

SIXTH ANNUAL
CATALOGUE

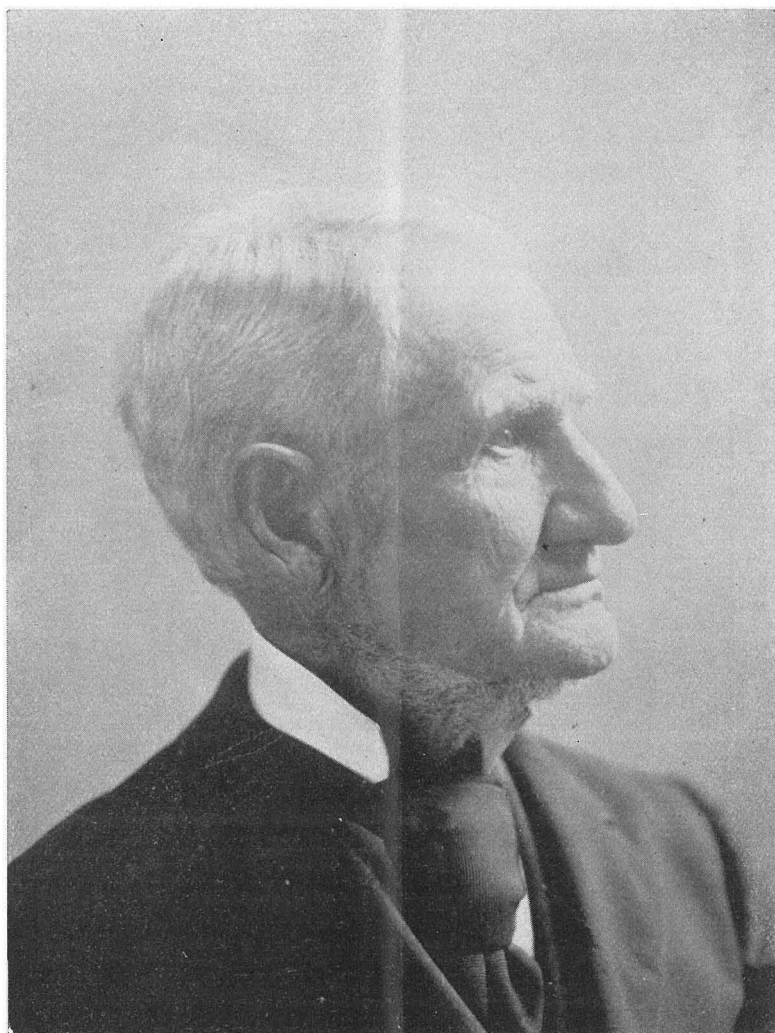


Throop
Polytechnic....
Institute



Pasadena, California

1897-98



HON. AMOS G. THROOP.

SIXTH ANNUAL CATALOGUE

OF

THROOP

Polytechnic Institute

.....AND.....

Manual Training School

Pasadena, California

1897-1898

1897

KINGSLEY-BARNES & NEUNER CO. LIMITED, LOS ANGELES, CALIFORNIA

FOUNDER

HON. AMOS G. THROOP

Born at De Ruyter, New York, July 22, 1811
Died at Pasadena, Cal., March 22, 1894

BOARD OF TRUSTEES

CHARLES D. DAGGETT,	Pasadena,	Term expires 1898
H. M. HAMILTON,	1898
A. R. METCALFE,	1898
PERRY M. GREEN,	1899
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EVERETT L. CONGER, D. D.,	1902
MRS. LOUISE T. W. CONGER,	1902
CHARLES B. SCOVILLE,	1902

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Residence, 286 N. Raymond Ave.

EXECUTIVE COMMITTEE OF THE BOARD

NORMAN BRIDGE,

E. L. CONGER,

C. D. DAGGETT,

THOS. C. HOAG,

JOHN WADSWORTH.

CALENDAR

1897-1898

Entrance Examinations,	..	Monday and Tuesday, September 20, 21, 1897
Fall Term begins	..	Wednesday, September 22, 1897
Thanksgiving Vacation,	From	Wednesday, Nov. 24, to Monday, Nov. 29, 1897
Founder's Day,	..	Thursday, Dec. 9, 1897
Fall Term ends,	..	Wednesday, Dec. 22, 1897
Winter Term begins,	..	Wednesday, Jan. 5, 1898
Winter Term ends,	..	Friday, March 25, 1898
Spring Term begins,	..	Monday, March 28, 1898
Spring Vacation,	..	Easter week
Spring Term ends,	..	Wednesday, June 22, 1898

OFFICERS OF INSTRUCTION AND GOVERNMENT

1897-8

WALTER A. EDWARDS, President

History and German

A. B. and A. M., Knox College, Galesburg, Ill.; Instructor in Latin and Greek, High School, Peoria, Ill., 1883-6; Student Universities of Berlin and Tübingen, 1886-9; Principal High School, Decatur, Ill., 1889-90; Principal High School, Rockford, Ill., 1891-5; Instructor Latin and Greek, High School, Pasadena, Cal., 1895-6; Instructor History and Greek, Throop Polytechnic Institute, 1896-7.

39 S. Euclid Avenue

MILLARD M. PARKER, Vice-President

Latin and Greek

A. B. and A. M., Wesleyan University, Middletown, Conn.; Principal High School, Livermore, Me., 1875; Principal Academy, Glastonbury, Conn., 1876-7; Principal High School, Holliston, Mass., 1877-82; Professor Latin and Greek, Sierra Madre College, Pasadena, Cal., 1884-5; Principal Academy, Pasadena, Cal., 1886-91; Instructor Latin and Greek, Throop Polytechnic Institute, 1891-

516 E. California Street

ARTHUR L. HAMILTON

Mathematics

Washington, Iowa, High School, 1878; Iowa State College, Ames, 1880-1; Principal Ainsworth, Iowa, High School, 1882-3; Law Student, 1884-5; Principal Garfield Grammar School, Pasadena, Cal., 1885-93; Instructor in Mathematics, Throop Polytechnic Institute, 1894-

836 N. Raymond Avenue

MRS. JENNIE COLEMAN

English and French

Instructor in Latin and English, High School, Rochester, N. Y., 1867-8; Principal Grammar School, Lakeport, Cal., 1884-6; Member County Board of Education, Lake Co., Cal., 1883-7; Vice-Principal High School, Pasadena, Cal., 1888-96; Instructor in English and History, Throop Polytechnic Institute, 1896-; Holder of California Life Diploma.

472 Benefit Court

WALLACE K. GAYLORD

Chemistry ; Librarian of the Institute

S. B., Massachusetts Institute of Technology, 1893; Instructor in Chemistry and Mathematics, Throop Polytechnic Institute, 1893-; Member of the American Chemical Society; Member of the German Chemical Society.

146 Terrace Drive

LUCIEN H. GILMORE

Physics and Electrical Engineering

A. B., Stanford University, 1894; Acting Assistant Department of Physics, Stanford University, 1894-5; Instructor in Physics and Electrical Engineering, Throop Polytechnic Institute, 1895-; Associate Member American Institute of Electrical Engineers.

250 Concord Court

HERBERT B. PERKINS

Mechanical Drawing and Higher Mathematics

S. B., Massachusetts Institute of Technology, 1874; Professor of Mathematics and Astronomy, Lawrence University, 1878-80 and 1882-86; Student of Mathematics, Physics and Astronomy, University and Polytechnikum, Munich, Germany, and University of Geneva, Switzerland, 1880-2; Student Mechanical Engineering, University of California, 1886-8; Professor of Modern Languages, University of Southern California, 1890-2; Instructor of Mechanical Drawing and Higher Mathematics, Throop Polytechnic Institute, 1892-

41 W. Walnut Street

ERNEST BRYANT HOAG

Biology

B. S., Northwestern University, Evanston, Ill., 1892; A. B., Stanford University, 1895; University Extension Lecturer, University of Chicago, 1895; Demonstrator of Histology, University of Southern California Medical School, 1895-6; Instructor in Biology, Throop Polytechnic Institute, 1895-.

346 Markham Avenue

NELSON SAUNDERS

Spanish

A. B. and A. M., Olivet College, Olivet, Michigan; Professor of Greek and German, Groton College, Dakota, 1885-7; Professor of Latin, Greek and German, Occidental College, Los Angeles, 1889-90; Instructor of English, Latin and Greek, Ludlam School of Oratory, Los Angeles, 1890-92; Instructor of Modern Languages, Throop Polytechnic Institute, 1892-

164 N. Euclid Avenue

WILLIAM H. PARKER

Pattern and Machine Shop

Lawrence Academy, Groton, Mass., 1883-5; Machinist, Florence Manufacturing Company, Florence, Mass., 1887-9; St. Louis Manual Training School and Washington University, 1890-2; Instructor Pattern and Machine Shop, Throop Polytechnic Institute, 1892-

721 N. Fair Oaks Avenue

CHARLES H. WRIGHT

Wood and Iron Shops

Graduated Manual Training Department, Washington University, St. Louis, 1885; Principal Haish Manual Training School, Denver University, 1885-7; Student Colorado School of Mines, 1889; Instructor Iron Shop, Throop Polytechnic Institute, 1894-

N. Marengo Avenue

ARTHUR H. CHAMBERLAIN

Director of Sloyd

Graduated Cook County Normal School, 1892; Teacher in the Public Schools of Cook County, Ill., 1892-4; Principal W. Harvey Public Schools, 1893-4; Studied at Throop Polytechnic Institute, 1895-6; Director of Sloyd, Throop Polytechnic Institute, 1896-

377 N. Los Robles Avenue

FANNY F. STERRETT

Drawing, Painting, Clay-Modeling, and Wood-Carving

Portrait Artist five years, Springfield, Ohio; Student Chicago Art Institute, 1891-2; Graduated Normal Art Department, Pratt Institute, Brooklyn, N. Y., 1894; Instructor Drawing and Painting, Throop Polytechnic Institute, 1894-

201 N. Fair Oaks Avenue

MRS. GRACE E. DUTTON

Cooking and Sewing

Graduated Pennsylvania State Normal School, 1885; Instructor in Public Schools of Twin Oaks, Pa., 1885-8; Graduate of Mrs. S. T. Rorer's Philadelphia School of Domestic Economy, 1897.

308 Grove Street

BONNIE BUNNELLE

Principal Sloyd Grammar School

Student in Normal Training School under Prof. P. W. Search, Sidney, Ohio, 1888-91; Student Pueblo Industrial School, Pueblo, Colo., 1892-4; Instructor Public School, Pueblo, Colo., 1891-4; Instructor Sloyd Grammar School, Throop Polytechnic Institute, 1894-

308 Lincoln Avenue

CHARLES F. HOLDER LL. D.

Honorary Curator of Museum

U. S. Naval Academy, 1866-71; Assistant Curator Zoölogy, American Museum of Natural History, New York, 1872-75; Fellow of the U. S. Academy of Sciences; Member of the Linnean Society of New York; Member of the National Geographical Society, Washington, D. C.

EXECUTIVE COMMITTEE

W. A. EDWARDS, Chairman

A. L. HAMILTON, Secretary

M. M. PARKER

W. K. GAYLORD

MRS. JENNIE COLEMAN

Throop Polytechnic Institute

Founding

Throop Polytechnic Institute was founded by Hon. Amos G. Throop in 1891, and during the remainder of his life received his consecrated energy and hearty support, and at his death the greater part of the remaining accumulations of his life were bequeathed for its support. Articles of incorporation were filed September 23rd; the first Board of Trustees organized October 2nd. The doors of the Institute were opened to students November 2nd. It was established as an institution of learning that should furnish to students of both sexes and of all religious opinions, a liberal and practical education, which, while thoroughly Christian, should be absolutely non-sectarian in character.

During the first year the Wooster Block was used for school purposes. In 1892 it was determined to make manual and industrial education the characteristic feature of the school, and the building now known as Polytechnic Hall was erected. In the following year East Hall was built.

Location

Pasadena is generally acknowledged to be one of the most beautiful residence cities in California. It is situated within ten miles of the city of Los Angeles, at the head of the San Gabriel valley and at the base of the picturesque San Gabriel mountains. In beauty and healthfulness, in the culture of its homes, and in its high social and moral tone, Pasadena has no superior on the Pacific Coast. It is reached by the Santa Fe, Los Angeles Terminal, Southern Pacific, and the Pasadena and Los Angeles Electric railways. The last named passes in front of each of the halls. Students living along these lines are enabled to make the daily trips to and from the Institute in seasonable hours and at reasonable rates.

Departments

The Institute comprises four departments, the Sloyd Grammar School, the Sloyd Normal Course, the Manual Training Academy, and the College Department.

