Throop Institute Bulletin

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The Roster of Students, 1908-09
and General Information

APRIL, 1909

PUBLISHED QUARTERLY BY
THROOP POLYTECHNIC INSTITUTE
PASADENA, CALIFORNIA

Entered May 22, 1905, at Pasadena, California, as second-class matter
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CALENDAR

1909-1910

Annual Meeting Board of Trustees.....
Tuesday, Sept. 14, 1909
Registration.....Sept. 17, 18, 20, and 21, 1909
First Term Begins.....Wednesday, Sept. 22, 1909
Thanksgiving Recess.....Nov. 25 to Nov. 27, 1909
Founder's Day.....Thursday, Dec. 9, 1909
Quarterly Meeting Board of Trustees.....
Tuesday, December 14, 1909
Christmas Recess.....Dec. 20, 1909 to Jan. 1, 1910
End of the First Term.....Saturday, Feb. 5, 1910
Second Term Begins.....Monday, Feb. 7, 1910
Quarterly Meeting Board of Trustees.....
Tuesday, March 8, 1910
Spring Recess.....March 21 to March 26, 1910
Baccalaureate Sunday .....June 5, 1910
Commencement.....Tuesday evening, June 7, 1910
Alumni Reunion...Wednesday evening, June 8, 1910
Quarterly Meeting Board of Trustees.....
Tuesday, June 14, 1910

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BOARD OF TRUSTEES

(Arranged in the order of seniority of service)

		Term Expires
Everett L. Conger, D. D.	Pasadena	1912
Norman Bridge, A. M., M. D.	Pasadena	1909
Charles D. Daggett	Pasadena	1913
Mrs. Clara B. Burdette	Pasadena	1910
Hiram W. Wadsworth, A. B.	Pasadena	1911
James H. McBride, M. D.	Pasadena	1910
S. Hazard Halsted	Pasadena	1912
Arthur H. Fleming	Pasadena	1909
C. J. Willett, A. M.	Pasadena	1913
Geo. E. Hale, Sc. D., LL. D.	Pasadena	1911
C. W. Gates	Pasadena	1912
J. A. Culbertson	Pasadena	1911
Henry M. Robinson	Pasadena	1910
W. H. Vedder	Pasadena	1909
J. S. Torrance	Pasadena	1913

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C. D. Daggett, Vice-President
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Theodore Coleman, Secretary and Business Agent
Residence, 149 South Madison Avenue
Grace B. Wright, Assistant Secretary
Residence, 306 Pleasant Street
C. J. Willett, Esq., Attorney

EXECUTIVE COMMITTEE OF THE BOARD

Norman Bridge, Chairman ex-officio
C. D. Daggett — **C. W. Gates**
A. H. Fleming — **C. J. Willett**

FINANCE COMMITTEE

A. H. Fleming — **C. W. Gates** — **J. S. Torrance**

FOUNDER

Hon. Amos G. Throop
Born at De Ruyter, New York, July 22, 1811. Died at Pasadena, California, March 22, 1894

THE FACULTY

JAMES A. B. SCHERER, President

A. B. and A. M., Roanoke College; Ph. D., Pennsylvania College (English Literature); LL. D., University of South Carolina. Teaching experience, 15 years. 500 Del Rosa Drive.

ARTHUR HENRY CHAMBERLAIN, Dean
Professor of Education

B. S. and A. M., Columbia University; Higher Diploma, Teachers' College; Graduate work with Leipzig University. Teaching experience, 16 years. 377 N. Los Robles Ave.

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Professor of History and Economics; Librarian

A. B. and B. D., Lombard College; A. M., University of Arizona; Graduate work with the University of Chicago. Teaching experience, 7 years. 274 N. Raymond Ave.

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Professor of Chemistry

B. S., Massachusetts Institute of Technology; Graduate work with the University of California. Teaching experience, 15 years.
75 N. Hudson Ave.

MRS. JENNIE COLEMAN, House Matron
Instructor in English

Life Diploma, California High Schools. Teaching experience, 31 years.
149 S. Madison Ave.

LUCIEN HOWARD GILMORE
Professor of Physics and Electrical Engineering; Inspector of Equipment

A. B., Leland Stanford, Jr., University; Graduate work with the University of Chicago. Teaching experience, 13 years. 649 Galena Ave.

HERBERT BOARDMAN PERKINS
John Wadsworth Professor of Mathematics

B. S., Massachusetts Institute of Technology; Graduate work with Munich and Geneva Universities, and the University of California. Teaching experience, 28 years. 45 S. Fair Oaks Ave.

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Professor of Mechanical Engineering and Director of Manual Training

B. E. E. and E. E., University of Minnesota; Graduate work with the same. Teaching experience, 11 years. 137 S. Madison Ave.

CARL SPENCER MILLIKEN
Professor of Biology

B. S., Massachusetts Institute of Technology. Teaching experience, 9 years. New York Ave., Altadena

ARTHUR BLEDSOE COOKE
Professor of German and French

A. B. and Ph. D., University of Virginia; Graduate work with the Universities of Gottingen and Berlin. Teaching experience, 13 years.
450 W. Walnut St.

ERNEST ALLEN BATCHELDER
Director of Arts

Diploma, Massachusetts Normal Art School; Graduate work in Europe. Teaching experience, 9 years. Absent on Leave.

MABEL COWDREY HIMROD
Director of Home Economics

Diploma, Pratt Institute; Graduate work with Pratt Institute, Teachers' College, and the University of Chicago. Teaching experience, 11 years.
88 N. Marengo Ave.

ALFRED GUILLOU
Director of Manual Arts

A. B., Princeton University; LL. B., University of Pennsylvania; Graduate work with Yale University and Throop Polytechnic Institute. Teaching experience, 7 years. 150 S. Los Robles Ave.

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Associate Professor of Mathematics

Ph. B., Cornell University. Teaching experience, 11 years.
723 N. Michigan Ave.

HARRY TRUMBULL CLIFTON
Assistant Professor of Physics

Ph. B., Sheffield Scientific School, Yale University; Graduate work with the University of California. Teaching experience, 6 years.
871 N. Lake Ave.

HARRY DAVIS GAYLORD
Assistant Professor of Mathematics

B. S., Harvard University. Teaching experience, 7 years.
552 N. Raymond Ave.

FRANK CHAMBERLAIN BODINE
Assistant Professor of Mechanical Drawing

Graduate work with the University of Cincinnati, and with Willis G. Hale, Philadelphia. Teaching experience, 3 years.
534 N. Fair Oaks Ave.

CHARLES EMORY BARBER
Assistant Professor of History

A. B. and A. M., University of Nebraska. Teaching experience, 16 years. 528 N. Los Robles Ave.

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Graduate Normal School, Throop Polytechnic Institute; Graduate work in Paris, France, and in Lacaze Institute, Lausanne, Switzerland. Teaching experience, 9 years. Los Angeles.

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Instructor in Wood Working

Graduate Normal School, Throop Polytechnic Institute. Teaching experience, 9 years. 973 Locust St.

CLARENCE ARTHUR QUINN
Instructor in Forging

Graduate Normal Department, Stout Manual Training School. Teaching experience, 10 years. 515 N. Marengo Ave.

ADA JANE MILLER
Instructor in English

Ph. B., Cornell College and the University of Chicago; Graduate work with the University of Chicago and with Leland Stanford, Jr., University. Teaching experience, 11 years. 107 Ford Place.

HOWARD BROWN FOSTER
Instructor in Machine Shop Practice and Pattern Making

B. S., Worcester Polytechnic Institute. Teaching experience, 3 years. 315 Center St.

HOMER WALDO SPIERS
Instructor in Athletics and Gymnastics

A. B., Oberlin College; Diploma, Department of Physical Education, Oberlin College; Graduate work with Teachers' College. Teaching experience, 3 years. 919 Albany St., Los Angeles.

NELLIE ALEXANDRA WARD
Instructor in Wood Carving

Graduate, Throop Polytechnic Institute. Teaching experience, 5 years. 53 Pepper St.

MARGARET JEANET STEWART
Instructor in Expression and Physical Education

Graduate, Cumnock School of Oratory, Northwestern University; Graduate work with Cumnock School of Expression, Los Angeles. Teaching experience, 10 years. 385 N. Raymond Ave.

MARGARET ISABEL DONALDSON
Instructor in Art

Graduate, Normal Art Department, Thomas Manual Training School, Detroit; Pratt Institute; Student, Handicraft Guild, Minneapolis. Teaching experience, 3 years. 88 N. Marengo Ave.

GRACE FISHER
Instructor in Home Economics

B. S., Columbia University; Diploma, Teachers' College. Teaching experience, 3 years. 1034 N. Los Robles Ave.

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Instructor in Mathematics

A. B., Pomona College; A. B., University of California; Graduate work with same. Teaching experience, 4 years. 509 E. Walnut St.

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Instructor in Home Economics

Graduate, Normal School, Throop Polytechnic Institute; Graduate work with Teachers' College. Teaching experience, 10 years.
137 S. Madison Ave.

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Instructor in Chemistry and Physiography

B. S., Cornell University; Graduate work with the University of California. Teaching experience, 7 years. 221 N. Euclid Ave.

THORNTON HENRY LODGE
Instructor in Commercial Subjects

Graduate, Halifax Business College. Teaching experience, 15 years.
"The London," Mary St.

IDA GRAY
Instructor in English

A. B., Leland Stanford, Jr., University. Teaching experience, 15 years.
221 N. Euclid Ave.

EFFINE BLOUNT
Instructor in German

A. B., Indiana University; Graduate work with the same. Teaching experience, 6 years. 76 N. Michigan Ave.

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272 N. Los Robles Ave.

MARIAN WALLACE SEGNER
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Ph. B., University of Chicago. Teaching experience, 11 years.
425 N. El Molino Ave.

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Instructor in Manual Arts

Life Certificate Kansas State Normal; Diploma in Manual Training, Kansas State Normal; Graduate work, University of Chicago. Teaching experience, 11 years. 72 Mary St.

ERIC E. PRITSCHOW
Instructor in Latin

A. B. and A. M., Royal University of Berlin. Teaching experience, 6 years.

JEANETTE GRAHAM THOMSON
Instructor in Spanish

Student, University of California; Student in Mexico City, Mexico. Teaching experience, 4 years. 154 S. Euclid Ave.

ERNEST BRYANT HOAG
Lecturer in Biology

B. S., Northwestern University; A. B., Leland Stanford, Jr., University; A. M., Northwestern University; M. D., same. Teaching experience, 14 years. 101 N. Los Robles Ave.

ASSISTANTS

MRS. M. LODGE, Commercial Subjects
JAY BUXTON, Handicrafts
LUELLA PORTER, Home Economics
LEROY BROWN, Wood Working
SIDNEY SHUTE, Wood Working
HARRIET TABOR, Home Economics

OFFICERS OF ADMINISTRATION

FACULTY COUNCIL

President Scherer, Dean Chamberlain, Junior Dean Stacey, Professors W. K. Gaylord, Ford, Gilmore, and Mrs. Coleman.

OTHER OFFICERS

Theodore Coleman, Secretary and Business Agent; Grace Wright, Assistant Secretary; Ruth Gaylord, Assistant Librarian; Ernest Bryant Hoag, A. M., M. D., Medical Examiner; Edith J. Claypole, Ph. D., M. D., Medical Examiner; Charles Frederick Holder, Director of the Museum.

FACULTY COMMITTEES

(The President is ex-officio a member of all Committees)

Admission. — Dean Chamberlain, Junior Dean Stacey, Registrar Gaylord.

Registration and Classification.—Professors W. K. Gaylord, Gilmore, Ford, Guillou, Van Buskirk, Batchelder, Mrs. Coleman, Miss Himrod.

Athletics.—Mr. Spiers, Professors Ford, Milliken, Misses Stewart and Craig.

Literary and Musical Organization.—Miss Stewart, Professors Miller, Van Buskirk, Barber, Mrs. Coleman, Mr. Lodge.

Social Activities.—Professor H. D. Gaylord, Misses Donaldson, Pearl Fisher, Grace Fisher, Messrs. French and Quinn.

Student Body Advisory.—Junior Dean Stacey, Professor Van Buskirk, Mr. Spiers.

INTRODUCTORY

Aims To produce skilled and resourceful engineers who are also broadly cultured in the essential humanities, is the chief aim of Throop Institute. Its secondary object is to provide through its humanistic departments a liberal, unspecialized education for students not concerned in engineering as a profession. To these latter (both men and women) it offers Certificates of Proficiency upon the completion of a certain number of assigned subjects, as explained in Part II. It gives the degree of Bachelor of Science in Electrical or Mechanical Engineering on the completion of a course of four years, as hereinafter described.

Environment The school has an ideal environment. Pasadena is not only one of the most beautiful and healthful of cities, with a climate of unapproached equability and poise, but it is also noted for the morality, refinement and culture of its citizenship. Being purely a residential town, ten miles from the factories and marts of Los Angeles, it is surrounded by safeguards and privileges that fit it for the guardianship of youth. Saloons are prohibited by charter. Boys under age are shut out by statute from questionable places of amusement, such as pool-rooms, of which there are few. A curfew law keeps younger boys off the streets at night. It is known as "the city of churches and schools."

