

M. I. T. ANNUAL CATALOGUES AND BULLETINS

1889/90

01 OF 03

MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY,  
BOSTON.



ANNUAL CATALOGUE.

1889-1890.

MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY,  
BOSTON.

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TWENTY-FIFTH  
ANNUAL CATALOGUE  
OF THE  
OFFICERS AND STUDENTS,  
WITH  
A STATEMENT OF THE COURSES OF INSTRUCTION  
AND A LIST OF THE ALUMNI.



1889-1890.

JOHN WILSON AND SON.  
University Press, Cambridge.  
1889.

### CALENDAR FOR 1889-90.

School year began . . . . .	Monday, Sept. 30, 1889.
Second term will begin . . . . .	Tuesday, Feb. 4, 1890.
Degrees conferred . . . . .	Tuesday, June 3, 1890.
First Entrance Examinations . . . . .	{ Thursday, June 5, 1890, and Friday, June 6, 1890.
Second Entrance Examinations . . . . .	{ Tuesday, Sept. 23, 1890, and Wednesday, Sept. 24, 1890.
Examinations for Advanced Standing . . . . .	Thursday, Sept. 25, 1890.
School year of 1890-91 will begin . . . . .	Monday, Sept. 29, 1890.

### CALENDAR FOR 1890-91.

School year will begin . . . . .	Monday, Sept. 29, 1890.
Second term will begin . . . . .	Tuesday, Feb. 3, 1891.
Degrees conferred . . . . .	Tuesday, June 2, 1891.
First Entrance Examinations . . . . .	{ Thursday, June 4, 1891, and Friday, June 5, 1891.
Second Entrance Examinations . . . . .	{ Tuesday, Sept. 22, 1891, and Wednesday, Sept. 23, 1891.
Examinations for Advanced Standing . . . . .	Thursday, Sept. 24, 1891.
School year of 1891-92 will begin . . . . .	Monday, Sept. 28, 1891.

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Meetings of the Corporation . . . . .	{ Oct. 9 and Dec. 11, 1889. March 12 and May 30, 1890.
Stated Meetings of the Executive Committee of the Corporation }	. . . . . First and third Tuesday of every month.



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## MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

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**Historical Sketch.**— The foundation of the Massachusetts Institute of Technology was laid in a report by Prof. William B. Rogers, entitled "Objects and Plan of an Institute of Technology, including a Society of Arts, a Museum of Arts, and a School of Industrial Science." A charter for the institution thus projected was granted by the Legislature of Massachusetts in an Act dated April 10, 1861. In this charter, the threefold plan outlined by Professor Rogers, who became the first President of the Institute of Technology, was preserved.

**The School of Industrial Science**, developed along the lines indicated at its foundation, has become the prominent feature of the work of the Institute; and, indeed, nearly all persons know it, and it alone, as the Institute. The present publication is thus of necessity mainly a catalogue of its courses of study, officers, and students. The School was opened in February, 1865, with twenty-seven pupils. It is devoted to the teaching of science as applied to the various engineering professions, viz., civil, mechanical, mining, electrical, chemical, and sanitary engineering, as well as to architecture, chemistry, metallurgy, physics, and natural history. Courses of a less technical nature, designed as a preparation for business callings, and a course preparatory to the professional study of medicine, are also given.

A Subsidiary School, known as the **LOWELL SCHOOL OF PRACTICAL DESIGN**, is maintained by the Corporation of the Institute. A statement of its scope and organization, with a list of present students, will be found on pages 156 to 159.

**The Society of Arts** held its first meeting on April 8, 1862. Its objects are to awaken and maintain an interest in the practical sciences, and to aid in their advancement. Meetings are held semi-monthly from October to May, at which inventions, discoveries, and matters of scientific and technical interest are presented. Its "Proceedings," with a list of its officers and members, are annually published. All communications concerning the Society should be addressed to the Secretary of the Society of Arts, Massachusetts Institute of Technology.

**Buildings.** — The buildings now occupied are, — the Rogers Building, on Boylston Street, devoted to instruction in mathematics, literature, history, political science, geology, mineralogy, and biology; the New Building, corner of Boylston and Clarendon Streets, mainly devoted to the departments of chemistry, physics, electricity, and architecture, and to instruction in language; the Engineering Building, on Trinity Place, devoted to the engineering laboratories and to instruction in mechanics and hydraulics, and in mechanical and civil engineering; a series of Workshops, on Garrison Street, with a room devoted to the Lowell School of Design; a Gymnasium and Drill-hall, on Exeter Street.

## Members of the Corporation.

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### Secretary and Treasurer.

LEWIS WM. TAPPAN, JR.

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HON. MARCUS MORTON, *Chief Justice of the Supreme Court.*  
HON. JOHN W. DICKINSON, *Secretary of the Board of Education.*









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*Instructor in English and History.*
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*Assistant in Physics.*
- WILLIAM E. MOTT, S. B.,  
*Assistant in Civil Engineering.*
- FRANK E. SANBORN, S. B.,  
*Assistant in Descriptive Geometry and Freehand Drawing.*
- FRANK H. THORP, S. B.,  
*Assistant in Industrial Chemistry.*
- HORACE P. EDGETT,  
*Assistant in Mathematics.*

## THE INSTRUCTORS AND ASSISTANTS IN THE MECHANIC ARTS ARE :

- THEODORE B. MERRICK,  
*Instructor in Wood-work and Foundry-work.*
- JAMES R. LAMBIRTH,  
*Instructor in Forging.*
- ROBERT H. SMITH,  
*Instructor in Machine-Tool work.*
- CHARLES H. WESTCOTT,  
*Assistant in Wood-work.*
- MARK W. ROYCE,  
*Assistant in Machine-Tool work.*
- WILLIAM C. STIMPSON,  
*Assistant in Forging.*

## LECTURERS FOR THE CURRENT YEAR.

- JOHN C. GRAY, A. M., LL.B., *on Business Law.*
- GEORGE W. BLODGETT, S. B., *on Applications of Electricity to Railway Working.*
- HENRY M. HOWE, A. M., S. B., *on Metallurgy.*
- ROSS TURNER, *on Water Color and Sketching.*
- CHARLES W. HINMAN, S. B., *on the Manufacture of Illuminating Gas.*
- WALTER S. ALLEN, S. B., *on the Manufacture of Fertilizers.*
- DAVID A. GREGG, *on Pen and Ink Drawing.*
- ANTHONY C. WHITE, S. B., *on the Distribution of Electricity for Commercial Purposes.*
- EDWARD BLAKE, Ph.B., *on the Construction and Applications of Electromotors.*
- EDWIN O. JORDAN, S. B., *on Biology.*



## Faculty.

---

FRANCIS A. WALKER, *President.*

JOHN D. RUNKLE.	SILAS W. HOLMAN.
GEORGE A. OSBORNE.	WEBSTER WELLS.
ROBERT H. RICHARDS.	LEWIS M. NORTON.
WILLIAM H. NILES.	PETER SCHWAMB.
CHARLES R. CROSS.	CECIL H. PEABODY.
GAETANO LANZA.	C. FRANK ALLEN.
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ALPHONSE N. VAN DAELL.	WILLIAM O. CROSBY.
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WILLIAM T. SEDGWICK.	DWIGHT PORTER.

HEINRICH O. HOFMAN.

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HARRY W. TYLER, *Secretary.*

## Courses of Instruction.

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THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY provides an extended series of scientific and literary studies, and of practical exercises. The courses of study include the Physical, Chemical, and Natural Sciences and their applications; Pure and Applied Mathematics; Drawing; the English, French, German, and other Modern Languages; History; Political Science; and International and Business Law. These studies and exercises are so arranged as to afford a liberal and practical education in preparation for active pursuits, as well as a thorough training for most of the scientific professions. The positions and the character of the work for which these prepare the graduates are best shown by the record of the present occupations of graduates (see page 5).

**Regular Courses.** — The following regular courses of study, each of four years' duration, have been established; and for proficiency in any one of them, the degree of Bachelor of Science (S. B.) in the course pursued is conferred. Descriptions of the courses are given on the pages referred to.

	PAGE
I. CIVIL AND TOPOGRAPHICAL ENGINEERING . . . . .	24
II. MECHANICAL ENGINEERING . . . . .	26
III. MINING ENGINEERING AND METALLURGY . . . . .	28, 30
IV. ARCHITECTURE . . . . .	32
V. CHEMISTRY . . . . .	34
VI. ELECTRICAL ENGINEERING . . . . .	36
VII. BIOLOGY . . . . .	38
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IX. GENERAL COURSE . . . . .	42
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XI. SANITARY ENGINEERING . . . . .	46



**Schedules and Descriptions of the Courses.** — The following pages contain schedules showing the distribution of studies throughout each of the regular courses. Each schedule is preceded by a brief description.

The first year for all courses is the same (see page 23), and contains subjects which are considered essential as preliminary training, or as a foundation for the more strictly professional studies of the later years of all courses. At the end of the first year the regular student selects the course which he will pursue during the remaining three years, and his work becomes more specialized thereafter as it progresses.

An idea of the nature and amount of the work to be done in any one of the regular courses may be obtained by considering, in connection with the schedule of that course (pages 25 to 47), the statements made in regard to the various branches of study (*e. g.*, Mathematics, Language, Chemistry, Physics, etc.) in the paragraphs descriptive of the "Methods and Apparatus of Instruction," pages 60 to 91, and by referring at the same time to the "Schedule of Topics," pages 92 to 112. The numbers in the course schedules correspond with those in the first column of the "Schedule of Topics."

**Options.** — Within each of these regular courses the student is given a considerable latitude in the selection of the branch of his intended profession to which he will specially devote his energies in the later years of his study. This is accomplished by means of lines of options. Thus in Civil Engineering, page 25, he may elect Sanitary and Hydraulic Engineering, Geodesy, or an advanced Course in Railroad Engineering and Management; in Mechanical Engineering, page 27, he may choose either Marine Engineering, Locomotive Construction, or Mill Engineering; and similarly for other courses. Inspection of the course — descriptions and schedules, pages 24 to 47 — will show the nature and effect of the options. In some cases the selection of later options is positively determined by the earlier ones, owing to the requirement of certain subjects as preparation for

the former; in others, a wide choice is offered throughout all the years, the difference in this respect arising largely from the nature of the topics involved. In all cases the necessary sequence of subjects may be determined by consulting the Schedule of Topics, pages 92 to 112.

**Advanced Courses** of study may be pursued either with or without reference to the advanced degrees authorized by the Corporation. (See page 48.)

**Five-Years' Course.** — Students purposing to take the degree of the Institute, but for exceptional reasons finding it advantageous to follow fewer studies at once than are prescribed in the schedules for the regular four-years' courses, may pursue a course arranged to distribute the entire work over five instead of four years. A further statement of the five-years' courses may be found at page 48.

**Methods and Apparatus of Instruction.** — The statements on pages 60 to 91 supply a general outline of the character and methods of instruction given, and of the equipment of the laboratories, museums, and libraries, which form conspicuous features in the work of the Institute.

**The Schedule of Topics** gives information as to the nature, number, and period of occurrence of exercises in any particular topic, the name of the instructor, and the preparation required for admission to exercises in that subject. This is particularly of service to the regular student in selecting options, and to the special student in affording the means of ascertaining precisely what instruction is given in any topic which he may desire to pursue, when, at what length, and by whom it is treated, and exactly what preparation will be demanded of every applicant for the topic considered. By careful consultation of this schedule the special course may be so planned that the earlier studies shall afford suitable preparation for the more advanced work towards which the course is directed. (See page 92.) The numbers in the left-hand column of the schedule correspond with those in the several course schemes, pages 23 to 47.

## REGULAR COURSES.

*SCHEDULES OF PRESCRIBED AND OPTIONAL STUDIES.*

## FIRST YEAR.

## COMMON TO ALL REGULAR COURSES.

FIRST TERM.		SECOND TERM.	
	Number		Number
Solid Geometry . . . . .	16	Plane and Spherical Trigonometry . . . . .	18
Algebra . . . . .	15	General Chemistry . . . . .	125
General Chemistry . . . . .	125	Chemical Laboratory . . . . .	125
Chemical Laboratory . . . . .	125	Political History since 1815 . . . . .	85
History of the English Language, and English Composition . . . . .	55	French (or German) . . . . .	70 (74)
French (or German) . . . . .	70 (74)	Mechanical Drawing . . . . .	50
Mechanical Drawing . . . . .	50	Freehand Drawing . . . . .	51
Freehand Drawing . . . . .	51	Military Drill.	
Military Drill.			

For descriptions of the methods, etc., used in the above instruction, see pages 60 to 64, and page 90.

NOTE.—The numbers opposite the various subjects in the course schemes are those of the corresponding titles in the Schedule of Topics, pages 94 to 112, to which reference may thus be easily made, for further details.

## I.—CIVIL ENGINEERING.

This course is designed to give the student a sound training, both theoretical and practical, in the sciences and principles upon which the practice of civil engineering is based. Particular care is taken to enforce the practical application of the principles taught; and the student is made familiar with the instruments and the problems of general occurrence. The fourth year is devoted to purely professional work.

The rapid specialization now going on in the various departments of civil engineering renders it desirable that students should be allowed some choice in the direction of their more advanced studies. The course therefore offers, principally in the fourth year, a selection among three options or lines of study,—namely, a general course in Civil Engineering; a course in which more than usual attention is devoted to roads, railroads, and railroad management; and a course giving special attention to geodesy, geology, and topography.

The more purely professional work is divided as follows: In the second year an extended course in elementary surveying, with practice in the field and work in the drawing-room, prepares the student for the more advanced work to follow; the subjects of topographical drawing and descriptive geometry are also completed. In the third year the subjects of railroad engineering, stereotomy, and advanced surveying, together with the elements of construction, design, and the strength of materials, are taken up. In the fourth year the student completes the courses on bridges, hydraulics, sanitary engineering, design, and strength of materials, as well as the advanced courses in railroads and geodesy. Students in this course also receive a certain amount of instruction in the principles of mechanism, and in machinery and motors.

In the summer vacation following the third year, students taking the geodetic option are required to devote several weeks to field-work in geology, topography, and geodesy.

Descriptions of the methods and nature of instruction in the several professional topics will be found on pages 70 to 75.

**I.—CIVIL ENGINEERING.**

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

**SECOND YEAR.**

FIRST TERM.		SECOND TERM.	
	Number		Number
Surveying and Plotting . . . . .	200	Surveying and Plotting . . . . .	200
Topographical Drawing . . . . .	203	Differential Calculus . . . . .	22
Descriptive Geometry . . . . .	52	Physics . . . . .	155
Descriptive Astronomy . . . . .	156	Physical Geography . . . . .	360
Analytic Geometry . . . . .	20	English Literature . . . . .	56
Physics . . . . .	155	German . . . . .	73
Political Economy . . . . .	95	<i>Options.</i>	
German . . . . .	73	1, 2. Principles of Mechanism . . . . .	247
		3. Mineralogy . . . . .	291

**THIRD YEAR.**

FIRST TERM.		SECOND TERM.	
Railroad Engineering, with Field-work and Drawing . . . . .	206, 208	Railroad Engineering, with Field-work and Drawing . . . . .	206, 208
Stereotomy . . . . .	212	Advanced Surveying . . . . .	204
Advanced Surveying . . . . .	204	Elements of Construction . . . . .	219
Integral Calculus . . . . .	23	Elementary Design . . . . .	220
General Statics . . . . .	41	Spherical and Practical Astronomy . . . . .	40
Physics: Heat . . . . .	159	Physical Laboratory . . . . .	160
Physical Laboratory . . . . .	160	Historical Geology . . . . .	364
Structural Geology . . . . .	361	German . . . . .	74
German . . . . .	74	Strength of Materials, Kinematics, and Dynamics . . . . .	42
English . . . . .	57		

**FOURTH YEAR.**

FIRST TERM.		SECOND TERM.	
Theory of Structures . . . . .	221	Theory of Structures . . . . .	221
Bridges and Roofs . . . . .	222	Bridges and Roofs . . . . .	222
Hydraulics . . . . .	213	English . . . . .	57, 124
Sanitary Fieldwork and Hydraulic Measurements . . . . .	218	Thesis Work.	
Strength of Materials, Theory of Elasticity . . . . .	43	<i>Options.</i>	
Metallurgy of Iron . . . . .	294	1. { Hydraulic Engineering . . . . .	217
<i>Options.</i>		{ Machinery and Motors . . . . .	44
1. { Sanitary Engineering . . . . .	214	{ Bridge and Sanitary Design . . . . .	223, 215
{ Bridge Design . . . . .	223	{ Bacteriology . . . . .	390
{ Railroad Management . . . . .	211	{ Railroad Engineering . . . . .	210
{ Railroad Engineering . . . . .	210	2. { Machinery and Motors . . . . .	44
2. { Railroad Management . . . . .	211	{ Bridge Design . . . . .	223
{ Bridge Design . . . . .	223	{ Hydraulic Engineering . . . . .	217
{ Least Squares . . . . .	30	3. { Geodesy and Map Projection . . . . .	205
3. { Geodesy . . . . .	205	{ Design.	
{ Physical Laboratory . . . . .	170	{ Differential Equations . . . . .	29



## II.—MECHANICAL ENGINEERING.

The course aims to equip the student with such training in pure and applied mathematics as shall qualify him to deal with the engineering problems of his profession from the most favorable standpoint. It attempts by instruction, both theoretical and practical, to acquaint him with engineering practice, and to give him a proper ground-work upon which to base a professional career. The more strictly professional work of the course may be classified as follows:—

Mathematics, physics, and applied mechanics, given outside the department; the last including the study of and practice in testing the strength of materials.

Recitation-room work of the department proper, beginning with a study of the principles of mechanism, the construction of gear-teeth, etc., and continued by courses on machine-tools and cotton machinery. Courses are given on the slide-valve and link-motion, thermodynamics, theory of the steam-engine, and on steam-boilers. The fourth-year instruction includes such mechanical engineering subjects as dynamometers, governors, fly-wheels, springs, effect of reciprocating parts of engines, injectors, steam-pumps, cylinder condensation, hydraulics, and hydraulic motors, etc. The option is given of courses in marine engineering, locomotive construction, and mill engineering.

Drawing-room work. The students in the second year make working-drawings from measurements, and the drawings necessary in connection with the course in mechanism and gear construction. In the third year they make detail and assembly drawings from machinery, and this is followed by mechanism designs and boiler drawings. In the fourth year a course in machine design is given.

Shop-work, including carpentry, pattern-making, forging, chipping, filing, and machine-tool work.

Engineering laboratory work. This begins with drill in steam-engine tests in the second term of the third year, and is continued throughout the fourth year, including tests of boilers, pumps, power, etc., and a large amount of investigation. (See pages 60, 61, 70, 75-78.)

**II.—MECHANICAL ENGINEERING.**

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

**SECOND YEAR.**

FIRST TERM.		SECOND TERM.	
	Number		Number
Principles of Mechanism . . . . .	240	Construction of Gear-teeth	} 245
Drawing . . . . .	242	Mechanism of Mill Machinery	
Carpentry and Wood-turning (shopwork) . . . . .	263	Mechanism of Shop Machinery	
Analytic Geometry . . . . .	20	Drawing . . . . .	242
Descriptive Geometry . . . . .	52	Pattern Work (shopwork) . . . . .	264
Physics . . . . .	155	Differential Calculus . . . . .	22
Political Economy . . . . .	95	Physics . . . . .	155
German . . . . .	73	English Prose . . . . .	56
		German . . . . .	73

**THIRD YEAR.**

FIRST TERM.		SECOND TERM.	
Slide-valve; Link Motion } . . . . .	} 248	Steam Engineering . . . . .	248
Thermodynamics		Drawing, Design, and Surveying	249
Steam Engineering		Engineering Laboratory . . . . .	253
Drawing . . . . .	249	Forging, Chipping, and Filing (shopwork) . . . . .	265, 266
Forging (shopwork) . . . . .	265	Strength of Materials, Kinematics and Dynamics . . . . .	42
Integral Calculus . . . . .	23	Physical Laboratory . . . . .	160
General Statics . . . . .	41	English . . . . .	57, 124
Physics: Heat . . . . .	159	German . . . . .	74
Physical Laboratory . . . . .	160		
German . . . . .	74		

**FOURTH YEAR.**

FIRST TERM.		SECOND TERM.	
Steam Engineering . . . . .	254	Hydraulic Engineering . . . . .	216
Hydraulics . . . . .	216	Engineering Laboratory . . . . .	259
Dynamics of Machines . . . . .	255	Machine-Tool Work (shopwork)	267
Machine Design . . . . .	257	Strength and Stability of Structures, Theory of Elasticity . . . . .	44
Engineering Laboratory . . . . .	259	English.	
Machine-Tool Work (shopwork)	267	Thesis Work.	
Strength of Materials, Friction . . . . .	43		
Metallurgy of Iron . . . . .	294		
Heating and Ventilation . . . . .	185		
<i>Options.</i>		<i>Options.</i>	
1. Marine Engineering . . . . .	261	1. Marine Engineering . . . . .	261
2. Locomotive Construction . . . . .	260	2. Locomotive Construction . . . . .	260
3. Mill Engineering . . . . .	262	3. Mill Engineering . . . . .	262

### III.—MINING ENGINEERING AND METALLURGY.

The mining and metallurgical professions formerly demanded of their members an especially wide range of attainments, so that the student was obliged to acquaint himself with many different branches of civil and mechanical engineering, as well as chemistry, metallurgy, and geology. With the gradual disappearance of this more primitive condition, the demand seems now plainly to indicate that, instead of endeavoring to fit himself in all possible directions, the student should select at the outset the line which he will follow, and should devote himself to this with correspondingly greater thoroughness. The schedules here for the first time presented in the Institute catalogue are arranged in accordance with this view; and each is thus enabled to afford an increase in subjects of direct technical importance.

The first two options (page 29) afford distinctively mining engineering courses, and contain, respectively, mechanical engineering and civil engineering subjects; the last two options (page 31) form metallurgical courses, characterized, respectively, by mechanical engineering and chemistry. Throughout the first three schedules, mathematics is prominent, continuing four years. In the fourth, the special characteristic is chemistry, with no mathematics beyond the second year.

The first option trains the student with a view to the eventual management of mining industries. It therefore contains mineralogy, geology, assaying, mining, ore-dressing, and metallurgy,—the last to a less extent than options 3 and 4,—but with a large amount of mechanical engineering; namely, mechanism, thermo-dynamics of steam, applied mechanics, mechanical engineering laboratory, etc., with particular reference to applications in mining engineering. Pure mathematics is necessarily continued into the third year, and its applications extend through the fourth year. The full course in physics is included, and a brief course on dynamo-electric machines is given.



**III.—MINING ENGINEERING AND METALLURGY.**

(MINING ENGINEERING.)

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

**SECOND YEAR.**

FIRST TERM.		SECOND TERM.	
	Number		Number
Physics . . . . .	155	English Literature . . . . .	56
German . . . . .	73	Differential Calculus . . . . .	22
Analytic Geometry . . . . .	20	Physics . . . . .	155
Surveying . . . . .	200	German . . . . .	73
Blowpipe Silver Assay . . . . .	290	Determinative Mineralogy . . . . .	291
Political Economy . . . . .	95	<i>Options.</i>	
Descriptive Geometry . . . . .	52	1. { Mechanism; Drawing . . . . .	243
1. Principles of Mechanism . . . . .	240	{ Physical Geography (elective) . . . . .	360
2. Topographical Drawing . . . . .	203	2. { Surveying and Drawing . . . . .	200
		{ Physical Geography . . . . .	360

SUMMER COURSE IN PRACTICAL MINING AND SURVEYING (ELECTIVE).

**THIRD YEAR.**

FIRST TERM.		SECOND TERM.	
Integral Calculus . . . . .	23	Strength of Materials, Kinematics, and Dynamics . . . . .	42
General Statics . . . . .	41	Physics . . . . .	160
Geology . . . . .	362	Assaying . . . . .	293
German . . . . .	74	German . . . . .	74
Mining . . . . .	292	Mining . . . . .	292
Physics—Heat . . . . .	159	Geology . . . . .	363
Physical Laboratory . . . . .	160	<i>Options.</i>	
1. { Steam Engineering; Thermodynamics . . . . .	248	1. { Steam Engineering . . . . .	248
{ Drawing . . . . .	250	{ Engineering Laboratory . . . . .	253
2. { Railroad Engineering . . . . .	206	{ Railroad Engineering . . . . .	206
{ Field-work and Drawing . . . . .	208	2. { Field-work and Drawing . . . . .	208

**FOURTH YEAR.**

FIRST TERM.		SECOND TERM.	
Ore-Dressing . . . . .	298	Metallurgy . . . . .	299
Metallurgy . . . . .	294, 295	Mining Laboratory . . . . .	297
Mining Laboratory . . . . .	296	Memoirs. English Criticism.	
Dynamo Machinery . . . . .	186	<i>Options.</i>	
Memoirs. English Criticism.		1. { Strength and Stability of Structures; Theory of Elasticity . . . . .	44
1. { Strength of Materials; Theory of Elasticity . . . . .	43	{ Engineering Laboratory . . . . .	259
{ Steam Engineering . . . . .	254	2. { Machinery and Motors . . . . .	44
{ Hydraulic Engineering . . . . .	213	{ Electric Railroads.	
{ Engineering Laboratory . . . . .	259	{ Hydraulic Engineering . . . . .	217
2. { Strength of Materials; Friction . . . . .	43		
{ Hydraulics . . . . .	213		
{ Hydraulic Measurements . . . . .	218		
{ Engineering Construction . . . . .	221		

The second option differs from the first mainly in that the engineering subjects are of civil rather than mechanical engineering; namely, surveying, drawing, railroad engineering, with field-work, and drawing, engineering construction, hydraulics, electric railroads, with the full course in applied mechanics. This course is designed for students who wish to become mine-surveyors, engineers, or superintendents. In both of these options pure chemistry terminates with the first year, all subsequent chemical work being only such as is included in the instruction in metallurgy, assaying, mineralogy, etc.

The third option provides a course in metallurgical engineering. Chemistry is continued through the third year and a part of the fourth, and the amount of metallurgical work is greatly increased. The engineering subjects are the same as those of the first option, — that is, branches of mechanical engineering related to metallurgical industries, — except that applied mechanics is discontinued at the middle of the fourth year. The work in physics is the same as in the other schedules, except that special instruction in heat measurements is introduced into the fourth year. This course looks particularly towards superintendence in iron, lead, copper, and zinc works.

The fourth option is devoted to metallurgical chemistry. In mining and metallurgical subjects it is identical with the third, but the engineering subjects are replaced by analytical, theoretical, and industrial chemistry. The study of physics is continued by electricity in the third, and by heat measurements and electro-metallurgy in the fourth year. The aim of this course is towards the position of chemist of works, and may lead to general management. The four schedules also contain nearly or quite the full amount of language, literature, history, and political economy given in the other engineering courses.

III.—MINING ENGINEERING AND METALLURGY.

(METALLURGY.)

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

SECOND YEAR.

FIRST TERM.		SECOND TERM.	
	Number		Number
Physics . . . . .	155	Differential Calculus . . . . .	22
German . . . . .	73	English Literature . . . . .	56
Analytic Geometry . . . . .	20	Physics . . . . .	155
Political Economy . . . . .	95	German . . . . .	73
Analytical Chemistry . . . . .	126	Determinative Mineralogy . . . . .	291
<i>Options.</i>		<i>Options.</i>	
3. { Descriptive Geometry . . . . .	52	3. { Mechanism; Drawing . . . . .	243
Principles of Mechanism . . . . .	240	Analytical Chemistry (elec-	
Blowpipe Silver Assay (elec-		tive) . . . . .	126
tive) . . . . .	290	4. Analytical Chemistry . . . . .	126
4. { Theoretical Chemistry . . . . .	127		
Blowpipe Silver Assay . . . . .	290		

THIRD YEAR.

FIRST TERM.		SECOND TERM.	
Analytical Chemistry, Lectures and Laboratory . . . . .	129	Analytical Chemistry, Lectures and Laboratory . . . . .	129
German . . . . .	74	Assaying . . . . .	293
Physics: Heat . . . . .	159	German . . . . .	74
Physical Laboratory . . . . .	160	Physical Laboratory . . . . .	160
<i>Options.</i>		<i>Options.</i>	
3. { Integral Calculus . . . . .	23	3. { Strength of Materials, Kine-	
General Statics . . . . .	41	matics, and Dynamics . . . . .	42
Steam Engineering; Thermo-		Steam Engineering . . . . .	248
dynamics . . . . .	248	Engineering Laboratory . . . . .	253
Drawing . . . . .	250	4. { Industrial Chemistry . . . . .	130
Electricity . . . . .	164	Industrial Laboratory . . . . .	139
4. { Industrial Chemistry . . . . .	130	Theoretical Chemistry . . . . .	128
Industrial Laboratory . . . . .	139	English . . . . .	57, 124
Drawing . . . . .			
English . . . . .	57		

FOURTH YEAR.

FIRST TERM.		SECOND TERM.	
Heat Measurements . . . . .	171	Metallurgy . . . . .	299
Dynamo Machinery . . . . .	186	Analytical Chemistry . . . . .	133
Metallurgy . . . . .	294, 295	Memoirs. English Criticism.	
Ore-Dressing . . . . .	298	<i>Options.</i>	
Memoirs. English Criticism.		3. { Technical Machinery . . . . .	269
<i>Options.</i>		Engineering Laboratory . . . . .	259
3. { Strength of Materials; Fric-		Metallurgical and Mining	
tion . . . . .	43	Laboratory . . . . .	297
Steam Engineering . . . . .	254	4. Metallurgical and Mining Lab-	
3. { Hydraulic Engineering . . . . .	213	oratory . . . . .	297
Engineering Laboratory . . . . .	259		
Mining and Metallurgical			
Laboratory . . . . .	296		
4. { Analytical Chemistry . . . . .	133		
Electro-metallurgy.			
Drawing . . . . .			
Metallurgical Laboratory . . . . .	296		

#### IV.—ARCHITECTURE.

Throughout this, as in the engineering courses, extends a full course in mathematics, pure and applied, to serve as a basis for professional work. (See pages 60 and 71.)

The more strictly professional work begins in the second year, with the study of the five orders and their applications, and of architectural history. The student is made familiar with the materials and principles of construction, by lectures, problems, and visits to buildings. The subject of specifications and contracts is thoroughly discussed. Practice in architectural design is continued throughout the course. Instruction is given in sketching in black and white and in water-color, and in drawing both from the cast and from life. Regular students pursue, in addition to this work, courses in German, French, English, and Physics.

All special students in Architecture are required to take in full, as a minimum, the following two-years' course:

##### SCHEDULE OF PARTIAL COURSE IN ARCHITECTURE.

FIRST YEAR.			
FIRST TERM.		SECOND TERM.	
Freehand Drawing . . . . .	51	Freehand Drawing . . . . .	51
Mechanical Drawing . . . . .	50	Mechanical Drawing . . . . .	50
Orders . . . . .	322	Graphical Statics. Materials	324, 325
Pencil Sketching . . . . .	338	Architectural History . . . . .	320
Pen and Ink . . . . .	336	Pen and Ink . . . . .	336
Architectural History . . . . .	320	Shades, Shadows, and Perspective	323
German or French . . . . .	74, 70	Charcoal Sketching . . . . .	339
Solid Geometry . . . . .	17	Original Design . . . . .	333
Logarithms. Plane Trigonometry	19	German or French . . . . .	74, 70
SECOND YEAR.			
FIRST TERM.		SECOND TERM.	
Descriptive Geometry . . . . .	52	Stereotomy . . . . .	328
Heating and Ventilation . . . . .	185	Iron Construction . . . . .	327
Working Drawings. Specifications	326	Schools, Theatres, and Churches .	331
Pen and Ink . . . . .	337	Problems in Construction . . . . .	330
Water-color Sketching . . . . .	340	Pen and Ink . . . . .	337
Problems in Construction . . . . .	330	Specifications and Contracts . . . . .	329
History of Ornament . . . . .	332	History of Ornament . . . . .	332
Original Design . . . . .	334	Water-color Sketching . . . . .	340
Lectures on the Fine Arts.		Original Design . . . . .	334
French or German . . . . .	76, 73	French or German . . . . .	76, 73

See pages 59, 60, and 81.

## IV.—ARCHITECTURE.

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

## SECOND YEAR.

FIRST TERM.		SECOND TERM.	
	Number		Number
Analytic Geometry . . . . .	20	Differential Calculus . . . . .	22
Descriptive Geometry . . . . .	52	English Literature . . . . .	56
Political Economy . . . . .	95	German . . . . .	73
German . . . . .	73	Physics . . . . .	155
Physics . . . . .	155	Architectural History . . . . .	320
Architectural History . . . . .	320	Materials . . . . .	325
Orders . . . . .	322	Shades, Shadows, and Perspective . . . . .	323
Pencil Sketching . . . . .	338	Pen and Ink . . . . .	336
Pen and Ink . . . . .	336	Charcoal Sketching . . . . .	339
		Original Design . . . . .	333

## THIRD YEAR.

FIRST TERM.		SECOND TERM.	
Integral Calculus . . . . .	23	Strength of Materials, Kinematics and Dynamics . . . . .	42
General Statics . . . . .	41	English . . . . .	57, 124
German . . . . .	74	German . . . . .	74
Physics: Heat . . . . .	159	Physical Laboratory . . . . .	160
Physical Laboratory . . . . .	160	Iron Construction . . . . .	327
Structural Geology . . . . .	361	Stereotomy . . . . .	328
Working Drawings . . . . .	326	Water-color Sketching . . . . .	340
Water-color Sketching . . . . .	340	Pen and Ink . . . . .	337
Pen and Ink . . . . .	337	Original Design . . . . .	334
Original Design . . . . .	334		

## FOURTH YEAR.

FIRST TERM.		SECOND TERM.	
Strength of Materials, Stability of Structures . . . . .	43	English. Language . . . . .	75
Advanced French . . . . .	75	Specifications and Contracts . . . . .	329
Acoustics. Heating and Ventilation . . . . .	185	Problems in Construction . . . . .	330
History of Ornament . . . . .	332	Schools, Theatres, Churches . . . . .	331
Specifications . . . . .	329	History of Ornament . . . . .	332
Problems in Construction . . . . .	330	Modelling. Water-color Sketching . . . . .	341
Water-color Sketching . . . . .	341	Original Design: Thesis Work . . . . .	335
Modelling. Lectures on Fine Art. Original Design . . . . .	335		



## V. — CHEMISTRY.

The course in Chemistry is primarily designed to prepare students for actual work in connection with manufactures based on chemical principles. It is also adapted to the needs of those who intend to become teachers of chemistry.

The class-room work consists of a full course of lectures on general chemistry, and lectures on theoretical, analytical, industrial, and organic chemistry. The non-chemical studies, such as mathematics, physics, mineralogy, English, history, political economy, and language, are selected with reference to their bearing on chemical work or for their educational value.

The student spends a large part of the four years in the laboratories, the work being arranged as follows: In the first year there is general laboratory practice, in which the student is taught the nature of chemical processes and the use of chemical apparatus, and is drilled in accurate habits of observation. Analytical chemistry — qualitative and quantitative — is begun in the second year, and continues throughout the course. Industrial, sanitary, and organic laboratory practice follow in the third and fourth years.

While there is a certain prescribed course of study and work in the separate departments of chemistry, which all regular students must pursue, there is allowed great latitude in the choice of subjects in the third and fourth years.

Effort is made to develop self-reliance in the student, so that he may be fitted to make his way without assistance. To this end he is required to make investigations, involving original research and reference to the appropriate literature in English, French, and German.

The details of instruction in this course, both for regular and special students, and the description of the Kidder laboratories, are given on pages 64-68.

## V.—CHEMISTRY.

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

## SECOND YEAR.

FIRST TERM.		SECOND TERM.	
	Number		Number
Analytical Chemistry . . . . .	126	Analytical Chemistry . . . . .	126
Theoretical Chemistry . . . . .	127	Mineralogy and Blowpipe Analysis . . . . .	291
Physics . . . . .	155	Physics . . . . .	155
German . . . . .	73	German . . . . .	73
Political Economy . . . . .	95	English Literature . . . . .	56
Analytic Geometry . . . . .	20	<i>Options.</i>	
		1. Differential Calculus . . . . .	22
		2. { Physical Geography . . . . .	360
		{ Microscopy . . . . .	381

## THIRD YEAR.

FIRST TERM.		SECOND TERM.	
Analytical Chemistry ; Labora- tory and Lectures . . . . .	129	Analytical Chemistry ; Labora- tory and Lectures . . . . .	129
Industrial Chemistry . . . . .	130	Theoretical Chemistry . . . . .	128
Physics : Heat . . . . .	159	Assaying . . . . .	293
Physical Laboratory . . . . .	160	Industrial Chemistry . . . . .	130
German . . . . .	74	Physical Laboratory . . . . .	160
English . . . . .	57	German . . . . .	74
<i>Options.</i>		English . . . . .	57, 124
Integral Calculus . . . . .	23	<i>Options.</i>	
Geology . . . . .	362	Electricity . . . . .	165, 166
Electricity . . . . .	164	Geology . . . . .	363
Sanitary Chemistry . . . . .	138	Sanitary Chemistry . . . . .	138
Industrial Chemistry . . . . .	139	Industrial Chemistry . . . . .	139

## FOURTH YEAR.

FIRST TERM.		SECOND TERM.	
Organic Analysis . . . . .	132	Organic Chemistry . . . . .	134
Abstracts.		Thesis Work.	
Organic Chemistry . . . . .	134		
Physical Laboratory . . . . .	169		
Metallurgy . . . . .	295		
<i>Options.</i>			
Physics.			
Language . . . . .	75		
Sanitary Chemistry . . . . .	140		
Textile Coloring . . . . .	141		
<i>Laboratory Options.</i>			
Analytical Laboratory . . . . .	132		
Organic Laboratory . . . . .	136		
Metallurgical Laboratory . . . . .	296		
Industrial Laboratory . . . . .	137		

## VI.—ELECTRICAL ENGINEERING.

This course has been established in order to meet the wants of young men desirous of entering upon the practice of any of the various applications of electricity in the arts. Its leading studies are physics, especially theoretical and applied electricity, mechanical engineering, and mathematics.