Libraries

The books belonging to the Institute are located with reference to convenience to students, special libraries being placed in the various department rooms. These contain works bearing on English Literature, Latin and Greek, History and Civics, Physics and Electricity, Chemistry, Physiology, Botany, Bacteriology, and Zoölogy, while a general assortment is found in the main library room in East Hall. Students also have access to many works from the private libraries of the various instructors, as also to the Pasadena Public Library, situated near the Institute. The library also receives regularly several periodicals which have been selected with considerable care so as to be of the greatest use to the students.

Polytechnic Hall

Most of the shops and laboratories of the Manual Training Department are located in Polytechnic Hall, which is a two-story brick structure with a frontage of 148 feet on Fair Oaks avenue and 80 feet on Chestnut street.

Wood Shop.

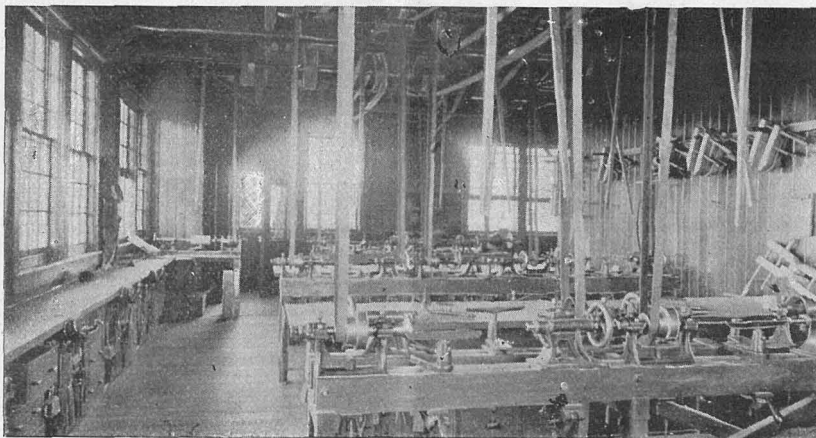
The wood shop, which is located on the second floor, is provided with twenty work-benches, at each of which four students can work daily. The benches are provided with a drawer for each student, in which, under lock, are placed the planes, chisels and turning tools used by the student to whom that drawer is assigned. He is held responsible for these tools and is taught how to keep them in good condition for use.

Each bench has, besides, a set of tools which are used in common by four students.

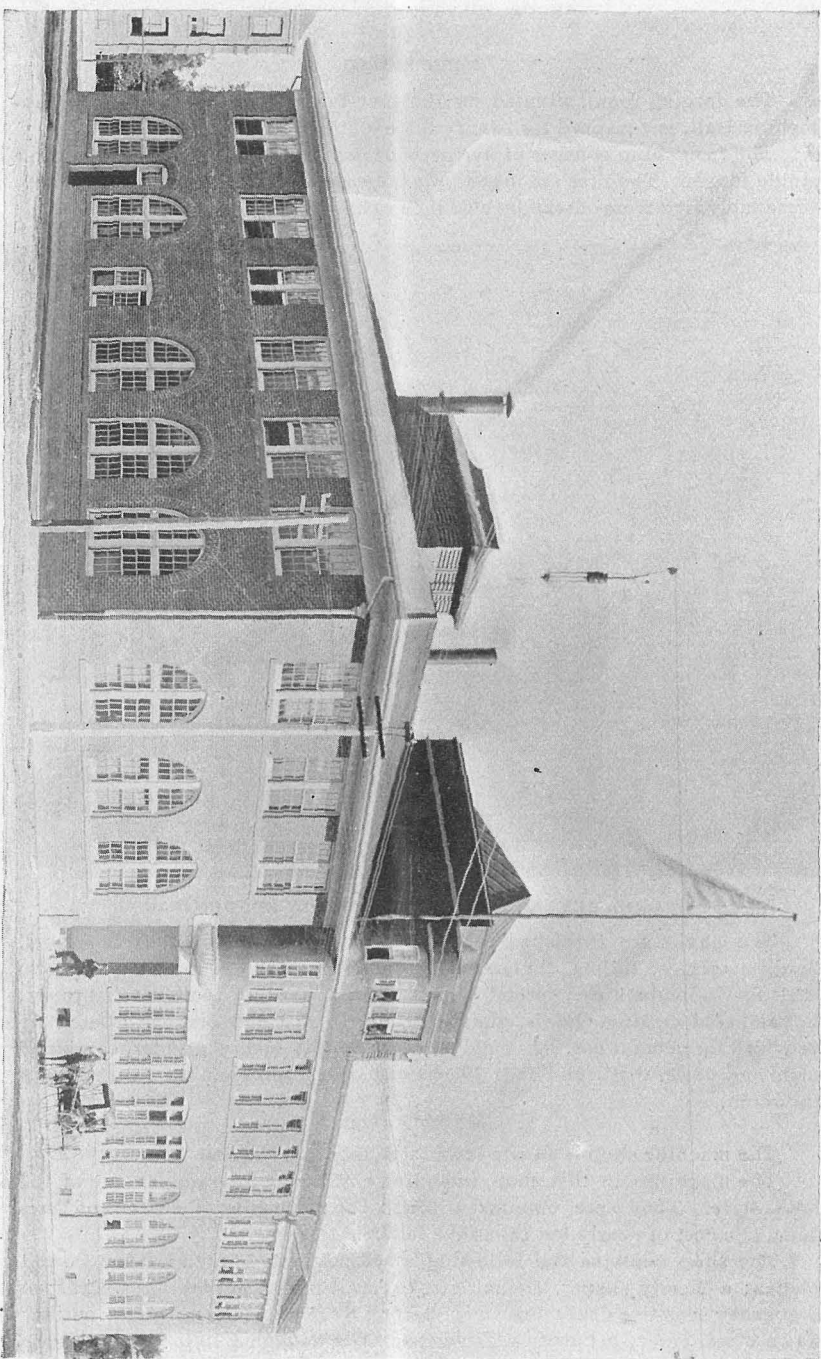
At each student's right hand, on the bench, is a fourteen-inch lathe, while at the opposite end of the bench is placed his bench-stop and lightning grip wood-worker's vise. The shop is supplied with a large band-saw for cutting up stock, and also a fine fret-saw. It is thus equipped with all the appliances and tools necessary to do thorough work in joinery, turning, inlaying and scroll-sawing. A special pattern-maker's lathe and well equipped bench is provided for the use of the instructor.

Pattern Shop

The pattern shop adjoins the wood shop and its equipment is similar to that of the wood shop. In addition, it is provided with a molding bench where the students may test their patterns and gain some knowledge of the principles of molding.



PATTERN SHOP

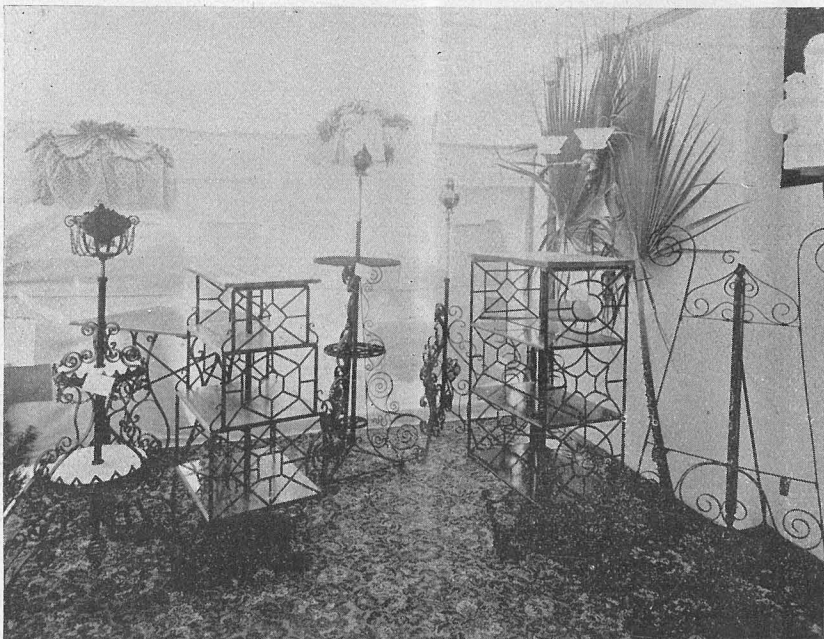


POLYTECHNIC HALL

Forging Shop

The forging-room, situated on the first floor in the east wing of Polytechnic Hall, is equipped for twenty-three pupils.

The furnishing consists of five nests of Buffalo quadruple forges and three single forges. The fires are urged by a pressure blower, and the room is kept reasonably free from smoke by a 60-inch exhaust fan.



ORNAMENTAL IRON WORK MADE BY STUDENTS

The anvils are furnished with all necessary tools, such as hammers, hardies, swages, fullers, flatters, tongs and squares. In addition to these tools for individual use, special sets of sledges, heading tools, set hammers, hot and cold cutting chisels, punches, calipers, taps and dies, drills, etc., are provided for general use. A hand blower, double emery grinder, combined hand and power drill, and four blacksmith vises complete the furnishing of the room.

Machine Shop

The machine shop is situated in a large room on the first floor.

The machines in this shop, including a 55-horsepower engine, are of the latest style. They were obtained through the generosity of citizens of Pasadena, at a cost of nearly ten thousand dollars.

The shop contains the following machines: A 24-inch x 6-foot Powell planer; a Hendy shaper, 15-inch stroke; a 24-inch Prentiss Bros. drill; a Sigourney sensitive drill; Brown & Sharpe's No. 1 universal milling machine; a two-wheel emery grinder; a grindstone; one 24-inch x 10-foot, one 16-inch

x 8-foot and four 14-inch x 6-foot Reed lathes, one of which has a taper attachment; two Prentiss Bros. lathes; one Putnam & Sons lathe; and one Hendy-Norton lathe, all 14-inch x 6-foot, and two speed lathes. In the tool-room is an 8-inch x 32-inch Mosely & Company bench lathe, and a Barnes foot-power lathe.

The following is a partial list of tools in the tool-room: One 24-inch, one 16-inch and three 12-inch four-jawed independent chucks; three 12-inch, two 9-inch and one 6-inch three-jawed universal chucks; milling and gear cutters, end mills and attachments for a milling machine; a set of twist drills from $\frac{1}{4}$ -inch to $1\frac{1}{4}$ -inch by 32nds; from $1\frac{1}{4}$ to 2-inch by 16ths; a set of hand reamers from $\frac{1}{4}$ -inch to $1\frac{1}{4}$ -inch by 32nds; a set of Rose reamers from $\frac{1}{4}$ -inch to $1\frac{1}{4}$ -inch by 16ths; a set of taps and dies from 7-64 to $\frac{1}{4}$ -inch by 64ths, and taps from $\frac{1}{4}$ to 1-inch by 16ths; a full set of dogs and two sets of arbors. A revolving frame contains calipers, squares, etc.

A check system is used in giving out tools, the students in turn caring for the tool-room.



Sewing Room

The sewing and garment-making room is located on the first floor. It is equipped with four large tables furnished with a sufficient number of drawers to accommodate three classes of sixteen members each in garment-making. Seven sewing-machines, a gas iron-heater, pressing-boards, together with necessary needles, scissors, thimbles, scales, tape-lines, etc., for the use of individual students, complete the equipment of this department. Adjoining the main sewing-room, a retiring-room for fitting purposes is provided.

Cooking-Room

The cooking-room is located on the second floor and is supplied with tables, upon which are gas stoves. Each table is provided with drawers for the caps, aprons, sleeve-protectors, note-books, etc., of the four students assigned to work at that table. Other drawers contain cooking utensils, mixing and measuring dishes, stirring spoons, kitchen knives and forks, etc., while in cupboards beneath is a full assortment of stove and kitchen furnishings. At

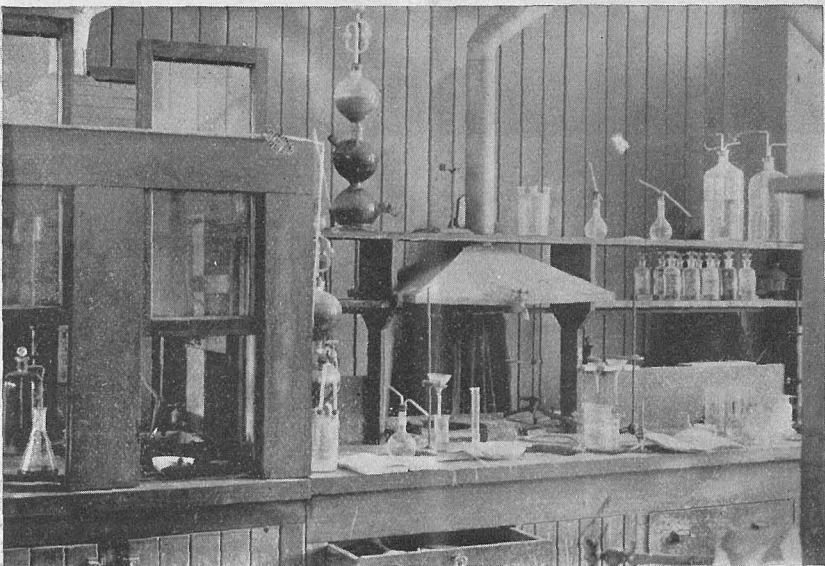


COOKING ROOM.

either end of the table, towels, lid-lifters, etc., are hung. A large dust-proof cupboard, containing meal and flour bins, dish closets, etc., a large water heater, a Lowe gas range, a large refrigerator, and a cupboard for furnishings, are also provided.