Self-Help The bond between city and school is unusually strong. Not only is Pasadena unfailingly loyal in the pecuniary support of the Institute, but there is a unique co-operation between school and municipality deserving of especial attention. By means of a Public Works Scholarship fund, donated by a Pasadena citizen, students approved by the Fac-

ulty are designated to apprenticeship in the public utilities, such as streets, sanitation, hydraulics and office administration, thereby gaining familiarity with practical business affairs while earning their own tuition. Actual application of knowledge simultaneously with its acquirement enforces invaluable lessons. As a recent observer has noted: "The whole tone and influence of the Institute are such that every student will be impelled to prepare himself practically for taking up the serious burdens of life and bearing a man's part on the battlefields of human achievement." There is a place in Throop Institute for any bright, upright boy that will work. The Pasadena Merchants' Association co-operates with the authorities of the Institute in providing casual employment for young men outside of school hours, and the Olive Cleveland Fund offers loans, under certain conditions, to students in need of assistance.

PART I.

ENGINEERING COURSES

Entrance to the first year of the engineering courses is conditioned upon the completion of the fitting course described on page 36, or its equivalent. This presupposes four years each of high school English and mathematics, two years of either French or German, one year of physiography, one year of physics, one year of chemistry and one year of United States history and government, making fourteen units* of required work; one other unit, to make up the minimum requirement for entrance may be offered from the list of subjects shown in Part II.

The term "prescriptive" as employed in the courses of study denotes branches that may be assigned by the Faculty to the individual student according to his talents or his needs. For example, students who are found to be deficient in English during their Freshman year may be advised to take "Special Composition" in the following year, even though they nominally complete the Freshman work in English, as required. On the other hand, those who show especial aptitude for natural science or modern languages, or whose future work will be furthered by advanced acquaintance with these branches, may take them as "prescriptive" (with the approval of the Faculty) after they cease to be required; that is to say, throughout the Junior and Senior years. The way is thus opened for research work during the latter half of the course.

For the first two years the curriculum is practically the same for all engineering students. Those seeking their degree in civil or mining branches may take their

*The unit here represents one year's work in a secondary school at the rate of five periods per week.

first two years at Throop Institute and find themselves prepared for entrance to the Junior class in the best engineering schools giving degrees in those branches. Throop Institute confines its degrees for the present to Electrical and Mechanical Engineering, the two courses diverging at the end of the Sophomore year.

The "course number" after each study named in the following schedules refers to the description of courses beginning on page 18, and the unit indicated represents each hour of work required per week for one term, in preparation and class, for a given subject. Credit for a subject will be given only when the required work has been satisfactorily completed. Forty-eight units constitute a normal term's work, and in order to graduate the student must satisfactorily complete the required work in the course he has chosen and enough prescriptive work to earn a total of 384 units.

ELECTRICAL AND MECHANICAL ENGINEERING
I-II.

SUBJECTS	Course Number	Hours per Week			Units
		Class	Laboratory	Preparation	
I. FRESHMAN YEAR					
1st Term					
Required					
English	410	3	0	3	6
French or German	430 or 440	3	0	4	7
Plane Trigonometry	350	2	0	2	4
Descriptive Geometry	470	3	0	5	8
Chemistry	300	3	4	5	12
Mechanical Drawing	460	0	4	0	4
Freehand Drawing	475	0	1	0	1
Shop Work	480 & 490	1	4	1	6
Prescriptive					
General Biology	370	2	2	4	8
Surveying	200	1	2	2	5
Gymnasium					
FRESHMAN YEAR					
2nd Term					
Required					
English	411	3	0	3	6
French or German	430 or 440	3	0	4	7
Analytic Geometry	353	3	0	6	9
Chemistry	301	3	4	5	12
Mechanical Drawing	460	0	4	0	4
Freehand Drawing	475	0	1	0	1
Shop Work	481 & 491	1	4	1	6
Computations	351	2	0	2	4
Prescriptive					
Advanced Algebra	352	2	0	4	6
Surveying	200	1	2	2	5
Gymnasium					
II. SOPHOMORE YEAR					
1st Term					
Required					
English	412	2	0	2	4
French or German	431 or 441	3	0	4	7
Differential Calculus	354	3	0	5	8
Physics	250	3	0	5	8
Physical Laboratory	251	0	4	0	4
Mechanism	150	2	0	2	4
Mechanical Drawing	461	0	3	0	3
Shop Work	482 & 492	1	4	1	6
Prescriptive					
Sociology	406	2	0	3	5
Special Composition	414	1	0	2	3
Natural Science					
SOPHOMORE YEAR					
2nd Term					
Required					
English	413	2	0	2	4
French or German	431 or 441	3	0	4	7
Integral Calculus	354	3	0	5	8
Physics	252	3	0	5	8
Physical Laboratory	253	0	4	0	4
Mechanism	150	2	0	2	4
Mechanical Drawing	462	0	3	0	3
Shop Work	483 & 492	1	4	1	6
Prescriptive					
The Development of the State	398	2	0	3	5
Special Composition	414	1	0	2	3
Natural Science					

ELECTRICAL ENGINEERING, III-IV.

SUBJECTS	Course Number	Hours per Week			Units
		Class	Laboratory	Preparation	
III. JUNIOR YEAR					
1st Term					
Required					
English	415	2	0	2	4
History of European Civilization	390	3	0	3	6
Applied Mechanics	160	4	0	6	10
Electricity and Magnetism	254	1	0	2	3
Electrical Measurements	255	1	0	1	2
Electrical Measurements	256	0	2	0	2
Direct Currents	100	3	0	6	9
Electrical Laboratory	101	0	3	0	3
Mechanical Laboratory	180	0	6	0	6
Engineering Design	463	0	3	0	3
Prescriptive					
Differential Equations	355	2	0	4	6
French	432	2	0	3	5
German	442	2	0	3	5
Natural Science					
JUNIOR YEAR					
Required **2nd Term**					
English	416	2	0	2	4
Problems in American Government	396	3	0	3	6
Applied Mechanics	160	4	0	6	10
Alternating Currents	102	3	0	6	9
Electrical Laboratory	103	0	6	0	6
Mechanical Laboratory	181	0	6	0	6
Graphic Statics and Structural Design	471	0	4	0	4
Prescriptive					
French	432	2	0	3	5
German	442	2	0	3	5
History of Science	380	2	0	2	4
Natural Science					
IV. SENIOR YEAR					
1st Term					
Required					
English	417	1	0	2	3
Socio-Economics	400	2	0	3	5
Business Law, etc.	405	2	0	2	4
Electrical Engineering	104	4	0	4	8
Electrical Laboratory	105	0	6	0	6
Steam Engineering	170	3	0	6	9
Surveying	206	1	2	2	5
Mechanical Laboratory	183	0	4	0	4
Prescriptive					
French	433	2	0	3	5
German	443	2	0	3	5
Contemporary History	391	2	0	2	4
Natural Science					
SENIOR YEAR					
2nd Term					
Required					
English	417	1	0	2	3
Economic History of the United States	401	3	0	2	5
Business Law, etc.	405	2	0	2	4
Electrical Engineering	104	4	0	4	8
Electrical Laboratory	105	0	3	0	3
Mechanical Laboratory	184	0	8	0	8
Thesis		0	0	12	12
Prescriptive					
French	433	2	0	3	5
German	443	2	0	3	5
Municipalities	397	2	0	2	4
Natural Science					

MECHANICAL ENGINEERING, III-IV.

SUBJECTS	Number Course	Hours per Week			Units
		Class	Laboratory	Preparation	
III. JUNIOR YEAR					
1st Term					
Required					
English	415	2	0	2	4
History of European Civilization	390	3	0	3	6
Applied Mechanics	160	4	0	6	10
Electricity and Magnetism	254	1	0	2	3
Electrical Measurements	255	1	0	1	2
Electrical Measurements	256	0	3	0	3
Mechanical Laboratory	180	0	6	0	6
Machine Details, Valve Gears, etc.	151	3	0	3	6
Mechanical Engineering Design	463	0	5	0	5
Prescriptive					
French	432	2	0	3	5
German	442	2	0	3	5
Natural Science					
JUNIOR YEAR					
2nd Term					
Required					
English	416	2	0	2	4
Problems in American Government	396	3	0	3	6
Applied Mechanics	160	4	0	6	10
Electrical Engineering	106	2	0	4	6
Electrical Laboratory	107	0	3	0	3
Mechanical Laboratory	181	0	6	0	6
Machine and Engineering Construction Details	152	3	0	3	6
Graphic Statics and Structural Design	161	0	5	0	5
Prescriptive					
French	432	2	0	3	5
German	442	2	0	3	5
History of Science	380	2	0	2	4
Natural Science					
IV. SENIOR YEAR					
1st Term					
Required					
English	417	1	0	2	3
Socio-Economics	400	3	0	3	6
Business Law, etc.	405	2	0	2	4
Steam Engineering	170	3	0	6	9
Electrical Engineering	104	4	0	4	8
Surveying	206	1	2	2	5
Mechanical Laboratory	182	0	8	0	8
Mechanical Engineering Design	464	0	3	0	3
Prescriptive					
French	433	2	0	3	5
German	443	2	0	3	5
Contemporary History	391	2	0	2	4
Natural Science					
SENIOR YEAR					
2nd Term					
Required					
English	417	1	0	2	3
Economic History of the United States	401	2	0	2	4
Business Law, etc.	405	2	0	2	4
Mechanical Engineering	175	3	0	6	9
Mechanical Laboratory	184	0	8	0	8
Thesis		0	0	12	12
Prescriptive					
French	433	2	0	3	5
German	443	2	0	3	5
Municipalities	397	2	0	2	4
Natural Science					

DESCRIPTION OF ENGINEERING COURSES, INCLUDING HUMANITIES

ELECTRICAL ENGINEERING

100. Direct Currents.—Theory of direct current generators and motors; distribution and wiring; measuring instruments. Numerous problems are worked. Text: Elements of Electrical Engineering, Franklin and Esty, Vol. I. Required of all electrical engineering students, first term, junior year.

101. Electrical Engineering Laboratory.—To supplement Course 100. Calibration of measuring instruments; practical operation and tests of direct current generators and motors; photometry. Required of all electrical engineering students, first term, junior year.

102. Alternating Currents.—Study of alternating currents by analytical and graphical methods. Among the subjects taken up are: Measuring instruments; inductance and capacity; harmonic electromotive force and harmonic current; problems of the inductive circuit, resonance; problems of coils in series and in parallel; the use of complex quantity; single and polyphase alternators; single and polyphase systems; theory of the transformer, synchronous motor, induction motor, rotary converter and transmission lines. Numerous problems are worked. Text: Elements of Electrical Engineering, Franklin and Esty, Vol. II. Required of all electrical engineering students, second term, junior year.

103. Electrical Engineering Laboratory.—To supplement Course 102. Measurement of the various electrical quantities involved; efficiency, regulation and other tests on alternating current apparatus. Required of all electrical engineering students, second term, junior year.

104. Electrical Engineering.—A course of lectures, including such subjects as the materials of electrical engineering, design of electrical apparatus, transmission and distribution of power, electric railways, telephone engineering. It is intended to have part of these lectures given by men engaged in commercial electrical work, and visits will be made to the various electrical plants in the vicinity. Required of all engineering students, both terms, senior year.

105. Electrical Engineering Laboratory.—A course in electrical testing. Required of all engineering students, both terms, senior year.

106. Elements of Electrical Engineering.—An abridged course for mechanical engineering students. Instruction is given by lectures, recitations, reading references and problems. Required of all mechanical engineering students, second term, junior year.

107. Electrical Engineering Laboratory.—Accompanying and supplementing Course 106. Required of all mechanical engineering students, second term, junior year.

MECHANICAL ENGINEERING

150. Mechanism.—Kinematics of machines, the various mechanism occurring in machines, geometry of motion of various parts, velocity diagrams, various linkages, valve and cam motions, toothed gearing, belt and chain gearing, mechanism found in machine tools. Required of electrical and mechanical engineering students, both terms, sophomore year.

151. Machine Details, Valve Gears, etc.—Theoretical consideration of the problems of engineering construction; choice of materials in any structure; proper arrangement of members to insure accessibility, convenience of operation and durability of machines; discussion of engineering data bearing upon lubrication, wearing surfaces, balancing of parts, riveting, assembling, etc., valve gearing of steam engines. Required of mechanical engineering students, first term, junior year.

152. Machine and Engineering Construction Details.—Critical study of the design of various machines and engineering structures; lathe and machine tool design, pumping machinery, blowers, engines, cranes, coal and ash handling machinery, boilers and other riveted structures, hydraulic presses. Examples from current engineering practice will be discussed, and where possible the structures themselves will be studied. Required of mechanical engineering students, second term, third year.

160. Theoretical and Applied Mechanics.—Statics, dynamics, strength of materials, hydraulic friction, etc. Required of electrical and mechanical engineering students, both terms, junior year.

161. Graphic Statics and Structural Design.—A course in graphic statics with especial reference to the design of structures in steel and reinforced concrete, beams and plate girders, roof and bridge trusses of various forms. Required of electrical and mechanical engineering students, ~~first~~ term, junior year.

170. Steam Engineering.—A study of the problems connected with the design, installation and operation of steam plants; fuels, boiler design and testing; chimneys and mechanical draft; steam engine both from the practical and the thermodynamic standpoint; steam turbines; condensers, accessories. Required of mechanical and electrical engineering students, first term, ~~junior~~ year.

175.—Mechanical Engineering.—A course of lectures and recitations upon special mechanical engineering practice; the subjects considered being arranged with reference to the special thesis work being undertaken by the students. Required of mechanical and electrical engineering students, second term, senior year.

180. Mechanical Laboratory—Strength of Materials.—Investigation of the properties of cement and concrete; tensile compressive and bending tests of various materials used in engineering structure; tests of endurance, torsional resistance, fragility and hardness of metals. Required of electrical and mechanical engineering students, first term, junior year.

181. Mechanical Laboratory—Hydraulics.—Measurements of the flow of water in open channels, over weirs, through various orifices and nozzles, in pipes and conduits; experimental determination of the various loss-of-head coefficients; calibration of meters; tests of turbines, water motors, etc. Required of electrical and mechanical engineering students, last term, junior year.

