP PRACTICE.** Prerequisites, courses 5 and 6, or their equivalent. This course consists of exercises in chipping, filing, and fitting, lathe and planer works, and operations on the drill press. Skill in manipulation is not sought so much as a working knowledge of methods, a familiarity with the limitations and possibilities of the tools, and a greater insight into the practical, productive, and commercial side of shop methods and management. To this end, occasional lectures are given throughout the year on such subjects as commercial machine shop methods, time keeping systems, piece-work and premium plans, cost keeping, and stock room management. *Two hours, counting one and one-half hours.*

APPLIED ARTS

Miss Binns
Miss Greenwood
Miss Fosdick
Miss Meritt

Drawing

1. Freehand drawing; perspective. Charcoal drawing from the antique. Detail of figure and full figure from east.

First year. Six hours studio. *Two hours.*

2. Drawing from the antique continued. Drawing from life. Painting from still-life and flowers.

Second year. Six hours studio. *Three hours.*

3. Water color painting from still life. Drawing and painting from life. Pastel, pen and ink, and pencil rendering.

Third year. Nine hours studio. *Three hours.*

4. Drawing and painting from life.

Fourth year. Six hours studio. *Two hours.*

Modeling

1. Elementary modeling from the east. Time sketches of ornament. Simple ornament from original designs. Principles and practice of plaster-casting in relief. Modeling for terra cotta.

Pottery building. Decoration of pottery by incising, inlaying and slip painting.

First year. Six hours studio. *Two hours.*

2. Modeling from the antique. Time sketches of ornament. Plaster casting in the round. Modeling for terra cotta from original designs. Decorative panels.

Pottery building. Decoration of pottery by incising, inlaying, and modeling.

Second year. Six hours studio. *Two and one-half hours.*

3. Modeling in relief from the antique and life. Time sketches in clay. Modeling for terra cotta from original designs. Decoration of wheel-made pottery by modeling, by underglaze, inlaid glazes.

Third year. Six hours studio. *Three hours.*

4. Modeling from life. Application of the figure to modeled decoration. Working out of such problems as sundials, fountains. Decorative panels for terra cotta. Advanced work in pottery decoration.

Fourth year. Six hours studio. *Three hours.*

Design

1. Designing of geometric ornament. The study of historic ornament. The designing of simple ornament in historic styles. Application of ornament to surface patterns, tiles, pottery, mosaics, etc.

First year. One hour lecture, four hours studio. *Two hours.*

2. Application of ornament continued. Illuminating book decoration, lettering, textiles, etc. Development of color.

Second year. One hour lecture, eight hours studio. *Three hours.*

3. Design as applied to Ceramics. Modeled designs. Wallpaper. Illuminating, "stained" glass, etc.

Third year. Nine hours studio. *Three hours.*

4. Architectural design. Application of ornament continued. Professional rendering.

Fourth year. Nine hours studio. *Three hours.*

Ceramic Craft

Study and production of ceramic wares. Relation of use and beauty. Hand and machine work. Professional rendering.

Third year. One hour lecture and five hours studio. *Two hours.*

Artistic Anatomy

Lectures dealing with the bones and muscles of the body, illustrated with analytical drawings. Construction of anatomical figure from memory.

Third year. One hour lecture, three hours studio. *Two hours.*

Chromatics

Study of color. Oil painting. Still-life. Landscape. Fourth year. Six hours studio. *Two hours.*

Composition

Study of the laws of composition. The use of the figure in decoration. Application to book illustration, terra cotta, etc.

Fourth year. One hour lecture, five hours studio. *Two hours.*

History of Art

Lectures and recitations illustrated with photographs and slides, on the history of art and the appreciation of beauty. The beginnings of art. Egyptian, Greek and Roman art. The arts and crafts of the Middle Ages. The painting and sculpture of the Renaissance. Modern art. Reinach's "History of Art Throughout the Ages," is used as a text-book with supplementary reading and keeping of note-books.

Third year. Two hours recitations. *Two hours.*

NORMAL ART

Miss Binns

Miss Greenwood

Miss Fosdick

Miss Meritt

Drawing

1. Same as Drawing 1 in Applied Arts Course. First year. Six hours studio.

2. Same as Drawing 2 in Applied Arts course. Second year. Nine hours studio.

Design

Same as Design 1 in Applied Arts Course.

First year. One hour lecture, four hours studio.

Modeling

Elementary modeling from the east. Modeling from memory of animals, etc. Story illustration. Sand table work. Simple decorated tiles, pottery, etc.

First year. Six hours studio.

Public School Drawing

1. Exercises in blackboard drawing. Pencil drawing from nature. Time sketches. Pose drawing. Exercises in teaching.

First year. Six hours studio.

2. Exercises in blackboard drawing. Pencil drawing of animals, plants, etc. Illustrative drawing. Memory sketching.

Second year. Six hours studio.

Mechanical Drawing

Geometric problems. Use of instruments. Reading of working drawings. Working drawings from freehand sketches. Perspective sketching from plan. Drawing to scale.

First year. Six hours studio.

Normal Training

Lectures on the theory of teaching, methods of criticism, methods of supervision. Observation of work in local schools. Working out of art problems for the grades and High School. Keeping of note-books and portfolios of work. Exercises in teaching.

Second year. One hour lecture, six hours studio.

History of Art

Same as in Applied Arts course.

Second year. Two hours lecture and recitations.

DEPARTMENT OF INVESTIGATION AND RESEARCH

Clay Testing

Professor Binns

The State School of Ceramics is fitted and the experts in charge are qualified, for the professional examination and testing of clays for economic purposes. Such clays may be classified under the following heads:

- (a) Kaolin, white burning residual clay.
- (b) Kaolin, white burning, washed for market, used in the manufacture of pottery, porcelain and paper.
- (c) Ball clay, white or cream burning, sedimentary clay of high plasticity, used in pottery manufacture.
- (d) Stone ware clay, gray or cream burning, more or less sandy in character, used in stone ware manufacture.
- (e) Fire clay, buff or white burning, refractory, used for manufacture of fire brick.
- (f) Brick clay including colored clays and shales, used for the manufacture of brick and tile of various qualities and descriptions.

For each of the above classes special tests are necessary, and the charges made are proportionate to the work required.

A report upon each sample will be furnished and must be understood to refer only to the samples submitted unless the experts are instructed to examine the deposit and prepare their own samples, in which case special charges will be

made. The report includes physical tests, and chemical analysis where necessary.

Advice as to washing or other preparation of the clay is also given, together with an opinion as to the industry to which the material may be applied.

Industrial Problems

Professor Binns

Professor Montgomery

The problems incidental to the manufacture of clay wares are regularly investigated at the school. Manufacturers are invited to present questions for study. Persons resident within the state are entitled to reasonable services without charge.