Mechanical and Architectural Drawing Room

This is an east room, situated on the second floor, and is well lighted. It is furnished with tables which have lockers for each student. This room is also provided with models and casts illustrating the five orders of architecture. A number of valuable imported models for work on machine design are in use.



STUDENTS' DESKS IN THE CHEMICAL LABORATORY

Chemical Laboratory

The department of Chemistry occupies three rooms on the second floor of Polytechnic Hall. They are all well furnished with the usual tables, shelves, closets, hoods, etc., for convenient experimental work, and are supplied with a large assortment of glassware, apparatus and chemicals.

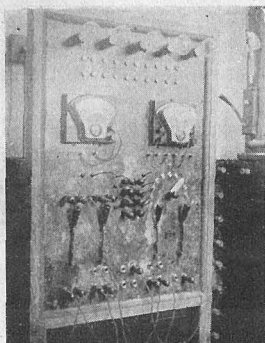
The library of the department is kept in one of these rooms and contains standard works on general, analytical, theoretical and organic chemistry.

Among the special apparatus in use in the department may be mentioned the following: Steam heating and evaporating apparatus, water still, automatic gas generators, combustion furnace, apparatus for analysis of baking powders, apparatus for milk analysis, Lunge's nitrometer, analytical balance, Westphal specific gravity balance, mercurial barometer, spectroscope, etc., etc.

Physical and Engineering Laboratories

The Department of Physics and Electrical Engineering occupies three rooms on the first floor of Polytechnic Hall. The Physical Laboratory is a large, well lighted room, fitted with gas, water and steam pipes, electric wires, tables, lockers, cases, etc. This room is used for the elementary work in physics and the more advanced work in physical and electrical measurements. In addition to much other apparatus for qualitative and quantitative experiments may be mentioned the following: Becker balance, micrometer calipers, aneroid and mercurial barometers, spectroscope, revolving mirror, compound microscope, Bunsen photometer, arc lamp for projection purposes, Deprez-D'Arsonval mirror galvanometer, Thompson tripod galvanometer, Queen ballistic galvanometer, universal and ordinary tangent galvanometers, resistance boxes, Queen testing set, earth inductor, Queen quadrant electrometer, one-third microfarad condenser, standard cells, slidemeter bridges, scales and telescopes, 6 x 12-inch induction coil suitable for Hertzian oscillation or X-ray work.

Adjacent to the laboratory is the lecture and recitation-room. It contains the library for this department, to which have lately been added several of the latest works on physics and electrical engineering. Leading physical and electrical engineering journals and transactions of the American Institute of Electrical Engineers are also on file in the library.

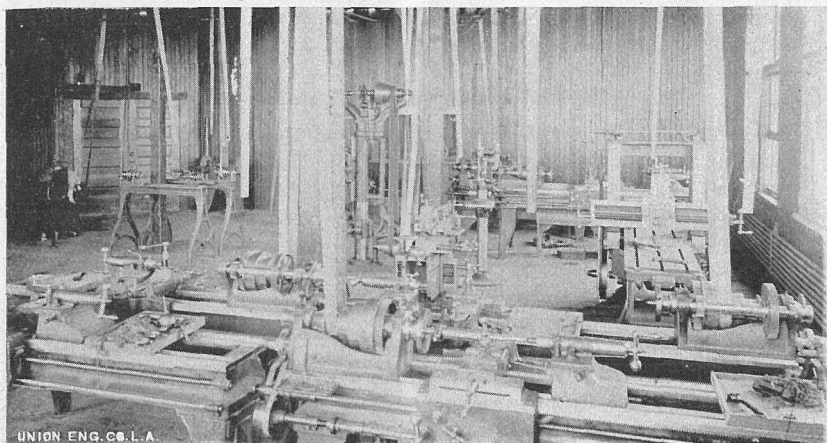


SWITCHBOARD MADE BY
STUDENTS IN ELECTRIC-
AL ENGINEERING

Adjoining the lecture and recitation-room on the north is the electrical testing laboratory. It is piped with gas and steam and has wires leading in from the five hundred-volt circuit of the Pasadena and Los Angeles Electric Railway. Its equipment consists of an air compressor with compressed air reservoirs, a steam engine built in the machine shop of the Institute and used for power and experimental purposes, Edison dynamo so arranged with commutator, collecting-rings and exciter as to give a direct current or a one, two or three-phase alternating current, Lundell motor, Crocker-Wheeler motor-generator, storage

batteries, banks of incandescent lamps, handsome serpentine distributing switch-board erected and fitted by class of '97, and such instruments as a Thompson steam engine indicator, Amsler planimeter, speed indicator, Prony brake, cradle dynamometer, Weston volt-meter and ammeter, Siemens electro-dynamometer, D'Arsonval wall galvanometer.

The electrical engineering students also have the advantage afforded by a fifty-five-horsepower McIntosh, Seymour & Co.'s engine for supplying power and testing; a sixty-horsepower horizontal multitubular boiler fitted with oil fuel apparatus, gauges, pumps, injectors, etc. These are in charge of an experienced steam engineer.



MACHINE SHOP

East Hall

This building stands on Chestnut street and Raymond avenue, and cost, finished and furnished, nearly forty thousand dollars.

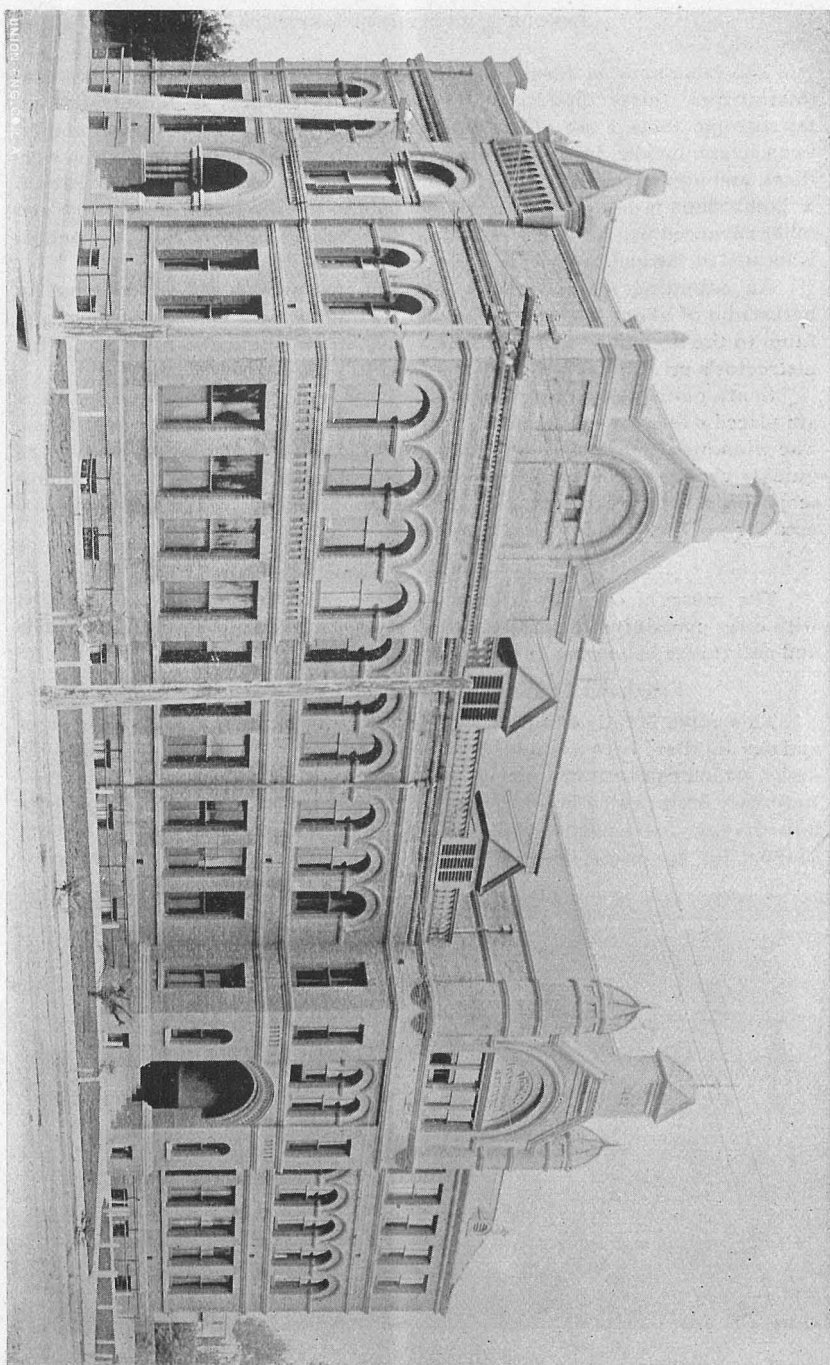
On the first floor are class-rooms for Latin and Greek, Mathematics, History, and the Sloyd Grammar School. A double office is located at the left of the main entrance, while at the rear are cloak and toilet-rooms for both ladies and gentlemen.

On the second floor are the assembly hall, the general library, cloak and toilet-rooms for ladies and gentlemen, and the quarters of the department of Biology.

On the third floor are located the rooms for modern languages, free-hand drawing, photography and blue printing, and the museum.

Biological Laboratory

The biological apartments are located on the second floor. Facing the north is the 19x50 laboratory lighted by nine large windows, with seven V-shaped tables, a sink, an aquarium, a glass-sided cage, and a rack for biological periodicals. Against the south wall are built seventy-four lockers, and four cases for books and reagents.



EAST HALL

The laboratory is furnished with seventeen Bausch & Lomb compound microscopes, thirty dissecting microscopes, thirty sets of dissecting and microscopic tools, a set of skeletons of typical vertebrates, two microtomes, two camerae lucidæ, injecting apparatus, culture dishes, a dry and a steam sterilizer, and other apparatus used in bacteriological work. A universal Bausch & Lomb stand is equipped with the appliances for work in bacteriology and other advanced work. A gas pipe, to which Bunsen burners can be attached, is located at the end of each of the microscope tables.

An adjoining room contains cases for instruments and material and an herbarium of about 4000 species of plants ranging from the lowest algæ and fungi to the highest flowering plants. This apartment is also fitted up as the instructor's private work-room.

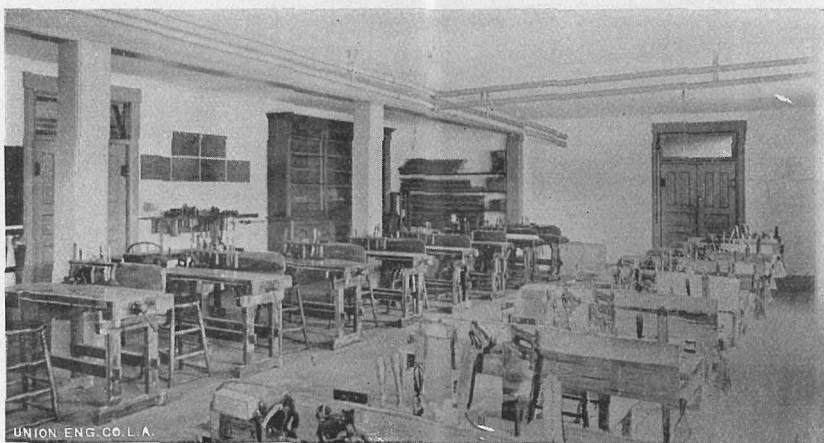
South of the instructor's room is a large, well lighted class-room. In it are placed a case for the students' herbaria and a case for alcoholic specimens. The windows are furnished with close-fitting shutters, making it possible to quickly change the room into a dark chamber for the projection of microscopic objects by solar light. In the south side of the room is a bay window used for work in physiological botany.

Museum

The museum occupies a large room on the third floor, and is furnished with cases containing the collections of minerals, geological specimens, shells and antiquities belonging to the Institute.