182. Mechanical Laboratory—General.—Tests of lubricants and investigation of phenomena of friction; calibration of various engineering instruments, gauges, indicators, etc.; calorimetry; brakes and dynamometers; gas engines. Required of mechanical engineering students, first term, ~~junior~~ year.

183. Mechanical Laboratory—General.—Course similar to Course 182, but abridged for electrical engineering students.

Required of electrical engineering students, first term, senior year.

184.—Mechanical Laboratory—Steam Engineering.—Operation and tests of efficiency of complete steam plant, including accessories; special investigations in mechanical engineering lines in connection with thesis work. Required of mechanical and electrical engineering students, second term, senior year.

SURVEYING

200. Elementary Surveying.—The first term will be devoted mainly to learning the theory and practice of the use of level and transit, running lines of level for railways and highways, computation of areas and earthwork, and making of maps and profiles. In the second term the work is largely a study of methods used in railway surveys, including simple and compound curves and spirals, with problems in the field illustrating each. Prescriptive, freshman year.

206. Surveying Instruments.—A short course teaching the use of compass, transit and level. Required of all mechanical and electrical engineering students, first term, senior year.

PHYSICS

The courses in Physics have been arranged with especial regard to the needs and interests of engineering students, but they may also be taken advantageously by students who are pursuing general courses or who expect to specialize in Physics. An attempt is made to base the work as largely as possible upon the every-day experiences of the student. The solving of problems is an important feature. In the laboratory thoughtful and accurate work and careful notes are required. The use of instruments of precision is taught when the need for them arises in an experiment which illustrates or verifies some principle.

250. Mechanics, Molecular Physics and Heat.—This course emphasizes the important principles of energy and motion and the application of these principles to the familiar phenomena and simple machines. The topics covered comprise kinematics; simple harmonic motion with especial reference to the later consideration of wave motion; the general properties of matter and such special properties particularly of liquids and gases as correlate with the later work and give

the student the idea of the essential unity of the subject. Heat is considered qualitatively as well as quantitatively, and the theory is connected with the measurements of temperature and heat quantities as made in the laboratory. Required of all engineering students, first term, sophomore year.

251. Physical Laboratory—Mechanics, Molecular Physics and Heat.—Includes experiments dealing with acceleration, the laws of forces and moments, hydrostatics, capillarity, laws of gases, thermometry and expansion. Required of all engineering students, first term, sophomore year.

252. Sound, Light, Electricity and Magnetism.—This course, based upon and forming a continuation of Course 250, begins with a careful study of wave motion. The consideration given to sound includes the sources, transmission, and application of fundamental principles to the musical scale and musical instruments. Light treated as a wave motion, applies to the laws of reflection, refraction and interference already studied. The nature and laws of electricity and magnetism and the phenomena of electric currents, including induced currents, are carefully considered. Required of all engineering students, second term, sophomore year.

253. Physical Laboratory—Sound, Light, Electricity and Magnetism.—Includes experiments on the focal length of lenses, photometry, indices of refraction, elementary spectrum analysis, theory of optical instruments and the elementary principles of electricity and magnetism. Required of all engineering students, second term, sophomore year.

254. Electricity and Magnetism.—A more advanced and detailed treatment of these subjects than is given in Course 252. Required of all electrical and mechanical engineering students, first term, junior year.

255. Electrical Measurements and Methods.—A course dealing with the theory of various electrical measuring instruments and methods, with especial reference to convenience of use, precision and possible sources of error. Required of all electrical and mechanical engineering students, first term, junior year.

256. Electrical Measurements.—A laboratory course supplementing Course 255. Required of all electrical and mechanical engineering students, first term, junior year.

CHEMISTRY

300. General Chemistry.—This includes lectures on general inorganic chemistry, fully illustrated with experiments and supplemented by study of a text book and by laboratory work of a character suited to the previous preparation of the students. Special attention is given to class discussion and to the solution of problems relating to the practical industrial phase of the subject, as well as to the modern theories of chemistry. In the laboratory those who have presented chemistry for matriculation are given a series of selected experiments in general chemistry, while those who have not previously studied the subject take a series of general experiments illustrative of the fundamental principles of the science, covering quite fully the non-metals. Text: Alexander Smith's General Inorganic Chemistry, and Smith and Hale's Laboratory Outline. Required of all regular students, first term, freshman year.

301. General Chemistry and Qualitative Analysis.—This includes lectures and recitations as in the foregoing course, taking up metals, etc., and laboratory work in qualitative analysis covering the more common metals. Those students who intend to take up qualitative analysis later in their course are given laboratory work in inorganic preparations instead of qualitative analysis. Texts: Same as in Course 300, with addition of Morgan's Qualitative Analysis, Blanchard's Synthetic Inorganic Chemistry, and a special laboratory manual of qualitative analysis. Required of all regular students, second term, freshman year.

302. Qualitative Analysis.—This subject consists of recitations and laboratory work covering the detection of common metals and acid radicals, and including the analysis of pure salts, mixtures and industrial products. Texts: Morgan's Qualitative Analysis, and Noyes' Qualitative Analysis. Prescriptive, first term, sophomore year.

303. Quantitative Analysis.—This includes typical determination of metals and non-metals, with class-room discussions of processes and reactions, special attention being given to stoichiometry. Both gravimetric and volumetric processes are given, the aim of the course being to lay a good foundation for subsequent work in analysis as well as to give a thorough drill in careful manipulation which is so important

to the student of science in general. Text: Talbot's Quantitative Analysis. Prescriptive, second term, sophomore year.

MATHEMATICS

350. Trigonometry.—A course especially adapted to students of engineering with much drill in the use of the tables of trigonometric functions. The surveying course is so arranged that it can be taken simultaneously with this if desired, thus affording continual exercise of the principles of trigonometry. Required of all engineering students, first term, freshman year.

351. Computations.—This is designed to give practice and to promote accuracy in the solution of problems. Attention is given to the possibility of errors and the checking of results. Short methods of computing, by means of the slide rule, tables, etc., are used wherever practicable. Required of all engineering students, second term, freshman year.

352. Advanced Algebra.—The course includes determinants, inequalities, limits and indeterminate forms, convergency and divergency of series; indeterminate coefficients, with applications to integral functions, partial fractions, expansion of functions, and summation of series; the binominal theorem for any index, exponential and logarithmic series; theory of equations, including the plotting of entire functions of one letter, Descartes' rule of signs, the solution of higher numerical equations, derived functions, etc. Prescriptive, second term, freshman year.

353. Analytic Geometry.—A course in Plane and Solid Analytic Geometry is given devoted chiefly to the study of the conics with a few curves of especial interest in engineering, such as the cycloid and catenary. The course in Solid Analytic Geometry is chiefly devoted to a brief discussion of the straight line, plane and quadric surfaces. Required of all engineering students, second term, freshman year.

354. Differential and Integral Calculus.—The aim of this course is to familiarize the student with the processes and methods which are continually applied in the various branches of engineering. Granville's text is employed. Required of all engineering students, both terms, sophomore year.

355. Differential Equations.—A course in Differential Equations especially designed to be helpful in the problems

of physics, mechanics and electrical engineering. Cohen's text is used. Prescriptive, first term, junior year.

BIOLOGY

370. **General Biology.**—This course is intended to convey such an understanding of the fundamental principles of biology as will be of value to the inquirer, not only in his professional duties, but in his life as a citizen and a member of society. Characteristics of living material are observed, and the structure, development and activities of certain typical organs are studied. This work is supplemented by a discussion of some of the more important biological theories. Prescriptive, first term, freshman year.

GENERAL SCIENCE

380. **History of Science.**—A study of the origin and development of scientific knowledge. The more important sciences are traced from simple beginnings down to the present, and biographical sketches of the more noted workers in the various fields are given. Prescriptive, second term, junior year.

HISTORY AND POLITICAL SCIENCE

390. **History of European Civilization.**—A study of the origin, growth and character of the civilization of Europe. Careful attention is given to the influence of the racial elements and the various economic, religious and political institutions, in the development of social life in the different periods and countries considered. Required in all courses, first term, junior year.

391. **Contemporary History.**—A course emphasizing the principal features of contemporary world politics. An examination is made of the political, social and economic conditions of those countries under consideration, with a brief historical sketch to show the character of each country's development. Students are required to read extensively and to prepare such papers as may be suggested by the work, and approved by instructor. Prescriptive, first term, senior year.

396. **Problems in American Government.**—A review of American political and social conditions from the Colonial period to the present, treating of early English progress toward union and independence, of the Federal Constitution

and the growth of nationality, of the conflict with State Sovereignty, of the evolution of the slavery struggle, of reconstruction, and of the policy of the country regarding some of the important problems confronting the nation and the states. Required in all courses, second term, junior year.

397. Municipalities.—A study of the origin, development and administration of modern city government with a comparison of the problems and administration of the principal American and European cities. Prescriptive in second term, senior year.

398. The Development of the State.—A course giving a definite exposition of the fundamental principles and organization of the state and tracing political development from its rude beginnings in the horde-tribe to its various modern governmental expressions in the United States, England, Continental Europe, and New Zealand. Indicating also the chief steps in the evolution of written constitutions and the growth of liberty and democracy. Prescriptive, second term, sophomore year.

ECONOMICS AND SOCIOLOGY

400. Elementary Socio-Economics.—A study of the characteristic concepts of sociological and economic thought, designed to acquaint the student with the vocabulary of the subject and the current theories of social and economic interpretation. The first part of the course includes a brief discussion of the elements of association underlying social relations and institutions; the result of race, group and individual competition; the relation between the individual and society; and some of the conditions of social progress. The second part includes a summary of economic history, an examination of the meaning and scope of economics, and a discussion of the production, distribution, exchange and consumption of wealth; the wage question; labor organizations; co-operation and profit-sharing; panics and depressions, and socialism. Required in all courses, first term, senior year.

401. Economic Development of the Uinted States.—A general view of the industrial evolution of the country in relation to social and political changes. Attention is given to the gradual advance in agriculture, the expansion of manufacture, the invention of machinery, the service rendered

by steam, the telegraph, telephone and electricity, and the general transformation and significance of our industrial institutions. Required in all courses, second term, senior year.

405. Business Law and Practice.—A course covering the laws governing ordinary business transactions and giving the student a practical training in the use of business forms. A study is made of contracts, sales, negotiable instruments, real estate, partnerships, corporations, etc. Students are also thoroughly drilled in business arithmetic and elementary bookkeeping. Required in all courses, both terms, senior year.

406. Elements of Sociology.—The course gives a clear and concise statement of the history and field of sociology and its scientific basis and purposes. It includes a sketch of sociological theory from the time of Plato and Aristotle, and a consideration of the development of such problems as the influence of nature and society, the idea of progress, the concepts of social unity, individualism and collectivism, etc. Prescriptive, first term sophomore year.

ENGLISH

410. Rhetoric and Composition.—In this course special attention is given to the principles and practice of English composition, the object being to give the greatest facilitiy possible in the clear expression and orderly arrangement of ideas. To this end the fundamentals of rhetorical theory are reviewed, questions of usage are discussed and the laws governing description, narration, exposition and argumentation are explained. Theme work is required of each student once every week; these compositions are discussed in class and errors in form, diction and conception of thought, are pointed out and the means of remedying them indicated. Required in all courses, first term, freshman year.

411. Representative English Literature.—In this course selections are made from the leading authors in both prose and poetry and the students are made acquainted with the best that has been done in our literature. The object here is two-fold: first, to show the principles of composition, as applied to the work of classic authors, and to furnish the student with the best forms of written and oral expression; and second, to bring the student in touch with the class of literature which will tend to develop a love of letters. Theme

work is continued through the term as indicated in 410. Required in all courses, second term, freshman year.

412. American Poets.—In this course the representative American poets are studied, and the influence and ideals of the different epochs of our national life, as indicated in this form of literature, are traced. Parallel readings as assigned in course enable the student to judge more accurately of the various authors studied. Themes are presented and criticized in class once every three weeks. Required in all courses, first term, sophomore year.

413. American Prose Writers.—In this course, while some consideration is given to the representative prose writers, attention is given largely to a study of the short story, Poe being used as a model. The principles of the short story are constantly kept in mind, and ample opportunity for application of the same is provided by requiring each student to present a written theme every three weeks throughout the term, as provided in 412. Required in all courses, second term, sophomore year.

414. Special Composition.—A course in composition supplementary to Courses 410 and 411 is required of any upper classman whose written or oral work shows that he is unable to express his ideas clearly and accurately. The course consists entirely of theme writing and consultation, and may be continued in each case as long as deemed necessary.

415. Victorian Poets.—In this course Tennyson and Browning are taken as representative poets of the era. Their works and lives are studied in relation to the Victorian period. The connection between the literature and the life of the time is always kept in view. Required in all courses, first term, junior year.

416. The English Novel.—A study of the origin and development of English Prose fiction, including a critical discussion of at least one novel each of Jane Austen, Scott, Thackeray, Kingsley, George Eliot and Dickens. Each of these is studied in connection with the history of the time in which the authors lived, and in relation to the national life of the period. Required in all courses, second term, junior year.

417. Technical English.—A course of composition involving the writing of scientific articles, the description of ma-

chines and devices, and reports upon laboratory experiments, lectures, and engineering problems, with a view to facilitating clear, correct and concise expression in connection with technical subjects. The work is conducted by regular class exercises and frequent conferences, the actual technical work of the student so far as possible being made its basis. Required in all courses, both terms, senior year.