A broad training is obtained by the introduction of full mathematical courses, and studies in history, literature, political economy, and French and German; the latter being of importance in obtaining at first hand a prompt acquaintance with the results of invention and discovery. Of the technical studies of the course, those in mechanical engineering run parallel with the electrical subjects, since in many branches of electrical engineering a sound knowledge of mechanics, motors, of measurements of power and its transmission, etc., is essential. Thus, through the second year the students follow mathematics, mechanism, shopwork, and drawing, to about the same extent as those of the mechanical engineering course. In the third year the pure and applied mathematics, mechanics, and mechanical engineering (lecture and laboratory work) are much the same in the two courses; and certain of these subjects are continued in the fourth year.

A full course in physics begins with the second year, and continues, by lectures, recitations, and laboratory work, to the end of the third year. A portion of this is devoted to electricity; and at the beginning of the third year special readings and recitations on this topic are begun, by which the study of the theory of electricity is continued until the end of that year. Work in the physical laboratory begins at the middle of the second year, and leads up to electrical measurements and testing. In the fourth year are given extended courses on the technical application of electricity to the telegraph, telephone, electric light, the electrical generation and transmission of power, etc. Electrical study and research occupy the principal position in the fourth year. A series of advanced mathematical topics forms an important part of the work of this year. (See pages 61, 68-70, 83.)



## VI.—ELECTRICAL ENGINEERING.

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

## SECOND YEAR.

FIRST TERM.		SECOND TERM.	
	Number		Number
Physics . . . . .	155	Physics . . . . .	155
Mechanics and Acoustics . . . . .	157	Physical Laboratory . . . . .	158
Analytic Geometry . . . . .	20	Acoustics and Electricity . . . . .	157
Descriptive Geometry . . . . .	52	Differential Calculus . . . . .	22
Principles of Mechanism . . . . .	240	Mechanism . . . . .	246
Carpentry and Wood-turning . . . . .	263	Drawing . . . . .	244
Political Economy . . . . .	95	Metal-turning . . . . .	268
German . . . . .	73	English Literature . . . . .	56
		German . . . . .	73

## THIRD YEAR.

FIRST TERM.		SECOND TERM.	
Physics: Heat . . . . .	159	Physical Lab.: Heat, Electricity	162
Physical Laboratory . . . . .	162	Electricity . . . . .	165, 166
Electricity . . . . .	164	Strength of Materials, Kinematics,	
Integral Calculus . . . . .	23	and Dynamics . . . . .	42
General Statics . . . . .	41	Steam Engineering . . . . .	248
Steam Engineering: Slide-valve,		Engineering Laboratory . . . . .	253
Link Motion, Thermodynamics	248	Drawing . . . . .	251
Drawing . . . . .	251	English . . . . .	57, 124
English . . . . .	57	German . . . . .	74
German . . . . .	74		

## FOURTH YEAR.

FIRST TERM.		SECOND TERM.	
Technical Applications of Elec-		Technical Applications of Elec-	
tricity to Telegraph, Telephone,		tricity . . . . .	179
Electric Lighting, etc. . . . .	179	Advanced Physics, Memoirs, etc.	168
Phys. Lab.: Electrical Testing . . . . .	170	Physical Research.	
Testing of Telegraph Lines, Dy-		Differential Equations . . . . .	29
namo-Machines, etc. . . . .	180, 182	Engineering Laboratory . . . . .	259
Advanced Physics: Memoirs, etc.	168	Discussion of the Precision of	
Photometry . . . . .	183	Measurements . . . . .	178
Method of Least Squares . . . . .	30		
Steam Engineering . . . . .	254	<i>Options.</i>	
Dynamics of Machines . . . . .	256	1. Quaternions . . . . .	31
Engineering Laboratory . . . . .	259	2. Physical Laboratory . . . . .	170
Strength of Materials, Friction . . . . .	43	3. Theory of Potentials . . . . .	184
Hydraulics . . . . .	216		

NOTE.—The student is advised to take Advanced German.

## VII.—BIOLOGY.<sup>1</sup>

The object of this course is first, to afford a general education in the natural sciences,—physiology, zoölogy, mineralogy, geology, botany, etc.,—and, second, professional training in biology, with special reference to medical studies and sanitary science. It is intended for those who wish to become biologists; for those who are preparing for medical studies; for those who wish to fit themselves for teachers of, or desire a general education in, the natural sciences.

Beginning with a substantial foundation of chemistry, physics, drawing, and the modern languages, the subjects peculiar to the course are early introduced, while history, political economy, and literature receive throughout due emphasis as essentials to a broad training, or as auxiliaries to the scientific studies. (See pages 62 to 70.)

The intimate relations existing between physics, chemistry, and biology on the one hand, and the medical and sanitary sciences—physiology, pathology, hygiene, etc.—on the other, make a course like this peculiarly valuable as a preparation for the scientific or professional study of medicine. To this end the student of biology is made familiar, not only with the essentials of physics, chemistry, and microscopy, but also with the comparative anatomy and physiology of the lower animals, especially vertebrates, and with sanitary bacteriology. (See page 84.)

Abundant opportunities are provided for practical laboratory studies in the biological, geological, and mineralogical laboratories (see page 86); while advantages somewhat unusual are offered by the library and museum of the Boston Society of Natural History. (See page 86.)

For field-work in zoölogy, botany, mineralogy, and geology, the vicinity of Boston affords rich opportunities in its long and accessible shore-line, varied geological features, and well-explored botanical fields.

<sup>1</sup> The course in Biology takes the place of the former course in Natural History. A course in Geology, corresponding to the geological option of the latter, is now in preparation, and will be presented in the next catalogue. A descriptive circular will be sent on application.

## VII.—BIOLOGY.

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

## SECOND YEAR.

FIRST TERM.		SECOND TERM.	
	Number		Number
Physics . . . . .	155	Physics . . . . .	155
Analytical Chemistry (Qualitative) . . . . .	126	English Literature . . . . .	56
General Biology . . . . .	380	Physical Geography . . . . .	360
Political Economy . . . . .	95	German . . . . .	73
German . . . . .	73	Biology of Micro-organisms . . . . .	} 382
Zoölogy . . . . .	385	Elementary Botany . . . . .	
Analytic Geometry (Brief Course) . . . . .	21	Zoölogy . . . . .	385
		Analytical Chemistry . . . . .	126
		Mineralogy and Blowpipe . . . . .	291

Those who cannot show that they have already enough proficiency in Latin to satisfy the department, must devote considerable time to that subject during this term.

## THIRD YEAR.

FIRST TERM.		SECOND TERM.	
Comparative Anatomy . . . . .	383	Comparative Embryology . . . . .	383
Structural and Chemical Geology . . . . .	362	Historical Geology . . . . .	363
Physics: Heat . . . . .	159	Physical Laboratory . . . . .	160
Physical Laboratory . . . . .	160	English . . . . .	57, 124
English . . . . .	57	German . . . . .	74
German . . . . .	74	Sociology . . . . .	115
Cryptogamic Botany . . . . .	386	Sanitary Chemistry . . . . .	138
Anthropology . . . . .	393		
Organic Chemistry . . . . .	135		

## FOURTH YEAR.

FIRST TERM.		SECOND TERM.	
Comparative Physiology . . . . .	387	Comparative Physiology . . . . .	387
Microscopic Anatomy . . . . .	388	Microscopic Anatomy . . . . .	388
History of Natural Science . . . . .	394	Bacteriology . . . . .	396
Climatology . . . . .	365	History of the Renaissance. . . . .	87
Sanitary Biology . . . . .	395	Lectures on Teaching (optional) . . . . .	392
Higher Biology . . . . .	391	Journals.	
History of the Renaissance . . . . .	87	Thesis Work.	
Journal Club.			

### VIII.—PHYSICS.

As distinguished from the professional or technical courses in Engineering, Architecture, etc., there are offered by the Institute certain courses of a purely scientific nature. The course in Physics contains a series of studies adapted to the needs of those who wish to become teachers of physics, or who desire to enter upon a course in pure science, whether with a view to its further continuance, or wholly as a matter of training. A strong line of mathematical topics and the continuous study of physics are its leading features. General, theoretical, analytical, and organic chemistry occupy a position next in prominence to mathematics, but of hardly less importance. Options are so arranged that choice may be made between the pursuit of more advanced mathematical and chemical topics; also between shopwork instruction in the use of tools, and work in the biological laboratory.

Historical and other allied subjects and the modern languages continue throughout the first three years; and the latter, which are of great importance, may be further prolonged if desired. Chemistry may be continued up to the middle of the last year, and mathematics, pure and applied, is required throughout the whole four years. Physics begins with the second year, and by lectures, readings, recitations, and laboratory exercises extends to the close of the course. A large amount of experimental work is performed, and an experimental investigation is undertaken during the fourth year in connection with the preparation of the thesis. At all times it is sought to encourage the spirit of original research, and to impart an understanding of the principles upon which scientific investigation, especially in quantitative measurement, should be conducted.

The advantages offered by the Rogers Laboratory of Physics, notably in the direction of electricity, acoustics, and heat, by the large equipment of apparatus, are somewhat unusual. The study of special topics is greatly facilitated by many valuable libraries, to which, by right or courtesy, the students have admission. (See pages 60, 61, 68-70.)

VIII.—PHYSICS.

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

SECOND YEAR.

FIRST TERM.		SECOND TERM.	
	Number		Number
Physics . . . . .	155	Physics . . . . .	155
Mechanics and Acoustics . . . . .	157	Physical Laboratory . . . . .	158
Analytic Geometry . . . . .	20	Acoustics and Electricity . . . . .	157
Analytical Chemistry . . . . .	126	Differential Calculus . . . . .	22
Theoretical Chemistry . . . . .	127	Microscopy . . . . .	381
Descriptive Astronomy . . . . .	156	English Literature . . . . .	56
Political Economy . . . . .	95	German . . . . .	73
German . . . . .	73	<i>Options.</i>	
		1. Chemistry . . . . .	126
		General Theory of Equations . . . . .	24
		2. Determinants . . . . .	25

THIRD YEAR.

FIRST TERM.		SECOND TERM.	
Physics: Heat . . . . .	159	Physical Laboratory: Heat, Electricity . . . . .	161
Physical Laboratory . . . . .	160	Optics, Electricity, or Heat 165, 166, 167	167
Optics or Electricity . . . . .	164, 167	Strength of Materials, Kinematics, and Dynamics . . . . .	42
Integral Calculus . . . . .	23	Theoretical Chemistry . . . . .	128
General Statics . . . . .	41	English . . . . .	57, 124
Physical Laboratory . . . . .	161	German . . . . .	74
Organic Chemistry . . . . .	135	<i>Options.</i>	
English . . . . .	57	1. Chemistry.	
German . . . . .	74	2. Advanced Calculus or Quaternions . . . . .	28
Physiology of the Senses . . . . .	384	3. Physics . . . . .	161
or Shopwork . . . . .	263		
<i>Options.</i>			
1. Chemistry.			
2. Analytic Geometry of Three Dimensions, or Advanced Algebra and Trigonometry . . . . .	27		
	26		

FOURTH YEAR.

FIRST TERM.		SECOND TERM.	
Physical Laboratory . . . . .	170	Physical Research.	
General Physics . . . . .	177	General Physics . . . . .	177
Advanced Physics: Memoirs, etc.	168	Advanced Physics: Memoirs, etc.	168
Principles of Scientific Investigation . . . . .	176	Differential Equations . . . . .	29
History of Physical Science . . . . .	175	Discussion of the Precision of Measurements . . . . .	178
Photography.		<i>Options.</i>	
Photometry . . . . .	183	1. Physiological Measurements.	
Thermodynamics . . . . .	248	2. Quaternions or Advanced Calculus and Definite Integrals . . . . .	31
Method of Least Squares . . . . .	30		28
<i>Options.</i>		3. Theory of Potential . . . . .	184
1. Chemistry.			
2. Advanced Algebra and Trigonometry, or Analytic Geometry of Three Dimensions . . . . .	26		
	27		



### IX.—GENERAL STUDIES.

This course is designed to meet, as far as possible, the needs of an increasing class of students who desire a general scientific education, or are looking forward to engaging in some branch of commerce, in the administration of public or private trusts, in banking, in journalism, in manufacturing or other business enterprises. It is accordingly somewhat less technical in its studies than the other courses of the school, though not less exacting in its requirements or less thorough in its educational discipline.

It will be noticed that natural science makes a considerable demand upon the time and attention of the student. He is required to study chemistry one year; physics, one year; structural and historical geology, one year; zoölogy, one year; and each of the following subjects one half year: viz., physical geography, climatology, descriptive astronomy, the history of the natural sciences, anthropology, and sanitary science. Optional courses permit the student to devote additional time to these subjects. In brief, the studies of this course have been arranged with a view to securing an education primarily through scientific study and experiment, yet with a larger amount of philosophical study in history, economics, language, and literature than is possible with the technical requirements of the other courses.

The special opportunities offered by the department of General Studies are: the more extended study of French and German; a continuous course of historical study, directed especially towards the political and social history of England and the United States; a more thorough acquaintance with English literature and with the models of style; economics, including its theory and history, with courses in industrial and commercial history and geography, finance and statistics; social and political science, directing especial attention to the origin and development of institutions.

(See pages 62 and 64.)



## IX.—GENERAL STUDIES.

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

## SECOND YEAR.

FIRST TERM.		SECOND TERM.	
	Number		Number
Physics . . . . .	155	Physics . . . . .	155
German. French . . . . .	73, 71	German. French . . . . .	73, 71
Political History of England and the United States . . . . .	86	Political History of England and the United States . . . . .	86
Political Economy . . . . .	95	Economic Problems . . . . .	96
Shopwork . . . . .	263	English Literature . . . . .	56
Analytic Geometry (Brief Course) . . . . .	21	Physical Geography . . . . .	360
General Biology and Zoölogy . . . . .	380, 385	Zoölogy and Field-work . . . . .	380, 385

## THIRD YEAR.

FIRST TERM.		SECOND TERM.	
Physics: Heat . . . . .	159	French. German . . . . .	72, 74
French. German . . . . .	72, 74	Sociology . . . . .	115
History and Literature of the Re- naissance and the Reformation . . . . .	87	*History of Commerce or of In- dustry . . . . .	99
Statistics . . . . .	105	History and Literature of the Re- naissance and the Reformation . . . . .	87
Financial History of the U. S. . . . .	97	Historical Geology . . . . .	363
Structural Geology . . . . .	361	<i>Options.</i>	
English . . . . .	57	1. History: England in the 16th and 17th Centuries.	
Commercial Geography . . . . .	98	2. *Political Science: Theories of Socialism, Communism, Co- operation, and Profit-sharing . . . . .	100
Anthropology . . . . .	393	3. Physical Laboratory . . . . .	160
<i>Options.</i>		4. Literature: Chaucer to Shak- speare . . . . .	59
1. History of Architecture . . . . .	321		
2. Shop-work: Forging . . . . .	265		
3. Physical Laboratory . . . . .	160		

## FOURTH YEAR.

FIRST TERM.		SECOND TERM.	
German . . . . .	75	Advanced German . . . . .	75
Comparative Politics . . . . .	116	International Law . . . . .	117
Physiology.		Business Law . . . . .	124
Taxation. Administration . . . . .	102, 103	Constitutional History . . . . .	88
Logic . . . . .	62	*History of Commerce or of In- dustry . . . . .	99
History of Philosophy . . . . .	89	Banking and Finance . . . . .	107
English Literature . . . . .	60	History of Economic Theory . . . . .	104
Descriptive Astronomy . . . . .	156	Sanitary Science . . . . .	390
Climatology . . . . .	365	Thesis Work.	
History of Nat. Science . . . . .	394	<i>Options.</i>	
Railway Management . . . . .	211	1. History: Studies in the Local History of the United States.	
<i>Options.</i>		2. *Political Science: European Systems of Administration.	
1. History: The Era of the French Revolution.		3. Language . . . . .	75
2. Political Science: Stat. of So- ciology . . . . .	106	4. Literature . . . . .	61
3. Language . . . . .	75		
4. Literature: The 17th Century.		* These studies alternate from year to year.	

## X.—CHEMICAL ENGINEERING.

This course is arranged to meet the needs of students who desire a general training in mechanical engineering, and who wish to devote a portion of their time to the study of the applications of chemistry to the arts, especially to those engineering problems which relate to the use and manufacture of chemical products. The instruction in the fourth year has been so arranged that the student can exercise a certain choice as to the special topics to which he wishes to devote his greatest attention. A student can receive instruction in textile coloring in case he expects to find employment in the textile industries, in heat measurements and metallurgy, to fit him especially for operations involving the use of furnaces, or in organic chemistry, if he intends to engage in the manufacture of organic products. It is expected that the graduates in this course will find employment as engineers, having to deal with problems of construction and administration in connection with dye-works and bleacheries, oil-refineries, gas-works, sugar-refineries, soap-works, paper and pulp mills, chemical works, and various other branches of industry where such special training is demanded, and also that they will acquire sufficient knowledge to be able to work intelligently in carrying out the processes used in these establishments.

The general engineering studies in the course in chemical engineering coincide for the most part with the work of the students in mechanical engineering. A special course of instruction is given to the students of the fourth year, devoted to a discussion of the appliances used in manufacturing and applied chemistry considered from an engineering point of view.

The instruction in industrial and applied chemistry is arranged with reference to the needs of this course, and special attention is directed to the methods of conducting the mechanical operations in the various manufacturing processes. At the same time, the chemical principles upon which operations rest are thoroughly taught.

**X.—CHEMICAL ENGINEERING.**

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

**SECOND YEAR.**

FIRST TERM.		SECOND TERM.	
	Number		Number
Principles of Mechanism . . . . .	240	Construction of Gear-teeth	} 245
Analytic Geometry . . . . .	20	Mechanism of Mill Machinery	
Descriptive Geometry . . . . .	52	Mechanism of Shop Machinery	
Physics . . . . .	155	Drawing . . . . .	242
Analytical Chemistry . . . . .	126	Differential Calculus . . . . .	22
German . . . . .	73	Physics . . . . .	155
		German . . . . .	73
		English Literature . . . . .	56
		Analytical Chemistry . . . . .	126

**THIRD YEAR.**

FIRST TERM.		SECOND TERM.	
Steam Engineering: Thermodynamics: Slide-valve, Link Motion	248	Steam Engineering . . . . .	248
Integral Calculus . . . . .	23	Drawing . . . . .	252
General Statics . . . . .	41	Engineering Laboratory . . . . .	253
Physics: Heat . . . . .	159	Strength of Materials, Kinematics, and Dynamics . . . . .	42
Physical Laboratory . . . . .	160	Physical Laboratory . . . . .	160
German . . . . .	74	German . . . . .	74
Drawing . . . . .	252	Industrial Chemistry: Lectures . . . . .	130
Industrial Chemistry . . . . .	130	Industrial Chemistry: Laboratory . . . . .	139
English . . . . .	57	English . . . . .	57, 124
Elements of Organic Chemistry . . . . .	135		

**FOURTH YEAR.**

FIRST TERM.		SECOND TERM.	
Steam Engineering . . . . .	254	Engineering Laboratory . . . . .	259
Dynamics of Machines . . . . .	256	Strength and Stability of Structures; Theory of Elasticity . . . . .	44
Engineering Laboratory . . . . .	259	Technical Machinery . . . . .	269
Strength of Materials, Friction . . . . .	43	Shopwork . . . . .	265
Metallurgy . . . . .	295	Applied Chemistry: Thesis. Memoirs.	
Political Economy . . . . .	95		
Applied Chemistry: Lectures . . . . .	142		
and Laboratory . . . . .	137		
Shopwork . . . . .	263		
		<i>Options.</i>	
		Metallurgy . . . . .	299
		Thermo-Chemistry and Fuel Examination . . . . .	128
		Organic Chemistry . . . . .	134
<i>Options.</i>			
Textile Coloring . . . . .	141		
Heat Measurements . . . . .	171		
Organic Chemistry . . . . .	134		

## XI.—SANITARY ENGINEERING.

This course is essentially one in Civil Engineering, but is designed for students who wish to pay particular attention to those engineering branches which are concerned with problems of the public health, and who, therefore, desire to gain a better knowledge of the subjects of chemistry and biology, and of their relations to engineering problems, than can be obtained in the course in Civil Engineering.

The line of study offered differs from the regular course in Civil Engineering, page 24, in the following particulars:

There is a reduction in the time devoted to Railroads and Bridges, and an entire omission of the mechanical engineering subjects of Mechanism and Machinery and Motors, and of the subjects of Astronomy, Metallurgy of Iron, and Historical Geology.

The time thus gained is devoted principally to courses in Chemistry and Biology. In these it is designed to give the students such training as shall fit them properly to interpret the results of sanitary chemistry and sanitary biology, and to co-operate with chemists and biologists in professional work. In the fourth year a course of instruction is also given in Heating and Ventilation.

The entire instruction in Sanitary and Hydraulic Engineering now given in the course of Civil Engineering, a portion of which is there optional with other studies, is required in the course in Sanitary Engineering.

**XI.—SANITARY ENGINEERING.**

FIRST YEAR COMMON TO ALL COURSES. SEE PAGE 23.

**SECOND YEAR.**

FIRST TERM.		SECOND TERM.	
	Number		Number
Surveying and Plotting . . . . .	200	Surveying and Plotting . . . . .	200
Topographical Drawing . . . . .	203	Differential Calculus . . . . .	22
Descriptive Geometry . . . . .	52	Physics . . . . .	155
Analytic Geometry . . . . .	20	Physical Geography . . . . .	360
Physics . . . . .	155	English Literature . . . . .	56
Political Economy . . . . .	95	German . . . . .	73
German . . . . .	73	Analytical Chemistry . . . . .	126
Organic Chemistry . . . . .	135		

**THIRD YEAR.**

FIRST TERM.		SECOND TERM.	
Railroad Engineering, with Field-work and Drawing . . . . .	207, 209	Railroad Engineering, with Field-work and Drawing . . . . .	207, 209
Stereotomy . . . . .	212	Advanced Surveying . . . . .	204
Advanced Surveying . . . . .	204	Elements of Construction . . . . .	219
Integral Calculus . . . . .	23	Elementary Design . . . . .	220
General Statics . . . . .	41	Physical Laboratory . . . . .	160
Physics: Heat . . . . .	159	German . . . . .	74
Physical Laboratory . . . . .	160	Strength of Materials, Kinematics and Dynamics . . . . .	42
Structural Geology . . . . .	361	Water Analysis . . . . .	138
German . . . . .	74	Biology of Microorganisms . . . . .	382
English . . . . .	57		
Analytical Chemistry . . . . .	129		
General Biology . . . . .	380		

**FOURTH YEAR.**

FIRST TERM.		SECOND TERM.	
Theory of Structures . . . . .	221	Theory of Structures . . . . .	221
Bridges and Roofs . . . . .	222	Bridges and Roofs . . . . .	222
Hydraulics . . . . .	213	English . . . . .	57, 124
Sanitary Field-work and Hydraulic Measurements . . . . .	218	Thesis Work.	
Strength of Materials, Theory of Elasticity . . . . .	43	Hydraulic Engineering . . . . .	217
Sanitary Engineering . . . . .	214	Engineering Design . . . . .	215
Bridge Design . . . . .	223	Chemistry of Natural Waters.	
Air Analysis.		Biology of Natural Waters.	
Sanitary Biology . . . . .	395	Sanitary Bacteriology . . . . .	396
Heating and Ventilation . . . . .	185	Building Construction.	
		Hygiene and Public Health.	



#### FIVE-YEARS' REGULAR COURSES.

The foregoing schedules of the regular courses are arranged for the completion of the work in four years. It may occasionally happen that considerations of health, lack of opportunities for thorough preparation, or other causes, render it advisable for a student to extend the work over five, instead of four, years. To meet such cases the Faculty have arranged, in certain departments, five-years' courses which contain precisely the same subjects and amounts of study as the corresponding four-years' courses, and differ from them only in the time over which the work is distributed, and, to a slight extent, in the sequence of some studies. They lead respectively to the same degree of the Institute. The standard of scholarship required of the student will be in every way the same, and he will be classed as a regular student so long as he maintains his standing in the course which he is pursuing. A five-years' course student may, with the permission of the Faculty, pursue additional or more extended lines of study. He thus has the opportunity of accomplishing more than the equivalent of the four-years' course.

Further information may be had upon application to the Secretary of the Institute.

#### ADVANCED COURSES.

The degree, Master of Science, is awarded for proficiency in complete advanced courses of study of at least one year's duration.

The degrees, Doctor of Philosophy and Doctor of Science, are awarded for proficiency in complete advanced courses of study of at least two-years' duration.

The particular courses of study which candidates for these degrees wish to pursue must be submitted in writing to the Faculty, and must meet their approval. Occasional short



absences, when the time is spent upon professional work by advice of the Faculty, will not be considered as interruptions of the student's residence.

Advanced courses in chosen lines of study, and without reference to the degrees, may be pursued by graduates of the Institute without preliminary examination, or by Bachelors of other institutions, who shall satisfy the Faculty, by examination or otherwise, that they are qualified to take with advantage the course proposed.

#### SPECIAL COURSES.

In general, no schedule for special courses of study is laid down; but any special course selected by the student or applicant, and receiving the approval of the Faculty, may be pursued. Applicants should consult the Schedule of Topics, pages 95 and 116. Special opportunity for the pursuit of laboratory and lecture courses is afforded to teachers, and to persons of mature years engaged in technical pursuits. All special students in Architecture are required to take in full, as a minimum, the course of two-years' duration laid down on page 32, for admission to which the full entrance examinations are required. (See pages 53 to 57.) Special students in Chemistry must also pass the regular entrance examinations.

### REQUIREMENTS FOR GRADUATION.

The degree, Bachelor of Science, in the course pursued, is given for the satisfactory completion of any regular course of study.

To be entitled to a degree, the student must have passed satisfactory examinations in all the prescribed studies and exercises, and, in addition, a final or degree examination, embracing all the subjects which particularly relate to his course. He must, moreover, prepare a dissertation on some subject included in his course of study; or an account of some research made by himself; or an original report upon some machine, work of engineering, industrial works, mine, or mineral survey; or an original architectural design, accompanied by an explanatory memoir. This thesis or design must be submitted to the Faculty for approval three days before the first degree examination, unless the thesis or design be dependent on laboratory work, in which case it must be presented two days after the close of the respective laboratories.

No degree can be conferred until all dues to the Institute are discharged.

Students leaving the school before graduation are entitled to receive an honorable dismissal, if their record for conduct, attention to studies, and scholarship is satisfactory to the Faculty.

## REQUIREMENTS FOR ADMISSION.

**Time of Examination for Admission.** — A first examination for admission to the first-year class will be held in the Rogers Building, 187 Boylston Street, beginning at 9 A. M., on the first Thursday after May 29, and continuing two days. A second examination for admission, and for applicants conditioned at the first examinations, will begin at 9 A. M., on the first Tuesday after September 17, and will continue two days. (See Calendar, page 2.) Attendance on both days of one examination or the other is required.

Entrance examinations were held in May, 1889, in New York, Philadelphia, Chicago, Cincinnati, St. Louis, Washington, San Francisco, St. Paul, Pittsburgh, and Kansas City. Arrangements will probably be made for examining applicants in June, 1890, in the same cities.

Candidates who intend to be examined in any other place than Boston are required to send their names to the Secretary in time for him to receive them by May 15th. A fee of five dollars is to be paid in advance by every candidate who is examined at any place other than Boston. The whole fee of a candidate who proposes to divide his examination between two years is payable in the year when he begins his examination. The fee should be sent by check, postal order, or registered letter, to Albert M. Knight, Bursar, at the same time that the candidate sends his name to the Secretary.

For detailed information, address the Secretary.

Applicants for *advanced standing* — that is, for admission to classes above the first year — must pass the entrance examinations, exception being made of applicants from other colleges (see page 58), and must present themselves for further examination (see page 58) at 9 A. M., on the Thursday following the second entrance examination. (See Calendar, page 2.)

Applications for admission at other times than the above, will be received only when illness or some other equally good cause has prevented attendance on the days prescribed. A fee of five dollars, to be paid to the Bursar, will be charged for all such examinations held at other times than those above specified. Women are admitted to any of the courses of the school.

#### ADMISSION TO THE REGULAR COURSES.

**First Year.**—To be admitted as a regular student in the first-year's class, the applicant must have attained the age of seventeen years, and must pass a satisfactory examination in Arithmetic, Algebra, Plane Geometry, French, English Language and Literature, History, and Geography.

The requirements in the various subjects are as follows:

1. *Arithmetic.*—Prime and composite numbers; greatest common divisor and least common multiple; ratio and proportion; common and decimal fractions; percentage; simple and compound interest; compound numbers; metric system of weights and measures; square root. A satisfactory treatment of these subjects may be found in either Seaver and Walton's, Wentworth and Hill's, or Greenleaf's Complete Arithmetic.

2. *Algebra.*—Fundamental operations; use of parentheses; factoring; highest common factor; lowest common multiple; fractions, simple and complex; simple equations, with one or more unknown quantities; involution of monomials and polynomials; evolution of monomials and polynomials and the cube root of numbers; the theory of exponents, with applications; radicals, including rationalization, imaginary quantities, properties of quadratic surds, square root of a binomial surd, and solution of equations containing radicals; quadratic equations; equations in the quadratic form; simultaneous quadratic equations; theory of quadratic equations;

ratio and proportion; arithmetical progression; geometrical progression; binomial theorem, with proof for a positive integral exponent. A satisfactory treatment of the topics in Algebra may be found in any of the following text-books: Wells's Academic, Wentworth's Elementary, or Todhunter's Algebra for Beginners.

3. *Plane Geometry*.—As much as is contained in the first five books of Wells's, Chauvenet's, or Wentworth's Geometry. The examination will be based on the first-named work. Much importance will be attached to the applicant's ability to demonstrate original exercises.

NOTE. *Solid Geometry*.—Candidates will be allowed an examination, in September, in Solid Geometry, and if successful, will be excused from studying that subject after admission.

4. *French*.—Elements of grammar, and some practice in translation. The requisite amount of preparation is represented by at least a year of careful work upon Part I. of Otto's Grammar, and fifty or sixty pages of easy reading. Practical exercises, both oral and written, are essential.

NOTE. *German*.—Candidates not prepared in French may substitute an equivalent in German. Otis's Elementary German represents the required amount. In this case the German will be continued and finished during the first year, and the following two years will be devoted to French.

For 1891 and subsequent years the requirements in Modern Languages will be,—

*French*.—(1) Proficiency in elementary grammar, to be tested by translation of easy English into French, or by direct questioning on the following topics: Inflection of nouns and adjectives for gender and number, excepting unusual cases; "pronominal adjectives;" the forms and position of pronouns, especially the personals; the partitive constructions; the inflection of the regular and of the more usual irregular verbs, such as *dire, faire*, and of the classes



represented by *ouvrir, sentir, venir, paraître, conduire, and craindre.*

(2) Ability to translate simple prose at sight, to be acquired by the reading of not less than two hundred duodecimo pages from at least two dissimilar works.

*German.* — Candidates not prepared in French may substitute an equivalent in German, for which the requirements will be, —

(1) Proficiency, to be tested as for French, in the following topics of elementary grammar: declension of readily classified nouns, of adjectives and of pronouns; conjugation of the weak and of the more usual strong verbs; simple cases of word order.

(2) The candidate must have read not less than one hundred and fifty duodecimo pages of easy German (of which one hundred and twenty-five must be prose), from not less than two dissimilar works.

NOTE. — Although a correct pronunciation in modern languages is not, for the present, one of the requirements for entrance examinations, it is desired that teachers will give this important subject all due attention. Candidates capable of presenting both French and German at the entrance examination will find this advantageous for their subsequent labors at the Institute.

5. *English Language and Literature.* — The requirements in English are included within the limits of those prescribed for entrance into the New England colleges.

The candidate will be required to correct specimens of defective English set for him at the time of the examination.

He will also be required to write a short English composition, correct in spelling, punctuation, grammar, division by paragraphs, and expression, upon one of the several subjects to be announced at the time of the examination. These subjects will be drawn from one or more of the following works, and the applicant is expected to be familiar with all the books in this list.<sup>1</sup>

<sup>1</sup> These books may all be had in an inexpensive form. A list of publishers and net prices will be sent upon application to the Secretary.



For 1890: Shakspeare's Julius Cæsar, Longfellow's *Evangeline*, Macaulay's *Essay on Lord Clive*, Thackeray's *English Humorists*, Webster's first Bunker Hill Oration, Scott's *Quentin Durward*, George Eliot's *Silas Marner*.

For 1891: Shakspeare's Julius Cæsar, Longfellow's *Evangeline*, Macaulay's *Essay on Lord Clive*, Webster's first Bunker Hill Oration, Irving's *Alhambra*, Scott's *Old Mortality*, George Eliot's *Silas Marner*.

For 1892: Shakspeare's Julius Cæsar, Scott's *Marmion*, Longfellow's *Courtship of Miles Standish*, Addison's *Sir Roger de Coverley Papers*, Macaulay's second *Essay on the Earl of Chatham*, Webster's first Bunker Hill Oration, Irving's *Alhambra*, Scott's *Talisman*.

NOTE. — In 1890, the applicant will be allowed to take his choice between an examination upon the above-mentioned requirements and an examination upon previous requirements for entrance, as by the catalogue of 1888-1889, viz. :—

“The applicant will be required to write a short English composition, correct in spelling, punctuation, grammar, division by paragraphs, and expression, upon one of several subjects to be announced at the time of examination.

“He will be required to be acquainted with the essentials of English grammar, and to correct specimens of defective English set for him at the time of the examination.

“In literature the applicant must have a knowledge of the life and best works of the principal English authors.

“Rev. Stopford Brooke's *Primer of English Literature* is recommended, but is not prescribed.”

6. *History*. — Preparation in either United States History or Ancient History may be offered. In the former subject, a thorough acquaintance with the history of the Thirteen Colonies and of the United States down to the present time is required. In the latter subject, the requirement covers the history of the early world down to the fall of the Roman Empire in the West.

If single text-books are used, Alexander Johnston's *History of the United States*, or P. V. N. Myers' *Outlines of*

Ancient History<sup>1</sup> (latest edition), are recommended, though not prescribed.

7. *Geography*. — The text-books in common use fairly represent the amount of preparation required. A knowledge of the geography of the United States and Europe is especially important. To have been familiar with geography at some previous time is not sufficient, but a systematic review of the whole is an essential part of an adequate preparation for certain studies which are included in all the Institute courses. Practice in freehand map-drawing from memory is strongly recommended.

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DIVIDED ENTRANCE EXAMINATIONS. — Candidates for admission will be allowed, at their option, to divide their entrance examinations between two successive years. The first divided examination will be held only in June; the second, in either June or September of the following year, at the dates named on page 51. For the first divided examination the candidate will be allowed the choice of any of the following nine subjects, but he must take at least six. No credit will be allowed on any of these unless at least five of the six taken are satisfactorily passed. At the second examination, all subjects not passed at the first must be taken.

To be admitted to the first divided examination, the candidate must be at least sixteen years of age, and must have notified the Secretary of the Faculty, at least two weeks before the date fixed for the examination, of his intention to apply. This notification must be accompanied by a list of the six subjects in which he will submit himself, and by a certificate from his teacher stating that he is qualified in them.

- I. Arithmetic (without Metric System).
- II. Metric System.
- III. Algebra (to Quadratics).
- IV. Advanced Algebra (completion of requirements stated on p. 52).
- V. Plane Geometry.
- VI. French (or German; see page 53).
- VII. English Language and Literature.
- VIII. History.
- IX. Geography.

NOTE. — The applicant may take Solid Geometry, as stated on page 53. Details of the above requirements are given on pages 52 to 56.

<sup>1</sup> Or Myers and Allen's Outlines of Ancient History, soon to be published.

In general, the training given in the best high schools and academies will afford suitable preparation. To the student the importance of thorough preparation is great; since the character and amount of instruction given in the school from the outset leave little opportunity for one imperfectly fitted to make up deficiencies, and render it impossible for him to derive the full benefit from his course, or perhaps even to maintain his standing.