Free-hand Drawing, Painting and Designing Room

This room is fully equipped with all necessary appointments. Side light and sky light are both available. The equipment is as follows: Adjustable desks, which can be transformed into tables or easels, at any angle desired; stationary desks, suitable for the execution of large designs, which also contain drawers for students' supplies; a large table with water connection adapted for mounting designs and grinding colors; blackboards for class



SLOYD ROOM

demonstrations of perspective principles; a full line of wooden models, type solids, from which first lessons in perspective are given; a case of bric-a-brac and objects of still-life, furnishing material for sketching; a complete set of charts used in study of historic ornament and design; plaster casts of historic ornament, natural leaf forms, masks, heads and full length figures which serve as models in the rendering of light and shade in charcoal drawings.

Sloyd Room

The Sloyd department, located in the basement of East Hall, is equipped with twenty Sloyd working-benches, each of which is provided with a set of high grade cabinetmaker's tools. Charts, models, blackboards, and cases divided into compartments where students keep their work, material, drawing instruments, etc., are also provided.

Wood-Carving and Clay-Modeling Rooms

The department of Wood-carving and Clay-modeling occupies a room in the basement of East Hall, fitted with work tables, lockers with tools for students' use and cases for exhibition of work. This room is furnished with a good selection of casts and charts showing the various styles of historic ornament. The Clay-modeling department is equipped with a fine selection of casts of ornament, and a complete set of anatomical charts, besides the usual lockers, stands, etc., for clay work.

Sloyd Grammar School

The urgent need of educational manual training in connection with the work ordinarily done in public schools inspired the establishment of a Sloyd department in the Institute. Pupils will be admitted to this department who have completed the usual third year of the public school. The work, as arranged for this department, consists of two lines: the ordinary book-work, and the manual-work.

Schedule of Work

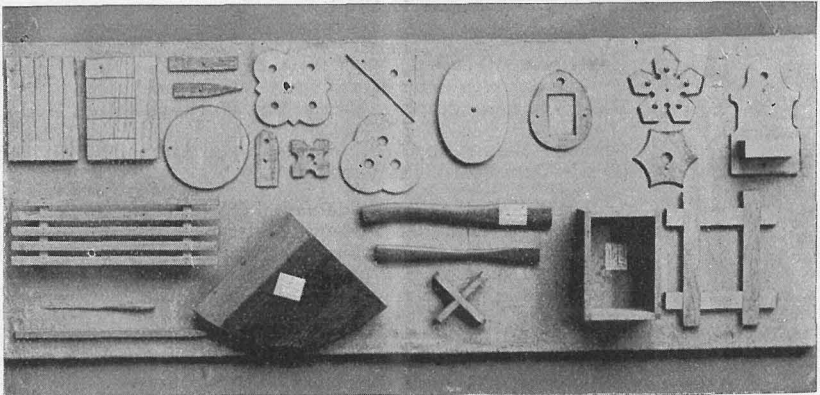
4TH GRADE.	{	Arithmetic—Fundamental Operations.
		English—Language Lessons from Hyde's Book I. Myths and Supplementary Reading.
		History and Geography—Elementary Work with Sand Modeling.
		Science—Elementary Work on Plants and Animals. Sloyd—Card-board and Wood.
5TH GRADE.	{	Arithmetic—Review of Fundamental Operations. Factoring. Greatest Common Divisor. Least Common Multiple. Simple Work in Fractions.
		English—Language Lessons in Hyde's Book I. Æsop's Fables. Miss Harrison's In Story Land.
		History and Geography—Eggleston's First Steps in United States History. Frye's Primary Geography with Sand Modeling.
		Science—Elementary Work on Plants and Animals.
		Sloyd—Card-board and Wood.

6TH GRADE.	Arithmetic—Fractions. Denominate Numbers. Regular Work in Dubbs' Complete Mental Arithmetic. English—Language Lessons in Hyde's Book II. Wonder Book. Ten Boys. History and Geography—Montgomery's The Beginners' American History. Frye's Advanced Geography with Modeling in Putty. Science—Elementary Work on Plants and Animals. Wood-Sloyd.
7TH GRADE.	Arithmetic—Applications of Percentage and Supplementary Work. Complete Dubbs' Mental Arithmetic. English—Elements of Grammar and Analysis. Kingsley's Greek Heroes. Evangeline. Geography—Geography Completed. Elementary Science. Wood-Sloyd.
8TH GRADE.	Arithmetic—Arithmetic Reviewed, using the Algebraic Equation and introducing Elementary Geometry. English—Grammar Completed. Lady of the Lake. Six Selections from Sketch Book. History—Fiske's United States History Completed. Elementary Science. Wood-Sloyd.

The Course in English includes a thorough drill in writing, spelling and composition.

Fourth and fifth grades will spend forty-five minutes daily in the Sloyd-room, where, for the first half year, the work will be in card-board Sloyd. Type forms and models based upon them will be made. The last half year will be devoted to wood Sloyd.

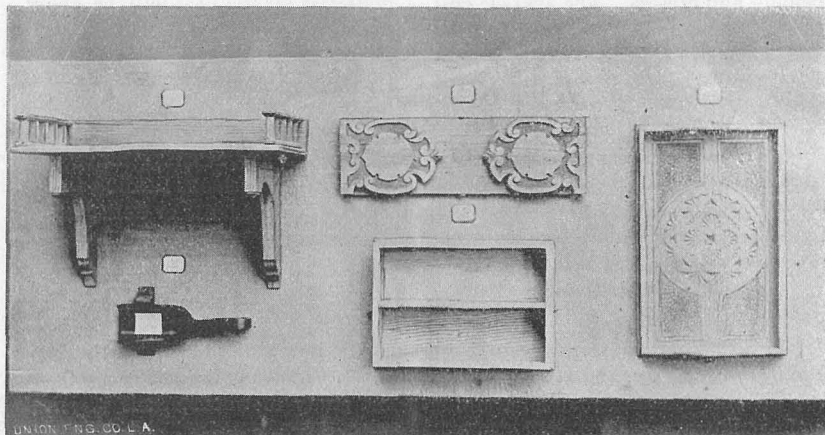
The sixth grade will give forty-five minutes and the seventh and eighth grades ninety minutes, daily, to wood Sloyd.



SLOYD MODELS

Manual Work

Drawing, including (1) Geometrical constructions ; (2) Principles of representation ; (3) Representation in reduced size by the use of scales ; (4) Orthographic and isometric projections ; (5) Linear perspective ; (6) Inking and tracing ; (7) Blue-printing and mounting ; (8) Free-hand drawing throughout the course.



SLOYD MODELS

Completion of forty Sloyd models, of which the first sixteen constitute Course I, the next nine, Course II, the following ten, Course III, and the last five, Course IV.

Completion of twelve wood-turning models.

Sharpening and care of tools.

In the four courses there are eighty-one different tool exercises, involving the use of forty-six tools.

No student will be awarded a Sloyd teacher's diploma unless the entire course has been finished. To complete this work requires one school year.

Academy

Requirements for Admission

Students holding a certificate of graduation from a California Grammar School, or any other school of equivalent grade, will be admitted to the Academy without examination. All other applicants will be subject to examination in Arithmetic, Grammar, English, Geography and United States History.

In Arithmetic the examination will be upon the following subjects :

Fundamental Operations, Factoring, Greatest Common Divisor, Least Common Multiple, Fractions, Denominate Numbers, Applications of Percentage, Involution, Evolution, Mensuration, and the Metric System.

In Grammar and English, upon Elements of English Grammar and the Analysis of the Sentence, Lady of the Lake, and Evangeline.

Each candidate for admission by examination will be required to write a short composition, in order to show his ability to compose, spell and punctuate, and to use capital letters properly.

Courses of Study

1. Roman numerals in following table refer to subjects outlined on pages 23 to 36.

2. A subject once elected may not be dropped after two weeks from the time of choice, and must thereafter be pursued until successfully completed. In special cases, for reasons satisfactory to the Executive Committee, this provision may be set aside.

3. If Latin, French or German be chosen it must be pursued for not less than two years to receive credits for the work. In the Modern Classical Course two years of Spanish may be substituted for two years of Latin.

4. Each student must, in order to complete a course, take not less than two years of English; two of Mathematics; two of History (except in the Scientific Courses); four years of Drawing; and four years of Shop-work (except in Scientific Courses A and B).

5. Girls may take Sloyd in place of Wood and Clay.

6. For graduation from the Academy, thirty-six credits are required. Two credits are given for the successful completion of each annual subject except Drawing, for which one credit is given. Students entering the Academy after June 20, 1896, must complete one of the following courses in order to receive the diploma of graduation.

	Ancient Classical	Modern Classical	Literary
First Year	English I Mathematics I Latin I Drawing I Shopwork	English I Mathematics I Latin I Drawing I Shopwork	English I Mathematics I { German I or French I Drawing I Shopwork
Second Year	English II Mathematics II Latin II Drawing II Shopwork	English II Mathematics II Latin II Drawing II Shopwork	English II Mathematics II { German II or French II Drawing II Shopwork
Third Year	Latin III Greek I History I Drawing III Shopwork	{ Physical Geography & Physiology { French I or German I History I Drawing III Shopwork	English III { French I or German I History I Drawing III Shopwork
Fourth Year	Latin IV Greek II History II Drawing IV Shopwork	Biology { French II or German II History II Drawing IV Shopwork	{ Physics, Chemistry or Biology { French II or German II History II Drawing IV Shopwork

	English—Scientific	Scientific—A	Scientific—B
First Year	English I Mathematics I { Physical Geography & Physiology Drawing I Shopwork	English I Mathematics I { Physical Geography & Physiology Drawing I Shopwork	English I Mathematics I { Physical Geography & Physiology Drawing I Shopwork
Second Year	English II Mathematics II Zoölogy or Botany Drawing II Shopwork	English II Mathematics II Zoölogy or Botany Drawing II (F. H.) Shopwork	English II Mathematics II Zoölogy or Botany Drawing II (F. H.) Shopwork
Third Year	{ Latin I, German I or French I { English III or Mathematics III Chemistry Drawing III Shopwork	{ Latin I or German I Geology Chemistry or Biology Drawing III Shopwork	German I Mathematics III Chemistry Drawing III Shopwork
Fourth Year	{ Latin II, French II or German II History II Physics Drawing IV Shopwork	{ Latin II or German II History II Biology or Chemistry Drawing IV, or Adv. Shopwork } Science	German II History II Physics Drawing IV, or Adv. Shopwork } Science

College

The requirements for admission to the college department are as follows :

(1) The completion of one of the Academy courses outlined on pages 21-22; or (2) the completion of a course in an accredited High School or an approved Preparatory School; or (3) passing an examination upon English I and II, and Mathematics I and II, and any eight of the following subjects, as outlined on pages 23 to 36: Physical Geography, Geology, Botany, Zoölogy I, Physics I, Chemistry I, Latin I, Latin II, Latin III, Latin IV, German I, German II, French I, French II, Greek I, Greek II, History I, History II, Mathematics III, English III. Any applicant offering Latin, French or German must present at least two years of each.

The work in this department is entirely elective. Each student who is a candidate for a degree must choose a major subject which is the work of one professor, who shall prescribe the necessary or desirable collateral work. Such major and accessory work shall not constitute more than two-thirds of the work offered for a degree, and the amount subject to prescription by the professor shall not exceed one-third. The remainder of the work may be chosen from any of the subjects offered with the exception of Mathematics I and II and English I and II and Physical Geography. The degree B. A. will

be granted to students having satisfactorily completed four years' work of at least three recitations or lecture-periods per day. Upon a basis of two credits for a year's work in each subject, twenty-four credits are required for graduation.

The Institute reserves the right not to organize classes in any given subject, unless at least eight students elect said subject.

Candidates for admission to college classes should make application as early as possible, indicating the subjects they purpose electing.

Subjects and Methods of Instruction

Mathematics

I. Elementary Algebra. Fundamental operations; special attention given to the reading of problems; to the subjects of factors, simultaneous equations, involution, evolution, theory of indices, surds, imaginary quantities and quadratic equations. This is first year work. The text-book used is Hall and Knight's Elementary Algebra, edition of 1896.

II. Plane Geometry. The usual college preparatory work in the five books of Plane Geometry is the work of the second year. The work includes the original propositions and problems in the text-book, supplemented by other original work. The text-book used is Phillips and Fisher's Elements of Geometry.

III. (a) Higher Algebra. Indeterminate equations, theory of quadratic equations, with solutions by factoring, logarithms, variation, arithmetical, geometrical and harmonical progression, binomial theorem, undetermined coefficients, permutations and combinations, theory of limits, and continued fractions. Text-book, Hall & Knight's Elementary Algebra, edition of 1896.