FRENCH AND GERMAN

All students looking toward a degree are required to pursue one or the other of these languages throughout the freshman and sophomore years; two additional years in each are offered. Students taking either French or German are presumed to have had two years' preparation in the language elected, and to be fairly grounded in the principles of grammar and construction. The courses are based upon this presumption, and therefore do not deal with syntax and composition except by way of review during the first year. The class-room work is from the standpoint of literature, and the courses are so planned as to give the student a fairly clear and comprehensive notion of the course of the German and the French literature. The imaginative element in literature is constantly kept in view, and that element in the student's mind is appealed to and fostered. The courses in the later years consider some of the older monuments of the literature, and mythology, and culminate in the fourth year in a study of the several literary epochs as expressions of national life.

430. Nineteenth Century French.—Composition and syntax are reviewed. The spoken language is used freely in the class-room. Translation at sight of representative texts receives stress and the student is expected to translate from the page with facility by the end of the first year. The course for 1909 to 1910 will be a study of the short story in French. Texts: Bouvet's French Syntax and Composition, Cameron's Coppée and Maupassant's Tales; and others to be announced. This course or 440 is required of all regular students, both terms, freshman year.

431. French Poets.—For 1909 and 1910 the course will be in the study of the French lyric. This or Course 441 is required of all regular students, both terms, sophomore year.

432. Seventeenth Century Literature.—Texts: Corneille's Le Cid, Horace; Molière's Le Misanthrope, Le Tartuffe; and others. Prescriptive, both terms, junior year.

433. Social Forces in Literature.—Lectures on the development of French literature, based on various texts. Prescriptive, both terms, senior year.

440. Nineteenth Century German.—Composition and syntax are taken up in review. The spoken language is freely used in the class-room. Ready translation at sight is stressed. The course is in contemporary German literature. Texts: Bierwirth's Elements of German; Sudermann's Frau Sorge; other texts to be announced. This or Course 430 is required both terms, freshman year.

441. Eighteenth Century.—This course considers Lessing and his works, as related to the growth of German letters. This or Course 431 is required both terms, sophomore year.

442. Middle High German.—The Nibelungenlied will be the basal text for 1909 and 1910. Parallel reading in English will be assigned in connection with the study of mythology so as to give the student a better notion of the part which mythology plays in the literature and life of a race. Prescriptive, both terms, junior year.

443. Development of German Literature.—In this course the social forces in German literature receive special emphasis. The work consists mainly of lectures by the professor, based upon texts to be announced from time to time. Prescriptive, both terms, senior year.

DRAWING AND DESCRIPTIVE GEOMETRY

460. Mechanical Drawing.—Use of instruments; lines and circles, geometric drawing; freehand and geometric lettering; projection of simple constructions; dimensioning; tracing, blue-printing, conventional representations of materials. Required of all regular students, both terms, freshman year.

461. Mechanical Drawing.—Course 460 continued. Isometric projection in its various forms, projection of inclined objects, intersections, developments of surfaces, sheet metal patterns, fundamental principles of perspective, simple shadows. Required of all regular students, first term, sophomore year.

462. Machine Detail Drawing.—Bolts, nuts, keys, pipe fittings, valves, shaft couplings, bearings, etc.; simpler details occurring in machines; problems from course in mechanism. Required of all regular students, second term, sophomore year.

463. Engineering Design.—The design of certain machines, the subject varying with the professional course pursued. A drawing board study of the proportion, distribution and accessibility of parts, bearing areas; provisions for lubrication; convenience of operation, and the detailing of parts for shop production. Required of all regular students, first term, junior year.

464. Mechanical Engineering Drawing.—Continuation of the work outlined in 463 on more complicated machines. Subject varies with student's special line of study. A foundation for thesis work. Required of all mechanical engineering students, first term, senior year.

470. Descriptive Geometry.—Principles of projection as applied to the point, line and plane, with practical applications; as in the case in most engineering drawing rooms, the third angle is used chiefly. Required of all regular students, first term, freshman year.

475. Freehand Drawing.—A course for the development of the personal powers involved in correct freehand drawing, such as correct seeing, selection, proportion, etc. It consists of plain and ornate lettering, rapid sketching in projection and perspective and practice in perspective sketching from working drawings. Required of all regular students, both terms, freshman year.

SHOP WORK

480. Wood Working.—Instruction in the care and use of the ordinary woodworker's tools; training in sawing, planing, chiseling and the commoner processes of the art; joinery, framing, fastening, glueing; staining and finishing. Wood turning, care and adjustment of the lathes, use of tools; ornamental turning. Required of all regular students, first term, freshman year.

481. Forging.—Instruction in the mechanism and care of the forge, operation and handling of fire, heating, drawing, bending, upsetting, heading, welding, punching, clipping, riveting, drilling, grinding. Working of steel, hardening, tem-

pering, refining. Structural and ornamental iron work. Required of all regular students, first term, sophomore year.

482. Pattern Making.—Instruction and practice in the making of patterns for iron and brass castings; the principles involved in the construction of patterns and the allowance for draft, shrinkage, etc., are given practical expression. Instruction in the use and making of core boxes, composite and ribbed patterns is given. Bench molding of students' patterns. Required of all regular students, first term, sophomore year.

483. Machine Shop Practice.—In bench and vise work the student takes up chipping, filing, scraping, polishing, laying out of work, etc. As a preparation for work on machines, a careful investigation of each machine is required, to familiarize the student with its construction and various motions, the office of each bolt, nut, handle and gear wheel, etc., being determined, and the general design being compared with other machines. The care of machines is considered at this point, and a systematic study is made of the needs of the machine for successful and rapid operation. Machine work is begun with a series of exercises illustrating the principal processes, as plain turning, facing, thread-cutting, inside boring and threading, turning of tapers, hand tool and chuck work of all kinds. At different stages of the course work is given on the planer, shaper, drill-presses and milling machines. Students are expected to provide themselves with calipers and scale. Required of all regular students, second term, sophomore year.

SHOP LECTURES

490. Wood Working.—Lectures and quizzes on subjects bearing on wood working. Materials, tools, processes are discussed and special lectures on forestry, lumbering, tool manufacture and commercial problems are given. Required in connection with Course 480.

491. Iron Working.—Lectures and quizzes on the production and treatment of iron, steel, fuels, etc. Discussion of the practical and commercial aspects of iron working. Required in connection with Course 481.

492. Pattern Making, Foundry, Machine Shop Practice.—Lectures and quizzes on subjects bearing on the above mentioned shop practice, following the outlines of Courses 482 and 483. Required in connection with Courses 482 and 483.

PART II.

GENERAL AND FITTING COURSES

THE COLLEGE—GENERAL COURSES

While Throop Institute offers degrees only to engineering graduates, its general collegiate courses are open to both men and women, provided that no less than fifteen periods weekly be taken by each student, in a program approved by the Faculty.* Certificates of Proficiency will be granted upon completion of such general courses.

The studies open for election are those already described in Part I., embracing work of a thoroughgoing character in the English language and literature, including expression; French and German (taught in relation to history); History, Civics, Sociology and Economics; the Natural Sciences, including an especially advanced course in Mathematics; Business Law, Method, and Practice; Freehand Drawing and Design.

THE ACADEMY—GENERAL COURSES

General courses in the Academy have been arranged: (1) To provide adequate preparation for the best colleges in the country, should the student not desire to continue his studies at the Institute; and (2) to give a broad and practical high school training to young men and young women who, for any reason, do not intend to enter college. English is required throughout of all students, and United States History

*The minimum schedule for General Courses shall be 15 periods weekly in class, laboratory and shop work, of which at least 10 periods shall be given to recitations (including laboratory work). The maximum amount of manual training work in General Courses shall be 15 periods, except by especial permission. Exceptions to the minimum schedule may be made in the case of adults.

with Civics, is required in the fourth year, as these studies are fundamental and essential. Large latitude is given in the further arrangement of courses, under direction, however, of the Faculty, with a view to individual requirements. The same minimum and maximum requirements apply here as in the General Courses of the College.*

For obvious reasons, certain differential subjects are assigned to young men and young women in the Academy courses, as indicated in the following schedules, although in the majority of classes they recite together.

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*See note, page 33.

SCHEDULE OF GENERAL COURSES

YOUNG MEN	Periods	Units *
FIRST YEAR		
Required		
English 1	5	1
Prescriptive		
Elementary Algebra	5	1
Commercial Arithmetic	5	1
Ancient History	5	1
General Science	5	1
Latin 1	5	1
Spanish 1	3	1
Freehand Drawing 1, Mechanical Drawing 1	3	¼ ¼
Shop Work 1	7	½
Expression 1	2	¼
Physical Education 1	3	¼
SECOND YEAR		
Required		
English 2	5	1
Prescriptive		
Plane Geometry	5	1
Modern European History	5	1
Physiography	5	1
Latin 2	5	1
Spanish 2	5	1
Bookkeeping	5	1
Shop Work 2 or 3	7	½
Freehand Drawing 2, Mechanical Drawing 2	3	¼ ¼
Expression 2	3	¼
Physical Education 2	2	¼
THIRD YEAR		
Required		
English 3	5	1
Prescriptive		
English History	5	1
Physics	8	1
Higher Algebra and Solid Geometry	5	1
French 1 or German 1	5	1
Botany or Zoology	8	1
Bookkeeping	5	1
Mechanical Drawing 3	3	¼ ¼
Shop Work 4 and 6	7	½ ½
Expression 3	2	¼
Physical Education 3	3	¼
FOURTH YEAR		
Required		
English 4	3	1
United States History and Government	5	1
Prescriptive		
Trigonometry and Applied Mathematics	5	1
French 2 or German 2	3	1
Commercial Geography, ½ year	5	½
Business Law, ½ year	5	½
Chemistry	8	1
Physiology and Hygiene	5	1
Shop Work 5 and 7	7	½ ½
Mechanical Drawing 4	3	¼ ¼
Expression 4	3	¼
Physical Education 4	2	¼

YOUNG WOMEN	Periods	Units
FIRST YEAR		
Required		
English 1	5	1
Prescriptive		
Elementary Algebra	5	1
Commercial Arithmetic	5	1
Ancient History	5	1
General Science	5	1
Latin 1	5	1
Spanish 1	5	1
Freehand Drawing 1, Mechanical Drawing 1	3	¼ ¼
Home Economics 1	7	½ ½
Expression 1	2	¼
Physical Education 1	3	¼
SECOND YEAR		
Required		
English 2	5	1
Prescriptive		
Plane Geometry	5	1
Modern European History	5	1
Physiography	5	1
Latin 2	5	1
Spanish 2	5	1
Bookkeeping	5	1
Home Economics 2	7	½
Freehand Drawing 2, Mechanical Drawing 2	3	¼ ¼
Expression 2	3	¼
Physical Education 2	2	¼
THIRD YEAR		
Required		
English 3	5	1
Prescriptive		
Advanced Algebra, ½ year	5	½
Solid Geometry, ½ year	5	½ ½
French 1 or German 1	5	1
Botany or Zoology	8	1
Physics	8	1
English History	5	1
Bookkeeping	5	1
Freehand Drawing 3	3	¼ ¼
Home Economics 3	7	½ ½
Expression 3	2	¼
Physical Education 3	3	¼
FOURTH YEAR		
Required		
English 4	3	1
United States History and Government	5	1
Prescriptive		
Commercial Geography, ½ year	5	½
Business Law, ½ year	5	½
French 2 or German 2	3	1
Chemistry	8	1
Physiology and Hygiene	5	1
Freehand Drawing 4	3	¼ ¼
Home Economics 4	7	½ ½
Expression 4	3	¼
Physical Education 4	2	¼

*Note.—The unit system at the Academy of the Institute is defined on page 13.

THE ACADEMY—FITTING COURSES

The Institute finds it necessary to maintain its own Fitting Academy, so that students may be thoroughly prepared for the engineering courses of the College. While the College and Academy are hereafter to be physically separate, each having its own ample campus and adequate corps of instructors, the most thorough co-operation will prevail, so that applicants for the collegiate courses will find it decidedly to their advantage to take the preparation provided in the Throop Institute Academy.

SCHEDULE OF FITTING COURSES*

	Periods	Units †
FIRST YEAR		
Required		
English 1	5	1
Elementary Algebra	5	1
General Science	5	1
Freehand Drawing 1, Mechanical Drawing 1	3	½
Shop Work 1	7	½
Prescriptive‡		
Ancient History	5	1
Latin 1	5	1
Spanish 1	5	1
Expression 1	2	¼
Physical Education 1	3	¼
SECOND YEAR		
Required		
English 2	5	1
Plane Geometry	5	1
Physiography	5	1
Freehand Drawing 2, Mechanical Drawing 2	3	½
Shop Work 3	7	½
Prescriptive		
Modern European History	5	1
Bookkeeping	5	1
Latin 2	5	1
Spanish 2	5	1
Expression 2	3	¼
Physical Education 2	2	¼

	Periods	Units
THIRD YEAR		
Required		
English 3	5	1
Higher Algebra and Solid Geometry	5	1
French 1 or German 1	5	1
Physics	8	1
Mechanical Drawing 3	3	¼
Shop Work 4 and 6	7	½
Prescriptive		
English History	5	1
Botany or Zoology	8	1
Bookkeeping	5	1
Expression 3	2	¼
Physical Education 3	3	¼
FOURTH YEAR		
Required		
English 4	3	1
Trigonometry and Applied Mathematics	5	1
United States History and Government	5	1
Chemistry	8	1
French 2 or German 2	3	1
Prescriptive		
Mechanical Drawing 4	3	¼
Physiology and Hygiene	5	1
Commercial Geography, ½ year	5	½
Business Law, ½ year	5	½
Shop Work 5 and 7	7	½
Expression 4	3	¼
Physical Education 4	2	¼

*This schedule is arranged primarily to fit students for engineering work in the Institute, but upon examination of the Academy curriculum in General Courses it will be found that ample facilities are provided to fit students for entrance into the best colleges and universities of the country, in case they do not desire to enter the regular collegiate courses here.