Students will find their progress in Physics and Chemistry promoted by making themselves thoroughly familiar with so much of Physics as is contained in Balfour Stewart's Primer.

A knowledge of the Latin language is not required for admission; but the study of Latin is strongly recommended to persons who purpose to enter this school, as it gives a better understanding of the various terms used in science, and greatly facilitates the acquisition of the modern languages. Those who intend to take the course in Natural History will find it advantageous to acquire also the elements of Greek. Some proficiency in Freehand Drawing will be found advantageous, particularly for applicants to the partial course in Architecture.

It should also be borne in mind by pupils purposing to enter the Institute that the broader the intellectual training of the student in any direction, and the more extensive his general acquirements, the greater the advantages he may expect to gain in his future course.

#### ADMISSION TO ADVANCED STANDING.

To be admitted as a regular student in the second, third, or fourth year, the applicant must have attained the proper age (eighteen, nineteen, or twenty years respectively), must in general pass satisfactorily the examination for admission to the first-year's class, and examinations on all of the subjects given in the earlier years of the course which he desires to enter. The examinations for advanced standing are held at

the time stated on page 51, and applicants should present themselves at that time. (See pages 51 to 56, and pages 23 to 47.)

Graduates of colleges are admitted to the Institute without examination, and will be permitted to enter any of the courses at such a point as their previous range of studies will allow. If prepared to enter upon most of the studies of the third year, they will be afforded opportunity to make up any studies of the earlier years in which they are deficient; they will, in general, be credited with all subjects in earlier or later years in which they can show, by examination or otherwise, a standing satisfactory to the Faculty, and will be received provisionally as regular students. The attention of such applicants is particularly called to the schedules of courses on pages 23 to 47, and to the schedule of topics on pages 95 to 116. It is highly desirable that students contemplating professional courses after graduation from college shall arrange their college electives to cover the earlier subjects of the chosen course, in order that the number of deficiencies to be made up may be as small as possible; and such students are advised to communicate with the Secretary of the Faculty, from whom detailed information may be obtained as to the requirements for entering any particular year of any course. In order to enter any of the engineering courses in the third year, it will be essential for the applicant to be familiar with Differential Calculus. It is exceedingly important that students applying for advanced standing in these courses should have had considerable practice in mechanical drawing.

#### ADMISSION TO SPECIAL COURSES.

To be admitted as a student in any one or more selected subjects in any of the regular courses, except that in Architecture (see page 49), that is, to partial or special courses, the applicant must have attained the age of at least seventeen

years, and must pass satisfactorily such examinations as shall prove him to be qualified to pursue to advantage the subjects chosen.

By means of the schedule of topics and requirements as given at pages 95 to 116, the applicant may ascertain what the various subjects of study are, how and by whom they are given, by what regular courses and when they are taken, the subjects required in preparation for each, and the time occupied by it. In general, no student will be allowed to take any one of these topics until he has passed a suitable examination in all other topics required as preparation for that applied for.

Special students in Architecture must pass the regular entrance examination to the first-year class (page 51), and are required to take as a minimum the full two-years' partial course given on page 32, but may, with the consent of the Faculty, substitute equivalent studies, or take such additional ones as they may desire. All special students desiring to take Chemistry of the first year must pass the full entrance examinations, except that an equivalent in some other subject may be substituted for Plane Geometry. Communications in regard to such substitution should be addressed to the Secretary.



## METHODS AND APPARATUS OF INSTRUCTION.

**Ordinary Exercises.** — Instruction is given by lectures and recitations, and by practical exercises in the field, the laboratories, and the drawing-rooms. Text-books are used in many, but not in all, subjects. In many branches the instruction given differs widely from available text-books; and, in many such cases, notes on extended courses of lectures and laboratory work have been printed, either privately or by the Institute, and are furnished to the students at cost. A high value is set upon the educational effect of laboratory practice, drawing, and field-work.

**Written Examinations.** — Besides oral examinations in connection with the ordinary exercises, written examinations are held from time to time. Near the close of the months of January and May, general examinations are held. After the examinations the standing of the student in each distinct subject is reported to his parent or guardian. The examinations of January and May form the basis of admonition or advice from the Faculty in the case of students who are not profiting by their connection with the school.

**The Instruction in Mathematics.** — Great importance is attached to the study of mathematics, both as a means of mental discipline and as affording a necessary basis for further instruction in the engineering and other courses. (See page 95.)

The four topics following are taken by all regular students: Solid and Spherical Geometry. Higher Algebra. Logarithms and Plane and Spherical Trigonometry. Plane Analytic Geometry, including the equations and properties of the point, right line, and circle, and of the parabola,



ellipse, and hyperbola. (A shorter course in this subject is given to students in Courses VII. and IX.)

Students in all the Engineering courses receive instruction in the Differential and Integral Calculus.

In addition to the above, the following topics are given in some courses: Differential Equations, with applications to problems in Geometry. The Theory of Probability and Method of Least Squares, including the adjustment of observations and the computation of probable errors. Determinants.

As elective work, opportunities are afforded for the study of Advanced Algebra and Trigonometry, including De Moivre's Theorem and its applications. The General Theory of Equations, with the solution of higher equations by methods of approximation. Analytic Geometry of Three Dimensions: the equations and properties of the point, right line, and plane, of the sphere, cylinder, and cone, and of the paraboloids, ellipsoids, and hyperboloids. An advanced course in the Calculus, including the theory of Definite Integrals. Quaternions.

Courses in Solid Geometry, Logarithms, and Plane Trigonometry are given to students in the Partial Course in Architecture.

**The Instruction in Descriptive Geometry.**—The exercises in Descriptive Geometry are of two kinds. In the lecture-room the instruction is given by means of models and diagrams, and also by the use of text-books. In the drawing-room the student is drilled in the solution of such problems as shall illustrate the work of the class-room, and make him thoroughly familiar with this subject.

**The Instruction in Drawing.**—Instruction is given to all regular students in the principles of Geometrical, Mechanical, and Freehand Drawing; and a large amount of time is devoted to practice in the drawing-room, to enable the student to acquire the necessary skill, and to prepare him for

his future work. Drawing is also continued in connection with the professional studies.

**The Instruction in Modern Languages.**—While the primary object of the instruction in French and German is facility in translation, so that the student may avail himself of foreign works relating to his particular department, much importance is attached to the study of these languages as a means of general training. For both purposes a thorough and systematic study of the structure of the language is deemed to be an essential basis. This is, however, accomplished by means of practical work with the language itself, including written and oral exercises, rather than by study of the abstract rules of grammar. French (see conditions of admission, page 53) is continued through one year, and German through two years, for all regular students. In certain courses, especially in Course IX., there is advanced and special work in French and German both optional and required. Instruction in the elements of Italian and Spanish is also offered.

**The Instruction in English.**—In this department all regular students receive a course of instruction in English Composition, in the History and Composition of the English Language, in the elements of Logic, and in the History of English Literature. Practice in composition, under the personal supervision and criticism of the instructor, is required; and the principles of good style are further studied and illustrated by the critical reading of standard English authors. In this connection a brief study is made of the history of the English language and the sources of its vocabulary. In the third year is given a course of instruction in advanced English Composition, requiring of each student the frequent writing of essays, which are discussed and criticised at length, corrected, and rewritten.

All students in Course IX. in the fourth year are required to study English Literature. The particular branch chosen

for the current year is the Development and History of the English Drama. Further instruction is offered to students in Course IX. in the following subjects: Chaucer and Shakespeare; English Literature of the Nineteenth Century; American Literature; The History of English Fiction.

**The Instruction in History and Political Science.** — Instruction is given to all regular students in the following subjects: — Contemporary Political History, with some reference to Geography, and with individual examination of current discussions in periodical literature. Mediæval and Modern European History, including a view of the Mediæval Papacy and Empire, the Free Cities, and the rise of Universities. English and American Constitutional History. Political Economy.

Further instruction is offered in the following topics: The history of politics and social institutions in England and the United States. Anthropology, the study of prehistoric man, life in the Stone Age, fetichism, totemism, and the relations of instinct to intellect. Sociology, the historical development of the family, the organization of State and Church, and problems of ethnology. Comparative Politics, including a presentation of the opinions of dominant political thinkers, as Plato, Aristotle, Machiavelli, Hobbes, and modern philosophers. International Law, the intercourse between separate States, studied in the light of the foreign relations of the United States. Financial and Tariff History of the United States, with special reference to the relation of the tariff to important industries, investigation being made in the public documents of the United States Government for the authority of statements. History of Industry, including guilds, trades-unions, factory-system, strikes, arbitration, labor statistics. History of Commerce. Banking and Finance, including municipal finance. History of Economic Theory, with a survey of the mercantilists and physiocrats, and the modern schools. Statistics, including graphic representations by diagrams and cartograms. Administration, National

and Municipal, with the consideration of the organization of departments, tenure of office, official responsibility, and the civil service.

In addition, six optional courses during the last three terms afford opportunities for the more comprehensive and exhaustive study of these subjects.

Students in these courses have the benefit of a special reading-room, provided with current periodicals devoted to history and political science. Adjoining this room is a departmental library relative to these subjects, and accessible to all. Special investigations are here made, under the personal supervision of the instructor in charge.

Drawing-tables and chart-paper and other necessary appliances are furnished to all students engaged in statistical work.

The latter also have access, under proper restrictions, to the library of the American Statistical Association, which is kept in the rooms of the department.

**The Instruction in Chemistry.** — All students who are candidates for degrees attend a course of lectures on Inorganic Chemistry, illustrated by experiments, and perform actual experimental work in the laboratory of general chemistry. The lectures are intended to prepare the student for his work in the laboratory, and to emphasize the facts which he there learns. In the laboratory the student receives instruction in chemical manipulation, and performs a series of experiments designed to illustrate the properties of the more important elements and the laws of chemical action. In connection with the lectures in Inorganic Chemistry, the elements of theoretical chemistry are taught, and the student has practice in the solution of stoichiometrical and other chemical problems. The study of the theory of the subject is continued by more advanced courses of lectures and recitations, in which are presented the prevailing theoretical views as to chemical action, the constitution and classification of chemical compounds, as well as certain portions of

molecular physics which bear directly upon chemical theories, especially in thermo-chemistry.

The instruction in Analytical Chemistry extends through two or more years. Each student is given a desk in the laboratory, which is open to him at all times, and he receives personal instruction. Regular students have analytical work assigned them, with particular reference to the course they are pursuing. This work is so arranged that they obtain experience in a great variety of methods and processes, and are thus prepared to undertake any chemical analysis. The more industrious students, and those who work extra time in the laboratory, have the privilege of supplementing their regular laboratory course with special work and instruction if they desire it. Special students may select any branch of analytical work for which they are qualified.

Particular attention is given to volumetric analysis. A special laboratory is fitted for this work, and the students are taught to graduate and calibrate the various instruments of measurement.

As an introduction to original work, each student is required to undertake a critical examination of some process of analysis, to determine its limits of accuracy under various conditions, and to make a written report thereon.

The special instruction in the laboratory is supplemented by lectures upon methods of analysis and manipulation; and the current chemical literature in English, French, and German is reviewed by the students, and subsequently discussed in the class-room under the direction of one of the professors.

The instruction in Sanitary Chemistry consists mainly of laboratory work, and special laboratories have been equipped for the purpose. For all who choose to pursue this subject, a minimum amount of work is laid out, consisting of practice in the methods commonly used in the chemical examination of air and water, of milk and of butter. For those who wish to take a more extended course, opportunity is afforded for the critical study of other methods of analysis, for the exam-



ination of other articles of food, and for the investigation of a variety of sanitary problems in which chemical questions are involved.

Industrial Chemistry is taught by a course of lectures and by work in the laboratory of industrial chemistry. A full description of the most important technical applications of chemistry is given in the lectures. A part of the lectures are given by persons actively employed in carrying out the processes which they describe. In the industrial laboratory the students prepare chemical products from raw materials, and also undertake the preparation of pure chemicals. They are taught fractionation and distillation; and particular attention is paid to the preparation of dyes and mordants.

Dyeing and Coloring receive special attention. The course of instruction includes the bleaching and dyeing of cotton, wool, and silk in the piece and in yarn. The students are taught how to use mordants, and to perform the common operations of the dye-house. They become acquainted with the principles involved in cotton printing, and have some experience in mixing colors. The methods of detecting the nature of the dye-stuffs present upon fibres are taught, together with many of the modern methods of commercial analysis. The laboratory instruction is supplemented by frequent excursions to manufacturing establishments, where the practical working of chemical industries can be examined.

The instruction in Organic Chemistry consists of lectures and laboratory work. The theories of organic chemistry are discussed, and the practical applications of these theories described. The work in the laboratory consists of ultimate analysis, preparation of organic products, and original research. Particular attention is paid to the coal-tar derivatives and to the chemistry of the artificial colors. The researches undertaken in this laboratory deal for the most part with those problems in organic chemistry which have a distinctively technical bearing. Ample opportunities are afforded



for the prosecution of investigations in the domain of pure chemistry.

The instruction in chemistry is designed primarily for those who are candidates for the several degrees of the Institute, and for such special students as are looking to chemistry as a profession, and are following in the main the courses laid out for the regular students. These special students are required to study French and German as a part of their course, and are subject to the same examinations in the branches which they pursue as are the regular students. In addition, the Institute desires to make available all the facilities of the lecture-rooms and laboratories to teachers who wish to perfect themselves in chemistry, and to persons of maturer years who are engaged in technical pursuits, and who wish to acquire an accurate knowledge of the science. Such persons may be admitted, without formal examinations, on satisfying the professors in the department that they are competent to pursue to advantage the subjects chosen.

**The Kidder Laboratories of Chemistry** afford accommodations for five hundred and fifty students. The chemical department occupies fourteen laboratories, two lecture-rooms, a reading-room and library, balance-room, offices, and supply-rooms,—in all, twenty-four rooms. The laboratory for general chemistry has places for three hundred and twenty students, and is very completely equipped for instruction in elementary chemistry. The analytical laboratory can accommodate one hundred and fifty students, and possesses every convenience for accurate and rapid analytical work. The organic laboratory has places for thirty students. Conveniences are afforded for conducting offensive and dangerous operations in the open air, or in a separate room. The laboratories for sanitary chemistry contain places for sixteen students. They possess a very complete outfit for the analysis of air and water, and for the investigation of sanitary problems. The laboratory of industrial chemistry accommodates thirty students. It consists of a series of rooms fitted with the needful

apparatus for the preparation of chemicals on a considerable scale. The students are here taught the preparation of chemical products from raw materials, the utilization of the by-products, and the methods for the purification of chemicals. A special assignment of work is made for each individual, so that the student may see a varied line of work. The laboratory contains kettles of various patterns, stills, presses, tanks, centrifugal dryers, filter-press, crystal dryers, furnace, and a variety of other apparatus. The laboratory devoted to textile coloring contains numerous jacketed kettles, baths, and dyetubs, squeeze-rolls, steamer, ager, and dryer, and a printing machine designed for experimental purposes. Kidder Hall has a seating capacity of one hundred and eighty, and is arranged with special reference to the delivery of experimental lectures. In addition, there is a small lecture-room, seating thirty. The lecture-rooms contain valuable cabinets of specimens for purposes of illustration. The balance-room is supplied with twenty-two balances.

The William Ripley Nichols Library of Chemistry, numbering more than thirty-nine hundred volumes and two thousand pamphlets, is kept in the reading-room of the department. This library contains complete sets of most of the important chemical periodicals. It is primarily designed to aid in the instruction, but is open to all persons who desire to consult it.

**The Instruction in Physics.**— This begins with a series of lectures, attended by all regular students, in which the whole subject of Physics is discussed. The various branches are treated both mathematically and experimentally. In all cases the theoretical discussion of a question is followed by a full account of its practical applications.

The Institute possesses an extensive and rapidly increasing collection of physical apparatus.

In addition to the courses of lecture-room and laboratory exercises in Physics, which are required of all regular students, various special courses of lectures, readings, and laboratory exercises in Optics, Acoustics, Heat, and Elec-

tricity, are provided for those making a specialty of Physics. Students pursuing these courses gain a familiarity with standard works on the various branches of Physics in both their own and foreign languages. The subject of Photography, including its applications to micro-photography, spectrum-photography, and the various photo-mechanical processes, will be discussed, and will be supplemented by practical exercises in the photographic laboratory. Instruction is also given in Microscopy, and in the use of the lantern as an instrument of demonstration in the lecture-room. A course of lectures and laboratory instruction in Heat Measurements and allied subjects has been instituted, and the course in general Electrical Measurements is undergoing continual extension.

**The Rogers Laboratory of Physics.** — All regular students enter upon a general course of experimental work in this laboratory after the conclusion of the lecture course in Physics. The work is designed to strengthen the student's grasp of the laws and phenomena of that science, and to impart to him a knowledge of methods and instruments used in measurement, and of the mathematical discussion of experimental results. The laboratory work consists almost exclusively of quantitative measurement. The earlier and simpler work serves chiefly to train the student in the use of methods or instruments which are employed as accessories later. To this succeed experiments on the mechanics of solids, liquids, and gases, each illustrating a method by which some physical law or constant is determined. Work in optics follows; and heat and electrical measurements occupy the remaining and more difficult part of the course. More advanced instruction is also provided for.

Accurate work is required throughout; and in connection with the use of instruments of precision, especially in the more advanced measurements, the student's attention is particularly directed to the study of possible sources of error, and to the discussion of the effects of these on the results obtained.

The particular line of work assigned to each person is determined, to some extent, by his course in the school; and the instruments which he studies are often such as he will be called upon to use in later technical work. In some courses, such as Physics, Electrical Engineering, and Chemistry, work of a more advanced scientific or technical nature is carried on. Original investigation is encouraged as far as possible, and the result has been a considerable number of published memoirs.

The library of the department contains the standard works upon various branches of Physics, and all new publications of value on that subject are added as they appear. It is especially full in works relating to Electricity. Most of the leading scientific and technical periodicals devoted to Physics are regularly received, and are accessible to students.

**The Instruction in Theoretical and Applied Mechanics** begins with the study of the Composition and Resolution of Forces, the general laws of Kinematics and Dynamics mathematically discussed, the principles governing the determination of the stresses in the different members of trusses, centre of gravity, moment of inertia, and the ordinary principles of the strength of materials.

The more advanced part of this instruction embraces the completion of the study of Strength of Materials, including work in the Engineering Laboratories, Theory of Elasticity, main principles of the Stability of Arches and Domes, and special study of Dynamics.

The methods of the differential and integral calculus are freely used whenever they are the most convenient.

**The Instruction in Civil Engineering** is given by means of lectures and recitations, and by practice in the field and in the drawing-room.

In Surveying, besides the work in the class-room, the use of the various instruments is taught by actual work in the field, covering the adjustments of the instruments, and the

principal operations involved in land, topographical, hydrographical, railroad, city, and underground surveying. The work in the drawing-room consists in representing upon paper the surveys made in the field, with practice in topographical and map drawing.

The course in Roads and Railroads includes the survey, location, construction, and equipment of railroads; and the laying-out, building, and maintenance of town and county roads, and of city streets and pavements. In addition to the work in the class-room, an actual railroad survey and location, several miles in length, is made each year upon such ground as shall best illustrate the problems occurring in practice; and the necessary maps and profiles are prepared by the students. Advanced courses are given, in which are discussed the economics of railroad location, and also the subjects of rolling stock, motive power, brakes, signals, yards, stations, etc., together with a course on railroad administration and management.

The course in Hydraulic Engineering embraces, — First, a detailed study of the principles of Hydraulics, including the laws of Hydrostatics and of the flow of water through orifices, over weirs, and through pipes; with numerous problems illustrating the practical application of the principles discussed. Second, practice in Hydrometry, in which the student is instructed in the methods of gauging the flow of streams, with practice in the field, using instruments of various kinds. Third, practice in carrying out hydraulic experiments on the flow of water and on the loss of head, under various conditions, with the aid of the tank and other apparatus in the hydraulic laboratory; as well as in the testing of motors, and other similar work. Fourth, a course of lectures covering the subjects of hydrology, rivers and canals, water-supply, water-power, hydraulic motors, foundations, coast and harbor work, and irrigation. In this course the object is to make the student familiar with the principles involved, and to give him a foundation on which he can afterward safely base his more extended practical



studies. Special attention is given in this course to the subjects of hydrology, water supply, water power, and foundations.

The instruction in Sanitary Engineering is given by a course of lectures, supplemented by field-work and design. The object sought is to prepare the student to deal intelligently with certain questions relating to the health of individuals and communities, and to properly plan works of sewerage and drainage. The course embraces the study in detail of the house, with its apparatus, the disposal of sewage by surface or sub-surface irrigation for isolated buildings, the collection and removal of sewage in the larger towns, and the sanitary drainage of cities. Frequent opportunities are given to the student for the inspection of actual examples of sanitary engineering, and a study is made of the questions of the day in relation to public health. Students taking this course also attend lectures and laboratory exercises on Bacteriology.

The course in the Strength and Stability of Structures embraces a study of the methods of proportioning beams, floors, columns, roofs, bridges, piers and abutments, arches, retaining-walls, and similar structures. Both the analytical and graphical methods of investigating the strength and stability of structures are taught. The course in Bridges and Roofs consists in an extended study of the different structures of this class, of wood, stone, and metal, with reference to economy of material, methods of proportioning parts, and the details of design. Parallel with these courses runs the work in the drawing room, in which the student is required to make complete designs and working drawings, with blue prints, for several structures of this kind. The materials used in engineering are studied in the courses on the Strength of Materials and the Metallurgy of Iron; and, in addition, further study is devoted to this subject in connection with the other courses, each material being taken up in connection with the structures in which it is most extensively applied. The study of Specifications and Contracts is also taken up in connection with each of the special courses,



and various actual specifications are studied, each in its proper place.

The course in Geodesy and Practical Astronomy includes the study of descriptive, spherical, and practical astronomy, and of the mathematical and physical principles of geodesy, with practice in some of the simpler geodetic field operations. In the summer vacation following the third year, students taking the topographical option are required to attend a summer course in Topography, Geology, and Geodesy, during four to six weeks in the early part of the summer. This course is held at some convenient and suitable point in the country, and its object is to give the students opportunity for more extended and more continuous field practice in these branches than is possible during the term. The work done consists of a topographical survey of a certain district, with field practice in geodesy and geology. The course is open, without extra charge for tuition, to all students in the department who have completed the third year, as well as to properly qualified students in other departments. Persons not connected with the Institute may also be permitted to attend, upon giving satisfactory evidence of being properly qualified, and upon payment of the tuition fee of \$25.00.

By the kindness of many active members of the profession, and especially through the courtesy of Mr. W. H. Barnes, General Manager of the Boston & Albany Railroad, of Mr. James T. Furber, General Manager of the Boston & Maine Railroad, and of Mr. Charles F. Choate, President of the Old Colony Railroad, the classes are frequently able to inspect engineering works of interest, and to carry on field operations in specially favorable localities. The aid thus received has been of very great value.

In addition to the regular lectures of the school, occasional lectures are given by prominent engineers, in active practice in their profession, upon subjects with which they are specially familiar. During the past year lectures were given by Mr. George W. Blodgett, Electrician of the Boston & Albany Railroad, on the Application of Electricity to Railway Work-

ing; by Mr. Eliot Holbrook, General Manager of the Pittsburgh and Lake Erie Railroad, on Railroad Maintenance; by Mr. Desmond Fitzgerald, Superintendent of the Western Division of the Boston Waterworks, on matters regarding Rainfall and Water-Supply; by Mr. C. W. Folsom, of the Boston Sewer Department, on some details of Sewer Work; and by Mr. John R. Freeman, Hydraulic Engineer of the Boston Manufacturers' Mutual Fire Insurance Company, on Stadia Surveying.

The department has a large and constantly increasing collection of instruments and apparatus, which may be classified as follows: A full outfit of the instruments used in surveying and in the drawing-room. A collection of hydraulic apparatus for work in the field, comprising single and double floats of various patterns, loaded tubes, and current meters of different kinds. An instrument for measuring the strain in bridges and other structures of iron, which gives a continuous record. The hydraulic apparatus for the measurement of the flow of water through orifices and mouthpieces, over weirs, through pipes, etc., is described elsewhere, in connection with the engineering laboratories.

The department has also a growing collection of models, illustrating bridge details, problems in stone-cutting, etc., which are used in connection with the work of instruction.

In order to provide for the needs of students wishing to pursue graduate courses of study, leading, if desired, to the degree of Master of Science or Doctor of Philosophy, an advanced course has been laid out, which includes, besides original work in research and criticism, further instruction in Bridge Construction and Design, Theoretical Hydraulics, Theory of Elasticity, with special reference to its applications to the strength of materials, and experimental work in the engineering laboratories.

**The Instruction in Mechanical Engineering** is given by means of lectures and recitations, and by practice in the drawing-rooms and in the engineering laboratories. Frequent visits

are made also to machine-shops and manufacturing establishments, to witness machinery in operation and manufacturing processes, in addition to those which can be seen at the Institute itself.

The laboratory work, in its earlier portions, is devoted to giving the student a drill in such experimental work as a mechanical engineer is constantly called upon to perform, such as boiler and engine tests, etc. The later laboratory work takes very largely the form of original research; and it is intended that the students in these laboratories shall, under suitable direction, undertake the experimental investigation of a number of important engineering problems.

A large amount of drawing is done by the students throughout their course in connection with their regular work, drawing for mere practice ceasing at the end of the first year. A definite style is adopted, and is adhered to throughout; early in their course the students are taught to use the "blue process."

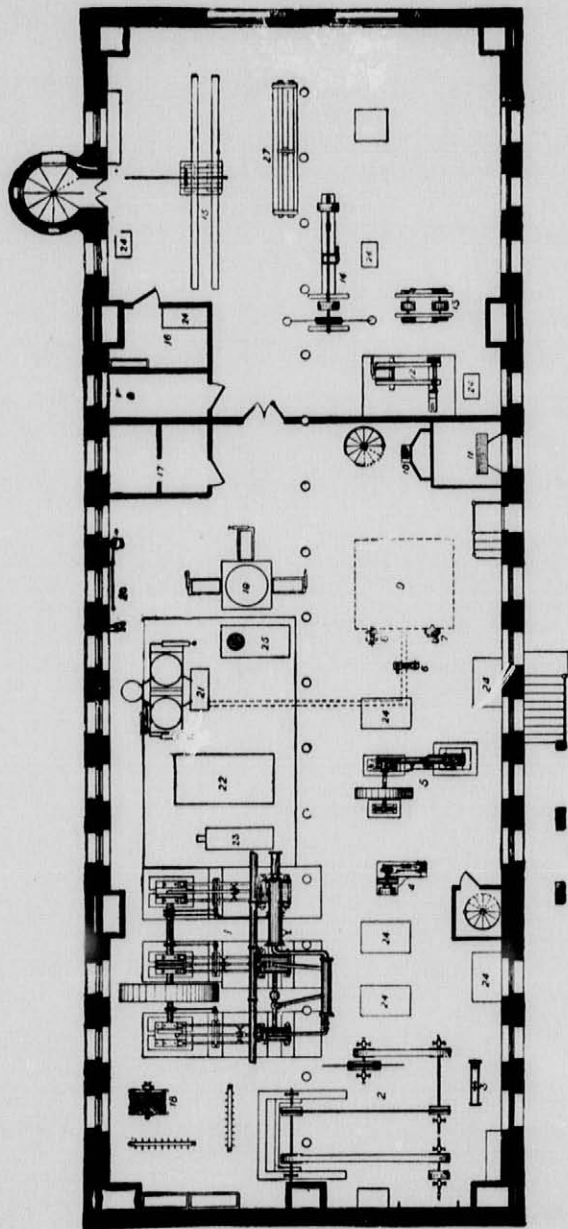
Besides the teaching done by the regular corps of instructors, lectures upon special subjects are given by gentlemen actively engaged in the profession. During the last school year lectures were given by Mr. J. J. Woodward, Constructor, U. S. Navy, on Naval Construction; Mr. Joseph Stone, on Mill Management; Mr. James N. Lauder, of the Old Colony Railroad, on the Locomotive; and Mr. David L. Barnes, on Compound Locomotives.

**The Engineering Laboratories.** — The objects to be accomplished by these laboratories are the following: First, to give the students practice in such experimental work as they are called upon to perform in the pursuit of their profession. Second, to give the students some experience in carrying on original investigations in engineering subjects, with such care and accuracy as to render the results of real value to the engineering community. Third, by publishing, from time to time, the results of such investigations, to add gradually to the common stock of knowledge.

These laboratories, which have heretofore been situated in the basement of the Rogers Building, are to be removed before Feb. 1, 1890, to a new building, now nearly completed, where they will occupy the two lower floors,  $50 \times 150$  feet each. They will thus be very much enlarged in space, and a considerable addition will be made to their equipment. The description given here corresponds to their proposed condition subsequent to that date, and hence during the second term of the present school year. (See plans.)

The laboratory for testing the strength of materials is furnished with the following apparatus: An Olsen testing machine of fifty thousand pounds capacity, for determining tensile strength, elasticity, and compressive strength. A testing machine of the same capacity for determining the transverse strength and stiffness of beams up to twenty-five feet in length, and of framing-joints used in practice. Machinery for the measurement of the strength, twist, and deflection of shafting while running and under the conditions of practice. Machines for time tests of the transverse strength and deflection of full-sized beams; for testing the tensile strength of mortars and cements, and of ropes; for testing the effect of repeated stresses upon the elasticity and strength of iron and steel; for determining the strength and elasticity of wire; for determining the deflection of parallel-rods when running under different conditions. Also accessory apparatus for measuring stretch, deflection, and twist.

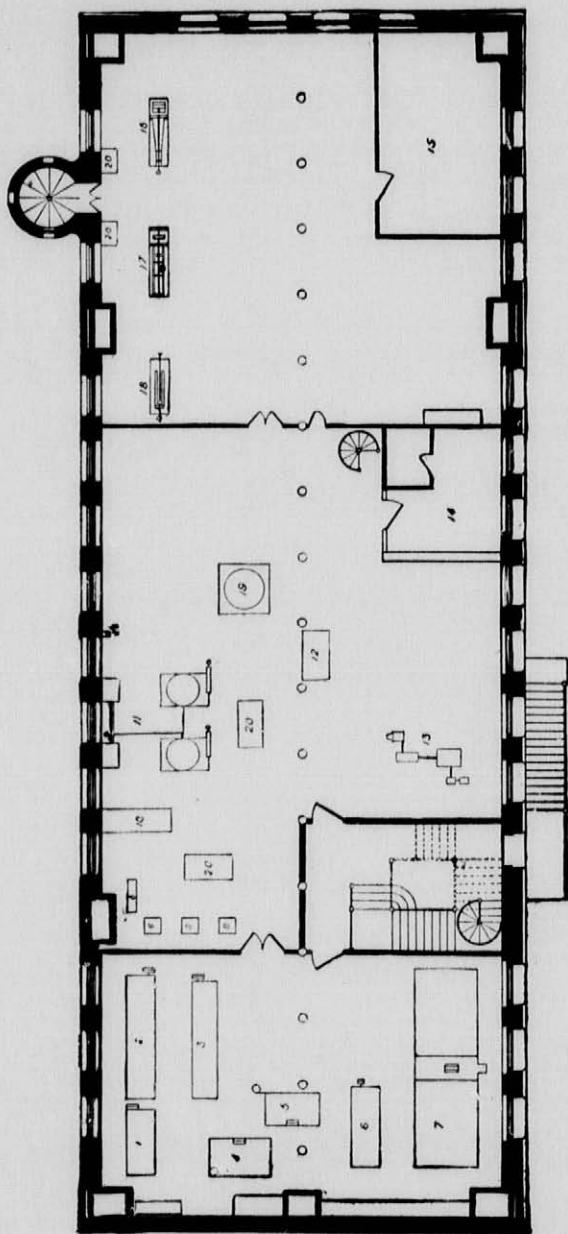
The hydraulic laboratory contains, — A closed tank five feet in diameter and twenty-seven feet high, connected with a stand-pipe ten inches in diameter and about ninety feet high. Apparatus, in connection with the tank and stand-pipe, for making experiments on the flow of water through orifices and mouthpieces, over weirs and in pipes, under different heads and under different conditions, and on the losses of head occurring under different circumstances. A six-inch Swain turbine so arranged that it can be run under different heads, and that measurements can be made of the power exerted, of the efficiency, etc., under different gates.



**BASEMENT, 150 X 50 FEET.**

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| <ol style="list-style-type: none"> <li>1. Triple Expansion Engine, 150 H. P.</li> <li>2. Rope and Belt Transmission Testing Machine.</li> <li>3. Engine Lathe.</li> <li>4. Kennell Engine, 8 H. P.</li> <li>5. Harris-Corliss Engine, 16 H. P.</li> <li>6. Steam Pump.</li> <li>7. Rotary Pump.</li> <li>8. Centrifugal Pump.</li> <li>9. Tank.</li> </ol> | <ol style="list-style-type: none"> <li>10. Fan Engine.</li> <li>11. Steam Pipes for Heating Air.</li> <li>12. Rope-Testing Machine.</li> <li>13. Parallel-Rod Machine.</li> <li>14. Shaft-Testing Machine.</li> <li>15. Fifty Thousand Pounds Beam-Testing Machine.</li> <li>16. Cement Room.</li> <li>18. Dynamo, 500 Lights.</li> </ol> | <ol style="list-style-type: none"> <li>19. Wrought-Iron Tank for Hydraulic Experiments (5 feet diameter, 27 feet high).</li> <li>20. Hydraulic Stand-Pipe (10 in. diam., 85 feet high).</li> <li>21, 22. Cisterns.</li> <li>23. Condenser.</li> <li>24. Tables.</li> <li>25. Turbine-Wheel and Tank.</li> <li>26. Mercury Column.</li> <li>27. Apparatus for Time Test of Wooden Beams.</li> </ol> |
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### FIRST FLOOR.

1. Drawing Frame.
2. Speeder.
3. Fly-Frame.
4. Carding Engine.
5. Carding Engine.
6. Spinning Frame.
7. Mule.

8. Calorimeters.
9. Calorimeters.
10. Calorimeters.
11. Injector and Weighing Tanks.
12. Tank for Turbine-Wheel.
13. Westinghouse Air Drake.
14. Office.

15. Office.
16. Olsen's Fifty-Thousand Pounds Tension Machine.
17. Repeated-Bending Machine.
18. Cement-Testing Machine.
19. Tank for Hydraulic Experiments.
20. Tables.
21. Mercury Column.



The steam laboratory contains, — A triple expansion engine, with cylinders of 9 inches, 16 inches, and 24 inches diameter respectively, and 30 inches stroke, arranged in such a way as to be run single, compound, or triple, as desired for the purposes of experiment. This engine is of the Corliss type, and was built by E. P. Allis & Co. It will have a capacity of about 150 horse-power when running triple, with an initial pressure of 150 lbs. in the high pressure cylinder. It is connected with a surface condenser and all the other apparatus necessary to adapt it to the purposes of accurate experiment.

This laboratory also contains a 16 horse-power Harris-Corliss engine, and an 8 horse-power engine, used for giving instruction in valve-setting, etc. It is also equipped with several surface-condensers, steam-pumps, calorimeters, mercurial pressure and vacuum columns; apparatus for determining the quantity of steam issuing from a given orifice or through a short tube under a given difference of pressure; apparatus for testing injectors; and with indicators, planimeters, gauges, thermometers, anemometers, and other accessory apparatus.

The engineering laboratories are also provided with a number of friction-brakes; with machinery for determining the tension required in a belt or rope to enable it to carry a given power, at a given speed, with no more than a given amount of slip; with three transmission dynamometers; with a complete set of Westinghouse air-brake apparatus, including the parts belonging on the car and on the locomotive; with cotton machinery as follows, namely, two cards, a drawing-frame, a speeder, a fly-frame, a ring-frame, and a mule, as well as accessory apparatus. There are also available for the purposes of experiment in connection with the work of these laboratories, two horizontal tubular boilers, one large Babcock & Wilcox boiler, and a Porter-Allen engine of about 80 horse-power, all situated in the Rogers Building; also another boiler, a 40 horse-power Brown engine, a number of looms, and other apparatus in the workshops on Garrison Street.

**The Instruction in Shopwork.** — Practical instruction in the nature of the materials of construction, and in the typical operations concerned in the arts, is considered a very valuable adjunct to the theoretical treatment of professional subjects. Workshops have been provided, and furnished with the more important hand and machine tools, so that the student may acquire a direct knowledge of the nature of metals and woods, some manual skill in the use of tools, and a thorough knowledge of what can be accomplished with them. The shops are located in the building on Garrison Street, and are equipped as follows: —

The carpentry, wood-turning, and pattern-making departments contain 40 carpenter's benches, 2 circular-saw benches, a swing-saw, 2 jig-saws, a buzz-planer, a mortising-machine, 36 wood-lathes, a large pattern-maker's lathe, and 36 pattern-maker's benches. The foundry contains a cupola furnace for melting iron, 2 brass furnaces, and 32 moulder's benches. The forge-shop contains 32 forges, 7 blacksmith's vises, and 1 blacksmith's hand-drill. The machine-shop contains 23 engine-lathes and 16 hand-lathes of recent approved patterns, 2 machine-drills, 2 planers, a shaping-machine, a universal milling-machine, a grinding-lathe, and 32 vise-benches arranged for instruction in vise-work.