(b) Solid Geometry. The course given in Phillips and Fisher's Elements of Geometry, books VI-IX, inclusive. This subject, supplemented by Higher Algebra, comprises the work of the third year in the regular course.

IV. (a) Trigonometry. The course comprises plane and spherical trigonometry. Problems from text-books proven in the field, also problems solved by the class.

(b) Plane surveying. Survey with chain alone; with compass and chain; leveling with "Y" level; making profiles of elevations and grades. Adjustment of transit and level. Plotting of field work, also field work done from plottings.

Higher surveying. Trigonometrical surveying. Running railroad preliminary lines; setting slope stakes; plotting cross-sections; calculating cut and fill, running grade lines for irrigating-ditches, or roads.

(c) Field Engineering. Theory and practice of laying out curves, side tracks, economic principles of railway location and construction. Carhart's Field Book will be used as a text-book.

Land surveying, plotting field work, using various methods of representing topography, calculation of areas by latitudes and departures, also by use of the planimeter. Carhart's Field Surveying the text-book.

V. (a) Analytic Geometry. This is studied chiefly in connection with its application to the study of the conic sections, and is followed by work in descriptive geometry and class work in which analytic and descriptive geometry are made mutually explanatory.

VI. (a) Differential and Integral Calculus. Differentiation of algebraic and transcendental functions. Leibnitz's Theorem. Expansion of functions. Maclaurin's and Taylor's Theorems. Functions of several independent variables. Applications to curves. Maxima and minima of functions of one and of several independent variables. Various methods of integration with applications to the study of curves and certain volumes. Definite integrals. Osborne's text-book is chiefly used.

In connection with the work in the integral calculus, there will be given some work in the integration of differential equations used in mechanics and electricity.

(b) Study of the strength of materials used in masonry, carpentry and metallic structures. Stresses and strains in framed structures and arches. Stresses computed analytically and also by graphical methods in the drawing room and results compared.

Construction of roofs, highway bridge trusses and railroad bridge trusses. The books chiefly used will be those by Merriman and by Du Bois.

English

I. During this year a critical study of the following selections will be made: Irving's *Alhambra*, Longfellow's *Courtship of Miles Standish*, Addison's *De Coverley Papers*, and Scott's *Marmion*. Compositions based upon the above will be required weekly, in which careful attention will be given to sentence structure, paragraphing, spelling, capital letters and punctuation.

II. Composition work continued throughout this year, and a standard rhetoric systematically studied. The critical readings will include Shakespeare's *Merchant of Venice* and *Julius Caesar*; also, George Eliot's *Silas Marner*. In each case the reading will be accompanied by such historical research as may be needed to make the selection interesting and instructive to the pupils.

III. From Milton to Tennyson will be the basis for work during the first term of the year. The reading of these poems will be accompanied by studies in biography, history and mythology; written reproductions and criticisms will be frequently required. Oration and Argument will occupy the winter term. From this, pupils are expected to secure a knowledge of modes of reasoning and to gain a deeper insight into causes of political disturbances. The spring term will be devoted to the study of the development of American literature.

IV. The work of this year will comprise a critical study of the development of English literature, placing especial emphasis upon the philosophic novel and the epic poem.

Ancient Languages

Latin

I. Collar and Daniels' *Beginners' Book*, through first and second terms. Special attention given to vocabularies; translation of the exercises from Latin into English and from English into Latin; conversations based upon the sentences and exercises translated will be held occasionally for memory-training.

Structure of Latin sentence and comparison with English sentence-structure. Paradigms will be mastered, not simply to be recited by rote, but that the pupil may be able to compare them and to see the laws which govern their formation.

Third Term, reading of easy Latin.

II. Introduction to Roman Literature. The readings comprise selections from Cæsar, with a generous amount of sight-reading.

Critical study of text with translation into idiomatic English. Prose composition; incidental study of history and geography throughout the year. Allen and Greenough's text and grammar.

III. Cicero's Orations. Textual study, as in Cæsar, sight-reading and composition; historical allusions investigated; the system of Roman government; powers of officers; customs and occupations of the people; geography involved in the text is made an incidental topic for study. Allen and Greenough's new Cicero.

IV. Vergil's *Æneid*. Structure of the poem, with the theory and practice of scansion of Latin poetry, especially of the hexameter; translation into idiomatic English; study of the superstitions and religious rites of antiquity, as well as of the myths and legends; minute word-study and analysis. Allen and Greenough's text.

Greek

I. The alphabet, inflections and simple translations will be studied the first term. The second term will have similar work, with the study of vocabularies. Composition exercises and conversations will be used for memory-training. The third term will be spent on the first four chapters of the *Anabasis*. White's *First Greek Book*.

II. *Anabasis* completed. Careful translation into English; points of linguistic or historical interest studied; prose-composition will be a part of the work through the year, also sight-reading. Goodwin's grammar and text.

III. Homer's *Iliad*. Usual amount of college preparatory work. Seymour's or any late edition.

Modern Languages

German

I. Careful attention to correct pronunciation; thorough drill in forms, and in the common principles of syntax; constant practice in translation at sight and at hearing and in conversation. The text-books used are Joynes-Meissner's *German Grammar* and a standard reader.

II. Exercises throughout the year in conversation, translation at hearing, and composition. Reading of standard German prose and a play of Schiller.

III. Two of Schiller's or Lessing's plays; Hodges' Course in Scientific German; Harris' German Composition. Conversation and translation at hearing continued.

French

I. Special practice of pronunciation with phonetic study; regular and irregular verbs; Super's Preparatory French Reader; conversational exercises. Text-book, Keetel's Analytical and Practical French Grammar.

II. *Madame Thérèse* (ERKMANN-CHATRIAN); lectures on the rhetorical structure of French; study of French idioms (Keetel); *Les Trois Mousquetaires* (ALEXANDER DUMAS); lectures on the history of the French language; continued study of Keetel's Analytical and Practical French Grammar, and conversational exercises.

III. Keetel's Collegiate French Course; special study of French Syntax and idioms; *Quatre-vingt Treize* (VICTOR HUGO); lectures on comparative philology as related especially to the French and other languages of modern Europe.

N. B.—Written exercises from English into French will be required throughout each year.

Spanish

I. Edgren's Elementary Spanish Grammar, with conversational and written exercises, will be used throughout the entire year.

First Spanish Readings (edited and selected by Prof. Matzke of Stanford University) will be used the first year. The cost of the two books together is about \$2.00.

II. Knapp's Modern Spanish Readings and *La Historia de Gil Blas de Santillana*. Same grammar as for first year, followed by Knapp's Grammar, together with special study of irregular verbs and idioms.

Also the conversational and written exercises are continued throughout the whole year.

Drill also will be given in Spanish composition and in formulas and methods of correspondence. The total cost of *Gil Blas*, with other books, about \$4.50.

History

I. Greek and Roman History. Careful study of the chief epochs of Greek and Roman History, with special reference to the development of the institutions and the growth and influence of the arts and literature of each. Four weeks at the beginning of the year are devoted to the history and civilization of ancient eastern nations. The text-book used is Myers and Allen's *Ancient History*, but collateral reading will be assigned, especially in the literature of the period studied.

II. Mediæval and Modern History and Civics. This course will be required of all students before graduation. Particular attention is paid to institutional growth and the social life of the people. Some selected epoch and

its influence on the history of the nineteenth century is made an especial study. The text-book used is Myers' *Mediaeval and Modern History*. The pupil is expected to familiarize himself with Emerson's *Middle Ages* and collateral reading from other works selected by the instructor.

The last term will be devoted to civics. This course will consider the origin and trace the development of constitutional government in the United States and California, using original sources as far as possible. Pupils will be expected to prepare bibliographies and do collateral reading. Text-book is Fiske's *Civil Government*.

III. English History. A study of social and institutional development for the first half year followed by a similar study of French History for the remainder of the year. In each of these courses pupils receive instruction in the preparation of bibliographies of each epoch studied, and are expected to attain the same proficiency in this as in general work.

Biology and Physical Geography (Physiography)

Physical Geography and Physiology

The first half of the year is spent on physical geography and the last half on physiology. One period daily is required. Tarr's *Physical Geography* will be used. Students in this course will learn, among other things, something of the solar system and the earth's place in it; the causes of storms; prediction of storms; the action of rivers, glaciers, etc.; the history of the various kinds of rocks; and, finally, something of the various types of animals and plants upon the earth, and man's place in nature.

The course in physiology will include considerable laboratory work, such as experiments in artificial digestion, the microscopical study of tissues, and dissection. Martin's *Human Body* will be used as the text-book.

Practical Hygiene will be made prominent throughout the course.

Geology

This course will acquaint the student with the principal minerals and rocks, a large collection of which is contained in the museum. It will also take up the action of water on the land surface, veins of minerals and their history, the history of the formation of the various rocks, a study of fossil animals and plants. Excursions will be made in order to study the geology of this locality. Text book: Tarr's *Elementary Geology*.

Botany

Most of the work will be in the laboratory, with occasional recitations, written reports, etc. The course is intended to give the student a general idea of the structure and functions of plants, their relation to one another and to the animal and mineral kingdoms. Bergen's *Botany* and McDougal's *Plant Physiology* will be used.

Zoology

Two years are offered in this branch. The first year will be a general introduction to the study of animals. The following will be among the types

studied: Protozoa, sponges, jelly-fish, star-fish, worms, clams and other mollusks, crabs and cray-fish, insects and some vertebrate (the frog). The second year's work will consist of the comparative study of vertebrate animals such as the fish, frog, lizard, bird, cat. It will include the elements of embryology (development) and histology (microscopical structure). Colton's Zoölogy, Parker's Biology, Parker's Zoötomy, Howell's Dissection of the Dog, McMurrick's Invertebrate Zoölogy and other standard books will be used during the course.

Physiology

One year in Advanced Physiology is offered. It is desirable that the student should first take a year in Botany or Zoölogy, but this will not be required. The elements of the structure and functions of the human body will form the basis of the year's work. The skeletons of various animals will be studied in detail. The study of the microscopical structure of the tissues of the body will be made prominent and a number of experiments will be performed on blood, digestive juices, muscle, nerves, etc. Martin's Human Body, Thornton's Physiology, and Tower & Gorham's Dissection of the Cat will be used.

Special Course on the Nervous System

This will include a comparative study of the nervous systems of various animals. The brains of animals from some of the lowest to the highest will be carefully dissected.

Other Special Courses

Teachers, mature special students and those preparing for a medical course may arrange for special work with the instructor.

Chemistry

I. (a) General Chemistry. The first half year's work consists of the study of the non-metallic elements and the essentials of chemical theory. Its principal aim is to develop the scientific method of observation and thought, to which the acquirement of the mere facts of chemistry is considered of secondary importance. The more important topics taken up are chemical change, elements and compounds, physics of gases, Avogadro's Law, atomic theory, stoichiometry. Much time is spent in the laboratory, and the experimental work is individual. Careful notes are required in this and in all the other laboratory courses in chemistry.

(b) The chemistry of the metals is studied in the second half year through the medium of qualitative analysis, supplemented by study of the principal facts of industrial and theoretical chemistry of the metals.

In both (a) and (b) the text-books are not followed explicitly, but frequent references to the library of the department are made, giving the student a broader view of the subjects treated.

Text-books (a) Elements of Chemistry, Freer; (b) Qualitative Chemical Analysis, A. A. Noyes.

In the Chemical Laboratory the chemicals and apparatus are furnished to the students at cost, and the total expense for the first year varies from five to seven dollars, exclusive of books.

II. More advanced work in Qualitative Analysis follows I (b) and is completed during the first term of the second year in chemistry. In the second and third terms Mineralogy and Organic Chemistry follow. Mineralogy is studied by aid of the collections of the Institute, and the work consists of descriptive mineralogy and crystallography followed by determinative mineralogy and blowpipe analysis. Text-books: Minerals and How to Study Them, E. S. Dana; Tables for the Determination of Common Minerals, W. O. Crosby; Determinative Mineralogy and Blowpipe Analysis, G. J. Brush.

The work in Organic Chemistry consists of a study of the various classes of carbon compounds by means of recitations and laboratory work.

The laboratory work comprises syntheses, class reactions, and elementary analysis. Text-book: Organic Chemistry, Bernthsen.

The expense of Course II is from five to eight dollars, exclusive of books and minerals.

III. In the third and succeeding years opportunities are offered for advanced work in organic, analytical and theoretical chemistry, and special arrangements of courses are made with each student.