†For explanation of units, see page 13.

‡For explanation of prescriptive studies, see page 13.

DESCRIPTION OF GENERAL AND FITTING COURSES*.

MATHEMATICS

1. **Elementary Algebra.**—Fundamental operations, simple equations, factors, factor theorem, fractions, simultaneous equations, involution, evolution, theory of indices, surds, simple quadratic equations, ratio, proportion. Text: Tanner's High School Algebra. Required in Fitting Course, both terms, first year.

2. **Higher Algebra.**—Theory of indices, surds, simultaneous quadratic equations, theory of quadratic equations, indeterminate equations of the first degree, inequalities, variation, arithmetical, geometrical, harmonical and other simple series, the binomial theorem for a positive integral exponent, logarithmic calculations. Text: Tanner's High School Algebra. Required in Fitting Course, first term, third year.

3. **Plane Geometry.**—Books I. to V., inclusive, in Shutt's Plane and Solid Geometry. Required in Fitting Course, both terms, second year.

4. **Solid Geometry.**—Course as given in Shutt's Plane and Solid Geometry. Required in Fitting Course, last term, third year.

In both Plane and Solid Geometry special attention is given to the demonstration of original theorems and to the solution of original exercises.

5. **Trigonometry.**—The course comprises plane and spherical trigonometry. Problems from text-books proven in the field, also solved by the class. Required in Fitting Course, first term, fourth year.

6. **Applied Mathematics.**—This course is a general review of the mathematics of the Academy by means of problems drawn from the various allied subjects and the industries. Much emphasis will be placed upon methods of computation and the analysis of the conditions under which the problems arise. Required in Fitting Course, last term, fourth year.

*All subjects required in the Fitting Course are prescriptive in the General Courses, excepting English and United States History and Government, which are required in all courses.

7. Commercial Arithmetic.—The aim of this course is to develop facility in the handling of the fundamental principles of business arithmetic, and to teach the student to apply these readily to the class of problems that are met with in life. To this end special attention is given to such subjects as practical measurements, bills and accounts, percentage, interest, discounts, and partnership settlements. Text: Moore's Commercial Arithmetic. Prescriptive, both terms, first year of general courses.

8. Bookkeeping.—In this work the fundamental principles of bookkeeping are developed and made clear. Through a series of drills combining theory with practice the student is led through journalizing, posting, taking off trial balances, and making out the various business statements and balance sheets, opening and closing sets of books, etc. After being thoroughly grounded in these principles, he is required to make the records from vouchers coming to him as the bookkeeper does in actual business. Along with this he gets practice in rendering statements of customers' accounts, the handling of commercial papers, such as checks, notes and drafts, and keeping a bank account. Text: Modern Illustrative Bookkeeping (introductory course). Prescriptive, both terms, second or third year.

ENGLISH

All regular students are required to take instruction in English during the four years of the Academy course. Special attention is given to clear and correct expression. Frequent and varied written exercises are required, and much care is given to oral reading, especially in English 1 and 2. The following works are made the basis of study:

1. First Year Work.—Alhambra, Classic Myths, Horatius, Vision of Sir Launfal; Gardiner, Kittredge and Arnold's Manual of Composition and Rhetoric, for study, and Ivanhoe for reading.

2. Second Year Work.—Merchant of Venice, Sir Roger de Coverley, Ancient Mariner, Tam O' Shanter, Deserted Village, American Scholar, Fortunes of the Republic, Gettysburg Speech and the Second Inaugural; Gardiner, Kittredge and Arnold's Manual of Composition and Rhetoric finished. For reading, David Copperfield and As You Like It.

3. **Third Year Work.**—Silas Marner, Vicar of Wakefield, Comus, Lycidas, Elegy, Eve of St. Agnes, Odes by Keats, Shelley, Wordsworth, The Bard, Rape of the Lock, My Last Duchess, Andrea del Sarto, Alexander's Feast. For reading, Under the Bonnie Brier Bush.

4. **Fourth Year Work.**—Julius Cæsar, Macbeth, Macaulay's Essay on Warren Hastings, Burke on Conciliation, Macaulay on Reform, Webster's Reply to Hayne, L'Allegro, Il Penseroso, Carlyle on Burns, Byron's Chillon or Childe Harold (selections), Tennyson's Passing of Arthur, Short History of English Literature. For reading, Midsummer Night's Dream, the Jungle Books, Wake Robin.

EXPRESSION

1. **First Year Work.**—A study is here made of the fundamentals of expression, English phonation, difficult forms of direct personal address and plain and dramatic narrative from the interpretative standpoint. Texts: Cumnock's Choice Readings, and Clark's How to Teach Reading. Prescriptive, both terms.

2. **Second Year Work.**—This course includes advanced work in Cumnock's Choice Readings, practice in extemporaneous speaking, and a study of the Merchant of Venice and Julius Cæsar, and of impersonal address and soliloquy from the interpretative standpoint. Open to students who have had Expression 1. Prescriptive, both terms.

3. **Third Year Work.**—A study is here made of Hamlet, Twelfth Night, Macbeth, selections from the New Testament and of the monologue from the interpretative standpoint. Extemporaneous speaking is continued through the year. Open to students who have taken Expression 1 and 2. Prescriptive, both terms.

4. **Fourth Year Work.**—This course is planned for the purpose of giving more advanced work in public speaking. The extemporaneous work is continued and emphasized, a study is made of masterpieces of oratory and constant practice is given in reading from memory. Text: Clark and Blanchard's Public Speaking. Open to students who have taken Expression 1. Prescriptive, both terms.

HISTORY AND ECONOMICS

The aim of the work in this department is to give the student a clear idea of the main facts in human progress and of the essential unity of history, together with some acquaintance with the sources of information and the most important writings on the subject. The use of a text book is supplemented by collateral readings and the preparation of notes, papers, outlines and maps, the amount of this work gradually increasing from year to year.

1. **Ancient History.**—In this course study is made of Greece and the East, and Rome and the West, to the time of Charlemagne. The object is not simply to give the student a view of the ancient world but to indicate what contributions were made by ancient to modern civilization. Special emphasis is put upon Greek history from the Persian Wars to the Hellenizing of the East, and upon Roman history from the establishment of Roman supremacy in the West to the breaking up of the world empire. Prescriptive, both terms, first year.

2. **European History.**—The course includes the study of Mediæval Europe from Charlemagne's time to the Reformation, and of Modern Europe from the Reformation to the twentieth century. Particular attention is given to mediæval institutions, the origin and development of modern nations, and the results of the religious, social, economic and political revolutions. Prescriptive, both terms, second year.

3. **English History and Government.**—A study of the origin, development and government of the English nation and of the British Empire. Constant reference is made to the relations of English political institutions, and ideals to those of America. Prescriptive, both terms, third year.

4. **American History and Government.**—A study of Colonial America to the organization of the government under the constitution, and of the United States from the adoption of the constitution to the present. While the political progress of America takes the chief place, some attention is given to its social and economic development. Required, both terms, fourth year.

5. **Commercial Geography.**—In this course the earth is considered as an agent in the production of commodities upon

which human life depends, the object being to study the various natural and manufactured products that are bought and sold in the markets of the world, and to discuss commercial life as it is influenced and determined by geographical conditions. Text: Gannet-Garrison-Houston's Commercial Geography. Prescriptive, first term, fourth year.

6. **Business Law.**—The object of this course is to present the leading principles of law as applied to the transaction of business. As all business rests upon contracts, of various kinds, a knowledge of the general rules concerning and governing contractual relations is an essential in the equipment of a business man, and without this knowledge he must be helpless in the conduct of his ordinary business affairs. Laws applying to contracts, sales of personal property, and negotiable instruments are given special attention. Text: Gano's Commercial Law. Prescriptive, second term, fourth year.

LATIN

1. **Beginning Latin.**—This course includes forms, syntax, vocabulary and translation of easy prose. Texts: Collar and Daniell's First Year Latin, Cannon's Beginner's Cæsar. Prescriptive, both terms, first year.

2. **Cæsar.**—The work here includes translation of four books, sight readings and prose composition. Texts: Allen and Greenough's New Revised Grammar, Allen and Greenough's New Cæsar. Prescriptive, both terms, second year.

FRENCH

1. **First Year Work.**—The reading of short French stories in order to acquire an accurate pronunciation and as a basis for conversation; a thorough drill in grammar and a study of the verbs; also frequent dictations and some memorizing. Texts: Beginner's French, Francois; Contes et Légendes, Guerber. This subject, or German 1, required in Fitting Course, both terms, third year.

2. **Second Year Work.**—Special study of the syntax and idioms and exercises in composition; daily practice in French conversation, reading and translation. Texts: French Syntax and Composition, Bouvet; Le Voyage de Monsieur Perrichon, Labiche and Martin; Le Comte de Monte Cristo, Dumas. This subject, or German 2, required in Fitting Course, both terms, fourth year.

GERMAN

1. **First Year Work.**—Special attention is given to pronunciation, drill in forms and the principles of syntax. The student is exercised in translation from the German into English and vice versa. Sight translation and the securing of a German vocabulary is stressed. Texts: Joynes and Wesselhoeft's German Lesson Grammar; Müller and Wenckebach's Glück Auf. This subject, or French 1, required in Fitting Course, both terms, third year.

2. **Second Year Work.**—Exercises throughout the year in translation, composition and conversation. Texts: Joynes and Wesselhoeft's German Lesson Grammar (continued); Storm's Immensee; Heine's Harzreise; other texts to be announced in course. This subject, or French 2, required in Fitting Course, fourth year.

SPANISH

1. **First Year Work.**—Thorough drill in pronunciation and forms by means of conversation; practice in translation at sight and hearing, and in memorizing. Texts: Introductión á la Lingua Castellana, Marion y Garennes, Ramsey's Reader. Prescriptive, both terms, first year.

2. **Second Year Work.**—Exercises throughout the year in conversation; translation at hearing; essays; correspondence, reading of standard Spanish, both prose and poetry; review of forms; syntax. Texts: Garner's Spanish Grammar; Ramsey and Lewis' Exercises in Spanish Composition, Part I.; El Pajaro Verde, Valera; Zaragüeta, M. R. Carriòn y Vital Aza; El Pajaro Verde, Alarcón. Prescriptive, second year.

GENERAL SCIENCE

1. **Elementary General Science.**—The purpose of this course is to give the student the point of view from which he will see the unity of science. In order to accomplish this purpose a study is made of the properties common to all bodies, and then of properties which, although not possessed by all bodies, are commonly met with in every-day experience. This is followed by a discussion of those theories which have made possible a more ready and easy understanding of the phenomena of nature. Required in Fitting Course, both terms, first year.

BIOLOGY

Carefully kept note and drawing books are called for in all courses. Reference and text books are assigned as required. The courses in Botany and Zoology will be given in alternate years. Zoology will be given in 1909-10.

1. **Zoology.**—The course in zoology consists of a careful study of several selected animals, such as the earth-worm, cray-fish, crane-fly, star-fish, squid, toad and rabbit. Their structure, physiology and life histories are treated of in the laboratory and lecture room. Occasional field excursions are undertaken in order that the habits and haunts of living animals may be observed. Prescriptive, both terms, third year.

2. **Botany.**—The course in botany is intended to give a general idea of the structure and relationship of plants. Special studies are made of certain selected types, from the one-celled forms to the flowering plants. Particular attention is paid to such groups as the algae and fungi, and to the higher plants which are of economic value. During the spring months some work is also done in naming and classifying our commonest native plants. Collecting trips therefore become a regular feature at that season. Prescriptive, both terms, third year.

PHYSIOLOGY AND HYGIENE

1. **Human Physiology and Hygiene.**—A study of the functions of the human body. Some time will necessarily be spent in studying anatomy, and questions of hygiene will be discussed in connection with the physiology. The laboratory method will be followed whenever possible. Prescriptive, both terms, fourth year.

CHEMISTRY

1. **General Chemistry.**—The first term's work consists of the study of the non-metallic elements and the essentials of chemical theory. Its principal aim is to develop scientific methods of observation and thought, to which the acquirement of the mere facts of chemistry is considered of secondary importance. To this end experiments are selected which require considerable care in manipulation, and illustrate quantitative relations of substances so far as possible. The time spent in laboratory work is four periods per week.

The experimental work is individual, and careful notes must be daily submitted to the instructor for examination. Accompanying the laboratory work there are three recitations per week. Considerable attention is paid to the solution of problems. The metals are studied in the second term and the principles of qualitative analysis taken up near the end of the year. Occasional lectures are given on the metallurgy and industrial chemistry of the principal elements. Occasional visits are made to ice and gas plants and other places of equal industrial importance. Texts: Hessler and Smith's Essentials of Chemistry and Laboratory Manual. Preparation advised: Algebra, Plane Geometry. Required in Fitting Course, fourth year.

PHYSICS

1. **General Physics.**—Instruction is given by means of laboratory work with discussion of experiments performed and study of references to text and books in library. Experiments are performed by the student himself, and careful notes are required. The relation of practical applications and of the phenomena of every-day life to the physical principles involved is emphasized. Preparation required: Algebra and Plane Geometry. Required in Fitting Course, both terms, third year.

PHYSIOGRAPHY

1. **Elementary Physiography.**—An elementary course in general science dealing with the position of the earth in the solar system; the agents affecting the earth's surface, such as rivers, waves, tides and glaciers; climatic conditions and weather changes; geographical distribution of plants and animals, the relation to their surroundings; and the influence of these various factors on the development of human society. The course includes laboratory work, and field trips to the mountains and sea shore. Text: Tarr's New Physical Geography. Required in Fitting Course, both terms, second year.