**The Cummings Mining and Metallurgical Laboratories.** — The aim of these laboratories is to furnish students the means for studying, experimentally, various processes of ore-dressing and smelting, and at the same time to enable them to gain an idea of what is required of a miner or metallurgist. To this end the apparatus has been chosen with a view of illustrating, as far as possible, the principles of the more important machines and furnaces which are used in Mining and Metallurgy.

The metallurgy of lead, copper, gold, and silver has been chosen as the best suited for laboratory illustration. Production of iron and steel in quantity is precluded by the size of the plant requisite, and by the large amount of ores and fluxes necessary to put this into operation.

The experimental work of the laboratory is carried on by the students under the immediate charge of an instructor. A sufficiently large quantity of ore is assigned to each student, who first examines it for its component minerals, sorts and samples it, and determines its character and value by analysis and assays, and makes such other preliminary examinations as serve to indicate the proper method of treatment. He then treats the given quantity, makes a careful examination of the products at each step of the process, ascertains, wherever practicable, the amount of power, water, chemicals, fuel, and labor expended, and thus learns approximately the effectiveness and economy of the method adopted. He learns also the value of chemistry as a check upon metallurgical work. Each student is assisted in working his ore by his classmates, each of whom has an opportunity in turn to manage the machines and furnaces.

The Institute does not claim that the instruction given in this laboratory is in any sense a substitute for the experience gained in large works. What is claimed is, that it prepares students to go into works and to profit by them. The spirit of investigation which is developed by the work, as well as the experience of comparing processes actually carried out with the same processes as described in the books, is of great advantage to the student.

The mining laboratory consists of three parts,—milling-room, furnace-room, and assay-room; with supply-room and ample storage-vaults attached.

The milling-room is supplied with four suites of milling-apparatus, as follows: A three-stamp battery, a set of amalgamating-plates, a mercury-saver, a Frue-vanner for concentrating tailings, a settling tank, and a centrifugal pump. A Blake challenge crusher, crushing-rolls, with automatic sizing screens, a Richards-Coggin separator, a spitzkasten, two Harz-Mountain jigs, an Evans table or rotary-buddle, a settling tank, and a centrifugal pump. A set of four amalgamating pans, 30, 18, 12, and 8 inches in diameter respec-

tively; also a 36-inch settler, and a little automatic kieve for separating mercury from pulp. A set of three 40-gallon leaching-vessels, a set of four 8-gallon leaching-vessels, and two dynamos for deposition of metals.

The laboratory contains also the following auxiliary apparatus: A steam-engine, a Bogardus mill, a ball mill, a Root blower, a Sturtevant dust-fan and blower, drying-tables, and four Morrell agate mortars.

The furnace-room contains a water-jacket blast-furnace, a copper-refining furnace, a reverberatory lead-smelting or agglomerating furnace, two roasting furnaces, a roasting kiln, furnaces for cupellation, furnaces for fusion, a blacksmith's forge, a melting-kettle, retorts, etc. The assay-room contains ten crucible furnaces,  $12 \times 12$ , all of which are jacketed with iron shells to insure good draught, stability, and durability; also two muffles  $4 \times 7$ , one muffle  $3 \times 6$ , four muffles  $7 \times 12$ , one muffle  $8 \times 15$ . These furnaces are all provided with ample flue capacity and abundant draught. This room contains also six pulp balances, six flux-balances, five button-balances, and desks for fifty students.

To bring the mining students into closer acquaintance with their profession, excursions are organized for visiting mines, mills, smelting-works, and geological fields. These excursions have taken place, in the past, as often as once in two years; and, since the year 1870, excursions have been made to Colorado, Lake Superior, Virginia, Vermont, Pennsylvania, Lake Champlain, New Brunswick, and Nova Scotia. Shorter excursions of a day or two at a time are sometimes made while the school is in session. During the summer of 1888 the excursion gave place to a summer school of mining of six weeks' duration, located at Capelton, Canada. The students surveyed, laid tracks, drilled, and blasted below ground; and they sorted ore, assayed, and made a geological survey on the surface.

In June, 1889, the summer course in Metallurgy was given among the anthracite iron furnaces of the Lehigh Valley and the coke furnaces of Lebanon, Steelton, and Baltimore. The

construction and running of furnaces were studied, also the starting up of furnaces after the Susquehanna flood.

In future the mining and metallurgical summer courses will take place in alternate years.

**The Instruction in Architecture.**—The instruction in this subject comprises the scientific study of construction and materials, the study of building processes and of professional practice, as well as that of composition and design, and of the history of the art. It is so arranged as to meet the wants both of those who commence their professional studies at the beginning, and of experienced draughtsmen who desire to make up deficiencies in their training, or to qualify themselves for undertaking the responsibilities of practice.

The more strictly professional work begins with the study of the Five Orders and their applications, and of Architectural History; while, with constant practice in drawing, the students are familiarized with the material elements of their future work by a course in practical construction, illustrated by lectures, problems, and by visits to buildings. The subject of specifications and contracts is discussed. Problems in construction of all kinds are given, which fix in the memory the principles already learned, and supplement them by more advanced instruction.

The students are continually engaged upon architectural design. Each set of drawings is examined and criticised before the classes by a jury from the Boston Society of Architects. Instruction is also given in sketching in black and white, and in water-color; and evening classes are held during the winter for drawing, both from life and from the cast, to which the advanced students of the department are admitted.

The Boston Society of Architects has established two prizes of the value of fifty dollars each, in books, for students who, at the end of the year, exhibit the best work.

**The Architectural Museum.**—Several thousand photographs, prints, drawings, and casts were originally collected for this



department, by means of a special fund raised for the purpose. To these collections large additions have been made, at first mostly by gifts, but later by regular appropriations. Models and illustrations of architectural detail and materials are arranged in the rooms of the department. The chief part of the collection of casts of architectural sculpture and detail belonging to the department has been deposited in the Museum of Fine Arts, together with the architectural collections belonging to the Museum. The students of the department have free access to them at all times; and as the Museum building is close at hand, no inconvenience results from the change; and the regular exercises in drawing from the cast are held there. The space thus gained at the Institute is filled with specimens of metal-work, tile-work, glass-work, and wood-work, partly purchased, but mostly deposited with the department by the manufacturers, forming a museum of sanitary and building appliances. The library of this department is very complete in technical works, and its collection is constantly increasing. It also contains all the leading periodicals, both American and foreign. The publications of the Royal Institute of British Architects and of the Société Centrale des Architectes in Paris are presented by those institutions.

**The Instruction in Electrical Engineering.**—As a foundation for subsequent work, thorough instruction is given in the theory of electricity. An extended course of lectures is devoted to the consideration of the various technical applications of electricity to land and submarine telegraphy, the telephone, electric lighting, and the electrical transmission of power. Instruction is given by lectures and laboratory exercises upon the processes of photometry, especially as applied to the measurement of electric lights. Advanced instruction in electrical measurements, including work with dynamo-electric machinery, together with a course on the electrical testing of telegraph and telephone lines, is provided. The subjects of construction, specifications, and contracts also receive attention.



In the later part of the course each student prepares and reads before his class an essay on some electrical process, instrument, or system, or other professional topic. These essays are written after a study of recently published papers and memoirs, and often embody also the results of experimental work by the student. They are intended to familiarize the class with the topics presented, and to give experience in independent study and in the preparation of original scientific papers. The work is also of particular advantage to those who intend to become teachers.

Besides the work done by the regular staff of instruction of the Institute, special teaching will be given by gentlemen who are professionally engaged in various departments of Electrical Engineering, or especially conversant with certain branches of applied electricity. During the past year such instruction has been given by the following gentlemen: —

Mr. George W. Blodgett, Electrician of the Boston & Albany Railroad, on the Application of Electricity to Railway Signalling, and on the Electric Lighting of Railway Trains; Mr. A. C. White, late of the Western Edison Electric Light Co., on Methods of Wiring for the Distribution of Electricity; Mr. Edward Blake, of the Sprague Electric Railway and Power Co., on Electro-Motors; Mr. C. J. H. Woodbury, of the Manufacturers' Mutual Fire Insurance Co., on Electric Lighting in its Relation to Fires and Fire Insurance; Mr. C. A. George, of the Boston Municipal Fire Alarm Telegraph, on Municipal Fire Alarm Systems; Mr. C. L. Edgar, Superintendent of the Boston Edison Electric Illuminating Co., on the Edison System of Electric Lighting; Mr. G. F. Curtiss, of the Thomson-Houston Electric Co., on the Thomson-Houston System; Mr. W. S. Hadaway, Jr., of the Schaefer Electric Lighting Co., on the Manufacture of Incandescent Lamps; Mr. W. S. Moody, of the Thomson Electric Welding Co., on Electric Welding; and Sergt. Parke Morrill, of the United States Signal Service, on Atmospheric Electricity.

The equipment of the laboratory includes a number of

dynamo machines of various patterns, both arc and incandescent, which are devoted to purposes of instruction. Its facilities for instruction and research have been greatly increased by the recent gifts of a complete Edison plant for isolated lighting, including a 150-light dynamo, from Mr. Thomas A. Edison, and of a 9,600-watt, inclined coil, constant potential dynamo, from the Thomson-Houston Electric Co. During the past year a 500-light Thomson-Houston alternating current machine, with convertors, has also been added. A 500-light United States direct current dynamo is to be used for the purpose of lighting the Engineering Building. This will be available for purposes of instruction.

In order to provide for the needs of students seeking instruction in Electrical Engineering beyond that given in the undergraduate course, an advanced course has been planned, which, if the student so desires, may lead to the degrees of Master of Science or Doctor of Philosophy. To this end, in addition to guidance in the prosecution of experimental research, provision will be made for the further study of the Mathematical Theory of Electricity, of Analytic and Applied Mechanics, including the Theory of Elasticity, the Dynamics of Rigid Bodies, and Hydrodynamics, and also of Advanced Mathematics.

**The Instruction in Biology** covers a coördinated series of related subjects, beginning with General Biology and Microscopy, and extending to special instruction in Comparative Physiology, Zoölogy, and Sanitary Biology.

General Biology is taught, partly as an introduction to the more special branches of the subject, which are accordingly made to depend more or less upon it, and partly for its own sake, as opening up to the general student of life-science a new and fertile field. Beginning with a brief review of the familiar facts of common knowledge concerning living things and lifeless things, their likeness and their difference, and of organisms, organs, and tissues, the more recondite subjects of cells and protoplasm are considered; after which consid-

erable time is spent upon a thorough examination and comparison, both macroscopic and microscopic, of a particular plant (the common brake) and a particular animal (the earth-worm), chosen as representative forms. Here also the elements of practical microscopy are necessarily acquired, although a distinct course in Microscopy is given, chiefly to students in Chemistry, Physics, and Mining.

General Biology is succeeded by a somewhat longer course in the Biology of the Micro-organisms, in which the simplest forms of life, from one-celled organisms like yeast, bacteria, and infusoria, upward, are studied and compared. This gradually introduces the student to Cryptogamic Botany, of which the outlines are taught, and to Zoölogy (including Palæontology), in which larger opportunities are provided. The essentials of Anatomy and Embryology are taught by a course in Comparative Anatomy and the Embryology of the Chick; and in these subjects the arts of Dissection and Histology are also readily acquired.

The instruction in Zoölogy is given by lectures and laboratory work, and by occasional visits to museums and to the seashore. Excursions are made every year to Wood's Holl (where are located the new Marine Biological Laboratory and the extensive aquaria, laboratories, and fish-hatching establishments of the United States Fish Commission), to Beverly Bridge, and to other points.

Students in the course in Natural History are allowed, in the fourth year, some choice of more special work, and are expected to arrive at professional attainments in their specialties. The subjects offered at present are Comparative Physiology (including Microscopic Anatomy), Advanced Zoölogy, and Sanitary Biology. For supplying the needs of students in either of these subjects the department of Biology is now fully prepared, and some of the apparatus available is enumerated in the next paragraph. Special facilities are offered in the new and rapidly developing science of Bacteriology, especially in its latest applications to sanitary science in the examination of air, ice, and water.

A biological journal club, to which the more advanced students are admitted, has been found helpful as a means of keeping abreast of current progress, and in giving practice in bibliography and the public presentation of original matter or of abstracts. Students of biology have also valuable privileges in connection with the Boston Society of Natural History, of which the museum, the library, etc., are freely accessible.

**The Biological Laboratory** is a large room on the first floor of the Rogers Building. It is furnished with tables for microscopical work, for dissection, and for the simpler operations of physiological chemistry. Every student is supplied with a Zeiss or Hartnack microscope, a work-table, and a locker. The laboratory instruments include Thoma, Schanze, and Minot microtomes; a long-roll kymograph; Du Bois-Reymond induction machines; a rotating drum for smoked paper; a pendulum myograph; a moist chamber; culture rooms; sterilizers; special microscopes and other bacteriological apparatus; etc. Frog-tanks and aquaria are also provided. The biological library includes all the ordinary text-books and works of reference, besides many important monographs. It has been much enlarged during the past year, both by gifts and by purchase, so that it now contains more than one thousand volumes.

**The Instruction in Mineralogy.** — Crystallography is taught with the aid of models, diagrams, and a series of crystals. In Descriptive Mineralogy specimens are freely used, an example of each of all the more important species being placed before each student; while a collection of typical specimens is always open to students. The collection in this department is supplemented by that in the Museum of the Boston Society of Natural History, as explained in the next section. In Determinative Mineralogy students are taught to identify minerals by their crystallization and physical properties, as well as by blowpipe or chemical tests. The instruc-

tion in Blowpipe Analysis is given in a separate laboratory, and is supplemented by sufficient practice to insure familiarity with the methods.

In the spring, several excursions are made to localities of mineralogical interest.

**The Instruction in Physical Geography and Geology.** — The topics of these closely allied sciences are taught in the order of their logical succession; hence the work done in one class is a preparation for the next.

**Physical Geography.** — The student who has studied Physical Geography at a good preparatory school will not find this course a repetition of what he has already received. The position of the study as a general science is recognized and fitly taught, while its relations to the progress and destinies of mankind receive that special attention they should have in a technological institution. Much of the success which attends engineering, commerce, manufacturing, and many other branches of industry, is, in a measure, dependent upon the control or utilization of great terrestrial forces. It is, therefore, just to claim that a scientific knowledge of the efficiency of these forces in nature, and of the physical laws of their action, is eminently important.

These forces are likewise geological agents, and it is through them alone that the student can interpret the structure of the earth. It is in this connection that Dynamical Geology is taught, as directly preparatory to the courses which follow.

The instruction consists essentially of a course of lectures; but at each exercise questions are asked, to which answers are given either orally by a few, or are written by all the members of the class. The students are required to take notes and present them for examination. The lectures are amply illustrated.

**Structural Geology.** — This division includes a systematic course in Lithology, in which observation or laboratory work is combined in an unusual degree with oral instruction. At



each lesson a tray containing a typical hand-specimen of every type to be studied is placed before each student; and the lessons consist largely in the examination, testing, and description of the specimens by the students themselves, the instructors simply directing and supplementing the work of the class. The collections in this department are extensive, and specially adapted to the laboratory method of instruction; and a complete series of typical rocks is accessible to students at all times. The principal structural features characterizing large masses of rocks, embracing stratification, joint-structure, faults, folds, slaty-cleavage, veins, dikes, etc., are taught as practically as circumstances will allow. The unusually favorable opportunities which the local geology of Boston presents for the illustration of these topics are utilized by means of frequent field-lessons. The instruction in Chemical Geology is also introduced here, and embraces the formation, alteration, and decay of rocks, the origin of vein-stones and ore-deposits, of rock-salt and mineral waters, and of coal and petroleum.

Historical Geology.—It is intended in this study to give the students a good general idea of the physical history of the earth, and to teach some of the technical applications of this branch of knowledge. The students who are in the department of Civil Engineering constitute a distinct class. With these, especial attention is given to those events in the history of the earth which largely determined the topographic and hydrographic features of its surface, with which their professional labor may be more or less intimately associated.

With the students in Natural History and in the General Course, more time is devoted to the life of the past ages, to the relations of life to physical conditions, and to the geologic events which led to the present distribution of organic beings upon the earth. To be admitted to this class the student must have had the requisite instruction in Biology and Zoölogy.

The collections at the Institute are for teaching, and not for

exhibition. The classes are conducted with the belief that the more intimate the students become with the natural objects and features, the better the instruction. There are serious obstacles to a liberal amount of field practice; but every available opportunity is improved, and the amount is steadily increasing. There is a valuable geological library.

In addition to the working collections in the Rogers Building, the students in this department have access at all times to the extensive and valuable mineralogical and geological collections of the Boston Society of Natural History. These are very conveniently placed, and have been arranged with special reference to the needs of students, each division of mineralogy and geology being separately and fully illustrated in the order in which it is taken up in the Institute course.

**The Instruction in Climatology.** — The elements of physical science, which are fundamental in the study of Meteorology, are taught in the course in Physics; and in the physical laboratory the students have some practice with the ordinary meteorological instruments. The course in Climatology is introduced with a general outline of Meteorology, and concluded with a discussion of the known influences of climates upon the nature and distribution of plants and animals, upon the resources of countries, and upon the health, vigor, and prosperity of communities and nations.

**Instruction in Chemical Engineering.** — The special instruction upon this subject begins with an extended descriptive course of lectures, giving a general view of Applied Chemistry. The chemical questions connected with the various chemical industries are discussed, and the mechanical appliances described, without entering into details of construction, which are specially dealt with in a subsequent course of instruction, designed to consider materials, methods of transportation, evaporation and distillation, refrigeration, furnace construction, and similar topics, with special reference to the

needs of the chemical industries. These special topics will be, so far as possible, taught by persons practically connected with the industries of which they treat. The machinery and mechanical appliances used in manufacturing chemistry are also discussed at length from a purely engineering point of view. Thermo-Chemistry and the Chemistry of Fuels are considered in separate courses of lectures. The laboratory instruction consists of practice in the preparation and application of chemicals in the laboratory of industrial chemistry, and in a special study of such machines as it may contain. Particular attention will be paid to comparative tests of various means and appliances used in chemical manufactures. Excursions are frequently made to various shops and manufacturing establishments.

**The Instruction in Military Science and Tactics.** — In conformity with the requirements of the Act of Congress of July 2, 1862, and of the Act of the General Court of Massachusetts in furtherance thereof, the Institute provides instruction in military tactics. All students who take two *c.* more first-year studies are required to attend, three times a week, an exercise in tactics, unless specially excused by the Faculty. For the drill-exercises they are required to provide themselves with uniforms, which are made from measures and by contract, in order to secure uniformity of material and manufacture, as well as cheapness. The whole cost to each student does not exceed fifteen dollars. A written and a drill examination are held at the middle and end of the year. Applications to be excused from drill may be granted by the Faculty when the student is an alien, a college graduate, or over twenty-one years of age, when he has a surgeon's certificate of disability, or is able to pass (within thirty days after the opening of the term) an examination satisfactory to the department in both theoretical and practical tactics and drill.

The large drill-hall includes a gymnasium, open to all students in the Institute.

**Libraries.** — The library of the Institute consists of a large collection of books relating to the work of the school, and contains fifteen thousand volumes and several thousand pamphlets. It is divided into a general library, containing certain books of reference, and nine department libraries, which contain a careful selection of the best text-books, special treatises, monographs, etc., and the more valuable periodical publications in the subjects germane to the work of the department. They are thus working libraries, accessible to all students; and a certain valuable experience in the use of them is acquired before the completion of the regular courses, either incidentally to the preparation of theses, or in connection with lectures or recitations. The division of the library enables each student to consult the works needed by him with the least possible inconvenience and loss of time.

The students have full use also of the valuable library of the Boston Society of Natural History, of the extensive collections of the Boston Public Library, comprising more than five hundred thousand volumes in all departments of knowledge, and of the library of the American Statistical Association.

Many libraries of scientific societies, of individuals, and of private corporations, rich in complete sets of the scientific periodicals of all countries, and of the publications of leading scientific societies throughout the world, are, through the courtesy of the owners, open to advanced students of the Institute.

## Schedule of Topics.

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THE following seventeen pages form a schedule which includes the larger part of all the distinct topics or subjects of study taught in the Institute. These subjects are classified under headings, such as "Mathematics," "Chemistry," "Physics," "Civil Engineering," "Mining," etc. In the first column of the table is given the numeral by which any given topic is designated for convenience of reference, the same numbers appearing in the course schedules pages 25 to 47; in the second column, the name of the subject; in the third, the manner in which it is taught, whether by lectures, by recitations, or by work in the laboratory, drawing-room, or field, or by several of these in conjunction; in the fourth, the name of the professor or instructor taking charge of the exercise; in the fifth, the courses including this subject; in the sixth and seventh, the term (1st or 2d) and number of the year (1st, 2d, 3d, or 4th) in which the subject occurs; in the eighth and ninth, the number of weeks and of hours per week given to the subject; and in the tenth, the number of the preparatory subject or subjects required of any one desiring to be admitted to the topic in question. These requirements include, not merely the subjects specified by number, but also those required as preparation for them. Thus, for instance, the requirements for 41 (Applied Mechanics) are 23 and 155; that for 23 is 22; that for 22 is 20; that for 20 is 18; those for 18 are 15 and 16; those for 15 and 16 are 1, 2, and 3 (the admission requirements in arithmetic, algebra, and



plane geometry); that for 155 is 18, which has already been followed through. So that, to take up the topic 41 in Applied Mechanics, the applicant must be prepared to pass, or must have passed, in 15, 16, 18, 20, 22, 23, 155, and in 1, 2, and 3. The sufficient reason for this is, that in topic 41 use is made of all of the subjects referred to; and, to carry on the work, the student must have had suitable training in all of them, and must give satisfactory evidence by examination or otherwise that such is the case. In the tenth column the numbers are in some cases in Italics. This denotes that the corresponding topics, if not previously completed, must be taken at the same time with the topic under consideration. For instance, in 245, Mechanism, the student must have completed 240, and also cannot take 245 unless he takes 22 at the same time, or has already completed it.

By a careful consideration of this schedule, in connection with the pages on the "Methods and Apparatus of Instruction" (60 to 91), the applicant for a special course may select for the earlier part of that course such topics as will enable him to pursue later those more advanced subjects which he may particularly desire. He may also ascertain what preparatory training is desirable before entering the School.

The topics included in the schedule are, of course, subject to change at any time by action of the Faculty.

Subjects numbered from 1 to 7 are the entrance requirements, full statements of which are given on pages 51 to 56.

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| 1. ARITHMETIC.     | 5. ENGLISH LANGUAGE and<br>LITERATURE. |
| 2. ALGEBRA.        | 6. HISTORY.                            |
| 3. PLANE GEOMETRY. | 7. GEOGRAPHY.                          |
| 4. FRENCH.         |  |

MATHEMATICS.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
15	Algebra . . . . .	Rec.	{ Wells, Skinner, French, Edgett. }	All reg. students .	1	1	7	4	(1) (2) (3)
16	Solid Geometry . . . . .	Rec.	{ Wells, Skinner, French, Edgett. }	All reg. students .	1	1	8	4	(1) (2) (3)
17	Solid Geometry . . . . .	Rec.	{ Skinner . . . . . }	IV. (Partial) . . .	1	1	5	5	(1) (2) (3)
18	Logarithms, and Plane and Spherical Trigonometry	Rec.	{ Wells, Skinner, French, Edgett. }	All reg. students .	1	2	{ 10 } { 5 }	{ 5 } { 4 }	(15) (16)
19	Logarithms, and Plane Trigonometry	Rec.	{ Skinner . . . . . }	IV. (Partial) . . .	1	1	10	5	(17)
20	Plane Analytic Geometry . . . . .	{ Lect., Rec. }	{ Runkle, Skinner, Bartlett, Frizell. }	{ All courses except VII. and IX. }	2	1	15	3	(18)
21	Plane Analytic Geometry . . . . .	{ Lect., Rec. }	{ Skinner . . . . . }	VII, IX. . . . .	2	1	. . .	. . .	(15)
22	Differential Calculus . . . . .	{ Lect., Rec. }	{ Runkle, Osborne, Bartlett, Frizell. }	{ All courses except VII. . . . . }	2	2	15	3	(20)
23	Integral Calculus . . . . .	{ Lect., Rec. }	{ Runkle, Osborne, Bartlett, Frizell. }	{ All courses except VII. . . . . }	3	1	{ 5 } { 4 } { 10 }	{ 4 } { 2 }	(22)
24	General Theory of Equations	{ Lect., Rec. }	{ Bartlett . . . . . }	VIII. . . . .	2	2	15	2	(18)
25	Determinants . . . . .	{ Lect., Rec. }	{ Osborne . . . . . }	VIII. . . . .	2, 3	2	15	1	(18)
26	Advanced Algebra and Trigonometry* . . . . .	Lect.	{ Bartlett . . . . . }	VIII. . . . .	3, 4	1	15	2	(18)
27	Analytic Geometry of Three Dimensions . . . . .	{ Lect., Rec. }	{ Wells . . . . . }	VIII. . . . .	3, 4	1	15	2	(22)

\* Not given during the present school year.

MATHEMATICS.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
28	Advanced Calculus . . . . .	{ Lect., Rec. }	Wells . . . . .	VIII. . . . .	3, 4	2	15	2	(23) (25)
29	Differential Equations . . . . .	{ Lect., Rec. }	Osborne . . . . .	I, VI, VIII. . . . .	4	2	15	3	(23)
30	Theory of Probability and Method of Least Squares	{ Lect., Rec. }	Bartlett . . . . .	I, VI, VIII. . . . .	4	1	15	2	(23)
31	Quaternions* . . . . .	{ Lect., Rec. }	Wells . . . . .	VI, VIII. . . . .	4	2	15	2	(23)
40	Spherical and Practical Astronomy . . . . .	{ Lect., Rec. }	Skinner . . . . .	I. . . . .	3	2	5	3	
41	Applied Mechanics (Statics and Stresses in Frames)	{ Lect., Rec. }	Sondericker . . . . .	{ I, II, III, IV, VI, VIII, X, XI. . . . . }	3	1	10	2	(23) (155)
42	Applied Mechanics (Strength of Materials, Kinematics, and Dynamics) . . . . .	{ Lect., Rec. }	Sondericker . . . . .	{ I, II, III, IV, VI, VIII, X, XI. . . . . }	3	2	15	3	(41)
43	Applied Mechanics (Strength of Materials, Friction, Stability of Structures, Theory of Elasticity) . . . . .	{ Lect., Rec., Lab. }	Lanza, Sondericker.	{ I, II, III, IV, VI, X, XI. . . . }	4	1	15	3	(42)
44	Applied Mechanics (Strength of Materials, Stability of Structures, Theory of Elasticity, and Machinery and Motors) . . . . .	{ Lect., Rec., Lab. }	Lanza, Sondericker.	I, II, III, X, XI.	4	2	15	3	(43)

\* Not given to Course VIII. during the present school year.

DRAWING.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
50	Geometrical and Mechanical Drawing . . . . .	{ Lect., } { Draw. }	{ Faunce, Burrison, } { Eaton. }	All reg. students .	1	1, 2	30	6	
51	Freehand Drawing . . . . .	Draw.	Adams . . . . .	All reg. students .	1	{ 1 } { 2 }	15 15	1 2	
52	Descriptive Geometry . . . . .	{ Lect., } { Rec., } { Draw. }	Faunce . . . . .	{ I, II, III, IV, } { VI, X, XI. }	2	1	15	5	(16) (50) (51)
LITERATURE AND LANGUAGE.									
55	Hist. of English Language, and English Composition }	{ Lect., } { Rec., } { Comp. }	Emery . . . . .	All reg. students .	1	1	15	2	(5) (6)
56	English Literature . . . . .	{ Lect., } { Rec., } { Comp. }	Emery . . . . .	All reg. students.	2	2	15	2	(55)
57	English . . . . .	{ Comp., } { Lect. }	Rand . . . . .	{ I, III, V, VI, } { VII, VIII, } { IX, X, XI. }	3	1 2	30	2	(56)
59	Chaucer and Shakspeare . . . . .	{ Lect., } { Read. }	Emery . . . . .	IX. . . . .	4	2 1	15	1	(56)

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LITERATURE AND LANGUAGE.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
60	Development and History of English Drama . . . . .	{ Lect., Read. }	Emery . . . . .	IX. . . . .	4	1	15	2	(56)
61	History of English Fiction . . . . .	{ Lect., Read. }	Emery . . . . .	IX. . . . .	4	2	15	2	(56)
62	Logic . . . . .	Rec.	Levermore . . . . .	IX. . . . .	4	1	5	2	
70	French (grammar and translation) . . . . .	Rec.	{ van Daell, Lu- quiens, Dippold, Vogel . . . . . }	All reg. students . . . . .	1	1, 2	30	3	(4)
71	Advanced French . . . . .	{ Lect., Rec. }	van Daell . . . . .	IX. . . . .	-	1, 2	30	3	(70)
72	French Literature . . . . .	{ Lect., Rec. }	Luquiens . . . . .	IX. . . . .	3	1, 2	15	2 or 4	(71)
73	German (elementary) . . . . .	Rec.	{ van Daell, Dip- pold, Vogel. }	All reg. students . . . . .	2	1, 2	30	3	
74	German (grammar and translation) . . . . .	Rec.	{ van Daell, Dip- pold, Vogel. }	All reg. students . . . . .	3	1, 2	30	3	(4) or (73)
75	Language (French, German, Spanish, Italian) . . . . .	{ Lect., Rec. }	{ van Daell, Lu- quiens, Dippold, Machato . . . . . }	IV, V, IX. . . . .	3-4	1, 2	30	3	(70) (73)
76	French (elementary) . . . . .	{ Lect., Rec. }	Vogel . . . . .	Optional with 73 . . . . .	2	1, 2	30	3	

HISTORY.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
85	Political History since 1815	{ Lect., Rec. }	Levermore. . .	All reg. students.	1	2	15	2	(6)
86	Political History of England and the United States . . .	{ Lect., Rec. }	Levermore. . .	IX. . . . .	2	1, 2	30	3	(85)
87	History and Literature of the Renaissance and the Reformation . . . . .	{ Lect., Rec. }	Levermore. . .	{ VII. . . . . IX. . . . . }	4 3	1, 2	30	3	(86)
88	Constitutional History . .	{ Lect., Rec. }	Levermore. . .	IX. . . . .	4	2	15	3	(86)
89	History of Philosophy . .	{ Lect., Rec. }	Levermore. . .	IX. . . . .	4	1	10	2	

ECONOMICS AND STATISTICS.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
95	Political Economy . . . . .	{ Lect., Rec. }	Dewey . . . . .	All reg. students.	2 (4)	1	15	2	(85)
96	Economic Problems . . . . .	Lect.	Dewey . . . . .	IX. . . . .	2	2	15	2	(95)
97	Financial History of the U. S.	{ Lect., Rec. }	Dewey . . . . .	IX. . . . .	3	1	15	3	(95) (96)
98	Commercial Geography . . . . .	{ Lect., Rec. }	Niles . . . . .	IX. . . . .	3	1	5	2	(95)
99	History of Commerce . . . . .	{ Lect., Rec. }	Dewey . . . . .	IX. . . . .	3, 4	2	15	3	(87) (97) (105)
100	Socialism and Co-operation . . . . .	Lect.	Dewey . . . . .	IX. . . . .	3, 4	2	15	3	(97)
101	German Economics . . . . .	Lect.	Rand . . . . .	IX. . . . .	4	1, 2	30	1	
102	Taxation . . . . .	{ Lect., Rec. }	Dewey . . . . .	IX. . . . .	4	1	15	2	(97)
103	Administration . . . . .	{ Lect., Rec. }	Dewey . . . . .	IX. . . . .	4	1	15	1	(97)
104	History of Economic Theory . . . . .	{ Lect., Rec. }	Dewey . . . . .	IX. . . . .	4	2	15	2	(102)
105	Statistics of U. S., and Graphic Methods . . . . .	{ Lect., Draw. }	Dewey . . . . .	IX. . . . .	3	1	10	2	(95)
106	Statistics of Sociology . . . . .	Lect.	Dewey . . . . .	IX. . . . .	4	1	15	4	(97) (105)
107	Banking and Finance . . . . .	{ Lect., Rec. }	The President . . . . .	IX. . . . .	4	2	15	2	(95)

POLITICAL SCIENCE.									
No.	Subject.	Lect., Rec., Lab., Draw, or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
115	Sociology . . . . .	{ Lect., } { Rec. }	Levermore . . . .	IX. . . . .	3	2	15	3	(393)
116	Comparative Politics . . . . .	{ Lect., } { Rec. }	Levermore . . . .	IX. . . . .	4	1	15	3	(115)
117	International Law . . . . .	{ Lect., } { Rec. }	Levermore . . . .	IX. . . . .	4	2	15	2	(116)
124	Business Law . . . . .	Lect.	Gray . . . . .	All reg. students .	3, 4	2	15	1	
CHEMISTRY.									
125	General Chemistry . . . . .	{ Lect., } { Lab. }	Pope, Bardwell . .	All reg. students . { III, V, VII, } { VIII, IX, X. }	1	1, 2	30	7, 6	{ (1) (2) (3) (4) } { (5) (6) (7) }
126	Analytical Chemistry . . . . .	{ Lect., } { Lab. }	Drown . . . . .	XI. . . . .	2	1, 2	30	-	(73)
127	Theoretical Chemistry . . . . .	{ Lect., } { Rec. }	Pope . . . . .	III, V, VIII. . . .	2	2	15	2	(125)
128	Theoretical Chemistry . . . . .	{ Lect., } { Rec. }	Andrews . . . . .	{ III, V, VIII, } { X. . . . . }	3	2	15	1	(127) or (248) first term.

NOTE.—Numbers in italics in the right-hand column indicate subjects which must be taken in connection with that in question.

CHEMISTRY.										
No.	Subject.	Lect., Rec., Lab., Draw, or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.	
129	Analytical Chemistry . . .	{ Lect., Lab. }	Drown . . .	III, V, VIII, XI.	3	1, 2	30	-	(126)	
130	Industrial Chemistry . . .	Lect.	Norton . . .	III, V, X. . .	3	1, 2	30	2	{ (50) (126) (70) or (74) }	
131	Organic Analysis . . .	Lab.	Norton, Andrews	V. . . . .	4	I	15	-	(129)	
132	Analytical Chemistry . . .	Lab.	Drown . . .	III, V, VIII. . .	4	I	15	-	(129)	
133	Analytical Chemistry . . .	Lab.	Drown . . .	{ III, VIII. }	4	1, 2	30	-	(132)	
134	Organic Chemistry . . .	Lect.	Norton . . .	V, X. . . . .	4	1, 2	30	2	(127) or (135)	
135	Organic Chemistry . . .	Lect.	Norton . . .	{ V, VII, VIII, X, XI. }	3 2	I	15	I	(125)	
136	Organic Chemistry . . .	Lab.	Norton, Andrews	V. . . . .	4	1, 2	30	12	(134)	
137	Industrial Chemistry . . .	Lab.	Norton, Smith . . .	V, X. . . . .	4	I	15	12, 5	(126) (139)	
138	Sanitary Chemistry . . .	Lab.	{ Drown . . . Mrs. Richards . . . }	V, VII, XI. . . XI. . . . .	3 4	1 or 2 I	15 6	6	(126)	
139	Industrial Chemistry . . .	Lab.	Norton, Smith . . .	{ III, V. . . . . X. . . . . }	3 3	1, 2 2	15 15	5	(126) (130)	
140	Sanitary Chemistry . . .	Lab.	{ Drown . . . Mrs. Richards . . . }	V. . . . .	4	I	15	6	(138)	
141	Textile Coloring . . .	Lab.	Norton, Smith . . .	V, X. . . . .	4	I	15	6	(139)	
142	Applied Chemistry . . .	Lect.	Norton . . .	X. . . . .	4	1, 2	30	I	(130)	



## PHYSICS.

No.	Subject.	Lect., Rec., Lab., Draw, or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
155	Physics . . . . .	Lect.	Cross . . . . .	All reg. students .	2	1, 2	30	3	(18)
156	Descriptive Astronomy . . . . .	Lect.	Clifford . . . . .	I., VIII., IX. . . .	2 or 4	1	15	1	(18)
157	Mechanics, Acoustics, and Electricity (in connection with 126)	{ Lect., } { Rec. }	Clifford . . . . .	VI., VIII. . . . .	2	{ 1 } { 2 }	{ 15 } { 15 }	{ 2 } { 1 }	(18)
158	Physical Laboratory . . . . .	Lab.	Holman . . . . .	VI., VIII. . . . .	2	2	15	2	(20) (155)* (157)
159	Physics: Heat . . . . .	Lect.	Holman . . . . .	All reg. students .	3	1	8	2	(155)
160	Physical Laboratory . . . . .	Lab.	Holman . . . . .	All reg. students .	3	{ 1 } { 2 }	{ 7 } { 15 }	{ 2 } { 2 }	(20) or (21) (159)
161	Physical Laboratory . . . . .	Lab.	Cross, Holman .	V., VIII. . . . .	3	1	7	—	(20) or (21) (155)
162	Physical Laboratory . . . . .	Lab.	Holman, Puffer .	VI. . . . .	3	1, 2	{ 7 } { 2 }	{ 2 } { 3 }	(158)
164	Electricity . . . . .	Read.	Cross . . . . .	V., VI., VIII. . . .	3	1	15	3	(155)
165	Elements of the Theory of Potential . . . . .	{ Lect., } { Read. }	Clifford . . . . .	V., VI., VIII. . . .	3	2	8	3	(164)
166	Electrical Measuring Instru- ments . . . . .	Lect.	Holman . . . . .	V., VI., VIII. . . .	3	2	7	3	(164)
167	General Physics (Optics, Acoustics, or Heat) . . . . .	Read.	{ Cross, Holman, } { Clifford . . . . }	VIII. . . . .	3	1, 2	30	3	(155) (157)
168	Advanced Physics (memoirs)	Read.	Cross, Holman .	VI., VIII. . . . .	4	1, 2	30	1	(155) (162)

\* The student must also be qualified to enter the second year of Course VI, as a regular, so far as mathematics and chemistry are concerned.