Physics

I. General elementary course in physics. Instruction is given by means of laboratory work with discussion of experiments performed and study of references to some text or books in library. Experiments are performed by the student himself and are not illustrations of some principle already learned, but the student is led to deduce the principle from the phenomena observed. Whenever possible quantitative experiments are employed. Careful notes are required in this and the following courses. The work is made as largely individual as possible so that the student may proceed as rapidly as his ability permits. ~~Advanced course in physics for those who have completed algebra and plane geometry.~~

Open to those who have completed algebra and plane geometry.

II. The principles of electricity and magnetism and physical measurements. This course is intended for those who wish to continue their work in physics or pursue the work in electrical engineering. In electricity and magnetism a careful study is made of the general principles and theories, together with the simpler applications of mathematics. The work in physical measurements consists of a series of experiments in mechanics, heat, sound and light, selected with the view of supplementing Course I, of acquainting the student with the use and adjustment of physical instruments and of familiarizing him with and enabling him to use with skill and precision the different methods for determining physical constants. A study is also made of the sources of error incidental to physical measurements and the means of eliminating them or correcting for them.

In electricity and magnetism the Stanford Manual and the Principles of Electricity and Magnetism, by Silvanus P. Thompson, are used. The experiments in physical measurements are selected from various manuals.

Open to those who have completed Course I, Trigonometry, and Chemistry I.

Electrical Engineering

I. Electrical measurements. This course includes such work as determination of horizontal component of earth's magnetism, measurement of resistance, measurement of current, determination of galvanometer constants, measurement of electro-motive force, measurement of capacity of condensers, study of magnetic qualities of iron, insulation tests, location of line faults, study of characteristic curves of dynamos and motors.

Instruction is given by work in laboratory, together with discussion of experimental work and reading references. Experiments are selected from various manuals.

Open to those who have completed Physics II and have completed or are taking Calculus.

II. Theory and use of steam engine indicator, cradle dynamometer and Prony brake; efficiency tests of dynamos and motors; photometry; study of alternating currents by analytical and graphical methods; design of dynamos, motors and transformers; study of general technical applications of electricity as telegraphy, telephony, electric lighting, electric distribution and transmission of power.

Instruction is given by means of laboratory work, recitations and lectures. In the latter part of the year the usual methods of instruction are supplemented by visits to the various electrical plants in Pasadena and Los Angeles and by talks from men engaged in commercial electrical work.

Open to those who have completed Electrical Engineering I and Differential and Integral Calculus.

The laboratory fee in any of the above courses need not exceed \$1.50.

Shop Work

Wood-Work

I. This course consists of work in joinery, turning and cabinet work. It has been the desire to arrange a course which would be valuable, considering it from both an educational and industrial standpoint. The exercises have been designed so that there would be a gradual growth in the difficulty of construction, and at the same time the presenting of practical, useful and æsthetic elements. Such a series of exercises would naturally call forth a gradual development in the ability of the student and also cultivate a sense for beauty and proportion.

The work is given to the student by means of a blue-print taken from a working-drawing. From these he constructs his model. These drawings are made with the greatest care and accuracy. Helpful notes in reference to the work accompany each drawing. This method acquaints the student with the reading of accurate working-drawings, and the working therefrom. After the model has been made he then makes his own working-drawings from it.

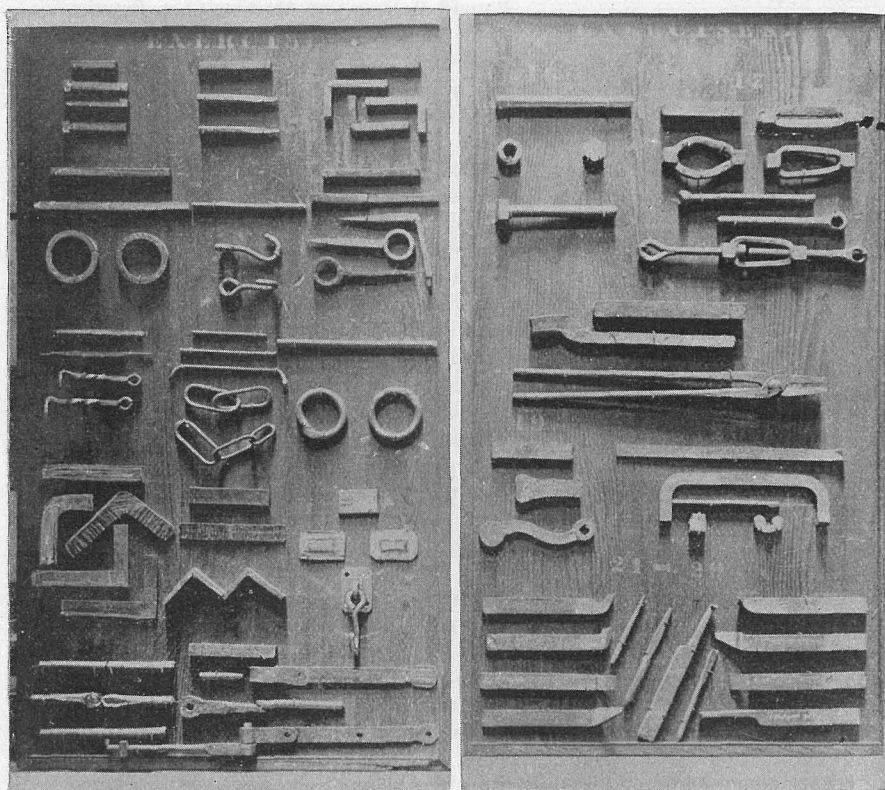
The course in joinery is composed of eighteen progressive exercises, involving the construction of sixteen different joints, the drawing of analytical and free-hand curves, and the use of fifty different tools and machines.

The student is allowed to display his individuality in the exercises in inlaying and cabinet-work. These exercises are made from his own drawings and after his own designs, which are submitted to the instructor before the work is begun.

The course in turning consists of fifteen progressive exercises given in the following order: Center-work, face-plate-work, chucked-work, and long-work.

The above problems in wood-work are taken in the order of joinery, inlaying, turning, and cabinet-work. This work is calculated to be finished by the average student in one school year, working one and one-half hours daily.

The expense connected with this work need not exceed three dollars for the entire year, and may be considerably less than that sum.



EXERCISES IN FORGING

Forging

II. Forge. Mechanism and care of forge ; preparation of forge for fire ; building and managing fire.

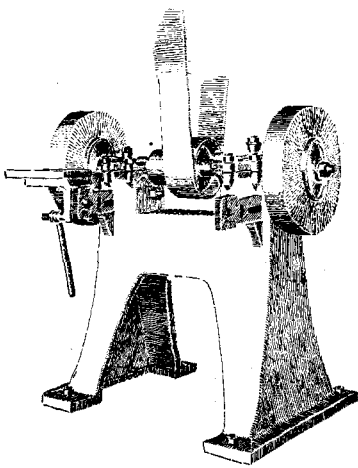
Tools. Instruction in the care and use of tools.

Processes. The processes involved in the year's work are: Drawing, bending, upsetting, different kinds of welding, punching, drilling, fullering, swaging, cutting cold, chipping, cutting hot, splitting, twisting, filing, brazing, hardening, tempering, and ornamental iron work.

Tempering. Hardening in water and oil, tempering or drawing, temperatures and colors used, and processes in tempering tools for wood and iron work.

Ornamental Iron Work. At the close of the year each student will be required to design and make some special piece involving the various elements of forging mastered.

The average cost of material used in this department is \$2.00 a year.



REPRODUCTION OF PEN AND INK
SKETCH OF EMERY GRINDER
IN MACHINE SHOP

Pattern-Making and Machine-Shop Practice

III. The entire year is spent on two courses of exercises, one in pattern-making and the other in machine-work. These courses are arranged to embody the different principles of pattern and machine-work, and students are not allowed to do any finished pieces until these exercises are completed.

The course in pattern-making brings out the principles of drawing, allowing for finish and shrinkage, split-patterns, and rib-work, segment-work, simple and complex core-work, etc. Some work in molding is required, and a suitable bench and tools are provided.

The course in machine-work includes work on lathes, such as plain turning, right and left and inside thread cutting, turning tapers, hand-tool work, and all kinds of chuck-work. Also each student does some work on the planer, shaper, milling-machine, and drill-presses. Special attention is given to accuracy of measurements, finish of work, and care of machines and tools.

IV. During the fourth year each student is expected to make, or assist in making, a complete set of patterns for some piece of machinery, and to do the machine-work on the castings.

A two-horsepower boiler and a one-horsepower gas engine have been built this year, also a governor for a one-horsepower engine which was built last year. A one-horsepower engine, and a 12-inch by 5-foot lathe are in process of completion. The designs, patterns, and machine-work of the lathe, governor and gas-engine have all been made as school exercises.

Text-books are not used.

Subjects required in preparation are wood-work, forging, and elementary geometry.

The cost of material during the third year is about \$2.50. Expense for the fourth year depends upon the work chosen by the student.

Modeling

(a) This work precedes that of wood carving, and is of great value as a means of comprehending and realizing good form and proportion.

The year's work includes the modeling of fruits, flowers and sprays of foliage from nature and casts; different styles of historic ornament from casts and photographs. If deemed advisable students may model from the mask and head, in the round, the first year. All work is individual. Each student is advanced as rapidly as his ability permits. Instruction is given in the making of plaster casts. No extra expense is attached to the work in clay unless pupils wish to preserve their work in plaster.



STUDENT'S PEN AND INK
SKETCH OF WORK IN
CLAY MODELING

Wood Carving

(b) This work aims to give the pupil practical application of the principles gained in the study of drawing and modeling. The year's work includes preliminary exercises for the care and use of tools,

horizontal and vertical decoration, plane and curved surface carving, incising and stamping, low relief in historic styles.

Instruction and practice are given in design, including elements of ornament, scroll patterns, surface decoration, borders, panels, and the application of these principles in designing and ornamenting pieces of furniture.

Students are required to make the working-drawings as well as the designs for the decoration of all work.

Students may elect to do more advanced work than that outlined in the required year's work. The extra expense in this work depends upon the work the pupil wishes to do. The finished work belongs to the pupil.



STUDENT'S PEN AND
INK SKETCH OF
WOOD CARVING

Plain Sewing

(a) Two periods each day. The fundamental principles of hand sewing, basting, running, hemming, hem-stitching, tucking, felling, sewing on lace, darning, etc.

(b) Machine Sewing. Plain stitching, hemming, tucking, and gathering.

(c) Continuation of Plain Sewing. Practical experience in shopping by each pupil.

During the year a complete suit of underwear must be made by each pupil; also a shirt waist, a cotton dress, and a wrapper or dressing sack. Some preliminary study in designing for the dressmaking course will be done. Neatness and accuracy demanded in all the work. Cost of material, 60 cents.

Dressmaking

Time: Two periods each day. Pupils must complete the plain sewing course before entering this class, the work of which includes the following:

(a) Taking measures for drafting; drafting tight-fitting basque with bias darts; cutting, fitting, and finishing waists for themselves; trimming and draping the same; putting on collars and revers; drafting sleeves, cutting and making them; cutting gored and circular skirts, lining, interlining, and hanging them.

(b) Choice of materials, cost, amount, harmony of colors; appropriateness of dress to individual; practical experience in shopping.

(c) Designing; original work in cutting and making up, in paper and inexpensive material, fancy sleeves, the musquetaire, chined, mutton-leg, and puffed; jacket fronts, cuffs, etc.

(d) Matching stripes, plaids, and figured goods; fitting stout figures.

(e) During the year three gowns and a house jacket or waist are required from each pupil.

Cooking

(a) The fundamental principles of cookery and practice in the preparation of vegetables, soups, meats, cereals, biscuits, eggs; cost of materials; care of a kitchen; serving a simple dinner.

(b) Instruction in the preparation of more complicated dishes; bread, fish, oysters, poultry, etc.; setting and serving a table.

(c) Entrees, salads, desserts, pastry, cake and creams; jellies, canning of fruits and vegetables.

(d) Menus; marketing; giving of entire breakfasts, luncheons and dinners.

(e) In connection with cookery, instruction will be given in the classification and composition of foods; the action of water upon starch and albumen; tea, coffee and alcohol, their food value and effects upon the system; the yeast plant; fermentation—lactic, vinous and acetic; baking powders, soda and cream of tartar.

Other subjects treated will be the development of odors and flavors of foods; food for the sick; food adulterations; the cheapest and most wholesome foods; physiology of digestion, and a general plan of household work.

Special lectures on Chemistry of Cookery, Bacteriology.

Throughout the year Dietaries and Nutrition will be kept constantly in mind, the object being as much to study the scientific principles of foods as to prepare palatable viands.

Text-books: Mrs. Rorer's cook-book, blank books for chemistry notes.

Average cost of material in cooking, \$6.50 a year.