FREEHAND DRAWING AND DESIGN

The first year's course of this work is planned with special reference to the needs of young men and young women, while the courses for the other three years are primarily for young women, but are open to young men who may desire, and who may be able to profit by the training which they offer.

1. **First Year Work.**—The first term's work includes object drawing, interiors for perspective, and conventional design. The second includes practical form design, charcoal, or pen and ink for object drawing, block printing, lettering, and perspective sketching from working drawings. This work covers the amount required in the first two years of the Fitting Course.

2. **Second Year Work.**—This course includes design for pottery forms, etc., flowers in charcoal and water color, composition and outdoor sketching. Prescriptive, both terms.

3. **Third Year Work.**—This includes charcoal and chalk still life, pose in charcoal and chalk, design for leather and other media, posters, etc., and elementary art history. Prescriptive, both terms.

4. **Fourth Year Work.**—This course is intended to be a more direct and practical application of the principles and practice of the previous work, and includes notes on house planning and decorating, color schemes for the house, based on original plan; water color interiors; and design for screen or fire-place. Art history is continued throughout the year. Prescriptive, both terms.

MECHANICAL DRAWING

1. **First Year Work.**—The work here includes preparation and use of instruments, practice in lines and circles, freehand sketches of models, freehand and instrumental lettering, simple projections, working drawings, and tracing and blue-printing. Required in Fitting Course, one term.

2. **Second Year Work.**—This course includes simple perspective with illustration of corresponding conventionalized perspective, isometric, cabinet and cavalier projections; application to architectural, structural, and mechanical illustrations; projection of objects inclined to the plane of projection, intersection of solids, development of patterns of surface and application of simple shadows. Required in Fitting Course, one term.

3. **Third Year Work.**—This includes sketches of elementary machine parts, gears, and cams; detail of drawings of simple machines, as lathe or drill press, assembly drawings, etc., and a study of masonry and timber construction, arrange-

ment of rooms and conveniences in simple house designs and a set of plans for a moderate priced cottage, including floor plans, elevations, and details of interior. Required in Fitting Course, both terms.

4. Fourth Year Work.—This course is planned for those who may desire and who may be able to profit by additional work in this line. It continues machine design work of the third year, taking up the design and detailed drawings of some special machine as the gas engine, a lathe or some similar machine, and gives considerable practice in shop drawings for machines and apparatus under construction in the shops of the Institute. Prescriptive, both terms.

SHOP WORK

In all the courses in shop work six periods per week will be devoted to practical work in the shop, while one period per week is given to recitations and lectures.

1. Wood Work.—The course consists of exercises arranged to develop the use of tools and to familarize the student with shop methods, and at the same time to present practical and æsthetic elements. As far as possible each article is complete and useful in itself. The work in turning involves center, face plate, chuck and inside turning. The second term is usually devoted to cabinet making, in which the student designs and constructs, under the oversight of the instructor, some piece of work which usually takes the form of tables, chairs, cabinets or other furniture. During the year a series of lectures is given on the growth of trees, properties of wood, methods of lumbering, forestry problems, etc. Required in Fitting Course.

2. Advanced Wood Work.—This course is entirely devoted to cabinet work, being a continuation of the work begun in the last part of the first year. The student is expected to design, construct and finish at least three pieces. Course 1 is required in preparation. Prescriptive, second year.

3. Forging.—The work includes, mechanism and care of forge, preparation of forge for fire, building and managing fire, instruction in the care and use of tools, and such processes as drawing, bending, upsetting, different kinds of welding, punching, drilling, fullering, swaging, cutting cold,

clipping, cutting hot, splitting, twisting, filing, brazing, hardening, tempering and ornamentation. Required in Fitting Course, both terms, second year.

4. Pattern Making.—The course comprises a series of exercises embodying the principles governing pattern construction supplemented with lectures, and illustrations of molding and other foundry practice having direct bearing on pattern work. The allowance for draft, shrinkage and casting finish are kept prominently before the student throughout the course and with each succeeding model the additional principles involved are brought out. Patterns may be actually tested in the molding sand as the Pattern Shop has, as an adjunct, a properly finished molding bench; some work in molding must be done by every student. Algebra, Plane Geometry, and Forging are necessary as preparation. Required in Fitting Course, first third of third year.

5. Advanced Pattern Making.—The work here is conditioned on and a continuation of the more elementary course described under Shop Work 4. The patterns here being generally made from original designs. Prescriptive, first third of fourth year.

6. Machine Shop Practice.—The course includes bench and vise and machine work. In bench and vise work the student takes up chipping, filing, scraping, polishing, laying out of work, etc. As a preparation for work on the machines, a careful investigation of each machine is required, to familiarize the student with its construction and various motions, the office of each bolt, nut, handle, gear wheel, etc., being determined, and the general design compared with other machines. The care of the machine is considered at this point and a systematic study is made of the needs of the machine for successful and rapid operation. Machine work is begun with a series of exercises illustrating the principal processes, as plain turning, facing, thread cutting, inside boring and threading, turning of tapers, and hand tool and chuck work of all kinds. At different stages of the course work is given on the shaper, planer, drill-presses and milling machines. Text books are not used, but notes are given on each subject, for which the student is held responsible. Those taking the course are expected to provide themselves with calipers and scale. Pattern making must be offered in prep-

aration. Required in Fitting Course, last two-thirds of third year.

7. **Advanced Machine Shop Practice.**—This continues and is based on the previous work in Machine Shop Practice, and embraces exercises illustrating more complicated processes in the actual construction of machines. Prescriptive, last two-thirds of fourth year.

HOME ECONOMICS

The general aim of this work is not simply to insure a thorough knowledge of the various subjects considered, but to develop habits of order, accuracy, and self-reliance, and to cultivate an appreciation of artistic effects and general utility along the broader lines of management and care of the home.

1. **Sewing.**—Fundamental stitches used in hand sewing, patching, darning, mending; ornamental stitches for decoration of garments and house furnishing; study of textiles and tools; machine stitching and use of attachments; use of patterns; designing, drafting, cutting, fitting and making under garments, shirt waists and dresses of washable material. Freehand Drawing 1 is required as a parallel course. Prescriptive, both terms, first year.

2. **Dress Making and Millinery.**—This course includes taking measurements preparatory to drafting skirts and fitted waists; basting, fitting and general finish of waists and sleeves; designing and making gowns of wool or silk; renovating straw and felt hats, velvets, etc.; binding and wiring hats; cutting and putting on facings and folds; bow making; sewing straw, making and trimming hats; the study of line, form and color; and the history, manufacture and nature of fabrics. Freehand Drawing 2 is required as a parallel course. Open to students who have had sewing. Prescriptive, both terms, second year.

3. **Cooking and Household Administration.**—The course includes a study of foods, principles of cooking, food preparation and serving, cost, selection and combination of food in a meal, marketing; household management, household accounts, cleaning processes, systematic planning of house work to save time and labor, house furnishing, kitchen and

dining room used as types. General science is required as a parallel course. Prescriptive, both terms, third year.

4. Advanced Cooking and Household Administration.—The work includes the study of the effect of heat on food principles, composition of common foods, application of special principles to more advanced work, effect of fermentation in bread making and prevention of same in preservation of foods; problems connected with modern living, detection of adulteration in common foods, comparison of home-made products with high-class purchased products and cheaper purchased products, systematic house keeping, domestic service and accounts, selection of a site for the home, plan and construction of the house, arrangement and furnishing of rooms, water supply, ventilation; emergency and home care of the sick, food for different conditions of life, for children and old people, the school lunch, etc. Open to students having had Course 3. Students entering this work will be required to take Freehand Drawing 4 as a parallel course. Prescriptive, both terms, fourth year.

PHYSICAL EDUCATION FOR YOUNG MEN

1. First Year Work.—This course is planned for beginners, special attention being given to corrective educational gymnastics. Graded exercises. Good posture and control are emphasized. The first half year is given to marching, free-hand exercises and light apparatus work, and the second to more advanced apparatus work, games, and light track and field athletics. Prescriptive.

2. Second Year Work.—A course designed for those who have already had some experience in gymnastic work. It will comprise free floor work, including wand, dumb bell and Indian club drills, and advanced apparatus work, elementary practice in boxing and wrestling, and track and field athletics, including base ball. Prescriptive, both terms.

3 and 4. Third and Fourth Year Work.—This course is intended to meet the demands for directed specialized work. The needs and desires of the individual are taken into consideration and those doing regular work under the Athletic Director will receive the same credit as those in the regular gymnastic classes. Prescriptive, both terms.

PHYSICAL EDUCATION FOR YOUNG WOMEN

1. **First Year Work.**—This course includes exercises for securing correct poise and healthful habits in breathing, etc.; calisthenics, dumb bell and Indian club work and recreative games. Prescriptive, both terms.

2. **Second Year Work.**—The exercises for breathing and poise are continued and advanced work is given with Indian clubs, wands, etc., together with recreative games and simple use of light apparatus. Prescriptive, both terms.

3 and 4. **Third and Fourth Year Work.**—The work is here planned so as not only to continue the corrective exercises as individual needs may require, but to give as much of the more difficult free work with rythmical drills for grace and harmony of movement as may be considered necessary. Considerable attention is also given to tennis, basket ball, volley ball and other athletic sports. Regular gymnasium suits are required. Those taking the work are examined at stated times and great care is taken to prevent any over exertion. Prescriptive, both terms.

PART III.

GENERAL INFORMATION

HISTORICAL

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 maintenance. Articles of incorporation were filed September 23d; the first Board of Trustees was organized October 2d. The doors of the Institute were opened to students November 2d. It was established to 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. A clause of the charter provides that a majority of the Board of Trustees "shall not belong to any one religious denomination or sect, and the institution shall be maintained and administered as an undenominational and non-sectarian school."

The Eldridge M. Fowler Trust Fund of $50,000 is in the hands of a board of trustees created for the purpose of managing it in such manner that the income only shall be used for the maintenance of the Institute. This board is constituted from the members of the board of trustees of Throop Institute. The donors of the fund are the late Eldridge M. Fowler, Mr. William Morgan, Mrs. Clara B. Burdette, Mr. William Stanton, Dr. Norman Bridge, Mr. H. T. Kendall, Mr. J. S. Torrance, Mr. J. D. Thomson and the F. and W. Thum Company, all of Pasadena, and one other.

Upon the death of Miss Olive Cleveland, in 1903, an agreement made with her by the Institute became

operative. It is to the effect that the income from a piece of property devised by her to this Corporation, and worth $20,000, shall be used in perpetuity to aid needy boys and girls in obtaining an education at Throop Institute. The particulars relating to this generous bequest may be learned upon application at the business office of the Institute.

Mr. John Wadsworth, one of the oldest members of the Board of Trustees in point of service, gave to the Institute several years ago income-producing property now worth about $30,000, thus founding the John Wadsworth Professorship of Mathematics.

In the year 1908 a generous friend purchased and gave to the Institute, at a cost of $50,000, a magnificient site of twenty acres within the limits of the city of Pasadena, for the accommodation of the new college buildings. The Academy will hereafter occupy the three buildings formerly used for Academy and College combined. Citizens of Pasadena have recently provided means for the construction of the great central building on the new campus, at a cost of not less than $160,000. It was for a while believed that this building could be completed for occupancy by the opening of the next school year in September; but the greatly enlarged plans of the Building Committee now render this doubtful. The erection of this great structure, comprising 800,000 feet of cubic contents, and fitted with modern equipment, marks a new era in the growth of the Institute; making feasible as it does the fulfilment of the plans of the Board of Trustees to develop in Southern California a great engineering school second to none in this country.

SCHOLARSHIPS

Through the generosity of some of the citizens of Pasadena, a number of 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 person desirous of extending the influence of the Institute in this way may obtain full information from the Secretary.

PRIZES

A first prize of fifteen dollars, and a second prize of ten dollars, offered by Fitz E. Beach, are awarded each year to the first and second best in a contest in declamation, the contestants being selected from the students in the Academy.

A gold medal offered by Dean Arthur H. Chamberlain is awarded each year to the member of the various Academy athletic teams maintaining the highest scholarship for the year.

A first prize of twenty-five dollars, a second prize of fifteen dollars and a third prize of ten dollars offered by Everett L. Conger, D. D., are awarded each year to the first, second and third best in an oratorial contest open to all students of the Institute. The orations are to be on either Universal Peace or Humane Education at the discretion of the faculty.

LIBRARIES

The books belonging to the Institute are located with reference to the convenience of students, special libraries being placed in the various department rooms. A general assortment is found in the main library room. The library receives regularly many periodicals, selected with especial reference to the work of departments.

The Pasadena Public Library, to which students have access, is situated near the Academy.

ADMISSION

Persons desiring to enter the Institute are required to furnish satisfactory evidence of good moral character and of honorable dismissal from the school last attended, together with statements from former schools or teachers showing in detail the amount and character of previous training. Blanks for this purpose will be furnished on request. To enter the Academy of the Institute one must be a graduate of the eighth grade of the public schools or have an equivalent preparation, and to enter the College he must be a graduate of some regularly accredited high school and offer such subjects as are indicated on page 14.

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 Institute is exceptionally good, and cases requiring severe discipline seldom occur. Any conduct harmful to the moral atmosphere of the Institute will render a student liable to dismissal. Parents may at any time be asked to withdraw from the Institute students whose work is unsatisfactory by reason of lack of diligence.