SCHEDULE OF TOPICS.

PHYSICS.									
No.	Subject.	Lect., Rec., Lab., Draw, or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
169	Physical Laboratory . . . .	Lab.	Holman . . . . .	V. . . . .	4	1	15	2	(160)
170	Physical Laboratory . . . .	Lab.	{ Cross, Holman, Puffer. . . . . }	{ I., VIII. . . . . }	4	1	15	2	(162)
171	Heat Measurements . . . .	Lab.	Holman . . . . .	III., X. . . . .	4	1	15	-	(159)
175	History of Physical Science.	Read.	Cross . . . . .	VIII. . . . .	4	-	-	-	(155) (162)
176	Principles of Scientific Inves.	Read.	Cross . . . . .	VIII. . . . .	4	-	-	-	(175)
177	General Physics . . . . .	Read.	Cross, Holman . . . . .	VIII. . . . .	4	1, 2	-	-	(23) (155) (161)
178	Precision of Measurements .	Lect.	Holman . . . . .	VI., VIII. . . . .	4	1	10	2	(30)
179	Electrical Engineering . . .	Lect.	Cross . . . . .	VI. . . . .	4	1, 2	{ 15 4 }	{ 15 5 }	(162) (165)
180	Telegraph Engineering . . .	{ Lect., Lab. }	Jacques . . . . .	VI. . . . .	4	1	-	-	(162) (165)
181	Railroad Signals . . . . .	Lect.	Blodgett . . . . .	I., II., VI. . . . .	4	2	-	-	(155)
182	Dynamo and Motor Testing	Lect.	Puffer . . . . .	VI. . . . .	4	1	-	-	(162) (166)
183	Photometry . . . . .	Lect.	Clifford . . . . .	VI., VIII. . . . .	4	1	-	-	(162) (164)
184	Theory of Potential . . . .	Read.	Clifford . . . . .	VI., VIII. . . . .	4	2	15	2	(23) (165)
185	Heating and Ventilation . .	Lect.	Woodbridge . . . . .	{ II., IV., VII. . . . . }	4	1	15	{ 1 }	
186	Elements of Dynamo Machinery . . . . .	Lect.	Cross . . . . .	II., III. . . . .	4	1	-	-	(155)

CIVIL ENGINEERING.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
200	Surveying . . . . .	{ Lect., Rec., Field, Draw. }	Burton, Robbins.	I, III, XI. . . . .	2	1, 2	30	6	(18) (50)
201	Surveying . . . . .	{ Lect., Field. }	Burton, Robbins.	II. . . . .	3	2	-	-	(18) (50)
202	Surveying . . . . .	{ Lect., Field. }	Burton, Robbins.	III. . . . .	2	1	15	4	(18) (50)
203	Topographical Drawing . . . . .	Draw.	Burton, Robbins.	I, III, XI. . . . .	2	1	15	2	(50) (51) (200)
204	Surveying . . . . .	{ Lect., Field, Draw. }	Burton, Robbins.	I, XI. . . . .	3	1, 2	30	2	{ (155) (156) (200) (203)
205	Geodesy . . . . .	{ Lect., Field. }	Burton . . . . .	I. . . . .	4	1, 2	30	2	(23) (40) (204)
206	Railroad Engineering . . . . .	{ Lect., Rec. }	Allen . . . . .	{ I, III. XL. . . . . }	3	1, 2	30	2	{ (22) (200) (203)
208	Railroad Field-work and Drawing . . . . .	{ Field, Draw. }	Allen, Robbins . . . . .	{ I, III. XI. . . . . }	3	1, 2	30	4	{ (206) (207)
210	Railroad Engineering . . . . .	{ Lect., Rec., Draw. }	Allen . . . . .	I. . . . .	4	1, 2	30	3	(42) (208) (212)
211	Railroad Management . . . . .	Lect.	Allen . . . . .	I, IX. . . . .	4	1	15	2	(95)

CIVIL ENGINEERING.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
212	Stereotomy . . . . .	{ Lect., Draw. }	Porter . . . . .	I, XI. . . . .	3	1	15	4	(52)
213	Theoretical Hydraulics . . . . .	{ Lect., Rec. }	Porter . . . . .	I, III, XI. . . . .	4	1	15	3	(42)
214	Sanitary Engineering . . . . .	{ Lect., Rec. }	Porter . . . . .	I, XI. . . . .	4	1	15	3	(213)
215	Sanitary Designing . . . . .	Draw.	Porter . . . . .	I, XI. . . . .	4	2	15	2	(213) (214)
216	Hydraulics and Hydraulic Motors . . . . .	{ Lect., Rec. }	Porter . . . . .	II, VI. . . . .	4	{ 1 2 }	{ 7 15 }	{ 2 2 }	(42)
217	Hydraulic Engineering . . . . .	{ Lect., Rec. }	Porter . . . . .	I, III, XI. . . . .	4	2	15	4	(213)
218	Hydraulic Measurements and San. Field-work . . . . .	{ Field, Draw. }	Porter . . . . .	I, III, XI. . . . .	4	1	15	2	(213)
219	Elements of Construction . . . . .	{ Lect., Rec. }	Swain . . . . .	I, XI. . . . .	3	2	15	2	(41)
220	Elementary Design . . . . .	Draw.	Swain, Robbins . . . . .	I, XI. . . . .	3	2	15	2	(219)
221	Theory of Structures . . . . .	{ Lect., Rec. }	Swain . . . . .	{ I, III. XI. }	4	1, 2	30	{ 2 - }	{ (42) (220)
222	Bridges and Similar Structures . . . . .	{ Lect., Rec. }	Swain . . . . .	I, XI. . . . .	4	1, 2	30	{ 2 - }	{ (42) (221)
223	Bridge Design . . . . .	Draw.	Swain, Robbins . . . . .	{ I. XI. }	4	1, 2 1	30 15	6	(222)

MECHANICAL ENGINEERING.									
No.	Subject.	Lect., Rec., Lab., Draw, or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
240	Principles of Mechanism . .	{ Lect., } { Rec. }	Purinton . . .	II, III, VI, X.	2	1	15	2	(18) (50)
241	Drawing . . . . .	Draw.	{ Schwamb } { Stephens } { Purinton }	{ II. } { I., X. } { III. } { VI. }	2	1	15	2	(18) (50) (20) (52)
242									
243									
244									
245	Mechanism: Construction of Gear-Teeth, Shop Machin- ery, Mill Machinery . .	{ Lect., } { Rec. }	Schwamb . . .	{ II, X. } { VI. }	2	2	15	3	(240) (22)
246									
247	Principles of Mechanism . .	{ Lect., } { Rec. }	Purinton . . .	I. . . . .	2	2	15	2	{ (18) (50) } { (20) (52) }
248	Steam Engineering; Slide Valve; Link Motion; Thermodynamics . . . .	{ Lect., } { Rec. }	Peabody . . .	{ II, III, VI, } { VIII, X. }	3	1, 2	30	3	{ (22) (155) (240) } { (23) (41) (42) (150) }
249	Drawing, Design, Surveying	Draw.	{ Peabody } { Schwamb } { Burton }	II. . . . .	3	1, 2	30	6	(242)
250									
251									
252									
253	Engineering Laboratory . .	Lab.	Merrill . . .	X. . . . .	3	2	15	2	(242)
254	Steam Engineering . . . .	{ Lect., } { Rec. }	Peabody . . .	II, III, VI, X.	3	2	15	2	(248)
255	Dynamics of Machines . .	{ Lect., } { Rec. }	Lanza . . . .	{ II. } { VI, X. }	4	1	8	2	(248)
256									



MECHANICAL ENGINEERING.									
No.	Subject.	Lect., Rec., Lab., Draw, or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
257	Machine Design . . . . .	{ Lect., Rec., Draw. Lab.	Schwamb . . . . .	II. . . . .	4	I	15	8	(42) (43) (44)
259	Engineering Laboratory . . . . .	{ Lect., Rec.	Merrill . . . . .	II, III, VI, X. . . . .	4	I, 2	30	4	{ (248) first term. { (216) (254) (255)
260	Locomotive Construction . . . . .	{ Lect., Rec.	Lanza . . . . .	II. . . . .	4	{ I { 2	{ 6 { 15	{ 2 { 3	{ (254) (255) { (43) (44) (216) { (254) (255) (257)
261	Marine Engineering . . . . .	{ Lect., Rec.	Peabody . . . . .	II. . . . .	4	{ I { 2	{ 6 { 15	{ 3 { 3	{ (254) (255) { (43) (44) (216) { (254) (255) (257)
262	Mill Engineering . . . . .	{ Lect., Rec.	Schwamb . . . . .	II. . . . .	4	{ I { 2	{ 6 { 15	{ 3 { 3	{ (254) (255) { (43) (44) (216) { (254) (255) (257)
263	Carpentry and Wood-Turning . . . . .	Shop.	Merrick . . . . .	II, VI, IX, X. . . . .	2	I	15	4	(263)
264	Pattern Work . . . . .	Shop.	Merrick . . . . .	II. . . . .	2	2	7	4	
265	Forging . . . . .	Shop.	Lambirth . . . . .	II, IX, X. . . . .	3	{ I { 2	{ 15 { 5	{ 6 { 4	
266	Chipping and Filing . . . . .	Shop.	Smith . . . . .	II. . . . .	{ 3 { 4	{ 2 { I	{ 10 { 4	{ 4 { 6	
267	Machine-Tool Work . . . . .	Shop.	Smith . . . . .	II. . . . .	4	I, 2	24	6	(266)
268	Metal Turning . . . . .	Shop.	Smith . . . . .	VI. . . . .	2	2	15	2	
269	Technical Machinery . . . . .	Lect.	Peabody . . . . .	III, X. . . . .	4	2	15	2	(254)

NOTE. — Numbers in Italics in the right-hand column indicate subjects which must be taken in connection with that in question.

MINING ENGINEERING.										
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.	
290	Blowpipe Silver Assay . . .	Lab.	Richards . . . .	III. . . . .	2	1	15	2	(125)	
291	Mineralogy (including Blow- pipe Analysis and Crystal- lography) . . . . .	Lect., Lab.	Crosby, Barton .	I, III, V, VII. .	2	2	15	6	(3) (125)	
292	Mining Engineering . . . .	Lect.	Richards, Hofman	III. . . . .	3	1, 2	30	3	(155) (200) (291)	
293	Assaying by Fire . . . . .	Lab.	Richards, Lodge .	III, V. . . . .	3	2	5	6	(126)	
294	Metallurgy of Iron . . . . .	Lect.	Richards . . . .	I, II, III, V, X.	4	1	15	1	(125)	
295	Metallurgy . . . . .	Lect.	{ Richards, Hof- man, Howe . . }	III, V, X. . . .	4	1	15	2	(126) (291)	
296	Mining and Metallurgy . . .	Lab.	Richards, Lodge .	III, V. . . . .	4	1	15	8	(129) (293)	
297	Mining and Metallurgy . . .	Lab.	{ Richards, Hof- man, Lodge . }	III. . . . .	4	2	15	12	(296)	
298	Ore Dressing . . . . .	Lect.	Richards . . . .	III. . . . .	4	1	15	1	(155)	
299	Metallurgy . . . . .	Lect.	Richards, Hofman	III, X. . . . .	4	2	15	3	(295)	

ARCHITECTURE.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
320	Architectural History . . .	{ Lect., Rec., Draw. }	Homer . . . . .	{ IV. (Partial) : : }	{ 2 } { 1 }	1, 2	30	1	{ (1) (2) (3) (4) } { (5) (6) (7) }
321	Architectural History . . .	{ Lect., Rec., Draw. }	Homer . . . . .	IX. . . . .	3	1	15	2	(50) (51) (52)
322	Orders . . . . .	{ Lect., Rec., Draw. }	Homer . . . . .	{ IV. (Partial) : : }	{ 2 } { 1 }	1	15	2	{ (1) (2) (3) (4) } { (5) (6) (7) }
323	Shades, Shadows, and Perspective . . . . .	{ Lect., Rec., Draw. }	Homer, Kilham .	{ IV. (Partial) : : }	{ 2 } { 1 }	2	15	2	(322)
324	Graphics . . . . .	{ Lect., Rec., Draw. }	Homer . . . . .	IV. (Partial) . . .	1	2	15	2	(17) (19)
325	Materials . . . . .	{ Lect., Rec. }	Chandler . . . . .	{ IV. (Partial) : : }	{ 2 } { 1 }	2	15	2	(320) (322)
326	Working Drawings . . . . .	{ Lect., Rec., Draw. }	Chandler . . . . .	{ IV. (Partial) : : }	{ 3 } { 2 }	1	15	1	(325)
327	Iron Construction . . . . .	{ Lect., Rec., Draw. }	Chandler, Kilham	{ IV. (Partial) : : }	{ 3 } { 2 }	2	15	1	(326)
328	Stereotomy . . . . .	{ Lect., Rec., Draw. }	Homer . . . . .	{ IV. (Partial) : : }	{ 3 } { 2 }	2	15	2	(52) (322)
329	Specifications and Contracts	Lect.	Chandler . . . . .	{ IV. (Partial) : : }	{ 4 } { 2 }	1, 2	30	1	(325)
330	Problems in Construction . .	{ Lect., Draw. }	Chandler . . . . .	{ IV. (Partial) : : }	{ 4 } { 2 }	1, 2	30	1	(325)

ARCHITECTURE.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
331	Schools, Theatres, Churches, Hospitals, etc. . . . .	Lect., { Draw. }	Chandler . . . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	4 { 2 }	2	15	1	{ 326 { { 320 } (322) { { 339 }
332	History of Ornament . . . .	{ Lect., { Draw. }	Walker . . . . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	4 { 2 }	1, 2	30	$\frac{1}{2}$	{ { 320 } (322) { { 339 }
333	Design . . . . .	Draw.	Homer, Kilham . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	2 { 1 }	2	15	7	{ 322
334	Design . . . . .	Draw.	Walker (Létang)	{ IV. (Partial) . . . . IV. (Partial) . . . .	3 { 2 }	1 2	15 15	11 12	{ 333
335	Advanced Design . . . . .	Draw.	Walker (Létang)	IV. . . . .	4	{ 1 2 }	15 15	19 25	{ 334
336	Pen and Ink . . . . .	Draw.	Gregg . . . . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	2 { 1 }	1, 2	30	1	{ { (1) (2) (3) (4) { { (5) (6) (7)
337	Pen and Ink . . . . .	Draw.	Gregg . . . . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	3 { 2 }	1, 2	30	1	{ 336
338	Pencil Sketching . . . . .	Draw.	Adams . . . . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	2 { 1 }	1, 2	15	2	{ { (1) (2) (3) (4) { { (5) (6) (7)
339	Pencil Sketching . . . . .	Draw.	Adams . . . . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	3 { 2 }	2	15	2	{ 338
340	Water Color Sketching . . . .		Walker . . . . .	{ IV. (Partial) . . . . IV. (Partial) . . . .	3 { 2 }	1, 2	30	2	{ 338
341	Water Color Sketching . . . .		Walker . . . . .	IV. . . . .	4	1, 2	30	2	{ 340

NATURAL SCIENCES.									
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.
360	Physical Geography . . . . .	Lect.	Niles . . . . .	{ I., III., V., VII., } { IX., XI. . . . . }	2	2	15	3	(7) (155) 1st term.
361	Geology (Elements of Lithology and Structural Geology) . . . . .	{ Lect., Lab. }	Crosby . . . . .	L., IV., V., IX., XI.	3	1	15	2	(125)
362	Geology (Lithological, Structural, and Chemical) . . . . .	{ Lect., Lab. }	Crosby . . . . .	III., V., VII. . . . .	3	1	15	3	(291)
363	Historical Geology . . . . .	{ Lect., Rec. }	Niles . . . . .	III., V., VII., IX.	3	2	15	3	{ (360) (361) or } { (362) }
364	Historical Geology . . . . .	{ Lect., Rec. }	Niles . . . . .	I. . . . .	3	2	15	2	{ (360) (361) or } { (362) }
365	Climatology . . . . .	{ Lect., Rec. }	Niles . . . . .	VII., IX. . . . .	4	1	15	2	(155)
380	General Biology . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . . .	{ VII., IX. } { XI. . . . . }	2	1	15	6	
381	Microscopy . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . . .	{ III., V., VII., } { VIII., IX. . . . . }	2	1	15	2	
382	Biology of the Micro-organisms; Elementary Botany . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . . .	{ VII. } { XI. . . . . }	2	2	15	3	(380)
383	Comparative Anatomy and Embryology . . . . .	{ Lect., Rec., Lab. }	Gardiner . . . . .	VII. . . . .	3	1, 2	30	8	(382)
384	Physiology of the Senses . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . . .	VIII. . . . .	3	1	15	2	(381)



NATURAL SCIENCES.										
No.	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation required.	
385	Zoölogy . . . . .	{ Lect., Lab. }	Gardiner . . . .	VII, IX. . . . .	2	1, 2	30	2		
386	Cryptogamic Botany . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . .	VII. . . . .	3	1	15	4	(382)	
387	Comparative Physiology . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . .	VII. . . . .	4	1, 2	30	8	(383)	
388	Microscopic Anatomy . . . . .	{ Lect., Lab. }	Gardiner . . . .	VII. . . . .	4	1, 2	30	7	(383)	
390	Bacteriology and Sanitary Science . . . . .	{ Lect., Lab. }	Sedgwick . . . .	I, IX. . . . .	4	2	15	2		
391	Higher Biology . . . . .	Lect.	Sedgwick, Gardiner	VII. . . . .	4	1, 2	30	1	(382) (383)	
392	Teaching of Natural Sciences	Lect.	Sedgwick . . . .	VII. . . . .	4	2	15	1		
393	Anthropology . . . . .	Lect.	Sedgwick . . . .	VII, IX. . . . .	3	1	15	1		
394	History of Natural Sciences	Lect.	Sedgwick . . . .	VII, IX. . . . .	4	1	15	1		
395	Sanitary Biology . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . .	VII, XI. . . . .	4	1	15	4	(386)	
396	Bacteriology . . . . .	{ Lect., Rec., Lab. }	Sedgwick . . . .	VII, XI. . . . .	4	2	15	8	(395)	

# Regulations.

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**School Year.** — The first term begins on the last Monday in September. There is a recess of one week after the semi-annual examinations, and the second term begins on the first Tuesday after January 28. On legal holidays and on the Friday and Saturday following Thanksgiving Day the exercises of the school are suspended.

## CALENDAR FOR 1889-90.

School year began . . . . .	Monday, Sept. 30, 1889.
Second term will begin . . . . .	Tuesday, Feb. 4, 1890.
Degrees conferred . . . . .	Tuesday, June 3, 1890.
First Entrance Examinations . . . . .	{ Thursday, June 5, 1890, and Friday, June 6, 1890.
Second Entrance Examinations . . . . .	{ Tuesday, Sept. 23, 1890, and Wednesday, Sept. 24, 1890.
Examinations for Advanced Standing . . . .	Thursday, Sept. 25, 1890.
School year of 1890-91 will begin . . . . .	Monday, Sept. 29, 1890.

## CALENDAR FOR 1890-91.

School year will begin . . . . .	Monday, Sept. 29, 1890.
Second term will begin . . . . .	Tuesday, Feb. 3, 1891.
Degrees conferred . . . . .	Tuesday, June 2, 1891.
First Entrance Examinations . . . . .	{ Thursday, June 4, 1891, and Friday, June 5, 1891.
Second Entrance Examinations . . . . .	{ Tuesday, Sept. 22, 1891, and Wednesday, Sept. 23, 1891.
Examinations for Advanced Standing . . . .	Thursday, Sept. 24, 1891.
School year of 1891-92 will begin . . . . .	Monday, Sept. 28, 1891.

**The Status of Students** in regard to scholarship and ability to continue their courses is largely determined by means of examinations; but regularity of attendance and faithfulness to daily duties are considered essential.

**Examinations.**— A semi-annual examination is held in January, covering all the studies of the preceding term; and an annual examination in May, covering, in the first, second, and third years, the studies of the entire year, except subjects finished during the first half year, and in the fourth year all the professional work of the year, and any professional work of previous years upon which it may be deemed best to hold examination.

Examinations for students conditioned in subjects of the first, second, and third years are held on the Thursday and following days after the September entrance examinations, and at the time of the annual examinations. But candidates for graduation, conditioned at the semi-annual examination of the fourth year, are re-examined at such time previous to the first of March as may be convenient for the instructors in whose subjects, they have been conditioned.

Intermediate examinations, the results of which are not made a matter of permanent record, may be held at any time in place of a regular exercise.

Students conditioned in any subject, and failing to make up the condition at the time appointed for the examination, will not be allowed another examination, but will be required either to repeat the subject or to discontinue it, as well as all subjects dependent thereon, unless further time be allowed by special vote of the Faculty. A regular student failing entirely to make up any condition, will cease to be regular, and his name will be therefore transferred to the list of special students.

Any special student attaining a proper standing in all subjects required of a regular student up to any given period of the course, may apply to have his name transferred to the list of regular students.

**Attendance Paper.**— At the opening of each term of every year, the student should fill out, and present to the Secretary, an attendance paper, blank forms for which will be supplied. The attendance paper is the direct means by which the student

must place before the Faculty his wishes in regard to his course or selection of studies. The paper must be presented at the earliest possible moment, to give opportunity for the immediate determination of qualifications and status.

**Bond or Deposit.** — Every student is required, on entering the school, to file with the Bursar a bond in the sum of two hundred dollars, signed by two responsible sureties, one of whom must be a citizen of the United States, as security for the payment of all bills of the Massachusetts Institute of Technology. If, for any reason, such a bond cannot be obtained, a deposit of fifty dollars, as security, will be accepted. No officer of instruction or student of the Institute will be received as a surety.

**Fees.** — The tuition-fee for regular students is \$200 per year, and must be paid in advance, as follows: \$125 on or before October 10, and \$75 on or before February 10. For one half, or any less fraction, of the school year, the fee is \$125. Payment is also required of the cost of apparatus injured or destroyed in the laboratories, and of the cost of repair of damage by students to any other property of the Institute.

Special students pay, in general, the full fee; but when a few branches only are pursued, and the time required for instruction is limited, some deduction may be made. The fee for students in the advanced courses is the same as that for regular students.

**Scholarships.** — *Sherwin Scholarship.* Founded by the English High School Association, in memory of the late Thomas Sherwin. The pupil, to receive the privilege of this scholarship, is to be a graduate of the English High School of Boston and a regular student of the Institute.

*James Savage Scholarship Fund.* Founded by the late James Savage, LL.D. Four hundred dollars from the income of this fund will be annually awarded to a graduate

student of the Institute, or of some similar institution of equal standing. This sum will be awarded only to a student of distinguished ability engaged in the advanced study of some branch or branches of knowledge taught in the Institute.

*Susan H. Swett Scholarship Fund.* Four hundred dollars from the income of this fund will be annually awarded to a graduate student of the Institute, or of some similar institution of equal standing, who by his character, capacity, training, and attainments, shall give evidence of special fitness to pursue advanced study in some branch or branches of knowledge taught in the Institute. The holder of this scholarship will be eligible to reappointment for a second year; and if in any year the sum above named cannot be advantageously used for the purpose prescribed, no appointment will be made.

*Milton High School Scholarship.* Founded by the contributions of residents of Milton. This scholarship will be conferred upon such former pupil of the Milton High School as the master of that school and the school committee of the town may select.

*Foy Scholarships.* The money by which these scholarships are sustained was given by Miss Nabby Joy. They were created pursuant to a decree of the Supreme Judicial Court of Massachusetts, for the benefit of one or more women studying natural science in the Institute. At present one scholarship only is available; a second will be established when the fund has increased sufficiently to warrant such an expenditure.

*James Henry Mirrlees Scholarship.* Founded by James B. Mirrlees, Esq., of Glasgow, Scotland, in memory of his son, who died in May, 1886, while attending the Institute. This scholarship will be awarded to a third or fourth year student in Mechanical Engineering.

*Perkins Fund.* By a bequest of the late Richard Perkins, of Boston, the income of fifty thousand dollars is available for aiding students in such amounts as shall be recommended by the Faculty.



*State Scholarships.* In consideration of aid received from the Commonwealth, the Institute has established twenty free scholarships, which are apportioned among the senatorial districts of the State. Information regarding the terms and conditions upon which these are to be awarded may be obtained by addressing the Secretary of the State Board of Education, Boston.

*Charles L. Flint Scholarship.* Not yet available.

*Farnsworth Scholarship.* In 1889 this scholarship was founded by Mary E. Atkins, of Boston, who has the right during her life to nominate the beneficiary.

**Conditions governing Scholarships.** — The facts considered in making assignments of scholarships are the needs of the student, and his promise as indicated by his previous work in the Institute. A student who is not greatly in need of aid cannot honorably apply for a scholarship, and none will be awarded to a student if, either from physical, mental, or moral weakness, he gives little promise of future usefulness. Awards will be made in October, and five-eighths of the amount awarded will be credited on the term bill due in October, and the remaining three-eighths on the term bill due in February. Applications for scholarships should be addressed to the Secretary of the Faculty.

**Graduate Scholarships.** — Five scholarships for graduates of the Institute have been established, and will be awarded to such applicants as are recommended by the Faculty.

**Residence and Expenses.** — As the exercises of the school begin at nine o'clock in the morning, and end before five o'clock in the afternoon, students may conveniently live in any of the neighboring cities or towns on the lines of the various railroads if they prefer to do so.

The cost of board and rooms in Boston and the neighboring cities and towns need not exceed from six to eight dollars a week. The cost of books, drawing instruments, paper,

etc., exclusive of chemical breakage, is from twenty-five to thirty-five dollars a year.

**Attendance.** — Regular students are expected to attend all the exercises of their several courses. Special students are expected to attend all the exercises in the subjects they have selected, unless excused by special vote of the Faculty. Students entering a lecture-room, drawing-room, or laboratory more than five minutes after the hour designated for the beginning of the exercise will be marked tardy. Students are, in general, expected to devote themselves to the work of the school between the hours of 9 A. M. and 4.15 P. M., except during the interval from 1 P. M. to 2.15 P. M. There are no exercises on Saturday afternoon, and the rooms are closed.

**Discipline.** — While within the limits of the Institute, students are expected to behave with decorum, to obey the regulations of the school, and to pay due respect to its officers. Every student will be held responsible for the furniture which he uses, and the cost of repairing any damage thereto will be charged to him. In case of injury to the building, or to any of the furniture, apparatus, or other property of the Institute, the damage will be charged to the student or students known to be immediately concerned; but if the persons who caused the damage are unknown, the cost of repairing the same will be assessed equally upon all the students of the school. Conduct inconsistent with the general good order of the school, if repeated after admonition, will be followed by suspension or dismissal. It is the aim of the Faculty so to administer the discipline of the school as to maintain a high standard of integrity and a scrupulous regard for truth; and the attempt of any student to present as his own the work of another, or to pass any examination by improper means, is regarded as a most serious offence, rendering the offender liable to immediate expulsion.

## Register of Students.

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For residence addresses in suburban portions of Boston, the following abbreviations are used:—

A. . . . . Allston. B. . . . . Brighton. C. . . . . Charlestown. D. . . . . Dorchester. E. B. . . . . East Boston. J. P. . . . . Jamaica Plain.		M. . . . . Mattapan. N. . . . . Neponset. S. B. . . . . South Boston. R. . . . . Roxbury. Ros. . . . . Roslindale. W. R. . . . . West Roxbury.
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### GRADUATE STUDENTS.

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#### CANDIDATES FOR ADVANCED DEGREES.

NAME.	HOME.	RESIDENCE.
Mildram, Samuel Howard S. B., Mass. Inst. Technology.	<i>Neponset</i> . . . . .	Wood St., N.
Russel, Richard Lee S. B., Mass. Inst. Technology.	<i>Pottsville, Pa.</i> . . . . .	17 St. James Ave.
Thurber, William Bartlett S. B., Mass. Inst. Technology.	<i>Plymouth.</i> . . . . .	Plymouth.
<hr style="width: 10%; margin: auto;"/>		
Alexander, Frank West A. B., A. M., Bowdoin College.	<i>Richmond, Me.</i> . . . . .	145 Appleton St.
Ballantine, George Alexander B. S., Rutgers College.	<i>Newark, N. J.</i> . . . . .	5 Chestnut St.
Bolan, Thomas Vincent A. B., Georgetown College.	<i>Philadelphia, Pa.</i> . . . . .	40 Dudley St., R.
Bridges, Lillian Willard A. B., Boston University.	<i>So. Framingham</i> . . . . .	So. Framingham.
Brownell, Ernest Henry A. B., Brown University.	<i>Bristol, R. I.</i> . . . . .	101 Warren Ave.
Burnham, Edward Clifton A. B., Brown University.	<i>Pawtucket, R. I.</i> . . . . .	98 Appleton St.

120 MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

NAME.	HOME.	RESIDENCE.
Carmalt, Laurance Johnson . . . A. B., Yale University.	<i>New Haven, Conn.</i>	Longwood.
Cogswell, Charles Northend . . . A. B., Harvard University.	<i>Cambridge . . . . .</i>	Cambridge.
Coolidge, Joseph Randolph, Jr., A. M., Harvard University.	<i>Chestnut Hill . . . . .</i>	Chestnut Hill.
Cromwell, Charles Hammond . . . S. B., Mass. Inst. Technology.	<i>Baltimore, Md. . . . .</i>	19 St. James Ave.
Davis, Arthur Lincoln . . . . . S. B., Mass. Inst. Technology.	<i>San Francisco, Cal.</i>	369 Columbus Ave.
Davis, Ida Sabine . . . . . B. A., Boston University.	<i>Newton Centre . . . . .</i>	Newton Centre.
de Gersdorff, George Bruno . . . A. B., Harvard University.	<i>Boston . . . . .</i>	205 Beacon St.
Derr, Louis . . . . . A. B., Amherst College.	<i>Pottsville, Pa. . . . .</i>	369 Columbus Ave.
Dill, Howard Albert . . . . . B. S., Swarthmore College.	<i>Richmond, Ind. . . . .</i>	29 St. James Ave.
Downing, George Miller . . . . . B. S., Pa. State College.	<i>West Chester, Pa. . . . .</i>	28 Hancock St.
Emery, Elwood Allen . . . . . B. L., University of Minnesota.	<i>Minneapolis, Minn. . . . .</i>	204 Dartmouth St.
Esty, William . . . . . A. B., Amherst College.	<i>Amherst . . . . .</i>	369 Columbus Ave.
Foster, Francis Homer . . . . . B. S., Boston University.	<i>Andover . . . . .</i>	Andover.
Gould, Alice Bache . . . . . A. B., Bryn Mawr College.	<i>Cambridge . . . . .</i>	236 Clarendon St.
Hammett, Philip Melanchthon . . . A. B., Harvard University.	<i>Newport, R. I. . . . .</i>	Cambridge.
Hayes, Harry Edgar . . . . . A. B., Harvard University.	<i>Boston . . . . .</i>	3 Columbus Sq.
Homer, Wm. Bradford, U.S.A. U. S. Military Acad.	<i>West Roxbury . . . . .</i>	Wren St., W. R.
Kenney, Carrie Belle . . . . . S. B., Mass. Inst. Technology.	<i>East Boston . . . . .</i>	111 Saratoga St., E. B.
Maltby, Margaret Eliza . . . . . A. B., Oberlin College.	<i>Oberlin, Ohio . . . . .</i>	Wellesley College.
Marquand, Phillip . . . . . A. B., Harvard University.	<i>Newburyport . . . . .</i>	4 Spruce St.
Mason, Henry Eager . . . . . B. A., Yale University.	<i>Chicago, Ill. . . . .</i>	5 Oxford Terrace.
McSweeney, Daniel J. . . . . A. B., Boston College.	<i>Boston . . . . .</i>	495 Harrison Ave.
Meade, William V. . . . . A. B., Holy Cross College.	<i>Lowell . . . . .</i>	Lowell.
Molineaux, Marie Ada . . . . . A. M., Ph. D., Boston University.	<i>Boston . . . . .</i>	283 W. Chester Pk.
Morgan, Lewis Henry . . . . . A. B., Harvard University.	<i>Washington, D. C. . . . .</i>	Victoria Hotel.

NAME.	HOME.	RESIDENCE.
Neave, Charles . . . . . B. A., Yale University.	<i>Boston</i> . . . . .	5 Oxford Terrace.
Noyes, Henry Ford . . . . . B. A., Yale University.	<i>Andover</i> . . . . .	13c Pembroke St.
Reynolds, Phillip Murray . . . . . A. B., Harvard College.	<i>Boston</i> . . . . .	236 Clarendon St.
Richmond, Knight Cheney . . . . . B. P., Brown University.	<i>Providence, R. I.</i> . . . . .	3 Oxford Terrace.
Roberts, William Jackson . . . . . A. B., Oregon State University.	<i>The Dalles, Oreg.</i> . . . . .	22 St. Charles St.
Root, Edward T. . . . . A. B., Brown University.	<i>Providence, R. I.</i> . . . . .	Malden.
Storrow, Samuel . . . . . A. B., Harvard University.	<i>Boston</i> . . . . .	417 Beacon St.
Sykes, Henry Hutchins . . . . . Ph. B., Yale University.	<i>New Haven, Conn.</i> . . . . .	165 West Canton St.
Talbot, Thomas . . . . . A. B., Harvard University.	<i>No. Billerica.</i>	
Torossian, Toros Horhanes . . . . . B. A. Robert College.	<i>Roustchuk, Bulgaria</i> . . . . .	Cambridge.
Vanderpoel, Aaron Melgert . . . . . B. S., Trinity College.	<i>Kinderhook, N. Y.</i> . . . . .	150 Chandler St.
Vielé, Francis Stuart . . . . . B. S., Hobart College.	<i>Geneva, N. Y.</i> . . . . .	1 Yarmouth St.
Wheeler, Arthur Lincoln . . . . . A. B., Brown University.	<i>Concord</i> . . . . .	Concord.
White, Walter Porter . . . . . A. B., Amherst College.	<i>Roxbury</i> . . . . .	135 Dudley St., R.
Williston, Arthur Lyman . . . . . S. B., Mass. Inst. Technology.	<i>Cambridge</i> . . . . .	Cambridge.
Woodman, Caroline Augusta . . . . . M. A., Vassar, B. S., Mass. Inst. Technology.	<i>Lewiston, Me.</i> . . . . .	Wellesley College.