Drawing, Designing and Painting

Freehand

I. Principles of perspective as applied in the drawing of simple type forms, beginning with cube, cylinder, sphere, etc., followed by objects based on type solids.

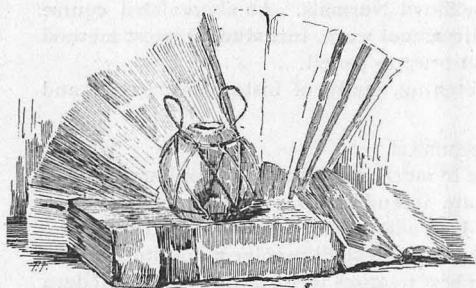
Parallel and angular perspective, convergence of lines, vanishing points and foreshortening are demonstrated on blackboard by the most simple and practical methods.

Perspective drawings of wood and iron shop exercises.

Outline, shade, shadow and artistic rendering of line are developed in the execution of drawings of rooms, houses and machinery.

Drawings of scrolls, and their original adaptation in prescribed borders, spandrels, and geometric fields.

Original designs for ornamental iron work and wood carving.

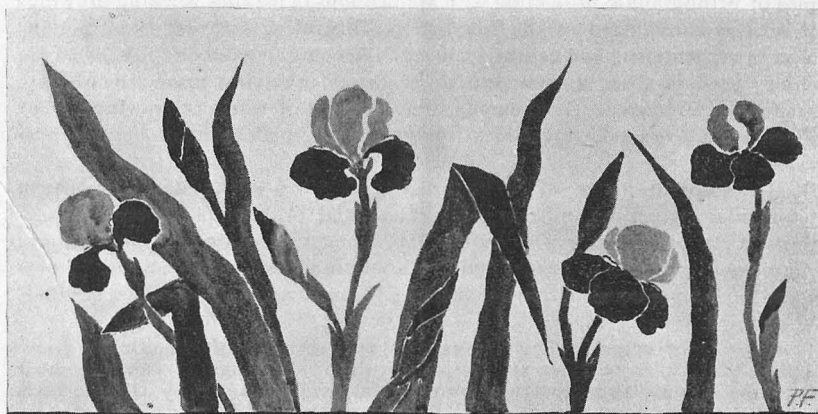


REPRODUCTION OF STUDENT'S PEN AND INK
SKETCH OF STILL LIFE

II. Perspective as applied in the drawing of groups of objects ; relative proportion and study of values ; light and shade ; the artistic grouping of objects of still-life. Drawings of the same are made in pencil, pen and ink, sepia and charcoal. Small sketchy effects, in which impressions of light and shade are jotted down, are the outgrowth of the pencil and pen and ink work. Charcoal studies are executed on a larger scale, requiring careful study of details.

Original adaptation of historic ornament in designs for tiles, book-covers and wall-paper. Designing from natural plant forms, conventionalizing flowers, etc. Color is first introduced by flat washes of water color to these designs.

III. Painting in water colors from groups of still-life, using full palette of color in portrayal of fruit and flowers.



REPRODUCED FROM STUDENT'S ORIGINAL DESIGN IN BRUSH WORK

Study of the history of art, and leading styles of ornament.

Pupils must pass a written examination on history of art, illustrating the same with memory sketches.

IV. Drawing of mask and head from plaster casts in pencil, pen and ink, and charcoal.

Poster designing, drawing full length figure from cast, "Greek Slave," "Venus de Milo," etc.

Sketching from life and costumed model.

Study of composition, followed by pen and ink illustrations of characters and scenes from English literature.

V. Special Teachers' Course for Sloyd Normals. An abbreviated course adapted to the requirements of public school work, introducing latest method of teaching children to handle brush prior to pencil.

Model drawing, perspective sketching, study of historic ornament, and original designing.

Mechanical

It is designed to make the course in mechanical drawing auxiliary to other work at the Institute. Those who are intending to pursue special lines of work will have such work as seems best adapted to their needs. Those who desire it, for instance, can take a course which shall involve much study of the laws of perspective, using one of the best treatises in English—Ware's Modern Perspective. Again, others may take work especially adapted to the needs of civil, mechanical, or electrical engineers.

When work not in the regular courses is taken by the students, it will be credited as regular course work should the student desire to enter the regular course at some subsequent time, provided that in quality and quantity it is a fair substitute for regular course work. At all times endeavor will be made to adapt the work to the needs and ability of the individual student.

Drawing instruments, paper, pencils, etc., are furnished by the student.

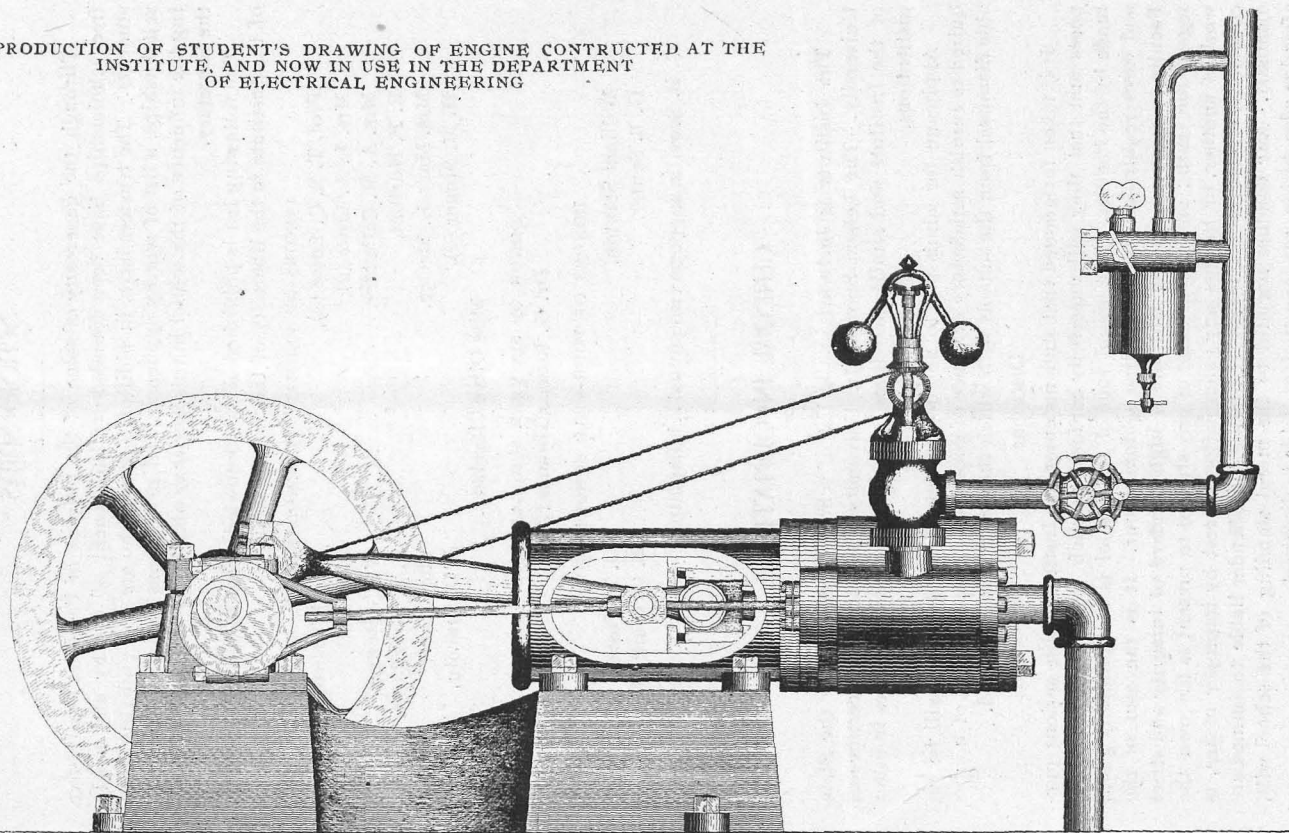
I. Selection and use of drawing instruments; fundamental principles of orthographic projection with applications in making working-drawings of articles constructed in the wood-shop, illustrating different constructions used in carpentering and cabinet-making. Rectangular and circular forms are chiefly used in these models and other forms involving more difficulty are gradually introduced. Tracing and blue-printing of working-drawings. For those who do not take the course in wood-work, models and copies are provided.

II. Shop-drawings of iron, brass and wood-work; development of prismoidal, pyramidal and conical surfaces, and projections of the intersections of various surfaces with each other; isometric and cavalier projections; simple constructions of shades and shadows; fundamental principles of perspective; simple constructions of shades and shadows in perspective; methods of coloring drawings.

III. Drawings of plans, elevations and sections of machines; drawings of patterns to be made in the pattern-shop; drawings in perspective of furniture, rooms and buildings from actual measurements by the methods practically used by architects and designers; drawings of architectural detail; drawing of involute and epicycloidal gearing from models and with odontographs; topographical drawing; laying out railway curves, profiles, etc.

IV. Drawings of machines with practice in design, using the principles laid down by Unwin, Reauleaux and others; drawings of the architectural orders; methods of artistic rendering used by architects, applied to drawings of buildings; perspectives of curved forms with their shades and shadows; elements of graphic arithmetic, composition and resolution of forces, studied graphically with diagrams of stresses for roof and bridge trusses.

REPRODUCTION OF STUDENT'S DRAWING OF ENGINE CONSTRUCTED AT THE
INSTITUTE, AND NOW IN USE IN THE DEPARTMENT
OF ELECTRICAL ENGINEERING



Scholarships

Through the generosity of some of the citizens of Pasadena twenty-five free scholarships have been founded for the benefit of worthy and needy students. The trustees have, in addition to those who are now enjoying these scholarships, a list of worthy applicants, and any persons desirous of extending the influence of the school in this way may obtain full information from the Secretary.

The following list is published as an acknowledgment of the indebtedness of the Institute to the liberality of the persons named:

DONORS OF PERMANENT SCHOLARSHIPS.

Prof. T. S. C. Lowe (2),	John Wadsworth,
Mrs. L. A. Lowe (2),	B. F. Ball,
Mrs. A. M. Callender,	W. C. Stewart,
E. F. Hurlbut,	F. J. Woodbury,
Mrs. Mary E. McGee,	Thos. Croft,
H. M. Singer (2),	J. D. Lincoln,
Miss Olive Cleveland.	

DONOR OF SIX-YEAR SCHOLARSHIPS.

Dr. G. Roscoe Thomas (2).

DONORS OF FOUR-YEAR SCHOLARSHIPS.

William Stanton,	G. F. Foster,
G. B. Senter,	B. O. Clark (2).

C. B. Scoville supports two annual scholarships.

GENERAL INFORMATION

The Institute is included in the list of schools accredited by the State University. The Leland Stanford Jr. University also accepts the certificates of the Institute and similar privileges are accorded to its graduates in other institutions.

Applicants for admission to any department of the Institute will be required to furnish satisfactory evidence of good moral character and of honorable dismissal from the schools with which they were last connected.

Discipline

It is taken for granted that students enter the Institute with serious purposes and that they will cheerfully conform to such regulations as may be made by the Faculty. The moral tone of the school is exceptionally good, and cases requiring severe discipline seldom occur. It is the aim of the Faculty to maintain in the Institute a high standard of integrity and strict regard for truth; and the attempt of any student to present as his own the work of another, or to pass any examination or test by improper means, is considered a most serious offense, rendering the offender liable to immediate dismissal. Any conduct harmful to the moral standing of the school will, after due admonition, render a student liable to dismissal.

Athletics

Encouragement is given to athletics, and the athletic organizations are under the immediate care of a committee of the Faculty. Membership in these organizations is subject to forfeiture for failure in any regular line of school work.

Literary Societies

Two literary societies, the Pierian, open to students of both sexes, and the Gnome Club, open only to young men, are maintained by the students of the Institute with the coöperation of the Faculty, and are doing good work ; they afford an opportunity for training in debating, essay writing, declamation, extempore speaking, parliamentary practice, etc.

The POLYTECHNIC, a monthly paper devoted to the interests of the school, is maintained by the students.

Finances

A tuition fee of \$35.00 per term admits to membership in any or all classes for which the pupil is prepared. A considerable reduction is made for two or more students from the same family. There are no extra charges for work in any of the industrial, manual, art or language departments. A deposit of \$5 is required of every student to cover breakage, injury or other loss in libraries, laboratories, shops and studios, as well as to cover the actual cost of material used. Any unused part of the deposit is returned to the pupil at the end of the year. If the actual expense in any case exceeds \$5, an additional deposit must be made.

Term bills will be payable strictly in advance, and students must submit the Secretary's receipt for the same to each instructor whose classes he may seek to enter.

Board

Good board can be obtained at from \$4.50 to \$6 per week. Any change in boarding place must be immediately reported at the office.