Disciplinary penalties involve the four grades of probation, suspension, dismissal and expulsion. Probation indicates that the student is in danger of exclusion, and that he is not permitted to represent the Institute on any public occasion. Suspension means exclusion for a definite period. Dismissal is exclusion for an indefinite period, with the presumption that the student's connection with the Institute will be ended by it. Expulsion, the highest academic censure, denotes final exclusion from the school.

ATHLETICS

Encouragement is given to athletics, and very careful supervision is kept over the various branches, the Athletic Director being a regular member of the Faculty and having direct control of all phases of the work. Students entering athletics are required to undergo a thorough medical examination. These examinations are given, without charge to the students, by the medical examiners of the Institute, Drs. E. B. Hoag and Edith J. Claypole.

Membership in any of the athletic teams is subject to forfeiture for failure in any regular line of school work.

The athletic grounds include a basket-ball court, two tennis courts, a field for baseball and football and an eight-lap running track.

An out-door gymnasium provided with good equipment is in daily use. Credits are given in the Academy, under certain regulations, for work in athletics.

ORGANIZATIONS

Several literary, debating, oratorical and musical organizations, with a Christian Association, are maintained by the students of the Institute with the cooperation of the Faculty, and are doing good work. Credits are given in the Academy, under certain regulations, for work in debate.

An association called the "Associated Students" aims to control affairs of general student concern and to deal with such matters of deportment and discipline as the Faculty may delegate to it. A fee of seventy-five cents per term for the use of the Association is levied upon all students, and is payable at the beginning of each term.

REGISTRATION AND PROGRAM

The last days of the summer vacation and the first day of each term are set apart for registration of students. A special registration fee of two dollars is charged all who register later than the first day of each term, of which there are two, beginning in September and February. The program of each student is made out only by the representative of the Faculty designated for that purpose. No student shall be enrolled by the Registrar without a card endorsed by such representative and also by the Business Agent. Each change of program shall be subject to such endorsement, and involves a fee of one dollar.

EXPENSES

With the exception of the fees mentioned under "Organizations" and "Registration," of which two are penalties that may be easily avoided, the Institute charges no fees apart from that for tuition. This is $100 a school year in all departments, collegiate and academic, regardless of the amount of work taken. The right is reserved, however, to collect costs of damage or waste from students who are careless or destructive about the shops, laboratories, or grounds. The tuition charge is payable in two equal parts, at the beginning of each term.

No reduction or refund is made to any student who may be suspended or expelled or who may leave school without a reason that shall be deemed valid by the Faculty Council.

The Institute maintains a Boarding Hall for a limited number of young men, where comfortable rooms, excellent table board, and the careful supervision of a representative of the Faculty living in the house, insure a good home for the occupants. The cost of these accommodations, including tuition, ranges

from $375 to $440 a school year, according to room chosen. Forty per cent. of the yearly rate is payable at the beginning of the first term, 40 per cent. prior to January 1st, and 20 per cent. prior to April 1st. No reduction is made for absences from the Hall of less than ten consecutive days.

A deposit of $5.00 is required of each occupant of the Hall, against which is charged costs, if any, of breakage and damage to property. Applicants for admission to the Hall must furnish satisfactory references as to character.

Good board elsewhere can be obtained at reasonable rates. Any change in boarding place must be immediately reported at the office.

A conveniently arranged lunch room is open daily for the accommodation of teachers and students, where well-cooked and wholesome dishes are served at noon at nearly cost prices. The benefit to health of providing students with hot and nourishing food is obvious.

The text-books used in the classes of the Institute may be purchased at the Institute book store at less than the usual retail prices.

GENERAL LECTURES

In co-operation with the Solar Observatory branch of the Carnegie Institution, the Institute offers a course of lectures each season of great value to students and townspeople. The course for 1908-09 embraced the following speakers and subjects:

Dr. George E. Hale, Mt. Wilson, California: "The Work of the Solar Observatory."

Prof. J. C. Kapteyn, the University of Groningen, Holland: "Studies on the Structure of the Universe."

Dr. Hale: "Solar Vortices and Magnetic Fields."

Professor Kapteyn: "The Trees as Weather Recorders."

Prof. Charles Frederick Holder, Pasadena: "Darwin's Birthday."

Dr. E. C. Moore, Los Angeles, California: "Mexico and its Schools."

President G. Stanley Hall, Clark University, Massachusetts: "Borderland Psychology."

President James A. B. Scherer, Throop Institute: "Shakespeare as a Teacher."

In addition to this course of lectures, the Assembly of students and Faculty on Friday mornings has been favored with lectures from a large number of distinguished visitors, including: Dr. Robert J. Burdette, Mrs. Burdette, the Hon. John Barrett, Dr. John Willis Baer, Dr. Winfred T. Grenfell, Dr. E. B. Hoag, Dr. Norman Bridge, Dr. James H. McBride, Dr. Matt. Hughes, Dr. Leslie E. Learned, Supt. A. L. Hamilton, Mrs. A. Bandini, Dr. D. K. Pearsons, John Burroughs, former Vice-President Fairbanks, Dr. F. J. Loba, Dr. Horace Porter.

The Friday lectures are free, attendance on assembly being compulsory. For the regular set series, a half-rate of one dollar is allowed to the students.

SCIENTIFIC RESEARCH

Through the kindness of an unfailing friend, Throop Institute shares with Johns Hopkins University and the Massachusetts Institute of Technology in an important undertaking directed by Mr. George W. Edmond, having as its main purpose scientific research in the unknown regions of the Mexican possession known as Lower California. Mr. Edmond is now engaged in his tour of exploration, and will ultimately make his reports under the auspices of the Institute. It is hoped that this is but the beginning of an active participation on the part of Throop Institute in the larger movements for the advancement of knowledge.

PART IV.

ROSTER OF STUDENTS, 1908-9

In the following Roster the letters E, G and F are used to designate respectively the Engineering, General and Fitting Courses already described; while Roman numerals from I. to IV. denote the class under each course to which the students belong. For example, "E II." indicates that the student is in the second or sophomore year of his collegiate course for the degree of B. S.; "G IV." that he is entitled to a Certificate of Proficiency at the approaching commencement; and "F I." that he is in the first year's class at the Fitting Academy.

Adney, Elsie Gertrude, F I.....Pasadena
Aldrich, Harry Manning, F I.....La Habra
Alexander, Max Hugo, F II.....Pasadena
Anderegg, Mae Haase, F II.....Pasadena
Anderson, Anne Elizabeth, G IV.....Santa Paula
Andrews, Raymond Daniel, F III.....Sierra Madre
Atterbury, Boudinot, F II.....Pasadena
Atwood, Amy Lovina, F I.....Pasadena
Austin, Dorothy Kathleen, F I.....Pasadena
Avakian, Garapet, F III.....Egder, Erivan, Russia
Bacon, Francis Romayne, F IV.....Los Angeles
Bailey, David Ross, F II.....Fair Oaks
Bailey, Robert John, F III.....Fair Oaks
Baker, Harold Underwood, F IV.....South Pasadena
Baker, Janet, G III.....Monrovia
Baldwin, Helen, F IV.....Kettle Falls, Wash.
Ballard, Emerette Grace, F I.....Radcliffe, Iowa
Bandini, Elliott, F I.....Pasadena
Bard, Richard, F III.....Hueneme
Bartle, Ruth, G I.....Pasadena
Batz, August, F III.....Bairdstown
Batz, Esperanza, F I.....Bairdstown
Beek, Joseph Allan, F III.....Pasadena

Behm, Fred William, F I.....Los Angeles
Bennett, Vera White, F I.....Pasadena
Bixby, Allen Bigelow, F IV.....Pasadena
Bond, Kenneth Bacon, F I.....Boston, Mass.
Boothe, Laurence Warrington, F II.....South Pasadena
Bowen, Virginia Keys, F III.....Pasadena
Bowman, Eunice Wright, F IV.....Pasadena
Boynton, Ralph H., G II.....Los Angeles
Bradfield, Oscar, F I.....Pasadena
Bradley, Anna Laura, F IV.....Pasadena
Brandt, Elsie, F II.....Pasadena
Brandt, Emil Charles, F III.....Pasadena
Brooks, Donald Beresford, G I.....Pasadena
Brown, Cedric Earl, G I.....Pasadena
Brugman, Vega Amend, G III.....Pasadena
Buffum, Cecil Oliver, F III.....Cambria
Bullock, Clarence Elisha, F II.....Rivera
Bundy, Ertle Mae, G III.....Pasadena
Burger, Florence Eula, F III.....Pasadena
Burnham, Jr., William Henry, F IV.....Orange
Burns, Charlotte Story Devereux, F I.....Alhambra
Burns, Shirley Devereux, F III.....Alhambra
Bush, Myrtle Eloise, F II.....Pasadena
Call, Raymond Fuller, F II.....Pasadena
Camp, Charles Lewis, F III.....Sierra Madre
Carkeek, Charles, F II.....Houghton, Mich.
Carkeek, Dudley, F I.....Houghton, Mich.
Carlson, Amy Adelaide, F II.....Seattle, Wash.
Carrington, Mayo Benjamin, F II.....Fowler
Carter, Scott, G II.....Pasadena
Chamberlain, Florence, F II.....Pasadena
Chapman, Alice Louise, F II.....Altadena
Chase, Mildred Sophia Lee, G III.....South Pasadena
Claberg, Clay, F IV.....Santa Paula
Clark, Charles H., F I.....Pasadena
Clark, Charles Laureston, F II.....Pasadena
Clark, Fred, F I.....Pasadena
Clark, Merton Hart, F I.....Sierra Madre
Clayton, Ednah Fae, G IV.....Whittier
Coatsworth, Margaret Reid, F II.....Buffalo, N. Y.
Colgan, Inda Evelyn, G III.....Sacramento
Compton, Fauntleroy Langstroth, F III.....Pasadena
Compton, Fay Irene, F I.....Pasadena

Condon, Walter Mills, F I.....Pasadena
Connor, Lyman Clark, F II.....Pasadena
Cook, Clark Keeler, F I.....Pasadena
Coolidge, Frances Emily, F II.....Pasadena
Cooper, Edith Marguerite, G III.....Salem, Ohio
Cooper, Howard Edwin, F II.....La Canada
Coulston, John Thomas, F I.....Pasadena
Crippen, Roy Daniel, G I.....San Diego
Crowley, James Phillip, F II.....Visalia
Curtis, Myrtle Lucile, F II.....Pasadena
Darmody, Thomas Joseph, F I.....Los Angeles
Davis, Charles Merritt, F IV.....Pasadena
Davis, Emma Josephine, G III.....Pasadena
Davis, Richard Green, F II.....Pasadena
Dexter, Constance Lucretia, F III.....Pasadena
Dickson, Grace Anna, G III.....Los Angeles
Dimmick, Walter Lloyd, E I.....Carpinteria
Duarte, Pedro Enrique, F I.....Agana, Isle of Guam
Dudley, George Martin, F I.....San Ardo
Duke, Woodward Washington, F I.....Durham, N. C.
Dunham, Edward, F I.....Pasadena
Dunlap, Gladys Alice, G III.....Pasadena
Dunn, Margeurite Isis, F II.....South Pasadena
Dunn, Mignonette Irene, F I.....South Pasadena
Earley, George Curtis, F III.....Pasadena
Eaton, Burdick, F III.....Pasadena
Eddy, Jerome Orrell, F I.....Pasadena
Edwards, Noel Condiff, G IV.....Los Angeles
Eliel, Leon Theodore, F I.....Pasadena
Eliel, Paul, G I.....Pasadena
Ellis, Sidney Hemenway, F IV.....La Canada
Failing, Frederick Ellison, F I.....Portland, Ore.
Failing, Kate Whittlesey, G III.....Portland, Ore.
Fennessey, Effie Dorothea, G IV.....Avon, Ill.
Fleming, George Adair, F I.....Rhyolite, Nev.
Foster, Madeline, F I.....Pasadena
Ford, Jay Banbury, F II.....Pasadena
Fox, Auburn Grant, F I.....Pasadena
Freeman, Ernest Irven, E I.....Fallbrook
Frost, Jack Arthur, F I.....Los Angeles
Furneaux, John Elson, F III.....Sierra Madre
Gammon, Vera, F I.....San Rafael Heights
Gardiner, Everett S., F III.....Pasadena

Gartz, Jr., Adolph Frederick, F I.....Altadena
Gaut, Charlotte, F II.....Pasadena
Geohegan, Joseph, F III.....Pasadena
Geohegan, William, F II.....Pasadena
George, Sada, G IV.....Whittier
Gerberding, Christian Otto, F II.....Hueneme
Gerckens, Henry Bernhart, F III.....Los Angeles
Gerhart, Ray, F IV.....Santa Ana
Gibson, Merrill Essington, E I.....Los Angeles
Gildey, Hazell Dorothy, G I.....Waupun, Wis.
Gird, Dorothy Madge, F IV.....Los Angeles
Glass, Dudley Richard, F III.....Pasadena
Godbe, Earl Thompson, E I.....Los Angeles
Godbe, Warren Charles, E II.....Los Angeles
Gorrochotegui, Gabriel Z., F I.....Tuxpam, Veracruz, Mex.
Graves, Marcia Lee Howard, F IV.....Pasadena
Green, Allen Wilbur, F I.....Pasadena
Green, Percy Bartlett, F III.....Pasadena
Green, Thomas Edward, F IV.....South Pasadena
Greenlaw, Amy Locke, G IV.....Sacramento
Greenleaf, May, G IV.....Upland
Gregg, Gladys Louise, F III.....Los Angeles
Gridley, Wayne Edward, F III.....Santa Barbara
Gross, Anna Rew, G IV.....Evanston, Ill.
Grover, Richard Blow, F II.....Pasadena
Guillou, Rene, F III.....Pasadena
Guirado, Alonzo, G III.....Los Angeles
Gurley, Leslie, F II.....Alhambra
Haase, Minnie, F II.....Pasadena
Hall, Helen Genevive, G IV.....Bostonia
Hall, William Benjamin, F I.....Ocean Park
Halliwell, Pauline, F III.....Chicago, Ill.
Hamlin, Thornton, F I.....Pasadena
Hampton, Jack Ellis, G I.....Hollywood
Harker, Harry, E II.....Pomona
Harris, Arthur Nelson, F III.....Los Angeles
Harris, Benjamin Harrison, F I.....Redlands
Harris, Elwin Marshall, F III.....Pasadena
Harris, Leon Milton, F III.....Pasadena
Harris, Madelein Mary, F IV.....Pasadena
Harris, Roy Witham, F IV.....Pomona
Harrison, Ben Demas, G III.....Pasadena
Hatch, Jr., Oscar Cutler, F I.....Pasadena