## REGULAR STUDENTS.

## Fourth Year.

NAME.	COURSE.	HOME.	RESIDENCE.
Adams, Arthur Henry . . .	II.	<i>Newton</i> . . . . .	Newton.
Alden, Charles Henry, Jr. . .	IV.	<i>Boston</i> . . . . .	204 Dartmouth St.
Atwood, Frank Wiley . . . .	V.	<i>East Boston</i> . . . . .	Lexington St., E. B.
Babb, Cyrus Cates . . . . .	I.	<i>Boston</i> . . . . .	12 Somerset St.
Baker, Joseph Black . . . .	VI.	<i>Newton</i> . . . . .	Newton.
Baldwin, Hiram Ellsworth . .	I.	<i>Niles, Ohio</i> . . . . .	91 Appleton St.
Bartlett, Spaulding . . . . .	V.	<i>Webster</i> . . . . .	3 Oxford Terrace.
Batchelder, John Langdon, Jr.	VII.	<i>Jamaica Plain</i> . . . . .	Pond St., J. P.
Beasom, Charles Boardman . .	II.	<i>Nashua, N. H.</i> . . . . .	30 Appleton St.
Bickford, Elizabeth Emma . .	VII.	<i>Piermont, N. H.</i> . . . . .	Melrose.
Blood, John Balch . . . . .	VI.	<i>Newburyport</i> . . . . .	Newburyport.
Boss, Austin Dunham . . . . .	II.	<i>Willimantic, Conn.</i> . . . . .	161 Warren Ave.
Bragg, Edward Franklin . . . .	II.	<i>Taunton</i> . . . . .	161 Warren Ave.
Bragg, Lottie Almira . . . . .	V.	<i>Braggville</i> . . . . .	Braggville.
Brown, Edward Dexter . . . .	VI.	<i>Reading</i> . . . . .	Reading.
Brownell, Ernest Henry, A. B.	I.	<i>Bristol, R. I.</i> . . . . .	101 Warren Ave.
Burley, Harry Benjamin . . . .	I.	<i>North Epping, N. H.</i> . . . . .	78 Rutland St.
Burnham, Edward Clifton, A. B.	II.	<i>Pawtucket R. I.</i> . . . . .	98 Appleton St.
Butters, Robert Greene Walker.	II.	<i>Haverhill</i> . . . . .	369 Columbus Ave.
Calkins, Gary Nathan . . . . .	IX.	<i>Chicago, Ill.</i> . . . . .	149 W. Canton St.
Carlisle, Morten . . . . .	VI.	<i>Cincinnati, Ohio</i> . . . . .	147 Worcester St.
Carlton, Chester Vernon . . . .	I.	<i>Milford, N. H.</i> . . . . .	564 Columbus Ave.
Carney, James Andrew . . . . .	V.	<i>Lowell</i> . . . . .	Lowell.
Chapman, George Daniel . . . .	II.	<i>Fitchburg</i> . . . . .	369 Columbus Ave.
Chase, Frank Linten . . . . .	I.	<i>Louisville, Ky.</i> . . . . .	78 Rutland St.
Clark, James, Jr. . . . .	VI.	<i>Louisville, Ky.</i> . . . . .	147 Worcester St.
Collins, William Henry . . . . .	V.	<i>Fall River</i> . . . . .	147 Warren Ave.
Crane, John Gooding . . . . .	I.	<i>Taunton</i> . . . . .	Taunton.
Creden, William Louis . . . . .	II.	<i>South Boston</i> . . . . .	940 Broadway, S. B.
de Bullet, John Charles Eugene.	I.	<i>Carroll P. O., Md.</i> . . . . .	Hotel Brunswick.
de Lancey, Darragh . . . . .	II.	<i>Plainfield, N. J.</i> . . . . .	9 Park Sq.
Delano, Alexander James . . . .	I.	<i>Boston</i> . . . . .	231 Dudley St.
De Wolf, John Oviatt . . . . .	II.	<i>Greenfield</i> . . . . .	14 Winthrop St.
Dodge, Frederick Holmes . . . .	II.	<i>Toledo, Ohio</i> . . . . .	149 W. Canton St.

NAME.	COURSE.	HOME.	RESIDENCE.
Dunbar, Francis William . . .	VI.	<i>Canton</i> . . . . .	Canton.
du Pont, Pierre Samuel . . .	V.	<i>Philadelphia, Pa.</i> . . .	126 W. Canton St.
Dwellely, Edwin Forrest . . .	I.	<i>West Hanover</i> . . . . .	West Hanover.
Emery, Elwood Allen, B. L. . .	IV.	<i>Minneapolis, Minn.</i> . . .	204 Dartmouth St.
Fenn, William Henry . . . . .	I.	<i>Jersey City, N. J.</i> . . . .	226 W. Canton St.
Flint, William Parker . . . . .	II.	<i>Brookline</i> . . . . .	Brookline.
Flood, Samuel Douglas . . . . .	II.	<i>Chicago, Ill.</i> . . . . .	35 St. James Ave.
Fuller, George Warren . . . . .	V.	<i>West Medway</i> . . . . .	West Medway.
Gilmore, George L. . . . .	II.	<i>Charlestown</i> . . . . .	Bunker Hill St., C.
Glidden, John Willard . . . . .	II.	<i>De Kalb, Ill.</i> . . . . .	165 W. Canton St.
Goodwin, Harry Manly . . . . .	VIII.	<i>Roxbury</i> . . . . .	Townsend St., R.
Greenlaw, Frank Murray . . . .	VI.	<i>Roxbury</i> . . . . .	5 Willoughby Pl., R.
Hale, George Ellery . . . . .	VIII.	<i>Chicago, Ill.</i> . . . . .	484 Wash'n St., D.
Hall, Frederick Bellows . . . . .	II.	<i>Longwood</i> . . . . .	Longwood.
Hall, John Richardson . . . . .	VI.	<i>Brookline</i> . . . . .	Brookline.
Hammett, Phil. Melancthon A. B. II.		<i>Newport, R. I.</i> . . . . .	Cambridge.
Haskins, William . . . . .	III.	<i>Medford</i> . . . . .	Medford.
Hayden, Charles . . . . .	IX.	<i>Boston</i> . . . . .	166 Newbury St.
Hayden, Sophia Gregoria . . . .	IV.	<i>Jamaica Plain</i> . . . . .	Pond St., J. P.
Hayes, Frank . . . . .	II.	<i>Superior, Wis.</i> . . . . .	154 Warren Ave.
Hayes, Harry Edgar, A. B. . . .	VI.	<i>Boston</i> . . . . .	3 Columbus Sq.
Hazard, Schuyler . . . . .	I.	<i>Georgetown, S. C.</i> . . . .	Braintree.
Hollis, Frederick Stearns . . . .	V.	<i>Newton Highlands</i> . . . . .	Newton Highlands.
Horton, Sidney Ellsworth . . . .	II.	<i>Windsor Locks, Conn.</i> . . .	6 Hotel Dunbar., R.
Kendall, Francis Howe . . . . .	I.	<i>Belmont</i> . . . . .	Belmont.
Knight, Franklin . . . . .	I.	<i>Lynn</i> . . . . .	Lynn.
Koch, Charles Frederick . . . . .	II.	<i>Cincinnati, Ohio</i> . . . . .	107 Chandler St.
Lenfest, Bertram Augustus . . . .	II.	<i>Wakefield</i> . . . . .	Wakefield.
Le Sueur, Ernest Arthur . . . . .	VI.	<i>Ottawa, Can.</i> . . . . .	Newton Highlands.
Loring, Atherton . . . . .	II.	<i>South Boston</i> . . . . .	789 Broadway, S. B
Mann, Bertram Haskell . . . . .	VI.	<i>Weymouth</i> . . . . .	Weymouth.
McConnell, George Bancroft . . . .	I.	<i>Roxbury</i> . . . . .	Blue Hill Ave., R.
Merrick, George Edward . . . . .	V.	<i>Holyoke</i> . . . . .	129 Pembroke St.
Metcalf, Frederick . . . . .	II.	<i>Providence, R. I.</i> . . . . .	69 Appleton St.
Moody, Burdett . . . . .	I.	<i>Deadwood, So. Dak.</i> . . . .	63 Chandler St.
Moore, Stephen Wallace . . . . .	II.	<i>Newton</i> . . . . .	Newton.
Neave, Charles, B. A. . . . .	VI.	<i>Boston</i> . . . . .	5 Oxford Terrace.
Newell, Allan Hovey . . . . .	II.	<i>Stockton, Cal.</i> . . . . .	369 Columbus Ave.
Nims, Norman Granville . . . . .	IV.	<i>Keene, N. H.</i> . . . . .	151 Appleton St.
Norris, Almon Evans . . . . .	II.	<i>Cambridgeport</i> . . . . .	Cambridgeport.
Norris, Clarence George . . . . .	I.	<i>Hyde Park</i> . . . . .	Hyde Park.
Noyes, Harry Lincoln . . . . .	I.	<i>Boone, Ia.</i> . . . . .	Parker Hill Ave., R.

NAME.	COURSE.	HOME.	RESIDENCE.
Noyes, Joseph Karr . . . .	I.	<i>Binghamton, N. Y.</i>	124 Chandler St.
Packard, George Arthur . .	III.	<i>Wakefield</i> . . . .	Wakefield.
Peyton, William Rowzee . .	II.	<i>Duluth, Minn.</i> . . .	154 Warren Ave.
Poland, William Balcock . .	I.	<i>Boston</i> . . . . .	227 W. Canton St.
Raymond, Edward Brackett .	VI.	<i>Somerville</i> . . . . .	Somerville.
Rice, Calvin Winsor . . . .	VI.	<i>Winchester</i> . . . . .	Winchester.
Richmond, Knight Cheney, B.P.	II.	<i>Providence, R. I.</i> . .	3 Oxford Terrace.
Ripley, Charles Edward . .	II.	<i>Rutland, Vt.</i> . . . .	80 Pinckney St.
Ripley, William Zebina . . .	I.	<i>Newton</i> . . . . .	Newton.
Roberts, Harold Barnes . . .	II.	<i>Boston</i> . . . . .	81 Mt. Vernon St.
Robinson, Edward . . . . .	II.	<i>Hudson</i> . . . . .	243 W. Canton St.
Rogers, Allen Hastings . . .	III.	<i>South Boston</i> . . . .	E. Broadway, S. B.
Rogers, Minnie . . . . .	IX.	<i>Jamaica Plain</i> . . . .	Pond St., J. P.
Schmidt, Louis . . . . .	V.	<i>Cincinnati, Ohio</i> . . .	147 Warren Ave.
Sherman, Adelaide . . . . .	V.	<i>Boston</i> . . . . .	17 Upton St.
Sherman, Charles Winslow . .	I.	<i>Kingston</i> . . . . .	40 Upton St.
Simpson, Edmund Thomas . .	V.	<i>Lowell</i> . . . . .	Lowell.
Slater, Howard Colfax . . .	II.	<i>Providence, R. I.</i> . . .	87 W. Rutland Sq.
Smith, William Lincoln . . .	VI.	<i>Boston</i> . . . . .	350 Marlboro' St.
Sonnemann, George Adolph . .	III.	<i>Boston</i> . . . . .	228 Tremont St.
Southworth, Martin Otis . .	VI.	<i>Stoughton</i> . . . . .	Stoughton.
Storrow, Samuel, A. B. . . .	I.	<i>Boston</i> . . . . .	417 Beacon St.
Sturges, Benton . . . . .	IX.	<i>Lake Geneva, Wis.</i> . . .	6 Louisburg Sq.
Sturtevant, Thomas Joseph .	VI.	<i>So. Framingham</i> . . . .	So. Framingham.
Swanton, Fred'k Worcester . .	VI.	<i>Bath, Me.</i> . . . . .	45 Milford St.
Towne, John Henry . . . . .	IX.	<i>Stamford, Conn.</i> . . . .	6 Louisburg Sq.
Voorhees, Gardner Tuffts . .	II.	<i>Cambridgeport</i> . . . .	Cambridgeport.
Walker, Elton David . . . . .	I.	<i>Taunton</i> . . . . .	39 Upton St.
Walker, Robert Turner . . . .	IV.	<i>Greenfield</i> . . . . .	14 Winthrop St., R.
Wason, Leonard Chase . . . .	VI.	<i>Brookline</i> . . . . .	Brookline.
White, Franklin Warren . . .	VII.	<i>Boston</i> . . . . .	457 Marlboro' St.
Whitney, Willis Rodney . . .	V.	<i>Jamestown, N. Y.</i> . . .	41 Union Park.
Wilson, Arthur Robert . . . .	I.	<i>Oakland, Cal.</i> . . . .	39 Upton St.
Woodman, Andrew Whitney . .	I.	<i>Chelsea</i> . . . . .	Chelsea.

## Third Year.

Aiker, Charles Wilson . . . .	II.	<i>Franklin, N. H.</i> . . . .	124 Chandler St.
Ball, Robert Steele . . . . .	II.	<i>Dublin, Ireland</i> . . . .	76 Bartlett St., R.
Barri, Joel Gray . . . . .	I.	<i>Cambridgeport</i> . . . .	Cambridgeport.
Bassett, William Hastings . .	V.	<i>New Bedford</i> . . . . .	760 Tremont St.
Birks, John Henry . . . . .	II.	<i>Montreal, Can.</i> . . . .	557 Columbus Ave.

NAME.	COURSE.	HOME.	RESIDENCE.
Blanchard, Fred'k. Chambers	II.	<i>Dorchester</i> . . . .	Commercial St., D.
Blinn Alfred Millard . . .	IV.	<i>Roxbury</i> . . . .	55 Elm Hill Ave., R.
Bolan, Thomas Vincent, A. B.	VI.	<i>Philadelphia, Pa.</i> . .	40 Dudiey St., R.
Boyd, Stephen Breed . . .	II.	<i>Waterbury, Conn.</i> . .	Malden.
Bradlee, Henry Goddard . .	VI.	<i>Boston</i> . . . .	113 Beacon St.
Bradley, Harry Cyrus . . .	I.	<i>Roxbury</i> . . . .	5 Gay Head St., R.
Brainerd, Wallace Heber . .	VI.	<i>South Englewood, Ill.</i>	Cushing Ave., R.
Brand, Horace Lewis . . .	II.	<i>Chicago, Ill.</i> . . . .	524 Columbus Ave.
Bryant, Dixie Lee . . . .	VII.	<i>Columbia, Tenn.</i> . . .	Pond St., J. P.
Bryant, William Page . . .	X.	<i>Charlestown</i> . . . .	Bunker Hill St., C.
Bryden, George William . .	II.	<i>Chelsea</i> . . . .	Chelsea.
Bunker, Carl Hervey . . .	X.	<i>Auburndale</i> . . . .	Auburndale.
Burton, Frank Howard . . .	II.	<i>Providence, R. I.</i> . . .	54 Berkeley St.
Campbell, George Ashley . .	I.	<i>Derry, N. H.</i> . . . .	302 Columbus Ave.
Campbell, Jeremiah . . . .	II.	<i>Chelsea</i> . . . .	Chelsea.
Capen, Barnard, Jr. . . .	VI.	<i>South Boston</i> . . . .	534 E. 4th St., S. B.
Cater, Douglas Aymar . . .	II.	<i>New York, N. Y.</i> . . .	150 Warren Ave.
Childs, Edward Lincoln . .	II.	<i>Lee</i> . . . .	42 Upton St.
Cogswell, Charles Perkins, Jr.	I.	<i>Norwich, Conn.</i> . . .	6 Berwick Pk.
Cole, Fred Allen . . . .	II.	<i>Camden, Me.</i> . . . .	Hotel Edinburgh.
Cole, Harrison Irving . . .	II.	<i>Kingston</i> . . . .	Kingston.
Collins, Reuben Belknap . .	I.	<i>Dedham</i> . . . .	Dedham.
Conant, Roger Winthrop . .	VI.	<i>Gloucester</i> . . . .	243 Warren St.
Creden, Thomas Harold . . .	VI.	<i>South Boston</i> . . . .	940 Broadway S. B.
Cunningham, Edward, Jr. . .	X.	<i>East Milton</i> . . . .	East Milton.
Dart, William Crary . . . .	X.	<i>Providence, R. I.</i> . . .	33 St. James Ave.
Dill, Howard Albert, B. S. .	I.	<i>Richmond, Ind.</i> . . . .	29 St. James Ave.
Donn, Edward Wilton, Jr. . .	IV.	<i>Washington, D. C.</i> . . .	22 Yarmouth St.
Dorr, Frank Hayes . . . .	VI.	<i>Great Falls, N. H.</i> . . .	37 Holyoke St.
Dow, Sterling Tucker . . . .	V.	<i>Portland, Me.</i> . . . .	663 Tremont St.
Dunham, Lewis Augustus . .	I.	<i>De Pere, Wis.</i> . . . .	195 W. Canton St.
England, Paul Willard . . .	VI.	<i>Allston</i> . . . .	4 Gardner St., A.
Ensworth, Horace Hayden . .	VI.	<i>Hartford, Conn.</i> . . .	509 Columbus Ave.
Favor, George Warren . . .	III.	<i>Chicago, Ill.</i> . . . .	20 St. James Ave.
Fiske, Henry Anthony . . .	X.	<i>Roxbury</i> . . . .	50 Elmore St., R.
Forbes, Howard Carleton . .	X.	<i>Roxbury</i> . . . .	96 Elm Hill Ave., R.
Füger, Frederic William . . .	II.	<i>Fort Barrancas, Fla.</i>	22 Yarmouth St.
Fuller, Will Spencer . . . .	IX.	<i>Brighton</i> . . . .	15 Sparhawk St., B.
Garrison, Charles . . . .	VI.	<i>Roxbury</i> . . . .	32 Linwood St., R.
Gottlieb, Albert Samuel . . .	II.	<i>Brooklyn, N. Y.</i> . . .	202 Dartmouth St.
Greer, Medorem William . . .	VI.	<i>Tacoma, Wash.</i> . . . .	101 Warren Ave.
Hamilton, Edgar Lockwood .	III.	<i>Fond du Lac, Wis.</i> . . .	11 St. James Ave.

NAME.	COURSE.	HOME.	RESIDENCE.
Hammond, Charles Frederick	I.	<i>Detroit, Mich.</i>	Hotel Ikley.
Hansen, Charles Waldemar	II.	<i>Chicago, Ill.</i>	52 Falmouth St.
Harwood, Harry Adams	I.	<i>Boston</i>	212 W. Newton St.
Hatch, Arthur Elliott	I.	<i>Charlestown</i>	160 Main St., C.
Hathaway, Herbert Emerson	V.	<i>Fall River</i>	159 Warren Ave.
Hawley, George Burton	VI.	<i>Hartford, Conn.</i>	507 Columbus Ave.
Hawley, William Church	VI.	<i>Malden</i>	Malden.
Hersam, Ernest Albert	V.	<i>Stoneham</i>	Stoneham.
Heywood, Lincoln Crawford	I.	<i>Pawtucket, R. I.</i>	Pawtucket, R. I.
Hilliard, John Dunlap, Jr.	VI.	<i>Provincetown</i>	28 Dwight St.
Holmes, George Alfred	X.	<i>Newton Centre</i>	Newton Centre.
Hooper, George Kennard	II.	<i>Roxbury</i>	29 Dorr St., R.
Hopton, Walter Edwin	II.	<i>Bridgeport, Conn.</i>	39 Appleton St.
Howard, Frank Wallace	II.	<i>Hyde Park</i>	Hyde Park.
Jacobs, Arthur Lincoln	II.	<i>Melrose Highlands</i>	Melrose Highlands.
Jordan, Harry Warren	V.	<i>Kennebunk, Me.</i>	37 Winthrop St., C.
Kauffman, Milton Henry	V.	<i>Chicago, Ill.</i>	2 Oxford Terrace.
Keene, Thomas Means	I.	<i>Chelsea</i>	Chelsea.
Keene, William Faitoute	I.	<i>Saugatuck, Conn.</i>	684 Tremont St.
Kimball, Herbert Sawyer	X.	<i>Roxbury</i>	22 Highland Ave., R.
Knowles, Morris, 2d	I.	<i>Lawrence</i>	Lawrence.
Lawrence, William Henry	IV.	<i>Dorchester</i>	34 Sumner St., D.
Leeming, Woodruff	IV.	<i>Brooklyn, N. Y.</i>	145 W. Newton St.
Leland, William Emmons	II.	<i>Saxonville</i>	Saxonville.
Libbey, Ernest Linwood	II.	<i>Lowell</i>	Lowell.
Mansfield, Arthur Newhall	VIII.	<i>Wakefield</i>	Wakefield.
March, Clement	I.	<i>Cambridge</i>	Cambridge.
Marquand, Philip, A. B.	I.	<i>Newburyport</i>	4 Spruce St.
McKenna, Alexander George	V.	<i>Allegheny, Pa.</i>	78 Rutland St.
Meyer, Joseph Andrew, Jr.	IV.	<i>Boston</i>	10 Rutland St.
Mitchell, Guy Edward	II.	<i>Lowell</i>	Lowell.
Moore, Frederick Campbell	X.	<i>Norwich, Conn.</i>	1 Yarmouth St.
Moore, Frederick Clouston	II.	<i>Brookline</i>	Brookline.
Moore, Fred Forrest	I.	<i>Waltham</i>	Waltham.
Moseley, Alexander Willett	II.	<i>Evanston, Ill.</i>	Cambridge.
Norton, Fred Elmer	II.	<i>Little Rock, Ark.</i>	55 Pinckney St.
Noyes, Henry Ford, A. B.	X.	<i>Andover</i>	130 Pembroke St.
Oxford, Geo. Henry Kimball	VI.	<i>Cambridgeport</i>	Cambridgeport.
Palmer, Edwin A.	II.	<i>Richmond, Va.</i>	213 W. Chester Pk.
Palmer, William Irving	VI.	<i>Winchester</i>	Winchester.
Pierce, Arthur Woodbury	VI.	<i>Bardesag, Turkey</i>	Auburndale.
Pierce, James Wilson	VI.	<i>Cambridgeport</i>	Cambridgeport.



NAME.	COURSE.	HOME.	RESIDENCE.
Pratt, Nathan Raymond . . .	I.	<i>Sudbury</i> . . . . .	44 Chandler St.
Punchard, William Henry . .	IV.	<i>Chelsea</i> . . . . .	Parker House.
Putnam, John . . . . .	VI.	<i>Sandwich</i> . . . . .	18 Upton St.
Ramsey, Allan . . . . .	VII.	<i>Cincinnati, Ohio</i> . . .	149 W. Canton St.
Read, Carleton Allen . . . .	II.	<i>Rockland</i> . . . . .	Rockland.
Reed, William Breckenridge .	IV.	<i>Westfield</i> . . . . .	157 Boylston St.
Richardson, William Cumston.	II.	<i>Boston</i> . . . . .	365 Marlboro' St.
Ricker, Charles William . . .	VI.	<i>Buffalo, N. Y.</i> . . . .	150 Warren Ave.
Roberts, William Jackson, A.B.	I.	<i>The Dalles, Oreg.</i> . . .	22 St. Charles St.
Roots, Willard Holt . . . .	IX.	<i>Little Rock, Ark.</i> . . .	55 Pinckney St.
Rose, Frederick Holland . . .	II.	<i>Cleveland, Ohio</i> . . . .	78 Rutland St.
Shattuck, Arthur Forrest . . .	V.	<i>Winchester</i> . . . . .	Winchester.
Smith, Edwin Clarence . . . .	II.	<i>Newton</i> . . . . .	Newton.
Snyder, Frederick Titcomb . .	VI.	<i>Chicago, Ill.</i> . . . . .	191 Warren Ave.
Spencer, Theodore . . . . .	VI.	<i>Cambridge</i> . . . . .	Cambridge.
Spooner, George Howard . . .	VI.	<i>New Bedford</i> . . . . .	760 Tremont St.
Stearns, Edward Burnham . . .	I.	<i>East Watertown</i> . . . .	East Watertown.
Stix, Sol. Henry . . . . .	IV.	<i>Cincinnati, Ohio</i> . . . .	379 Columbus Ave.
Stix, Sylvan Louis . . . . .	IV.	<i>New York, N. Y.</i> . . . .	379 Columbus Ave.
Stoddard, Arthur Bates . . . .	V.	<i>Taunton</i> . . . . .	Taunton.
Swan, James . . . . .	II.	<i>Dorchester</i> . . . . .	Arcadia St., D.
Sykes, Henry Hutchins, Ph.B.	VI.	<i>New Haven, Conn.</i> . . .	165 W. Canton St.
Thompson, Herbert Arthur . .	VIII.	<i>Amherst</i> . . . . .	234 W. Canton St.
Trowbridge, Walter Bacon . . .	II.	<i>Newton</i> . . . . .	Newton.
Tyler, Clifford Molineaux . . .	II.	<i>Brookline</i> . . . . .	Brookline.
Vaillant, George Wightman . .	I.	<i>New York, N. Y.</i> . . . .	Hotel Ilkley.
Verges, Luis Francisco . . . .	I.	<i>Arroyo, Porto Rico</i> . . .	The Cluny.
Vielé, Francis Stuart, B.S. . .	VI.	<i>Geneva, N. Y.</i> . . . . .	1 Yarmouth St.
Wait, Henry Heileman . . . .	VI.	<i>Chicago, Ill.</i> . . . . .	82 Myrtle St.
Warner, George Menzies . . . .	VI.	<i>Fall River</i> . . . . .	200 Dartmouth St.
Warren, Joseph Adams . . . .	I.	<i>Cumberland Mills, Me.</i>	118 Chandler St.
Warren, William . . . . .	I.	<i>Brighton</i> . . . . .	Brighton.
Waterman, Charles Clarence . .	VI.	<i>Charlestown</i> . . . . .	80 Green St., C.
Weed, Henry Townsend . . . .	V.	<i>Brooklyn, N. Y.</i> . . . .	145 W. Newton St.
Weston, William Hutchinson .	III.	<i>Boston</i> . . . . .	285 Newbury St.
Wetherbee, Charles Phelps . . .	II.	<i>Detroit, Mich.</i> . . . . .	Somerville.
White, Annie Elizabeth . . . .	V.	<i>Roxbury</i> . . . . .	233 Highland St., R.
White, James Francis . . . .	VI.	<i>Waterbury, Conn.</i> . . .	135 W. Newton St.
Wilder, Salmon Willoughby, Jr.	X.	<i>Lowell</i> . . . . .	Lowell.
Wilson, Fred Allan . . . . .	II.	<i>Nahant</i> . . . . .	11 Albion St., D.
Wood, Charles Hancock . . . .	II.	<i>Brookline</i> . . . . .	Brookline.

## Second Year.

NAME.	COURSE.	HOME.	RESIDENCE.
Adams, William Linville . . .	II.	<i>East Boston</i> . . .	111 Eutaw St.
Allen, Orren . . . . .	VI.	<i>Denver, Col.</i> . . .	45 Concord Sq.
Andrews, Edmund Lathrop . .	VI.	<i>Chicago, Ill.</i> . . .	3 Oxford Terrace.
Beal, Charles Alston . . . .	VI.	<i>Abington</i> . . . .	Abington.
Beckler, Alice Hooper . . .	VII.	<i>South Boston</i> . . .	590 E. 7th St., S. B.
Bigelow, Charles Hudson . .	VI.	<i>Salem</i> . . . . .	Cambridgeport.
Brown, Bertha Millard . . .	VII.	<i>Roxbury</i> . . . . .	16 Holborn St., R.
Brown, Glenn Charles . . .	III.	<i>Tower, Minn.</i> . . .	34 Rutland Sq.
Brown, Wm. Franklin Snow . .	II.	<i>Portland, Me.</i> . . .	40 Union Park.
Burbank, Philip Mountfort . .	VI.	<i>Waltham</i> . . . . .	Waltham.
Burnham, Charles Morton . .	VI.	<i>Waltham</i> . . . . .	Waltham.
Burnham, Guy Johnston . . .	X.	<i>Gloucester</i> . . . .	32 Gardner St.
Burnham, Harry Atwood . . .	II.	<i>Waltham</i> . . . . .	Waltham.
Chase, Charles Harris . . . .	VI.	<i>Stoneham</i> . . . . .	Stoneham.
Chase, Richard Davenport . .	XI.	<i>New Bedford</i> . . .	376 Columbus Ave.
Church, Albert Kingsley . . .	V.	<i>Lawrence</i> . . . . .	114 Chandler St.
Clogher, Arthur William . . .	IX.	<i>Dedham</i> . . . . .	Dedham.
Cody, Lewis Phillip . . . . .	VI.	<i>Grand Rapids, Mich.</i>	40 Union Park.
Colby, John Mason, Jr. . . .	II.	<i>East Boston</i> . . . .	Trenton St., E. B.
Curtin, John Andrew . . . . .	I.	<i>Roxbury</i> . . . . .	19 Waumbeck St., R.
Dana, Gorham . . . . .	I.	<i>Dorchester</i> . . . .	34 Glendaie St., D.
Davis, Albert Gould . . . . .	VI.	<i>Knoxville, Tenn.</i> . .	321 Columbus Ave.
Davis, Carleton Emerson . . .	I.	<i>Newton Centre</i> . . .	Newton Centre.
Dean, Arthur Warren . . . . .	XI.	<i>Taunton</i> . . . . .	Taunton.
de Carvalho, Raul Rezende . .	IX.	<i>Rio de Janeiro, Brazil</i>	52 Union Park.
Dennett, William Hartley . . .	IV.	<i>Saco, Me.</i> . . . . .	52 Union Park.
Derr, Louis, A. B. . . . .	VI.	<i>Pottsville, Pa.</i> . . .	369 Columbus Ave.
Dodge, Samuel Douglass . . .	I.	<i>Arlington</i> . . . . .	Arlington.
Doe, Haven . . . . .	VI.	<i>Salmon Falls, N. H.</i>	303 Columbus Ave.
Douglass, Walter Bailey . . .	I.	<i>Lowell</i> . . . . .	Lowell.
Downey, Julian Bryan . . . .	VI.	<i>Pueblo, Col.</i> . . . .	294 Columbus Ave.
Downing, George Miller, B. S.	VI.	<i>West Chester, Pa.</i> . .	28 Hancock St.
Dresser, Henry Chester . . .	II.	<i>Southbridge</i> . . . .	45 Concord Sq.
du Bois, Barron Potter . . .	VI.	<i>Portsmouth, N. H.</i> . .	303 Columbus Ave.
Ely, Sumner Boyer . . . . .	II.	<i>New York, N. Y.</i> . . .	117 Berkeley St.
Esty, William, A. B. . . . .	VI.	<i>Amherst</i> . . . . .	369 Columbus Ave.
Falvey, John Joseph . . . . .	XI.	<i>East Somerville</i> . . .	East Somerville.
Feland, Logan . . . . .	IV.	<i>Owensboro', Ky.</i> . . .	115 Pembroke St.
Foster, William Wallace . . .	VI.	<i>Boston</i> . . . . .	6 Berwick Park.
Francis, Frederick Leighton .	IV.	<i>Fitchburg</i> . . . . .	234 W. Canton St.

NAME.	COURSE.	HOME.	RESIDENCE.
French, Allen . . . . .	IX.	<i>Boston</i> . . . . .	200 Comm'th Ave.
French, Edward Rutledge . . . . .	VI.	<i>Waterbury, Conn.</i> . . . . .	75 Chandler St.
Frisbie, Walter Levi . . . . .	II.	<i>Waterbury, Conn.</i> . . . . .	70 Chandler St.
Fuller, Charles Edward . . . . .	II.	<i>Wellesley</i> . . . . .	Wellesley.
Gamble, William Burt . . . . .	VI.	<i>Detroit, Mich.</i> . . . . .	26 St. James Ave.
Gill, Edward Paddington . . . . .	IV.	<i>Baltimore, Md.</i> . . . . .	12 St. James Ave.
Gilmore, Howard . . . . .	II.	<i>North Easton</i> . . . . .	North Easton.
Goodell, George Haskell . . . . .	II.	<i>Salem</i> . . . . .	Salem.
Goodkind, Leo . . . . .	IV.	<i>St. Paul, Minn.</i> . . . . .	7 Holyoke St.
Gray, William Palmer . . . . .	VI.	<i>Richmond, Va</i> . . . . .	26 St. James Ave.
Green, William Wilcox . . . . .	I.	<i>Blue Island, Ill.</i> . . . . .	310 Columbus Ave.
Grimes, Charles Browning . . . . .	V.	<i>Boston</i> . . . . .	Monmouth St., E. B.
Hall, Albert Percival . . . . .	I.	<i>Chicago, Ill.</i> . . . . .	436 Columbus Ave.
Hall, Edward Childs, Jr. . . . .	II.	<i>Watertown</i> . . . . .	Watertown.
Heywood, Albert Samuel . . . . .	VI.	<i>Worcester</i> . . . . .	408 Columbus Ave.
Highlands, John Ashley . . . . .	II.	<i>Fall River</i> . . . . .	2 Columbus Square.
Holmes, Francis Clinton . . . . .	IX.	<i>Plymouth</i> . . . . .	Plymouth.
Howland, Frederick Hoppin . . . . .	I.	<i>Providence, R. I.</i> . . . . .	17 St. James Ave.
Hoxie, Frederick Jerome . . . . .	VI.	<i>Phenix, R. I.</i> . . . . .	385 Columbus Ave.
Hutchinson, William Spencer . . . . .	III.	<i>Mattapan</i> . . . . .	44 Morton St., M.
Ingraham, George Hunt . . . . .	IV.	<i>New Bedford</i> . . . . .	Milton.
Johnson, Jesse Folsom . . . . .	X.	<i>Ipswich</i> . . . . .	Danversport.
Kales, William Robert . . . . .	II.	<i>Chicago, Ill.</i> . . . . .	3 Oxford Terrace.
Kendall, William Roy . . . . .	VI.	<i>Kansas City, Mo.</i> . . . . .	People's Church.
King, Warren Dudley . . . . .	VI.	<i>Peabody</i> . . . . .	Peabody.
Knudsen, Augustus Francis . . . . .	I.	<i>Kuui, Hawaiian Islds.</i> . . . . .	Hotel Cluny.
Koch, Armand David . . . . .	IV.	<i>Milwaukee, Wis.</i> . . . . .	306 Columbus Ave.
Lane, William Homer . . . . .	VI.	<i>Medford</i> . . . . .	Medford.
Linder, John Farlow . . . . .	II.	<i>Newton</i> . . . . .	Newton.
Locke, William Willard . . . . .	XI.	<i>Lockeford, Cal.</i> . . . . .	298 Columbus Ave.
Lovering, Mary Campbell . . . . .	V.	<i>Mattapan</i> . . . . .	Norfolk St., M.
Lukes, George Holt . . . . .	VI.	<i>Racine, Wis.</i> . . . . .	10 Follen St.
Lukes, Joseph Brian . . . . .	VI.	<i>Racine, Wis.</i> . . . . .	10 Follen St.
Lyon, Joseph Palmer . . . . .	I.	<i>Hanover, Conn.</i> . . . . .	385 Columbus Ave.
Manahan, Elmer Grove . . . . .	XI.	<i>Lawrence</i> . . . . .	Lawrence.
Manley, Laurence Bradford . . . . .	I.	<i>West Roxbury</i> . . . . .	West Roxbury.
Mansfield, R. Herbert, Jr. . . . .	VI.	<i>Lynn</i> . . . . .	Lynn.
Marcy, Willard Adna . . . . .	II.	<i>Newton Upper Falls</i> . . . . .	Newton Upper Falls.
Mathews, Albert Prescott . . . . .	VII.	<i>So. Evanston, Ill.</i> . . . . .	708 Tremont St.
May, George Henry . . . . .	V.	<i>Newton Centre</i> . . . . .	Newton Centre.
McCaw, Wallace Eugene . . . . .	VI.	<i>Macon, Ga.</i> . . . . .	26 St. James Ave.
McCulloch, Alfred Hugh . . . . .	VI.	<i>Mason City, Ia.</i> . . . . .	32 Lawrence St.

NAME.	COURSE.	HOMR.	RESIDENCE.
McQuesten, George Edward	VI.	<i>Boston</i>	115 Newbury St.
Meade, William V., A. B.	I.	<i>Lowell</i>	Lowell.
Merrill, Frank Henry	X.	<i>Newburyport</i>	Newburyport.
Merrill, George Albert	XI.	<i>Newburyport</i>	Newburyport.
Meserve, Frederick Hill	IV.	<i>Dover, N. H.</i>	708 Tremont St.
Messenger, William Henry	II.	<i>East Boston</i>	Princeton St., E. B.
Metcalf, Leonard	I.	<i>Cambridge</i>	Cambridge.
Milburn, Charles Coad	VI.	<i>Washington, D. C.</i>	45 Concord Sq.
Müller, Herbert Stanley	VI.	<i>Elizabeth, N. J.</i>	144 W. Newton St.
Mirick, George Landon	II.	<i>Everett</i>	Everett.
Mitchell, Benjamin Merwin	II.	<i>So. Britain, Conn.</i>	507 Columbus Ave.
Morrill, Asa Hall	I.	<i>Neposet</i>	2 High St., N.
Morse, John Gavit	I.	<i>Salem</i>	Salem.
Newkirk, Walter Matthew	II.	<i>Newark, Ohio</i>	76 Chandler St.
Newman, Frank Eaton	IV.	<i>Plainfield, N. J.</i>	22 E. Brookline St.
Nickerson, Ernest	I.	<i>Newton Centre</i>	Newton Centre.
Nilson, Leonard Johan	II.	<i>Boston</i>	124 Beacon St.
Ober, Arthur Joseph	I.	<i>West Medford</i>	West Medford.
Paraschos, Nicholas Theophanes	I.	<i>Constantinople, Turkey.</i>	453 Beacon St.
Parkes, Harry Charles	III.	<i>Chicago, Ill.</i>	151 W. Canton St.
Parrish, James Scott	II.	<i>Richmond, Va.</i>	12 St. James Ave.
Payne, Albert Bronson, Jr.	III.	<i>Nashville, Tenn.</i>	17 St. James Ave.
Perkins, Frank Edson	IV.	<i>Boston</i>	14 Appleton St.
Perry, John Cranston	II.	<i>Providence, R. I.</i>	54 Berkeley St.
Phillips, Henry Morton	VI.	<i>Wrentham</i>	298 Columbus Ave.
Pierce, Arthur Gilbert	VI.	<i>East Boston</i>	26 Bremen St., E. B.
Pollard, Albert Abner	IV.	<i>Roxbury</i>	32 Whiting St., R.
Pope, Macy Stanton	I.	<i>East Machias, Me.</i>	5 Pelham St.
Potter, Herbert Sturgis	II.	<i>Newton</i>	43 Pierce Building.
Pratt, Dana Moore	I.	<i>So. Hanson</i>	So. Hanson.
Quevedo, Narciso Tadeo	II.	<i>Guatemala, C. A.</i>	Worcester.
Ranlett, Arthur Grover	III.	<i>San Francisco, Cal.</i>	153 W. Canton St.
Reynolds, Philip Murray, A.B.	VI.	<i>Boston</i>	236 Clarendon St.
Rhodes, Frederick Leland	VI.	<i>Winchester</i>	Winchester.
Robertson, Andrew Robert	II.	<i>Glasgow, Scotland</i>	84 Charles St.
Rowell, George Freeman	I.	<i>Peabody</i>	Peabody.
Sargent, Albert Francis, Jr.	I.	<i>Malden</i>	Malden.
Saunders, Robert Thomson	I.	<i>Tacoma, Wash.</i>	Chelsea.
Shaw, Edmund	V.	<i>Rockland</i>	Rockland.
Shepherd, Frank Cummings	XI.	<i>Gloucester</i>	84 Chandler St.
Shute, Harry Damon	VI.	<i>Boston</i>	137 Newbury St.
Skinner, Theodore Hobart	IV.	<i>Boston</i>	157 Newbury St.