At the request of parents the Institute will assume responsibility for the care and oversight of students who board in homes approved by the officers of the Institute.

For further information address the President or the Secretary,

THROOP POLYTECHNIC INSTITUTE,

PASADENA, CALIFORNIA.

List of Students

1896-7

College

Bickley, George E.....	Los Angeles
Coleman, Frank Brown.....	Pasadena
Fisher, Walter C.....	Pasadena
Gearhart, Edna.....	Pasadena
Grinnell, Joseph.....	Pasadena
Hamilton, Margaret Elizabeth.....	Pasadena
Snyder, Blanchard M.....	Anaheim
Wight, Freeman C.....	Boston, Mass.

Academy

Allen, Echo.....	Highland Park
Baker, Calvin.....	Pasadena
Baker, Ruth Ellen.....	Pasadena
Barker, James Edmund.....	Pasadena
Barrett, Ruth.....	Pasadena
Becker, John.....	Pasadena
Beery, Mary Ellen.....	Pasadena
Bent, Roberts Judson.....	San Diego
Betz, Valentine Joseph.....	Shorb
Bicknell, Ralph Edmund.....	Altadena
Bishop, Charles Alden.....	Alhambra
Bixby, William Flint.....	Sierra Madre
Blackman, Roy Beebe.....	Los Angeles
Blick, John Charles.....	Pasadena
Blick, Kate Fay.....	Pasadena
Bullard, Joseph Alfred.....	Lee Park, Neb.
Burnham, Wilbur Dodge.....	Omaha, Neb.
Call, Merrill Asa.....	Sioux City, Ia.
Canfield, Charles Shumway.....	Pasadena
Carhart, Ralph.....	Los Angeles
Clark, Adeline Orilla.....	Pasadena
Conger, Lyda Drowne.....	Pasadena
Conger, Ray Everett.....	Pasadena
Creamer, James Clifton.....	Shorb
Dalrymple, Lila Madge.....	Pasadena
Davidson, Leonard Ernest.....	Kingsburg
Davis, Blanche Eliza.....	Pasadena
Derby, William Sperry.....	Orange
Dodworth, Arthur.....	Pasadena
Dunn, Harry E.....	Pasadena
Ellean, Jeannette.....	Sierra Madre

Farnsworth, J. Arthur, Jr.	Los Angeles
Farris, Edwin Lu	Pasadena
Fisher, Pearl B.	Pasadena
Folsom, Harry Gilman	Los Angeles
Fordyce, Mabel.	Pasadena
Forsyth, Boyden	New Orleans, La.
Gale, Oliver M.	Pasadena
Garben, Charles Philip.	Chicago, Ill.
Gaylord, James Mason	Pasadena
Glass, William Minor	Pasadena
Grant, Ethel Jeanie	Pasadena
Greer, William List	Pasadena
Griffith, Leigh Merriam	Pasadena
Groesbeck, D. Sayre	Pasadena
Hale, Robert Taylor.	Pasadena
Hamilton, Lloyd.	Terra Haute, Ind.
Hamilton, Pearl	Los Angeles
Hansen, Waldemar Grant.	Pasadena
Hasse, Carl Edward.	Soldiers' Home
Hatch, Arthur Joseph	Camden, N. J.
Hawley, Alonzo Milton.	Pasadena
Hayes, William Thornton.	Monrovia
Hays, Willis Barnum.	Pasadena
Heald, Oscar Leslie	Anaheim
Hill, Harry Hutchinson.	South Pasadena
Holbrook, Lucy May.	Pasadena
Jewett, Frank Baldwin	Lamanda
Jewett, Pauline	Lamanda
Johnston, Blanche	Pasadena
Jones, Allen	Pasadena
Jones, Philip.	Pasadena
La Du, John T., Jr.	Los Angeles
Lamb, Ellen Augusta.	Los Angeles
Langford, Mabel Celia.	Pasadena
Lawson, Lawrence	Pasadena
Macomber, Roy A.	Pasadena
McQuilling, William Sedwick.	Pasadena
Menner, Lottie Ethel.	Pasadena
Miller, James Evans.	Los Angeles
Monroe, Grace Ella	Pasadena
Nelmes, Jeanie McAlister.	Pasadena
Nelmes, Thomas Hussey	Pasadena
Nevin, Lowrie Baird	Los Angeles

O'Harra, Lewis	Los Angeles
Olson, Albert L.	Kingsburg
Packard, Ulysses Grant	Pasadena
Parker, Grace Miles.....	Pasadena
Parker, George Millard.....	Pasadena
Pettingill, Stuart.....	Redlands
Phillips, David D.....	Elsinore
Pinger, Evalyn Gertrude	Pasadena
Poindexter, Charles L.	Los Angeles
Polkinhorn, Edwin J.....	Los Angeles
Raleigh, Carl Vernon.....	Los Angeles
Ratcliff, Walter Harris	Pasadena
Read, Archie L.....	Alhambra
Reed, John Owen	Deer Lodge, Mont.
Richards, Bessie Everett.....	Pasadena
Richert, Cornelia E.....	Pasadena
Russell, Emma.....	Pasadena
Saunders, Florence I. B	Pasadena
Saunders, Mrs. Nelson	Pasadena
Sawyer, Clarence Rice.....	Los Angeles
Schutte, Fritz	Toluca
Senter, Stanley	Pasadena
Simpson, Harold Grant.....	Pasadena
Smith, Howard M.....	Scotia
Smith, Sidney	Pasadena
Springer, Maud Irwin	Pasadena
Sterrett, Roger Jordan.....	Pasadena
Stimson, Charles Willard.....	Los Angeles
Strong, Robert Marquis	Pasadena
Tanner, J. Bernard	Los Angeles
Thom, Cameron De Harp	Los Angeles
Vallette, Arline Hilda.....	Pasadena
Van Trees, Paul J.....	Los Angeles
Vose, Richard Alden	Los Angeles
Waite, Marion Pishon	Riverside
Wamsley, T. Victor.....	Glendora
Webber, Harrison O'Gilvie.....	East Riverside
Wilder, Fred Blaisdell	Evanston, Ill.
Williams, James Thomas.....	Wilkes Barre, Pa.
Wood, Clifford Harvey.....	Pasadena
Wool, Ralph E.....	Santa Ana
Wright, Edna Rachel.....	Pasadena

Sloyd Normal Course

Batchelder, Lizzie.....	Pasadena
Cleveland, Ada C.....	Pasadena
Cook, Mary Arminto.....	Pasadena
Coombs, Sarah Carthrae	Visalia
Fisher, Pearl B.....	Pasadena
Holbrook, Lucy M.....	Pasadena
Mellish, Ida M	Pasadena
Smith, Mary M	Pasadena
Wright, Charles H	Pasadena
Wright, Mrs. Chas. H	Pasadena

Sloyd Grammar School

Abs Hagen, Walter.....	Los Angeles
Allen, Paul Joseph.....	Pasadena
Bell, Charles H	Pasadena
Billings, Leon Henry.....	Pasadena
Blankenhorn, George	Pasadena
Boothe, Stephen Sterling.....	Los Angeles
Brigden, Timothy Dwight	Pasadena
Brown, Herman Lynn.....	San Diego
Brown, Paul.....	San Diego
Bruer, Otto	Bancroft, Iowa
Burnham, Roderick Deane	Pasadena
Callander, Willie Curtis.....	San Dimas
Carpenter, Lewis	Chicago, Ill.
Carter, Ned Peck.....	Pasadena
Clark, May Ethel	Pasadena
Corbin, William S., Jr.....	Los Angeles
Daggett, Maud.....	Pasadena
Davidson, Wilmar.....	Kingsburg
Davis, Paul McDonnell.....	San Bernardino
Douglass, Ernest.....	Pomona
Farley, Jessie	Pasadena
Frazier, Frank Foster	Los Angeles
Gardner, Mabel.....	Pasadena
Gaylord, John Clarence	Pasadena
Gaylord, Ruth Louise.....	Pasadena
Gilbert, Horace Ray.....	Clair
Gray, Harry William.....	Pasadena
Hallett, Hazel.....	Pasadena
Hallett, Homan	Pasadena
Hatch, Bruce	Los Angeles
Heath, Frank Coleman.....	San Diego

Hechtman, Henry.....	Los Angeles
Hechtman, Judson.....	Los Angeles
Helmke, Jacob, Jr.....	Pasadena
Henderson, Leroy Munson.....	Pasadena
Holcombe, John Delaney.....	Pasadena
Howe, Eliot Callender.....	Pasadena
Hughes, William Ashton.....	Los Angeles
Hulbert, Benjamin Bruce.....	St. Louis, Mo.
Hull, Roy Bascom.....	Pasadena
Johnston, Joseph Augustus.....	San Diego
Lapp, Clemens Elmer.....	Salina, Kas.
Law, Elijah Willett.....	Brooklyn, N. Y.
Law, Harry Comstock.....	Brooklyn, N. Y.
Leavers, George R.....	Los Angeles
Lemmon, Horace Hall.....	Pasadena
McDermid, Katherine Leome.....	Pasadena
Mallory, Conroy B., Jr.....	South Pasadena
Moore, Hubert.....	Sewicklay, Penn.
Morgan, Harry Dukes.....	Los Angeles
Muskat, Louis.....	Los Angeles
Peck, Sidney Chilton.....	Pasadena
Phillips, Virginia.....	Pasadena
Poulson, Wendall W.....	North Branch, Minn.
Ray, James Chandler.....	Duluth, Minn.
Russell, Thomas.....	Pasadena
Schwed, David.....	Los Nietos
Sherman, Henry Lancey.....	Pasadena
Sidwell, Lester Lawrence.....	Rivera
Smiley, Walter.....	Pasadena
Stein, Sidney Joseph.....	Pasadena
Stevens, Kenneth Phelps.....	San Bernardino
Stewart, Douglas Homer.....	San Diego
Stuart, Philander Phil.....	Los Angeles
Swift, William Felton.....	Pasadena
Thomas, Jessie Prudence.....	Pasadena
Thomas, Ross Ray.....	Pasadena
Williams, Charles Henry.....	San Francisco

List of Graduates

1895

Academy

Allen, Robert S.....	Pasadena
Carlton, Don W.....	Los Angeles
Doty, George F.....	Boston, Mass.
Ferguson, Clarence.....	Los Angeles

Sloyd Normal Course

Daniels, Esther C	Pasadena
Gower, Hattie F	Los Angeles
Harris, Carolyn	Pasadena
Miller, Charles E.....	Los Angeles
Simcoe, Benjamin F.....	Los Angeles

1896

College

Haynes, Dian M	Pasadena
Doty, George F	Boston, Mass.

Academy

Arnold, Ralph	Pasadena
Conger, Lulu N.....	Pasadena
Gray, Roy W	Pasadena
Morrison, Margaret L.....	Compton
Menner, Ivy	Pasadena
Snyder, Blanchard N.....	Anaheim
Winslow, Edward F.....	Faribault, Minn.

Sloyd Normal Course

Burkhead, Ada H	Orange
Chamberlain, Arthur H	Pasadena
Johnson, Annette	Los Angeles
Keyes, Helen B	Berkeley
Mathews, Amanda.....	Los Angeles
McLaren, Jennie	Alameda
Riggins, Ara.....	Pasadena

1897

College

Grinnell, Joseph	Pasadena
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Academy

Baker, Calvin	Pasadena
Baker, Ruth Ellen	Pasadena

Barker, James Edmund.....	Pasadena
Blick, Kate Fay	Pasadena
Conger, Lyda Drowne.....	Pasadena
Conger, Ray Everett	Pasadena
Farnsworth, John Arthur, Jr.....	Los Angeles
Jewett, Frank Baldwin	Lamanda
Johnston, Blanche	Pasadena
McQuilling, William.....	Pasadena
Polkinhorn, Edwin J.....	Los Angeles
Reed, John O.....	Deer Lodge, Mont.
Russell, Emma.....	Pasadena
Stimson, Charles W	Los Angeles
Vose, Richard A.....	Los Angeles

Sloyd Normal Course

Batchelder, Lizzie.....	Pasadena
Blanchard, Ada F	Malden, Mass.
Cleveland, Ada C.....	Pasadena
Cook, Mary A.....	Pasadena
Coombs, Sarah C.....	Visalia
Fisher, Pearl B.....	Pasadena
Holbrook, Lucy M	Pasadena
Mellish, Ida M.....	Pasadena
Smith, Mary M	Pasadena
Wright, Charles H	Pasadena

Officers of the Alumni Association

President, Ralph Arnold, '96.	Vice-President, Lulu N. Conger, '96.
Secretary, Don W. Carlton, '95.	Treasurer, Roy W. Gray, '96.
Historian, Dian M. Haynes, '96.	