Hatfield, Frederick Basley, F III.....Sierra Madre
Hawkins, Harold Fuller, F IV.....Pasadena
Hay, Alice, G III.....Los Angeles
Hayes, Ben, E I.....El Monte
Henderson, Earl James, F I.....San Francisco
Herd, Clifton Bradford, F I.....Pasadena
Hertel, Anita Marion, F III.....Pasadena
Hester, George Knight, F IV.....Pasadena
Higgins, Jr., Harvey Alexander, F IV.....Pasadena
Hill, Erle Gladstone, E I.....Pasadena
Hill, Harold Curtis, E II.....Pasadena
Hill, James, F IV.....Carpinteria
Hinton, Frederick Thompson, F I.....Sierra Madre
Hoagland, William Glessner, E I.....Duarte
Hoffman, John Roy, F II.....South Pasadena
Hoffman, Laura, F II.....South Pasadena
Hoffner, George Henry, F I.....Pasadena
Hoover, Harold Otto, F II.....Pasadena
Hopf, Naomi Josephine, F III.....San Mateo
Hopwood, Clyde Charles, F II.....Pasadena
Hovey, Chester Raymond, F IV.....South Pasadena
Hubbard, Lois May, F II.....Pasadena
Huff, Malcolm, G IV.....Abingdon, Ill.
Hughes, Blakeney, F III.....Pasadena
Humphrey, Norman Egbert, E II.....Orange
Hunter, Paul Mallers, F III.....Pasadena
Hyde, Franklin Benjamin, F I.....Pasadena
Hymer, Chester Wilmer, F I.....Goldroad, Ariz.
Janes, Elizabeth Irene, F II.....Pasadena
Johnson, Wilbur Wallace, F III.....Pasadena
Johnston, Frederick Leroy, F I.....Acton
Jones, Lawrence M., F IV.....Joliet, Ill.
Jones, Leslie Harry, F I.....Los Angeles
Jones, Ralph, F III.....Pasadena
Judd, George Thomas, F III.....Pasadena
Judd, Harriet Stewart, F IV.....Pasadena
Juncal, Juan, F I.....Tuxpam, Veracruz, Mexico
Kellogg, Florence Ellen Scripps, F IV.....Altadena
Kendall, Ella Frances, F III.....Pasadena
Kershaw, Adolphus, F II.....Sierra Madre
Knapp, Ben Dewitt, F I.....Pasadena
Koch, Adolph Henry, F III.....Pasadena
Koch, Martha Wilson, G III.....Bozeman, Mont.

Komoda, Henry Hanjero, F III.....Tokyo, Japan
Krafft, Earl Adolf, F III.....Sierra Madre
Kuencer, Charles Wendell, F III.....South Pasadena
Kuencer, Walter Emil, F III.....South Pasadena
Lacy, Richard William, F I.....South Pasadena
Lee, Sara Blanche, F III.....Pasadena
Le Grand, George Washington, F I.....Pasadena
Le Grand, Jr., Richard Virginius, F II.....Pasadena
Leonard, Frank William, F II.....San Bernardino
Lewis, Stanley Morton, E II.....Herbst, Ind.
Leyden, Edward Asher, F I.....Reforma, Mexico City, Mex.
Liddle, Maude Goodwin, G IV.....Cedar Rapids, Iowa
Linnard, LeRoy, F III.....Pasadena
Lippincott, Rose Harriet, F III.....Los Angeles
Lombard, Jr., Charles Sumner, F I.....Redlands
Lombard, Norman Mitchell, F I.....Redlands
Lowther, George Chambliss, F I.....Altadena
Loy, Edgar Monfort, F I.....Pasadena
Lutz, Arthur John, F I.....Los Angeles
Lytle, William Clayton, F I.....Mojave
Magill, Mervyn, F II.....Pasadena
Manasse, Ryta Elois, G III.....Hanford
Martin, Allan Lee, F II.....Pasadena
Matthews, Rudy Dole, F III.....Pasadena
McCament, Jessie, F III.....Pasadena
McCasland, Julia Elizabeth, F III.....Pasadena
McCurtain, Frank, E I.....Salt Lake City, Utah
McKellar, Stanley, F II.....Pasadena
McKinley, Thomas James, F III.....Pomona
McKinlock, Guillaume, F I.....Pasadena
McLeod, Roy, F I.....Pomona
McNally, George Henry, F I.....Toronto, Canada
Mears, Emeline, G I.....Osceola, Wis.
Mears, Henriette Amelia, G I.....Osceola, Wis.
Merriam, Ralph T., F II.....Pasadena
Merrifield, John Dodge, E I.....Lindsay
Miller, Aurora May, F III.....Pasadena
Miller, F. Curt, E II.....Tempe, Ariz.
Miller, Lawrence Goodwin, F I.....Pasadena
Moffatt, Howard Lee, F III.....Rialto
Morgan, Edwin Marshall, F III.....Paicenes
Moriguchi, Kumataro, F I.....Tokyo, Japan
Myrick, Jr., Walter Asbury, F III.....Beaumont, Texas

Nash, Clara, G III.....Pasadena
Needham, Anne, F I.....Carthage, Mo.
Nevenzel, Gladys Margaret, G III.....Los Angeles
Nichols, George Page, F III.....Pomona
Nichols, Ross Martin, G III.....Pasadena
Nichols, Vera Rhoena, F IV.....Pasadena
Nichols, Vernon Garrett, G III.....Pasadena
Nix, Harold Stanley, F I.....Los Angeles
Obear, William Frank, F I.....Los Angeles
Odwarker, Ralph Benjamin, F I.....Sierra Madre
Okazaki, Kamijiro, G I.....Tokyo, Japan
Oneal, Charles Herbert, G I.....Pasadena
Osburn, Pingree, F I.....Pasadena
Osuyos, Basilio Fuentes, F II.....San Diego
Palmateer, Seldon Dow, F I.....Pasadena
Parker, Oliver Jay, F III.....Pasadena
Parker, Pauline Mary, G III.....Los Angeles
Parkes, Roy Braik, F III.....Pasadena
Patterson, Forrest Ashmond, F III.....Los Angeles
Paxton, Clara E. B., G III.....Rivera
Payson, Kenneth, F I.....Pasadena
Payson, Samuel Edward, F I.....Pasadena
Peabody, Dora Mildred, F III.....Pasadena
Perkins, Jephena, G IV.....Flagstaff, Ariz.
Peycke, Armand Hawkins, G II.....Chicago, Ill.
Pierson, Alfreda Moss, F III.....South Pasadena
Pool, Roydon Oliver, F I.....Sierra Madre
Powell, Eyre, F III.....Pasadena
Procter, Gilbert, F I.....Santa Monica
Putnam, Elizabeth Ernestine, F II.....Pasadena
Randolph, McClew Nelson, F I.....Pasadena
Reed, Rhoda Ramona, F IV.....Pasadena
Reynolds, Margaret, F II.....Pasadena
Reynolds, Susan Claire, G IV.....Burlington, Vt.
Rice, Meta Cleora, G IV.....Sierra Madre
Ricker, Claire William, F III.....Pasadena
Ridenour, Charles Krouff, F IV.....Hackberry, Ariz.
Rider, Almah Lord, F III.....Pasadena
Rider, Marian Edith, G III.....Watsonville
Rieson, Alvin, F III.....Monrovia
Risdon, Edward Hamilton, F I.....Pasadena
Ritchey, Willis Gray, F III.....Pasadena
Ritter, Jr., Joseph Maxfield, F II.....Philadelphia, Pa.

Robbins, Wilma, F III.....Pasadena
Robin, Harold de J., F I.....Porterville
Robinson, Everett Waldo, F I.....Los Angeles
Rorick, Walter Blaine, F I.....Pasadena
Ross, Bessie Spiers, F III.....Pasadena
Ross, Donald Stanford, F III.....Pasadena
Ross, Leopoldo Charles, F I.....Los Angeles
Rust, Otto Percival, F III.....Anaheim
Sage, Aldis E., F I.....Pasadena
Salisbury, Arnold Cedric, F II.....South Pasadena
Savage, Leora Elizabeth, F II.....Pasadena
Savage, Lillian, F I.....Pasadena
Sawyer, Laura Marie, G III.....San Francisco
Schaetzel, Julius, F I.....South Pasadena
Schrock, Effie Irena, G IV.....Pasadena
Schweikert, Josephine, F I.....Lamanda Park
Seymour, Alva Noble, F I.....Denver, Colo.
Seymour, Edgar Asa, F I.....Denver, Colo.
Sheldon, Ella Nora, G III.....San Diego
Shlaudeman, Mildred, F I.....Pasadena
Shrode, Jacob Loyd, F I.....Long Beach
Shute, Sidney, G III.....San Gabriel
Simpson, Earle Henry, F I.....South Pasadena
Simpson, Ralph Townsend, F III.....South Pasadena
Sinclair, Freeman William, F II.....Pasadena
Slavin, Sara, F III.....Pasadena
Smith, Charles Warren, F III.....Pasadena
Smith, Charlotte E., F I.....Montpelier, Vt.
Smith, Joshua Clark, F III.....Pasadena
Smith, Lucy Marceline, F III.....Pasadena
Smith, Phoebe Jane, G III.....Manhattan, Kan.
Sprague, Edgar Leon, F III.....Pasadena
Stacy, Edward Wick, F II.....Niles City, Mont.
Stambach, Elise, F III.....Pasadena
Stambach, George Mahlon, F I.....Pasadena
Stewart, James Rees, F I.....Sierra Madre
Stokes, Herbert, F III.....South Pasadena
Stormer, Carl Ferdinand, F II.....Pasadena
Street, Fay Arlington, F I.....Ashland, Wis.
Strieff, Roberta Florence, F II.....Pasadena
Stringfield, Lydia Alberta, G IV.....San Luis Obispo
Sutliff, Helen Phoebe, F I.....Pasadena
Sutliff, Helene Barnard, G III.....Sacramento

Tantau, Louise Brier, F II.....Pasadena
Taylor, Archie Allerton, F II.....Sully, Iowa
Taylor, Fletcher Brandon, F IV.....Pasadena
Taylor, Flora Eleanor, F II.....Pasadena
Taylor, John M., F II.....Altadena
Taylor, Ralph, F II.....Susanville
Thompson, Maurice, F II.....Pasadena
Thornburg, Max Weston, F II.....Sierra Madre
Thornburg, Wayne Wright, F I.....Sierra Madre
Toon, Lester Fernly, F I.....Portland, Ore.
Truesdale, Langdon, F II.....Minneapolis, Minn.
Tufts, Herbert William, F IV.....Sierra Madre
Tweedy, Hazel Jewel, F III.....Compton
Twinting, Sadie, G III.....Pasadena
Vallee, Paul, F II.....San Gabriel
van Rossem, Adriaan Joseph, F I.....Pasadena
Van Scoyoc, Lloyd, F IV.....Los Angeles
Vessey, Elton, F I.....Pasadena
Vinson, Thomas Newcome, F II.....Pasadena
Wadsworth, Joseph Hilton, F III.....Pasadena
Ward, Royal Vincent, E III.....Pasadena
Wardall, Mildred, G III.....Monrovia
Warren, Charles Mavro, F III.....Glendora
Warren, William Halford, F III.....Glendora
Weatherby, Harold Lerow, G IV.....Pasadena
Weik, Fred, F II.....Pasadena
Welch, Brian Kennicott, F II.....Pasadena
Wells, Albert William, F III.....Pasadena
Wetherby, Henry Visscher, F I.....Pasadena
Wheeler, Mildred Lucile, F II.....Redlands
White, Anita, F I.....San Gabriel
White, George Cossitt, F II.....Pasadena
White, Walter, F I.....Pasadena
Whitney, Joseph Ware, F II.....Pasadena
Whitney, Margaret Ware, G I.....Pasadena
Willoughby, George Dorance, F I.....Los Angeles
Wilson, Bessie Catherine, F III.....Colorado Springs, Colo.
Winston, Ralph Pettus, F I.....Pasadena
Wold, Paul, F III.....Pasadena
Wood, Herbert Sidney, E I.....Los Angeles
Wood, William Stanley, F IV., G IV.....Brooklyn, N. Y.
Woodbury, Walter Willfred, F II.....Pasadena
Woodworth, Wendell Albert, F II.....Pasadena

Wright, Edward Prescott, F II.....Pasadena
Wright, Jr., Ernest Neall, F II.....Pasadena
Wright, Howard Walter, F II.....Pasadena
Yale, Charles, F I.....Pasadena
Yewell, Paul Ridout, F II.....Sespe
Young, George Beaumont, F II.....Pasadena

SUMMARY

Total enrollment for year.....373
Young men 255
Young women 118
States represented 23
Foreign countries represented 5