NAME.	COURSE.	HOME.	RESIDENCE.
Studley, Fred Butler . . .	VI.	<i>Rockland</i> . . . .	Rockland.
Sweetser, Ralph Hayes . . .	III.	<i>Portsmouth, N. H.</i> . .	15 Putnam St., R.
Taylor, Robert Robinson . . .	IV.	<i>Wilmington, N. C.</i> . .	23 Porter St.
Thalheimer, William Coolidge .	I.	<i>Cincinnati, Ohio</i> . . .	Newton Centre.
Tidd, Winthrop Lowe . . . .	II.	<i>Taunton</i> . . . . .	Taunton.
Torossian, Toros Horhanes, B. A. I.		<i>Roustchuk, Bulgaria</i>	Cambridge.
Tucker, Ross Francis . . . .	IV.	<i>Oakland, Cal.</i> . . . .	Hyde Park.
Vanderpoel, Aaron Melgert, B.S. II.		<i>Kinderhook, N. Y.</i> . . .	150 Chandler St.
Vining, John Franklin . . . .	IV.	<i>So. Weymouth</i> . . . .	So. Weymouth.
Vining, Louis Bradford . . . .	VI.	<i>So. Weymouth</i> . . . .	570 Columbus Ave.
Wales, Thomas Crane, Jr. . . .	VI.	<i>Roxbury</i> . . . . .	Elm Hill Ave., R.
Walker, Francis . . . . .	I.	<i>Boston</i> . . . . .	237 Beacon St.
Wallace, Charles Frederic . . .	VI.	<i>Roxbury</i> . . . . .	62 Forest St., R.
Warner, Murray . . . . .	II.	<i>St. John, N. B.</i> . . . .	298 Columbus Ave.
Waterman, Richard, Jr. . . .	IX.	<i>Chicago, Ill.</i> . . . .	330 W. Chester Pk.
Weis, Samuel Washington . . .	I.	<i>New Orleans, La.</i> . . .	7 Columbus Sq.
Wells, Edward Castle . . . .	II.	<i>Quincy, Ill.</i> . . . .	153 W. Canton St.
Wendell, George Vincent . . . .	VIII.	<i>Cambridgeport</i> . . . .	Cambridgeport.
Wentworth, Charles T. . . .	III.	<i>Roxbury</i> . . . . .	46 Sherman St., R.
Wheeler, Arthur Lincoln, A. B. VI.		<i>Concord</i> . . . . .	Concord.
Williams, Harry Nye . . . .	I.	<i>Cleveland, Ohio</i> . . . .	453 Columbus Ave.
Worthington, Arthur Morton VII.		<i>Dedham</i> . . . . .	Dedham.
Yoerg, Frank . . . . .	IV.	<i>St. Paul, Minn.</i> . . . .	23 Milford St.
Yorke, George Marshall . . . .	VI.	<i>Lowell</i> . . . . .	Lowell.

## First Year.

Abbot, John Cameron . . . .	<i>Westford</i> . . . . .	11 St. James Ave.
Abbott, Frederic Bassett . . . .	<i>Lynn</i> . . . . .	Lynn.
Albee, Orton Wheelock . . . .	<i>Marlboro'</i> . . . . .	Marlboro'.
Alden, Herbert Watson . . . .	<i>Peoria, Ill.</i> . . . .	20 Auburn St., R.
Allen, Charles Vernon . . . .	<i>Pasadena, Cal.</i> . . . .	294 Columbus Ave.
Ames, John Ormsbee . . . .	<i>Providence, R. I.</i> . . . .	46 Chestnut St.
Anthony, John Gould . . . .	<i>Cincinnati, Ohio</i> . . . .	60 Berkeley St.
Armstrong, Herbert . . . .	<i>Detroit, Mich.</i> . . . .	295 Columbus Ave.
Ashton, Franklin George . . . .	<i>Somerville</i> . . . . .	Somerville.
Atkins, George Herbert . . . .	<i>Somerville</i> . . . . .	Somerville.
Badger, Frank Sidney . . . .	<i>Wellesley Hills</i> . . . .	214 Columbus Ave.
Baker, Frederic Wallace . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Barbour, Minard Townsend . . .	<i>Chicago, Ill.</i> . . . .	402 Columbus Ave.
Barker, Percy Lewis . . . .	<i>Portland, Me.</i> . . . .	273 Columbus Ave.
Barnes, William Thomas . . . .	<i>South Boston</i> . . . .	773 Broadway, S. B.



NAME.	HOME.	RESIDENCE.
Barrows, George Shattuck . . .	<i>Philadelphia, Pa.</i> . . .	17 St. James Ave.
Barrows, Irving McFarland . . .	<i>Fairhaven</i> . . . . .	50 Union Park.
Barstow, George Edward . . .	<i>Lynn</i> . . . . .	Lynn.
Barton, Howard Rittenhouse . . .	<i>Englewood, N. J.</i> . . . .	Newton.
Batcheller, Henry Rensselaer . . .	<i>Norfolk, Va.</i> . . . . .	34 Monument Sq., C.
Baxter, Jesse Bunton . . . . .	<i>East Milton</i> . . . . .	East Milton.
Beattie, Roy Hamilton . . . . .	<i>Fall River</i> . . . . .	159 Warren Ave.
Beddall, Albert Richard . . . . .	<i>Boston</i> . . . . .	2 St. Paul St.
Belcher, Charles Edwin . . . . .	<i>Winthrop</i> . . . . .	Winthrop.
Belden, Richard Edwin . . . . .	<i>New London, Conn.</i> . . . .	111 Boylston St.
Bemis, Albert Farwell . . . . .	<i>Colorado Springs, Col.</i> . . . .	Newton.
Berry, Hereford . . . . .	<i>North Andover</i> . . . . .	North Andover.
Biscoe, Maurice Bigelow . . . . .	<i>Westboro'</i> . . . . .	Medford.
Bissell, Joseph Emery . . . . .	<i>Pittsburgh, Pa.</i> . . . . .	8 St. James Ave.
Blake, Edmund Enos . . . . .	<i>Newton</i> . . . . .	Newton.
Blood, Grosvenor Tarbell . . . . .	<i>Newburyport</i> . . . . .	Newburyport.
Boss, Charles Royce . . . . .	<i>New London, Conn.</i> . . . .	111 Boylston St.
Bowker, Lyman Appleton . . . . .	<i>Waltham</i> . . . . .	Waltham.
Boyd, James Churchill . . . . .	<i>Jamaica Plain</i> . . . . .	Pond, St., J. P.
Breed, Stephen Alec . . . . .	<i>Lynn</i> . . . . .	204 Dartmouth St.
Breed, Stephen Lovejoy . . . . .	<i>Lynn</i> . . . . .	Lynn.
Bremer, Samuel Parker . . . . .	<i>Boston</i> . . . . .	49 Beacon St.
Brooks, Warren Everett . . . . .	<i>Boston</i> . . . . .	85 Dartmouth St.
Brown, Charles Custer . . . . .	<i>Waltham</i> . . . . .	Waltham.
Brown, Jacob Winn . . . . .	<i>Woburn</i> . . . . .	Woburn.
Brown, John Clifford . . . . .	<i>Portland, Me.</i> . . . . .	84 Charles St.
Brown, Walter Vail . . . . .	<i>Oldtown, Me.</i> . . . . .	Cumberland St.
Buchanan, Leonard Brown . . . . .	<i>Woburn</i> . . . . .	Woburn.
Buck, Arthur Augustine . . . . .	<i>Bucksport, Me.</i> . . . . .	Chelsea.
Bullard, John Richards, Jr. . . . .	<i>Dedham</i> . . . . .	Dedham.
Burbank, Robert Sumner . . . . .	<i>Belmont</i> . . . . .	Belmont.
Burckhardt, Horatio Wolcott . . . . .	<i>Cincinnati, Ohio</i> . . . . .	519 Columbus Ave.
Burke, John Ryan . . . . .	<i>East Boston</i> . . . . .	78 Everett St., E. B.
Burt, Arthur Morton . . . . .	<i>Lowell</i> . . . . .	Lowell.
Cadwell, William Harry . . . . .	<i>Nashua, N. H.</i> . . . . .	29 St. James Ave.
Caldwell, George Andrews . . . . .	<i>Newburyport</i> . . . . .	Newburyport.
Callahan, Dennis Edward . . . . .	<i>Boston</i> . . . . .	329 Federal St.
Callender, Harry Rea . . . . .	<i>Boston</i> . . . . .	63 W. Newton St.
Campbell, James Fairman . . . . .	<i>Long Island, N. Y.</i> . . . . .	1 Yarmouth St.
Carney, Edward Bullard . . . . .	<i>Lowell</i> . . . . .	Lowell.
Carney, George Sydney . . . . .	<i>Lowell</i> . . . . .	Lowell.
Carter, Philip Greenleaf . . . . .	<i>New York, N. Y.</i> . . . . .	62 W. Rutland Sq.

NAME.	HOME.	RESIDENCE.
Carter, William Wood . . . .	<i>Boston</i> . . . . .	110 Dartmouth St.
Chadwick, Henry Mason . . . .	<i>Malden</i> . . . . .	Malden.
Chapman, Thomas Irvin . . . .	<i>Brookline</i> . . . . .	Brookline.
Clapp, Harry Lincoln . . . . .	<i>South Boston</i> . . . . .	18 Atlantic St., S. B.
Clapp, John Cotton, Jr. . . . .	<i>South Boston</i> . . . . .	729 E 4th St., S. B.
Clapp, Wilfred Atherton . . . .	<i>South Boston</i> . . . . .	104 F St., S. B.
Clark, Farley Granger . . . . .	<i>Thorndike</i> . . . . .	67 Chandler St.
Cook, Charles Nourse . . . . .	<i>Woonsocket, R. I.</i> . . . .	41 Mt. Vernon St.
Cox, Frederick Edward . . . . .	<i>St. Louis, Mo.</i> . . . . .	224 Huntington Ave.
Craighill, Nathaniel Rutherford	<i>Charlestown, W. Va.</i> . . . .	Brookline.
Cromwell, Martin John Spaulding.	<i>Baltimore, Md.</i> . . . . .	19 St. James Ave.
Crosby, William Wyman . . . .	<i>Woburn</i> . . . . .	Woburn.
Curry, George Archibald . . . .	<i>Milwaukee, Wis.</i> . . . . .	34 Rutland Sq.
Cutler, Nathan Pearson, Jr. . . .	<i>Newton</i> . . . . .	Newton.
Cutler, William Worcester . . . .	<i>Waltham</i> . . . . .	Waltham.
Dana, George Frink . . . . .	<i>Cincinnati, Ohio</i> . . . . .	524 Columbus Ave.
Darrow, Courtland Rogers . . . .	<i>Waterford, Conn.</i> . . . . .	17 Harwich St.
Dates, Henry Baldwin . . . . .	<i>New Britain, Conn.</i> . . . . .	3 Concord Sq.
Davis, William E., Jr. . . . .	<i>Englewood, Ill.</i> . . . . .	52 Union Park.
Dawes, Herbert Nathan . . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Day, Philip Baldwin . . . . .	<i>Charlestown</i> . . . . .	Navy Yard, C.
Dearborn, George Knight . . . .	<i>Dorchester</i> . . . . .	Harrison Sq., D.
Demond, Charles Denny . . . . .	<i>East Boston</i> . . . . .	Webster St., E. B.
Dennett, James Vaughan . . . .	<i>Saco, Me.</i> . . . . .	52 Union Park.
Densmore, Edward Dana . . . . .	<i>Somerville</i> . . . . .	Somerville.
Dillon, Benjamin Henry . . . . .	<i>Fitchburg</i> . . . . .	217 W. Canton St.
Dillon, Frederick Nathan . . . .	<i>Fitchburg</i> . . . . .	217 W. Canton St.
Dixon, Laurence Belmont. . . . .	<i>Chicago, Ill.</i> . . . . .	35 St. James Ave.
Dolan, Peter Francis . . . . .	<i>East Boston</i> . . . . .	185 Chelsea St., E. B.
Dorman, Theodore Taylor . . . .	<i>Upper Montclair, N. J.</i> . . . .	Newton Highlands.
Doughty, Stewart Brown . . . .	<i>Englewood, N. J.</i> . . . . .	192 Dartmouth St.
Duncan, Robert Jones . . . . .	<i>Englewood, N. J.</i> . . . . .	Newton.
Edwards, Ariel Ballou . . . . .	<i>Woonsocket, R. I.</i> . . . . .	52 Union Park.
Ellis, John . . . . .	<i>Woonsocket, R. I.</i> . . . . .	19 Upton St.
Emery, James Albert . . . . .	<i>Taunton</i> . . . . .	Taunton.
Evans, Wilbur Forbes . . . . .	<i>Springfield</i> . . . . .	385 Columbus Ave.
Evans, William Eugene . . . . .	<i>Jamaica Plain</i> . . . . .	South St., J. P.
Fabyan, Francis Wright . . . . .	<i>Boston</i> . . . . .	36 Beacon St.
Fairfield, Edmund John . . . . .	<i>Hartford, Conn.</i> . . . . .	611 Tremont St.
Fales, Harold Everett . . . . .	<i>Milford</i> . . . . .	Milford.
Farwell, Arthur George . . . . .	<i>St. Paul, Minn.</i> . . . . .	38 Union Park.
Fay, Frederic Harold . . . . .	<i>Marlboro'</i> . . . . .	76 Chandler St.

NAME.	HOME.	RESIDENCE.
Flynn, Edward James . . . .	<i>Somerville</i> . . . . .	Somerville.
Forbes, Fred Bettinson . . . .	<i>East Cambridge</i> . . . .	East Cambridge.
Forbes, William Stuart . . . .	<i>Jamaica Plain</i> . . . . .	Chestnut Ave., J. P.
Foss, Herbert Collamore . . . .	<i>Bangor, Me.</i> . . . . .	Newtonville.
Fowle, Arthur Edwin . . . . .	<i>Newton Centre</i> . . . . .	Newton Centre.
Francis, Ira Johnson . . . . .	<i>Portland, Oreg.</i> . . . .	385 Columbus Ave.
Gardner, John Howland . . . .	<i>New London, Conn.</i> . . .	4 Union Park.
Gaylord, Wallace Kendall . . . .	<i>Cambridge</i> . . . . .	Cambridge.
Gilmore, Harry Smith . . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Glidden, George Blanchard . . . .	<i>Boston</i> . . . . .	23 Greenville St.
Godchaux, Jules . . . . .	<i>New Orleans, La.</i> . . . .	193 W. Canton St.
Gorham, Marvine . . . . .	<i>Buffalo, N. Y.</i> . . . . .	26 Holyoke St.
Guppy, George . . . . .	<i>Jamaica Plain</i> . . . . .	13 St. John St., J. P.
Gutmann, Walter Usher . . . . .	<i>Lewiston, Me.</i> . . . . .	People's Church.
Hadley, Frederick Walter . . . .	<i>Arlington Heights</i> . . . .	Arlington Heights.
Hagar, Edward McKim . . . . .	<i>Chicago, Ill.</i> . . . . .	14 Harris Ave., J. P.
Hahn, William Irwin . . . . .	<i>East Boston</i> . . . . .	35 Chelsea St., E. B.
Hanchett, George Tilden . . . .	<i>Hyde Park</i> . . . . .	Hyde Park.
Hanscom, Isaiah Clifford . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Hawes, George Mason . . . . .	<i>Fall River</i> . . . . .	11 Yarmouth St.
Hawkins, William Robert . . . .	<i>Steubenville, Ohio</i> . . . .	98 Appleton St.
Hawley, John Church . . . . .	<i>Malden</i> . . . . .	Malden.
Hayden, Charles Fred . . . . .	<i>Holbrook</i> . . . . .	Holbrook.
Heywood, Charles Davis . . . .	<i>Holyoke</i> . . . . .	145 W. Newton St.
Hill, William Reed . . . . .	<i>Milton</i> . . . . .	Milton.
Hineckley, John Fred . . . . .	<i>Marlboro'</i> . . . . .	76 Chandler St.
Holmes, Frank Blackwell . . . .	<i>Melrose</i> . . . . .	Melrose.
Hooper, George Mitchell, Jr . . . .	<i>Bridgewater</i> . . . . .	Bridgewater.
Hopewell, Charles Frederick . . . .	<i>Cambridgeport</i> . . . . .	Cambridgeport.
Houck, William Gabriel . . . . .	<i>Buffalo, N. Y.</i> . . . . .	74 Chandler St.
Houghton, Frank . . . . .	<i>Boston</i> . . . . .	18 Perrin St.
Howe, Josiah Wilder . . . . .	<i>New Haven, Conn.</i> . . . .	Dedham.
Hoyt, Charles Henry . . . . .	<i>Lynn</i> . . . . .	Lynn.
Iglesias, Eugenio Tomas . . . .	<i>San Juan, Porto Rico</i> . . .	59 Chester Sq.
Jackson, Daniel Dana . . . . .	<i>Lanesville</i> . . . . .	Newtonville.
Jackson, Oliver Howard . . . . .	<i>Fall River</i> . . . . .	Medford.
James, Lawrence Stearns . . . . .	<i>East Boston</i> . . . . .	56 Trenton St., E. B.
Johnson, Charles Herbert . . . .	<i>Jamaica Plain</i> . . . . .	494 Centre St., J. P.
Jones, Stephen Edward, Jr. . . . .	<i>Louisville, Ky.</i> . . . . .	148 Chandler St.
Keith, Simeon Curtis, Jr. . . . .	<i>East Bridgewater</i> . . . . .	75 Chandler St.
Kendall, Albert Lincoln . . . . .	<i>Framingham</i> . . . . .	Framingham.
Kendall, Fay Brigham . . . . .	<i>Roxbury</i> . . . . .	40 Codman Park, R.

NAME.	HOME.	RESIDENCE.
Kenison, Ervin . . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Keyes, Frederic Hale . . . . .	<i>Newtonville</i> . . . . .	Newtonville.
Kimball, Edward Richard, Jr. . . . .	<i>Roxbury</i> . . . . .	2 Lewis Park, R.
Kimball, Henry Raymond . . . . .	<i>Lowell</i> . . . . .	Lowell.
King, George Ilgenfritz . . . . .	<i>York, Pa.</i> . . . . .	15 St. James Ave.
Knowlton, Willis Taylor . . . . .	<i>Malden</i> . . . . .	Malden.
Labouisse, John Peter . . . . .	<i>New Orleans, La</i> . . . . .	Brookline.
Lamb, William Franklin . . . . .	<i>Roxbury</i> . . . . .	23 Waumbeck St., R.
Lane, George H. Thomas . . . . .	<i>Cincinnati, Ohio</i> . . . . .	Hotel Glendon.
Latey, Harry Nelson . . . . .	<i>St. Louis, Mo.</i> . . . . .	Cohasset.
Latham, Harry Milton . . . . .	<i>Stoneham</i> . . . . .	Stoneham.
Logan, John Wood . . . . .	<i>Bala, Pa.</i> . . . . .	65 Chandler St.
Lord, Frederic Wait . . . . .	<i>West Medford</i> . . . . .	West Medford.
Lynch, Patrick Maurice . . . . .	<i>Holyoke</i> . . . . .	85 Chandler St.
Maki, Heichiro . . . . .	<i>Tokyo, Japan</i> . . . . .	76 Waltham St.
Merrill, George Earnest . . . . .	<i>St. Paul, Minn.</i> . . . . .	Newton Centre.
Meyer, Gustav Julius . . . . .	<i>Cincinnati, Ohio</i> . . . . .	665 Tremont St.
Mitchell, George Mackenzie . . . . .	<i>New Glasgow, N. S.</i> . . . . .	58 Chester Sq.
Moody, Arthur Monroe . . . . .	<i>Newburyport</i> . . . . .	Newburyport.
Moore, Arthur Lewis . . . . .	<i>Warren</i> . . . . .	163 W. Chester Pk.
Moore, George . . . . .	<i>Fond du Lac, Wis.</i> . . . . .	142 Chandler St.
Morrill, Harley Winslow . . . . .	<i>Neponset</i> . . . . .	Neponset.
Mors, Henry Adams . . . . .	<i>Boston</i> . . . . .	323 Marlboro' St.
Mott-Smith, Harold Meade . . . . .	<i>Boston</i> . . . . .	559 Columbus Ave.
Moulton, Albert Sweetser . . . . .	<i>Lynn</i> . . . . .	Lynn.
Moulton, Raymond Edward . . . . .	<i>Dinard, France</i> . . . . .	Somerset Club.
Murray, Archibald . . . . .	<i>Yarmouth, N. S.</i> . . . . .	9 Union Park.
Nichols, Henry Windsor . . . . .	<i>Cohasset</i> . . . . .	6 Bond St.
Noble, Walter Edwin . . . . .	<i>Newton Centre</i> . . . . .	Newton Centre.
Noblit, Joseph Curtis . . . . .	<i>Ogontz, Pa.</i> . . . . .	65 Chandler St.
Northey, William Ezra . . . . .	<i>Salem</i> . . . . .	Salem.
Norton, Charles Ladd . . . . .	<i>Springfield</i> . . . . .	11 Milford St.
Page, Edward, Jr. . . . .	<i>Newtonville</i> . . . . .	Newtonville.
Page, Edward Samuel . . . . .	<i>Melrose</i> . . . . .	Melrose.
Page, William Brewster . . . . .	<i>Fitchburg</i> . . . . .	129 Dartmouth St.
Paine, Cecil E. . . . .	<i>Portland, Me.</i> . . . . .	Chelsea.
Parce, Joseph Yale, Jr. . . . .	<i>De Land, Fla.</i> . . . . .	91 Waltham St.
Parker, Edwin Mason . . . . .	<i>West Acton</i> . . . . .	West Acton.
Parks, Oren Elisha . . . . .	<i>Westfield</i> . . . . .	273 Columbus Ave.
Parmly, Dalton . . . . .	<i>Oceanic, N. J.</i> . . . . .	60 Berkeley St.
Patch, Walter Woodbury . . . . .	<i>Roxbury</i> . . . . .	45 Quincy St., R.
Pease, Edward Gardner . . . . .	<i>Dayton, Ohio</i> . . . . .	26 Holyoke St.

NAME.	HOME.	RESIDENCE.
Peck, Walter Toucey . . . . .	<i>Boston</i> . . . . .	Hotel Argyle.
Perkins, George Batcheller . . . . .	<i>Boston</i> . . . . .	387 Beacon St.
Perry, Philip Edward . . . . .	<i>Jamaica Plain</i> . . . . .	10 Gordon St., J. P.
Pevear, Arthur Stetson . . . . .	<i>Cambridgeport</i> . . . . .	Cambridgeport.
Phillips, Harry Milo . . . . .	<i>Keokuk, Ia.</i> . . . . .	148 Chandler St.
Phinney, Frank Ferguson . . . . .	<i>Stoughton</i> . . . . .	18 St. James Ave.
Pickert, Leo Walter . . . . .	<i>Boston</i> . . . . .	10 Greenville St.
Piper, William Benjamin . . . . .	<i>Dorchester</i> . . . . .	2 Winter St., D.
Pleasants, John . . . . .	<i>Pottsville, Pa.</i> . . . . .	Mt. Pleasant Ave., R.
Porter, Edward Augustus . . . . .	<i>Calais, Me.</i> . . . . .	57 Chandler St.
Randall, Edward Bryant . . . . .	<i>Medford</i> . . . . .	34 Hancock St.
Read, Edward Burrell . . . . .	<i>Malden</i> . . . . .	Malden.
Reed, Arthur Gordon . . . . .	<i>Cambridge</i> . . . . .	Cambridge.
Reed, James Henry, Jr. . . . .	<i>Boston</i> . . . . .	3 Gloucester St.
Reed, William Kimball . . . . .	<i>Columbus, Ohio</i> . . . . .	Newton.
Resor, William Seth . . . . .	<i>Cincinnati, Ohio</i> . . . . .	17 St. James Ave.
Reynolds, Robert Duncan . . . . .	<i>Jamaica Plain</i> . . . . .	45 Orchard St., J. P.
Rice, Harry Lawson . . . . .	<i>Lawrence</i> . . . . .	114 Chandler St.
Richardson, Frank Douglas . . . . .	<i>Chicago, Ill.</i> . . . . .	14 Harris Ave., J. P.
Roberts, William Elmer . . . . .	<i>Waverley</i> . . . . .	Waverley.
Rollins, George Oscar . . . . .	<i>No. Brookfield</i> . . . . .	W. Brookline St.
Sanborn, George Waldo . . . . .	<i>Charlestown</i> . . . . .	81 Elm St., C.
Sanderson, Edward Spalding . . . . .	<i>Scranton, Pa.</i> . . . . .	17 St. James Ave.
Sargent, Charles Grandison . . . . .	<i>Graniteville</i> . . . . .	11 St. James Ave.
Sargent, Howard Rankin . . . . .	<i>Newburyport</i> . . . . .	Newburyport.
Sawyer, Albert Haydn . . . . .	<i>Newburyport</i> . . . . .	Newburyport.
Sayward, William Henry, Jr. . . . .	<i>Dorchester</i> . . . . .	Monadnock St., D.
Schwarz, Morris Louis . . . . .	<i>Portsmouth, N. H.</i> . . . . .	67 Chandler St.
Seyffert, Federico Ramon, Jr. . . . .	<i>Chihuahua, Mex.</i> . . . . .	42 E. Newton St.
Shurtleff, Arthur Asahel . . . . .	<i>Boston</i> . . . . .	9 W. Cedar St.
Shurtleff, Arthur Webster . . . . .	<i>Lewiston, Me.</i> . . . . .	112 Chandler St.
Simonds, Frederic Pond . . . . .	<i>Salem</i> . . . . .	Salem.
Skinner, Fenwick Fenton . . . . .	<i>Boston</i> . . . . .	2849 Washington St.
Smith, Arthur Blakeley . . . . .	<i>Providence, R. I.</i> . . . . .	249 Berkeley St.
Smith, Clarence Warren . . . . .	<i>Chicago, Ill.</i> . . . . .	2 Oxford Terrace.
Smith, George Benton . . . . .	<i>New Britain, Conn.</i> . . . . .	3 Concord Sq.
Soley, William Alexander . . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Solomon, John Isaac . . . . .	<i>New York, N. Y.</i> . . . . .	13 St. Charles St.
Southard, Francis Marshall . . . . .	<i>Brooklyn, N. Y.</i> . . . . .	145 W. Newton St.
Souther, John Kerfoot . . . . .	<i>Fredericksburg, Va.</i> . . . . .	19 Upton St.
Speer, James Ramsey . . . . .	<i>Pittsburgh, Pa.</i> . . . . .	5 St. James Ave.
Spofford, Charles Milton . . . . .	<i>Georgetown</i> . . . . .	Georgetown.



NAME.	HOME.	RESIDENCE.
Stanwood, Herbert Winthrop . . . . .	<i>Brookline</i> . . . . .	Brookline.
Starkweather, Geo. Mathewson . . . . .	<i>Pawtucket, R. I.</i> . . . . .	Pawtucket, R. I.
Stearns, Henry F. . . . .	<i>Pawtucket, R. I.</i> . . . . .	Pawtucket, R. I.
Stose, George Willis . . . . .	<i>Chicago, Ill.</i> . . . . .	214 Columbus Ave.
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Swanton, Walter Irving . . . . .	<i>Gardiner, Me.</i> . . . . .	45 Milford St.
Taintor, Charles . . . . .	<i>Keene, N. H.</i> . . . . .	Pond St., J. P.
Taylor, Charles Malcolm . . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Tenney, Winthrop Parker . . . . .	<i>Dorchester</i> . . . . .	Pleasant St., D.
Thomas, Alfred Clarence . . . . .	<i>Cincinnati, Ohio</i> . . . . .	350 Columbus Ave.
Thomas, Percy Holbrook . . . . .	<i>Wayland</i> . . . . .	Wayland.
Toinfohrde, John Frederic . . . . .	<i>Charlestown</i> . . . . .	Mt. Vernon St., C.
Towle, Edward Avery . . . . .	<i>Westfield</i> . . . . .	Cambridgeport.
Towne, Frederic Tallmadge . . . . .	<i>Stamford, Conn.</i> . . . . .	6 Louisburg Sq.
Tripp, Charles Albion . . . . .	<i>Hudson</i> . . . . .	102 Chandler St.
Tucker, William Alfred . . . . .	<i>Roxbury</i> . . . . .	55 Waverley St., R.
Varney, Fred Lane . . . . .	<i>Lynn</i> . . . . .	Lynn.
Vorce, Walter Herbert . . . . .	<i>Farmington, Conn.</i> . . . . .	611 Tremont St.
Wadsworth, Aug. Baldwin . . . . .	<i>Plainfield, N. J.</i> . . . . .	198 Beacon St.
Wadsworth, James Stevenson . . . . .	<i>Malden</i> . . . . .	Malden.
Waldron, Samuel Payson . . . . .	<i>Coös, N. H.</i> . . . . .	2 Canton Pl.
Walker, Amasa . . . . .	<i>No. Brookfield</i> . . . . .	80 Appleton St.
Wallis, Robert Norcross . . . . .	<i>Fitchburg</i> . . . . .	146 Chandler St.
Warren, Frederic Ives . . . . .	<i>Bay City, Mich.</i> . . . . .	17 St. James Ave.
Watson, Arthur Parker . . . . .	<i>Boston</i> . . . . .	242 Huntington Ave.
Webster, Laurence Jackson . . . . .	<i>Boston</i> . . . . .	232 Newbury St.
Whiston, William Cortelyou . . . . .	<i>Newtonville</i> . . . . .	Newtonville.
Wilder, Parker Hastings . . . . .	<i>Cincinnati, Ohio</i> . . . . .	69 Appleton St.
Williams, Frank Percival . . . . .	<i>East Weymouth</i> . . . . .	20 Rutland Sq.
Wilson, Harry Colby . . . . .	<i>Nahant</i> . . . . .	11 Albion St., D.
Wingate, Edward Lawrence . . . . .	<i>Malden</i> . . . . .	Malden.
Wintringer, Harry Dohrman . . . . .	<i>Steubenville, Ohio</i> . . . . .	377 Columbus Ave.
Woodbridge, Jonathan Edwards . . . . .	<i>Duluth, Minn.</i> . . . . .	Brookline.
Woods, Henry Tyler . . . . .	<i>Somerville</i> . . . . .	Somerville.
Ycaza, Osvaldo . . . . .	<i>Panama, Colombia</i> . . . . .	42 E. Newton St.

## SPECIAL STUDENTS.

The abbreviations used in this list, which includes all students who are not in the full regular courses, are, —

App. Mech.	Applied Mechan- ics.	Elect. . . .	Electrical Engineering.	Met. . . .	Metallurgy.
Arch. . . .	Architecture.	El. Fr. . . .	Elementary French.	Mil. . . .	Military Drill.
Arch. (part.),	Partial course in Architecture.	Eng. . . .	English.	Min. . . .	Mining Engi- neering.
Ast. . . .	Astronomy.	Fr. . . .	French.	Org. Chem.	Organic Chemis- try.
Biol. . . .	Biology.	Geol. . . .	Geology.	Phys. . . .	Physics.
B. A. . . .	Blowpipe Analy- sis.	Germ. . . .	German.	Physiol. . . .	Physiology.
Chem. . . .	General and Ana- lytic Chemistry.	H. and V. . . .	Heating and Ventilation.	P. E. . . .	Political Econ- omy.
Civ. Eng. . . .	Civil Engineer- ing.	Hist. . . .	History.	Pol. Sci. . . .	Political Science.
Clim. . . .	Climatology.	Ind. Chem.	Industrial Chem- istry.	R. R. Man.	Railroad Man- agement.
Com. Geog.	Commercial Geography.	Lit. . . .	Literature.	Shop. . . .	Shopwork.
Dr. . . .	Drawing.	Math. . . .	Mathematics.	Sp. . . .	Spanish.
D. G. . . .	Descriptive Geometry.	Mech. . . .	Mechanism.	Surv. . . .	Surveying.
		Mech. Eng.	Mechanical Eng.	Th. Chem.	Theoretical Chemistry.
		M. and A.	Mechanics and Acoustics.	Zoöl. . . .	Zoölogy.

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Chem. Phys.		
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Arch. (part.), App. Mech., Phys.		
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Chem., Dr., Fr., Math.		
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Davis, Ida Sabine, B. A. . . . .	<i>Newton Centre</i> . . . . .	Newton Centre.
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Chem., Ind. Chem., Lit.		
Draper, Alfred Ernest . . . . .	<i>Canton</i> . . . . .	Canton.
Dr.		
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Ellis, Walter . . . . .	<i>Newton</i> . . . . .	Newton.
Elect., Math., Mech. Eng., Phys.		
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Chem., D. G., Math., Mech., Phys., P. E., Shop.		
Fitz, Charles Frederick, Jr. . . . .	<i>Watertown</i> . . . . .	Watertown.
D. G., Germ., Math., Mech., Phys., P. E., Shop.		
Forbush, Gayle Tilton . . . . .	<i>Natick</i> . . . . .	Natick.
D. G., Germ., Lit., Math., Mech., Phys.		
Foster, Cassius Marcellus . . . . .	<i>Toledo, Ohio.</i> . . . .	165 W. Canton St.
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Fox, Charles Eli . . . . .	<i>Reading, Pa.</i> . . . .	306 Columbus Ave.
Arch. (part.), App. Mech., D. G., Math.		
French, Lester Gray . . . . .	<i>Brattleboro', Vt.</i> . . . .	13 Concord Sq.
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Fuller, Clarence Edward . . . . .	<i>West Quincy</i> . . . . .	West Quincy.
Arch. (part.)		
Gallison, William Edward . . . .	<i>Chelsea</i> . . . . .	Chelsea.
D. G., Germ., Math., Phys., P. E., Shop.		



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Ast., D. G., Germ., Math., Phys., P. E., Surv.		
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R. R. Man.		
Goodwin, Homer . . . . .	<i>Roxbury</i> . . . . .	62 Forest St., R.
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Goss, William F. M. . . . .	<i>Lafayette, Ind.</i> . . . . .	49 Rutland St.
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Gould, Alice Bache, A. B. . . . .	<i>Cambridge</i> . . . . .	236 Clarendon St.
Math., Phys.		
Graves, Charles William . . . . .	<i>Exeter, N. H.</i> . . . . .	42 Allston St.
D. G., Germ., Math., M. and A., Mech., Phys., P. E., Shop.		
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Hall, John Wentworth . . . . .	<i>Roxbury</i> . . . . .	8 Hillside St., R.
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Chem., Met.		
Hanington, Charles Harrington . . . . .	<i>Denver, Col.</i> . . . . .	16 Chester Sq.
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Harris, John Luther . . . . .	<i>Hancock, Mich.</i> . . . . .	20 St. James Ave.
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Hart, Albert Lewis . . . . .	<i>Boston</i> . . . . .	117 Pinckney St.
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Hart, Susan Josephine . . . . .	<i>Philadelphia, Pa.</i> . . . . .	4 Brimmer St.
Biol., Chem., Com. Geog., Geol., Physiol., Zool.		
Harvey, Frederic Hall . . . . .	<i>Galt, Cal.</i> . . . . .	7 Columbus Sq.
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Henderson, Walter Power . . . . .	<i>Brookline</i> . . . . .	Brookline.
Arch. (part.), D. G.		
Hilton, George Albert . . . . .	<i>Cambridge</i> . . . . .	Cambridge.
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Howe, Lois Lilley, Jr. Arch. (part.)	<i>Cambridge</i>	Cambridge.
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Maltby, Margaret Eliza, A. B. . .	<i>Oberlin, Ohio</i> . . . . .	Wellesley College.
App. Mech., Phys.		
Mansfield, King William . . . . .	<i>Melrose Highlands</i> . . . . .	Melrose Highlands.
App. Mech., D. G., Math., Mech., Phys., Shop.		
Marbury, David Hatton . . . . .	<i>Bozeman, Ala.</i> . . . . .	Cambridge.
D. G., Math., Mech., Phys., Shop.		
Martin, Charles Edwin . . . . .	<i>Philadelphia, Pa.</i> . . . . .	84 Charles St.
Chem., Germ., Ind. Chem., Org. Chem.		
Mason, Henry Eager, B. A. . . . .	<i>Chicago, Ill.</i> . . . . .	5 Oxford Terrace.
App. Mech., D. G., Dr., R. R. Man., Surv.		
Maynard, Fred Bell . . . . .	<i>Somerville</i> . . . . .	Somerville.
D. G., Germ., Math., Mech., Phys., P. E., Shop.		
McDonald, Frank Austin . . . . .	<i>Ellsworth, Me.</i> . . . . .	63 Chandler St.
App. Mech., Civ. Eng., Met., R. R. Man.		
McLeod, Percy De Mille . . . . .	<i>Boston</i> . . . . .	149 W. Concord St.
Biol., Chem., D. G., Eng., Lit., Zool.		
McSweeney, Daniel J., A. B. . . .	<i>Boston</i> . . . . .	495 Harrison Ave.
Chem., Dr., Phys.		
Mead, Percy Winthrop . . . . .	<i>Norwalk, Conn.</i> . . . . .	150 Warren Ave.
Chem., Math., Mech., Phys., Shop.		
Miller, Lilly . . . . .	<i>Charlestown</i> . . . . .	33 Essex St., C.
Dr., Germ., Math., Phys., P. E., Th. Chem.		
Miller, Ralph Hastings . . . . .	<i>Boston</i> . . . . .	19 Wellington St.
Arch. (part.)		
Mitchell, Everett Still . . . . .	<i>Boston</i> . . . . .	494 Tremont St.
App. Mech., Civ. Eng., Met., R. R. Man.		
Molineux, Marie Ada, A. M., Ph. D.	<i>Boston</i> . . . . .	283 W. Chester Pk.
Biol.		
Moody, Frederick Clark . . . . .	<i>Boston</i> . . . . .	116 Appleton St.
App. Mech., H. and V., Mech. Eng., Met.		
Moody, Herbert Raymond . . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Chem., Germ., Math., Phys., P. E., Th. Chem.		
Morgan, Lewis Henry, A. B. . . . .	<i>Washington, D. C.</i> . . . . .	Victoria Hotel.
Arch., (part.)		
Morse, Charles Francis . . . . .	<i>Milford, N. H.</i> . . . . .	41 Union Park.
Chem., Dr., Eng., El. Fr., Math., Mil.		
Mossman, William . . . . .	<i>Mattapan</i> . . . . .	Norfolk St., M.
App. Mech., Germ., Math., Mech. Eng., Phys.		
Müller, Charles Emil . . . . .	<i>Boston</i> . . . . .	64 Huntington Ave.
Arch. (part.)		
Newman, Andrew Parker, Jr. . . . .	<i>Roxbury</i> . . . . .	19 Montrose St., R.
Ast., D. G., Germ., Math., Phys., P. E.		
Norris, Walter Henry . . . . .	<i>Melrose</i> . . . . .	Melrose.
Ast., Chem., D. G., Germ., Math., Phys., P. E., Surv.		
Norton, Francis Cobb . . . . .	<i>Rockland, Me.</i> . . . . .	509 Columbus Ave.
Chem., D. G., Germ., Math., Phys., P. E., Shop.		

NAME.	HOME.	RESIDENCE.
Noyes, Edmund Horatio Chem., D. G., Germ., Lit., Math., Mech., Phys.	<i>Arlington</i>	Arlington.
Nutter, Charles Latham D. G., Germ., Math., Mech., Phys., P. E., Shop.	<i>East Bridgewater</i>	East Bridgewater.
Osgood, George Frederick Arch. (part.), D. G.	<i>Lawrence</i>	Lawrence.
Packard, Ambrose Ast., D. G., Germ., Math., Phys., P. E., Surv.	<i>Bayonne, N. J.</i>	76 Chandler St.
Palmer, Alden Robbins Chem., Dr., Eng., El. Fr., Math., Mil.	<i>Wellington, Ohio</i>	Lynn.
Palmer, Charles Nelson B. A., Chem., D. G., Eng., Germ., Math., Mech., Phys., P. E.	<i>Middletown, Conn.</i>	147 Warren Ave.
Park, Charles Francis D. G., Germ., Math., Mech., Phys., P. E., Shop.	<i>Taunton</i>	Taunton.
Parker, Charles Brunel Chem., D. G., Germ., Math., Phys., P. E., Shop.	<i>Cambridgeport</i>	Cambridgeport.
Parsons, Percy Grosvenor Chem., Eng., Fr., Math., Mil.	<i>Boston</i>	132 Huntington Av.
Peabody, William Welcome Dr., Math.	<i>Gilead, Me.</i>	35 Rutland Sq.
Perry, Hiram Edmund Arch. (part.)	<i>Sandwich</i>	518 Columbus Ave.
Peter, Walter Gibson Arch. (part.)	<i>Washington, D. C.</i>	179 Warren Ave.
Peters, Morris Austin Arch. (part.)	<i>Jamaica Plain</i>	6 Louisburg Sq.
Pettee, Eugene Everett Chem., D. G., Germ., Math., P. E.	<i>Whitman</i>	Whitman.
Pierce, Albert Russell Biol., Com. Geog., Fr., Geol., Germ., Hist., Phys.	<i>New Bedford</i>	83 Pinckney St.
Pierce, Loring Ellsworth Chem., Dr., Eng., Germ., Math., Mil.	<i>East Lexington</i>	East Lexington.
Pinto, Francisco de Miranda App. Mech., Ast., Civ. Eng., Geol., Lit., Math., Phys.	<i>Rio de Janeiro, Brasil</i>	52 Union Park.
Plack, Louis, Jr. Arch. (part.)	<i>Altoona, Pa.</i>	American House.
Pratt, Calvin Barton App. Mech., Civ. Eng., Geol., Germ., Lit., Math., Phys.	<i>Bridgewater</i>	Mass. Gen. Hosp.
Prescott, Alice Beardslee Math.	<i>Jamaica Plain</i>	Pond St., J. P.
Reed, Frederick Newland Arch. (part.), Hist.	<i>Boston</i>	320 Shawmut Ave.
Rice, Hamilton App. Mech., Germ., Math., Mech. Eng., Phys.	<i>Palatine Bridge, N. Y.</i>	39 Appleton St.
Richardson, Mary Woods Chem., Clim., Com. Geog., Geol., Germ., Phys.	<i>Memphis, Tenn.</i>	15 Doane St.
Ripley, Hubert George Arch., D. G., H. and V.	<i>Melrose Highlands</i>	Melrose Highlands.
Roach, Harry Fay Arch. (part.)	<i>St. Louis, Mo.</i>	Newton Highlands.

NAME.	HOME.	RESIDENCE.
Rogers, Howard Lewis . . . . Chem., Dr., Math., Mil.	<i>Newton Centre</i> . . . .	Newton Centre.
Root, Edward T., A. B. . . . . Arch. (part.)	<i>Providence, R. I.</i> . . . .	Malden.
Rosewater, William Marcus . . . . D. G., Dr., Eng., Fr., Math., Mech., Mil., Phys., Shop.	<i>Cleveland, Ohio</i> . . . .	25 Berwick Park.
Ruggles, Aubrey . . . . . Chem., El. Fr.	<i>Cambridgeport</i> . . . .	Cambridgeport.
Ruggles, Horace Fowle . . . . . Germ., Dr., Math., Mech., Phys., P. E., Shop, Sp.	<i>Brookline</i> . . . . .	Brookline.
Schlacks, Henry John . . . . . Arch. (part.), Geol., Hist.	<i>Chicago, Ill.</i> . . . . .	287 Columbus Ave.
Schneider, Ferdinand Turton . . . . Arch. (part.), Eng.	<i>Washington, D. C.</i> . . . .	84 Chandler St.
Schneitzer, John Francis . . . . . Arch. (part.)	<i>New Orleans, La.</i> . . . .	294 Columbus Ave.
Schroeter, Hugo Elmer . . . . . Chem., Math., Met., Min., P. E.	<i>Roxbury</i> . . . . .	177 Vernon St., R.
Seager, James Benjamin . . . . . App. Mech., Chem., Math., Met., Min.	<i>Hancock, Mich.</i> . . . . .	19 St. James Ave.
Sears, Charles Maxwell . . . . . D. G., Germ., Math., Mech., Phys., P. E., Shop.	<i>Boston</i> . . . . .	32 Chester Sq.
Seeler, Edgar Viguers . . . . . Arch. (part.), App. Mech., Geol., Math.	<i>Philadelphia, Pa.</i> . . . . .	82 W. Newton St.
Selfridge, Russell . . . . . Biol., Fr., Geol., Germ., Hist., Lit., Phys., Pol. Sci.	<i>Boston</i> . . . . .	61 Mt. Vernon St.
Shankland, Edith Gwendoline . . . . D. G., Dr., El. Fr., Germ., Math.	<i>South Boston</i> . . . . .	813 Broadway, S. B.
Shedd, Robert Swan . . . . . Arch. (part.)	<i>Newtonville</i> . . . . .	Newtonville.
Sheldon, Samuel Bertram . . . . . Chem., Met., Org. Chem.	<i>Manchester</i> . . . . .	Manchester.
Sherman, Le Roy Kempton . . . . . Ast., D. G., Germ., Math., Phys., P. E., Surv.	<i>Chicago, Ill.</i> . . . . .	26 Worcester St.
Slade, James Henry, Jr. . . . . Chem., D. G., Germ., Math., Mech., Phys., P. E., Shop.	<i>Quincy Point</i> . . . . .	Quincy Point.
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Smith, Bowen Bancroft . . . . . Arch. (part.)	<i>Newton</i> . . . . .	Newton.
Smith, Frank Patterson . . . . . Arch. (part.)	<i>Washington, D. C.</i> . . . .	16 Worcester Sq.
Smith, Frederick Dexter . . . . . Chem., Dr., Eng., El. Fr., Math.	<i>So. Framingham</i> . . . . .	So. Framingham.
Smith, Henry . . . . . Arch. (part.)	<i>Newton Centre</i> . . . . .	Newton Centre.
Smith, Robert Russell . . . . . Arch. (part.)	<i>Berkeley, Cal.</i> . . . . .	60 Clarendon St.
Spaulding, Arthur Rogers . . . . . Arch. (part.)	<i>West Newton</i> . . . . .	West Newton.



NAME.	HOME.	RESIDENCE.
Stebbins, Elywyn Wilfred Chem., Dr., Eng., Math., Mil.	<i>Boston</i>	24 Blagden St.
Stebbins, Londa Loleta Chem., El. Fr., Math.	<i>Boston</i>	29 St. James Ave.
Stevenson, John Robert Chem., Geol., Germ., Min., Zool.	<i>Lima, Peru</i>	34 E. Brookline St.
Stickney, Lilla Florence Th. Chem.	<i>Charlestown</i>	210 Main St., C.
Stone, Edward Nathan Arch. (part.)	<i>Brooklyn, N. Y.</i>	Cambridge.
Sutton, Stansbury D. G., El. Fr., Math., Mech., Phys., P. E., Shop.	<i>Allegheny, Pa.</i>	17 St. James St.
Sweet, Kilburn Smith Chem., Dr., Eng., El. Fr., Math., Mil.	<i>Kenduskeag, Me.</i>	57 Chandler St.
Swift, Humphrey Hathaway, Jr. Arch. (part.)	<i>New York, N. Y.</i>	Cambridge.
Sylvester, Edmund Quincy, Jr. Arch. (part.)	<i>Hanover</i>	Hanover.
Talbot, Thomas, A. B. Chem., Dr., Math.	<i>North Billerica</i>	No. Billerica.
Taylor, Gordon Hooker App. Mech., Biol., Civ. Eng., Com. Geog., Germ., Math., Met., R. Man.	<i>North Cambridge</i>	North Cambridge.
Taylor, Harry Burlingame Chem., Ind. Chem., Math., Met., Org. Chem.	<i>Boston</i>	115 Boylston St.
Thompson, John Gifford Chem., Germ., Lit., Math., Phys., Shop., Th. Chem.	<i>Roxbury</i>	15 Moreland St., R.
Tilson, Willard Curtis Chem., Met., Org. Chem.	<i>Malden</i>	Malden.
Tuttle, Herbert Charles Chem., Met., Ind. Chem., Org. Chem.	<i>Boston</i>	1 Cumberland St.
Vance, Joseph McArthur Arch. (part.)	<i>Chattanooga, Tenn.</i>	518 Columbus Ave.
Waite, Henry Matson App. Mech., Civ. Eng., D. G., Geol., Germ., Lit., Math., Phys.	<i>Toledo, Ohio</i>	17 St. James Ave.
Waitt, Charles Green Chem., D. G., Germ., Math., Phys., P. E.	<i>Malden</i>	Malden.
Walker, Ambrose Arch. (part.), Hist.	<i>Boston</i>	237 Beacon St.
Walker, James Wilson Grimes Ast., D. G., Germ., Math., Phys., P. E., Surv.	<i>Washington, D. C.</i>	249 Beacon St.
Wallace, Frederic Appleton D. G., Germ., Math., P. E.	<i>Lynnfield</i>	Lynnfield.
Wardner, Herbert Leavitt Arch. (part.)	<i>Dorchester</i>	Bowdoin Ave., D.
Warner, Philip Augustus Ast., Chem., Germ., Math., Surv.	<i>West Newton</i>	West Newton.
Warren, John Broadfield Dr., Math.	<i>Roxbury</i>	Hillside St., R.
Waterman, Harry Cushing Arch., Chem., D. G., Math., Phys., P. E.	<i>Hanover</i>	Hanover.

NAME.	HOME.	RESIDENCE.
Watson, Charles Morris . . . . .	<i>Jamaica Plain</i> . . . . .	Greenough Ave., J. P. Elect., Math., Mech. Eng., Phys.
Webb, Harry Storrs . . . . .	<i>Cincinnati, Ohio</i> . . . . .	166 West Canton St. D. G., Germ., Math., M. and A., Mech., Phys., P. E., Shop.
Webber, Scott Adams . . . . .	<i>Waltham</i> . . . . .	Waltham. Arch. (part.)
Welch, James J. . . . .	<i>Salem</i> . . . . .	Salem. Chem., D. G., Germ., Math., Phys., Surv.
Welch, Thaddeus Stevens . . . . .	<i>Augusta, Me.</i> . . . . .	5 Myrtle Pl., R. Chem., D. G., Germ., Math., Mech., Phys., P. E., Shop.
Wells, Channing Gregory . . . . .	<i>Southbridge</i> . . . . .	Hotel Clifton. D. G., Germ., Math., Mech., Phys., P. E., Shop.
Wetherbee, George Henry, Jr. . . . .	<i>East Marshfield</i> . . . . .	East Marshfield. Chem., Geol., Germ., Math., Phys., Surv.
White, Joseph Foster . . . . .	<i>Brookline</i> . . . . .	Brookline. Chem., Germ., Ind. Chem., Lit., Phys.
White, Walter Porter, A. B. . . . .	<i>Roxbury</i> . . . . .	135 Dudley St., R. Chem., Th. Chem.
Whiting, David . . . . .	<i>Wilton, N. H.</i> . . . . .	Somerville. Ast., Chem., D. G., Germ., Math., Surv.
Whitley, Charles Walter . . . . .	<i>Englewood, Ill.</i> . . . . .	191 Warren Ave. Chem., D. G., Dr., Germ., Lit., Math., M. and A., Phys.
Whitman, Edward Payson . . . . .	<i>Cambridge</i> . . . . .	Cambridge. Arch. (part.)
Whitney, Clarence Edgar . . . . .	<i>Hartford, Conn.</i> . . . . .	167 W. Newton St. App. Mech., Dr., Math., Phys., Shop.
Williston, Arthur Lyman, S. B. . . . .	<i>Cambridge</i> . . . . .	Cambridge. Civ. Eng., R. R. Man.
Wills, Mary Bradford . . . . .	<i>Roxbury</i> . . . . .	149 Roxbury St., R. Chem., Geol., Germ., Math., Phys., Th. Chem.
Woodman, Caroline A., M.A., B.S. . . . .	<i>Lewiston, Me.</i> . . . . .	Wellesley College. Physiol.
Woods, Edwin Stoughton . . . . .	<i>Chicago, Ill.</i> . . . . .	152 Huntington Av. B. A., Chem., Dr., Math.
Wooftindale, Warren Herbert . . . . .	<i>Charlestown</i> . . . . .	Bunker Hill St., C. B. A., Chem., Germ., Phys., Th. Chem.
Wray, Charles Henry . . . . .	<i>St. Louis, Mo.</i> . . . . .	287 Columbus Ave. Arch. (part.)
Wright, Vernon Ames . . . . .	<i>Boston</i> . . . . .	51 Chestnut St. Arch., (part.)
Young, Harry Hayward . . . . .	<i>Roxbury</i> . . . . .	516 Warren St., R. App. Mech., Dr., Germ., Math., Mech., Met., Phys., Shop.

## SUMMARY.

GRADUATE STUDENTS . . . . .	50	REGULAR STUDENTS, 2d year . . . . .	148
REGULAR STUDENTS, 4th year . . . . .	110	“ “ 1st “ . . . . .	261
“ “ 3d “ . . . . .	130	SPECIAL STUDENTS . . . . .	257
Total . . . . .			956
Deduct names counted twice . . . . .			47
			909

## Lowell Free Courses of Instruction.

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THE Trustee of the Lowell Institute has established, under the supervision of the Institute of Technology, courses of instruction, generally given in the evening, and open to students of either sex, free of charge.

These courses are more or less varied from year to year by the omission or interchange of particular subjects, but include, in their entire scope, instruction in mathematics, mechanics, physics, drawing, chemistry, geology, natural history, biology, English, French, German, history, navigation, and nautical astronomy, architecture, and engineering.

The subjects and the extent of the several courses will be made known, by suitable advertisement in the public journals, in October of each year.

As it is the object of these courses to provide substantial teaching rather than merely popular illustration of the subjects treated, it is expected that all persons attending will come with a serious purpose of improvement, and that they will cheerfully comply with such rules as may be prescribed in regard to attendance and to order in the class or lecture-room.

The conditions of attendance on these gratuitous courses are as follows: —

1. Candidates must have attained the age of eighteen years.
2. Their applications must be made in writing, addressed to the Secretary of the Faculty, specifying the course or courses they desire to attend, mentioning their present or prospective occupations, and, when the course is of a nature

demanding preparation, stating the extent of their preliminary training.

The number of students in each class is necessarily limited.

The courses for 1889-90 are on the following subjects :

I. LIVRES ET AUTEURS. Twelve lectures in French by Associate Professor Jules Luquiens, on Tuesdays and Fridays, at 7.30 P.M., beginning November 5th.

II. PRINCIPLES AND PROBLEMS OF ECONOMICS. Twelve lectures by Assistant Professor Davis R. Dewey, on Tuesdays and Fridays, at 8 P. M., beginning November 5th.

III. ELEMENTARY ELECTRICAL MEASUREMENTS. Ten laboratory exercises by Associate Professor S. W. Holman, on Fridays, at 7 P. M., beginning November 8th.

IV. VALVE GEAR DESIGNING. Twelve lectures by Assistant Professor Peabody, on Tuesdays and Fridays, at 7.30 P. M., beginning November 8th. (Class limited to twenty. Drawing instruments and elements of drawing required.)

V. THEORETICAL PRINCIPLES underlying the more important practical APPLICATIONS OF ELECTRICITY. Twelve lectures by Professor Charles R. Cross, on Mondays and Wednesdays, at 7.30 P. M., beginning November 11th.

VI. PLANE ANALYTIC GEOMETRY. Twelve lectures by Associate Professor Webster Wells, on Tuesdays and Thursdays, at 7.30 P. M., beginning November 12th.

VII. GOETHE'S FAUST. Twelve lectures by Professor A. N. van Daell, on Wednesdays, at 7.30 P. M., beginning November 20th.

VIII. SANITARY BIOLOGY. Twelve lectures by Associate Professor W. T. Sedgwick, on Mondays and Wednesdays, at 7.30 P. M., beginning January 6th.

IX. THE EASTERN QUESTION IN EUROPEAN POLITICS. Twelve lectures by Assistant Professor C. H. Levermore, on Mondays and Wednesdays, at 7.30 P. M., beginning January 13th.

X. ROADS AND STREETS. Twelve lectures by Assistant Professor C. Frank Allen, on Tuesdays and Fridays, at 7.30 P. M., beginning January 21st.

## Lowell School of Practical Design.

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THE Lowell School of Practical Design was established, in 1872, by the Trustee of the Lowell Institute, for the purpose of promoting Industrial Art in the United States. The Corporation of the Massachusetts Institute of Technology, having approved the purpose and general plan of the school as proposed by the Trustee of the Lowell Institute, assumed the responsibility of conducting it; and in the same year the first pupils were admitted.

The expenses of this school are borne by the Lowell Institute, and tuition is free to all pupils.

The school occupies a drawing-room and a weaving-room in the building of the Institute on Garrison Street. The weaving-room affords students an opportunity of working their designs into actual fabrics of commercial sizes and of every variety of material and of texture. The room is supplied with two fancy chain-looms for dress-goods, three fancy chain-looms for fancy woollen cassimeres, one gingham loom, and one Jacquard loom. The school is constantly provided with samples of all the novelties in textile fabrics from Paris, such as brocaded silks, ribbons, alpacas, armures, and fancy woollen goods.

**Course of Study.** — Students are taught the art of making patterns for prints, ginghams, delaines, silks, laces, paperhangings, carpets, oil-cloths, etc. The course is of three years' duration, and embraces, —

1. Technical manipulations; 2. Copying and variations of designs; 3. Original designs or composition of patterns; 4. The making of working drawings, and finishing of designs.



Instruction is given personally to each student over his work, with occasional general exercises. Students supply their own instruments and materials, the cost of which is about \$5 per year.

The class is under the personal direction of MR. CHARLES KASTNER, assisted in the weaving department by Mr. Albert Bryant, and in the designing department by Mrs. Minnie E. Gray.

**Requirements for Admission.**— To teach drawing is not among the objects of this school. Applicants must therefore possess a knowledge of drawing adequate to enable them advantageously to begin the work of composition and design. A considerable degree of skill in freehand drawing from nature, and in the use of the brush, will be positively required for entrance to the school.

Applicants for admission, or persons desiring further information regarding this school, may apply by letter to the Secretary of the Institute.

**Regulations of the School.**— The next school-year will begin on Sept. 29, 1890. The number of students in the school, including those to be admitted, will be limited to sixty. Examinations for applicants for admission will be held on Sept. 23, 1890. Students are required to be regular in their attendance, the hours being from 9.30 A. M. to 12 M., and from 2 P. M. to 4.30 P. M. Only those students can be retained in the school who, after a fair and patient trial, are found to have some aptitude for the work. At the close of each half-year, the Director will, with the approval of the President of the Institute, convey the needed information to such students as shall be found gravely deficient in qualifications for an advantageous pursuit of their studies. No publication will be made of the fact, and such students will be left to withdraw as of their own motion.

## REGISTER OF STUDENTS.

NAME.	HOME.	RESIDENCE.
Aldrich, George Eugene . . . .	<i>Worcester</i> . . . . .	Worcester.
Allen, Constance Eugenia . . . .	<i>Wellesley Hills</i> . . . . .	Wellesley Hills.
Allen, Maud Augusta . . . . .	<i>Roxbury</i> . . . . .	4 Grosvenor Pl., R.
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Bates, Elizabeth Carver . . . .	<i>Newton</i> . . . . .	Newton.
Brooks, Jenny . . . . .	<i>Salem</i> . . . . .	Salem.
Brown, Louis Henry . . . . .	<i>Leominster</i> . . . . .	Leominster.
Burbank, Edith . . . . .	<i>Portsmouth, N. H.</i> . . . . .	Medford.
Cain, Leonard Lincoln . . . . .	<i>West Hingham</i> . . . . .	West Hingham.
Carr, Benjamin Kingsbury . . . .	<i>Melrose</i> . . . . .	Melrose.
Choate, Jeanette Hunter . . . .	<i>West Somerville</i> . . . . .	West Somerville.
Clark, Louis Wells . . . . .	<i>Middleboro'</i> . . . . .	Middleboro'.
Clarke, Elsie Bryant . . . . .	<i>Jamaica Plain</i> . . . . .	Centre St., J. P.
Colby, Emma Louise . . . . .	<i>Charlestown</i> . . . . .	Waverly House, C.
Cole, Isabel Newell . . . . .	<i>Newton</i> . . . . .	Newton.
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Dansereau, William Winfield . . . .	<i>Marlboro'</i> . . . . .	Marlboro'.
DeSmedt, Cora Jeanette . . . . .	<i>Roxbury</i> . . . . .	61 Bower St., R.
Dodge, Luvein Elma . . . . .	<i>Dover</i> . . . . .	Dover.
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Faulkner, Eunice Florence . . . .	<i>South Boston</i> . . . . .	480 Fourth St., S. B.
Ford, Myron Porter . . . . .	<i>East Weymouth</i> . . . . .	East Weymouth.
Frost, Edith . . . . .	<i>Somerville</i> . . . . .	Somerville.
Haskell, Emma Averell . . . . .	<i>Charlestown</i> . . . . .	11 Cross St., C.
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Hill, Maria Louise . . . . .	<i>Salem</i> . . . . .	Somerville.
Josephs, Ella Freeman . . . . .	<i>Quincy</i> . . . . .	Quincy.
Ladd, Elizabeth Appleton . . . . .	<i>Needham</i> . . . . .	Needham.
Lincoln, Benjamin Morton . . . . .	<i>Taunton</i> . . . . .	Taunton.
Luce, Fred Alonzo . . . . .	<i>Haverhill</i> . . . . .	Haverhill.
Luce, William Darius . . . . .	<i>Haverhill</i> . . . . .	Haverhill.
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Moore, Fred C. . . . .	<i>Newton Highlands</i>	
Park, Harry Segers . . . . .	<i>Waltham</i> . . . . .	Waltham.
Pratt, Walter Francis . . . . .	<i>North Weymouth</i> . . . . .	North Weymouth.
Prouty, Annah Richardson . . . . .	<i>Chelsea</i> . . . . .	Chelsea.
Ray, Frank Leslie . . . . .	<i>Eastport, Me.</i> . . . . .	195 West Springfield St.
Richardson, Genie Warren . . . . .	<i>Stoughton</i> . . . . .	Stoughton
Rogers, Kate Lincoln . . . . .	<i>Hawaiian Islands</i> . . . . .	54 Appleton St.
Sargent, Frederick Amasa . . . . .	<i>Melrose</i> . . . . .	Melrose.
Shedd, Mary Maud . . . . .	<i>Somerville</i> . . . . .	Somerville.
Sidelinger, William Frank . . . . .	<i>Quincy</i> . . . . .	Quincy.
Snow, Warren Freeman . . . . .	<i>Brewster</i> . . . . .	195 West Springfield St.
Stanwood, Ethel . . . . .	<i>Wellesley Hills</i> . . . . .	Wellesley Hills.
Thacher, Elizabeth More . . . . .	<i>Dorchester</i> . . . . .	Stoughton St., D.
Thompson, Aivah Bickford . . . . .	<i>Denver, Colo.</i> . . . . .	2741 Washington St., R.
West, Frederick W. . . . .	<i>Haverhill.</i>	
Wixsell, Theresa J. . . . .	<i>Dorchester</i> . . . . .	98 Savin Hill Ave., D.
Williams, Herbert De Land . . . . .	<i>Newton Centre</i> . . . . .	Newton Centre.
Woods, Reuben Edward . . . . .	<i>South Boston</i> . . . . .	876 East Fourth St., S. B.

## ALUMNI ASSOCIATION.

THE Alumni Association of the Institute holds its annual meetings in Boston in December or January; and in May of each year gives a reception to the graduating class, the Corporation, and the Faculty of the Institute. It includes in its membership all graduates of the Institute.

Its officers for the current year are, —

*President:* FRANCIS H. WILLIAMS, '73.

*Vice-President:* A. LAWRENCE ROTCH, '84.

*Secretary:* C. FRANK ALLEN, '72.

*Executive Committee:* THE PRESIDENT, VICE-PRESIDENT, AND SECRETARY, SUMNER HOLLINGSWORTH, '76, WALTER B. SNOW, '82.

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## THE NORTHWESTERN ASSOCIATION. MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

*President:* FREDERICK GREELEY, '76, Opera House Building, Chicago, Ill.

*Vice-Presidents:* W. F. SARGENT, '75, JULIAN A. KEBLER, '78.

*Secretary and Treasurer:* F. K. COPELAND, '76, 74 West Lake St., Chicago, Ill.

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## WESTERN ALUMNI ASSOCIATION.

*Treasurer:* E. W. ROLLINS, Denver, Col.

## Register of Graduates.

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For names marked with a † the addresses are not known to be correct for the present year.  
 The Roman numerals in the column marked "Course" denote the course in which the Graduate received the degree of S. B. For description of courses, see page 22.

### 1868.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
ELLERY C. APPLETON . . . Walnut Ave., Revere, Mass.	III.	Civil Engineer.
WHITNEY CONANT . . . Long Branch, N. J.	III.	Secretary, Long Branch Water Supply Co.
*FRANK R. FIRTH . . .	I.	Died June 9, 1872.
ELI FORBES . . . Clinton, Mass.	Sci. and Lit.	Chemist at the Lancaster Mills.
CHARLES C. GILMAN . . . Marshalltown, Marshall Co., Ia.	III.	Railroad Contractor.
CHAS. E. GREENE, A. M., C. E. Ann Arbor, Mich.	I.	Professor of Civil Engineering, University of Michigan.
ALBERT F. HALL . . . Boston, Mass.	II.	Mechanical Engineer in the employ of the George F. Blake M'fg Co.
WILLIAM E. HOYT . . . Rochester, N. Y.	I.	Chief Engineer, Buffalo, Rochester & Pittsburgh R. R. Co.
ROBERT H. RICHARDS . . . Boston, Mass.	III.	Professor of Mining Engineering and Metallurgy, Mass. Institute of Technology.
WALTER H. SEARS . . . 35 Congress St., Boston, Mass.	I.	Civil Engineer.
*CHARLES A. SMITH . . .	I.	Died Feb. 4, 1884.
JOSEPH STONE . . . 85 Milk St., Boston, Mass.	I.	In business.
BRYANT P. TILDEN . . . Jamestown, S. Dak.	III.	Chief Engineer, N. P. R. R.
JAMES P. TOLMAN . . . 164 High St., Boston, Mass.	III.	President, Samson Cordage Works.



## 1869.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
WILLIAM H. BAKER . . . Fitchburg, Mass.	I.	Civil Engineer.
HOWARD A. CARSON . . . 21 Hamilton St., Boston, Mass.	I.	Chief Engineer of the Metropolitan Sewerage Commission of Massachusetts.
J. RAYNER EDMANDS . . .	II.	In charge of Time Service at Harvard College Observatory.
*WILLIAM RIPLEY NICHOLS	V.	Died July 14, 1886.
CHANNING WHITAKER . . . Tyngsborough, Mass.	II.	Mill and Steam Engineering, Construction, Consultation, and Expert Work.

## 1870.

*EDWARD K. CLARK . . .	II.	Died Sept. 10, 1878.
CHARLES R. CROSS. Sci. and Lit. Boston, Mass.		Thayer Professor of Physics, Mass. Institute of Technology.
RUSSELL H. CURTIS . . . 59 Clark St., Chicago, Ill.	I.	Lawyer.
CHARLES W. HINMAN . . . 32 Hawley St., Boston, Mass.	III.	State Inspector of Gas.
SAMPSON D. MASON . . . St. Paul, Minn.	I.	Principal Assistant Engineer, Northern Pacific R. R.
N. FREDERICK MERRILL . . . Burlington, Vt.	V.	Professor of Chemistry, University of Vermont.
THEODORE F. TILLINGHAST 366 Union St., New Bedford, Mass.	I.	Lumber Dealer.
EDMUND K. TURNER . . . Fitchburg, Mass.	I.	Chief Engineer, Fitchburg R. R.
DANIEL W. WILLARD . . . 55 Broadway, New York, N. Y.	II.	Of the Firm of Babb, Cook & Willard, Architects.
LAURENCE F. J. WRINKLE . . . Keeler, Cal.	III.	Supt. Inyo Development Co.

## 1871.

FOSTER E. L. BEAL . . . Lunenburg, Mass.	I.	Farming.
ADDISON CONNOR, A. B.† . . . New York, N. Y.	I.	In the Public Works Department.
*HENRY M. CUTLER . . .	I.	Died May 16, 1877.
*ELMER FAUNCE . . .	III.	Died July 6, 1882.
EDWARD H. FOOTE . . . 31 Commercial St., Boston, Mass.	I.	Of the Firm of Skilton, Foote & Co., Manufacturers of Pickles.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
FRANK L. FULLER . . . . 12 Pearl St., Boston, Mass.	I.	Civil and Hydraulic Engineer.
HENRY M. HOWE, A. M. . . . 241 Beacon St., Boston, Mass.	III.	Mining Engineer, and Lecturer on Metallurgy, Mass. Institute of Technology.
ALBERT H. HOWLAND, A. M. . . . 60 Congress St., Boston, Mass.	I.	Civil Engineer.
G. RUSSELL LINCOLN . . . . Pottstown, Pa.	III.	Chemist, Pottstown Iron Co.
WILLIAM A. PIKE . . . . 2525 University Ave. S. E., Minneapolis, Minn.	I.	Professor of Engineering and Director of the College of Mechanic Arts of the University of Minnesota.
GEORGE H. PRATT . . . . 11 Albion St., Dorchester, Mass.	V.	Chemist, with Merrimac Chemical Co., So. Wilmington, Mass.
EDWARD W. ROLLINS . . . . 1655 Curtis St., Denver, Colo.	III.	President, Rollins Investment Co.
WALTER W. SMITH . . . . Dayton, Ohio.	II.	Builder of Steam Pumps and Hydraulic Machinery (Smith, Vaile & Co.).
CHARLES F. STONE . . . . Waltham, Mass.	III.	Treasurer, Waltham Savings Bank.
*ALMARIN TROWBRIDGE, JR.	II.	Died Dec. 5, 1878.
ISAIAH S. P. WEEKS . . . . Lincoln, Neb.	I.	Chief Engineer, Burlington & Missouri River R. R. in Nebraska.
RANDAL WHITTIER . . . . 444 W. Jefferson St., Louis- ville, Ky.	V.	Cashier, Kentucky Branch Office, N. Y. Life Insurance Co.

## 1872.

C. FRANK ALLEN . . . . Boston, Mass.	I.	Associate Professor of R. R. Engineering, Mass. Institute of Technology.
BENJAMIN E. BREWSTER . . . . Cheyenne, Wyoming Ter.	III.	Manager, War Bonnet Live Stock Co.
WILLIAM B. DODGE . . . . Columbus, Ohio.	I.	Scale Inspector, P. C. & St. L. R. R.
FREDERIC A. EMMERTON . . . . 214 Richard St., Joliet, Ill.	V.	Supt. Blast Furnaces, Joliet Works, Illinois Steel Co.
JAMES A. HERRICK . . . . 15 Whitehall St., New York, N. Y.	V.	Consulting Engineer and Furnace Builder.
JAMES M. HODGE . . . . Bristol, Tenn.	III.	Engineer and Geologist.
BRADFORD H. LOCKE . . . . Central City, Colo.	III.	Mining Engineer.
CHAS. S. MINOT, S. D. (Harv.) Boston, Mass.	V.	Assistant Professor of Histology and Embryology, Harvard Medical School.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
MAURICE B. PATCH . . . Lake Linden, Mich.	III.	Superintendent, Calumet & Hecla Smelting Co.
WALTER SHEPARD, A. B. . Arion St., Dorchester, Mass.	I.	Assistant Engineer, Boston & Albany R. R.
RICHARD H. SOULE, A. B. . Twissvale, Pa.	II.	Gen'l Agent, Union Switch & Signal Co.
CLARENCE S. WARD . . . Allston, Mass.	III.	Lawyer.

**1873.**

AMORY AUSTIN, A. B. . . . 23 Catherine St., Newport, R. I.	V.	
GEORGE W. BLODGETT . . . Central St., Auburndale, Mass.	I.	Electrical Engineer, B. & A. R. R., and Consulting Electrician.
WILLIAM E. BROTHERTON . Cincinnati, Ohio.	V	Book-keeper, Second National Bank.
*SAMUEL A. FABENS, JR. . .	I.	Died March 14, 1875.
SAMUEL M. FELTON . . . . 21 Cortlandt St. New York, N. Y.	I.	First Vice-President of N. Y., L. E., & W. R. R. Co.
FREDERICK L. FISHER . . .	I.	Insurance Agent and Broker, Medway, and 35 Kilby Street, Boston.
FRED. GUILD, JR., Sci. and Lit. Boston, Mass.		With Whittier Machine Co., 1176 Tremont St.
W. DALE HARRIS . . . . .	I.	Chief Engineer, P. P. J. Railway; Chief Engineer, O. & G. V. Railway.
CLAR. L. HOWES, A.B., M.D. †	II.	Physician. Hanover, Mass.
*WILLIAM P. JEWETT . . . .	I.	Died Jan. 4, 1884.
*WILLIAM A. KIMBALL . . .	II.	Died December, 1887.
*WILLIAM C. MAY . . . . .	V.	Died March 11, 1878.
FRANK B. MORSE . . . . .	I.	Superintendent, Willard Mining Co.; Agent, Norfolk Mine.
CHARLES O. PARSONS . . . .	III.	Mining Engineer. 77 State St., Boston, Mass.
GEORGE PHILLIPPS . . . . .	III.	Mining Engineer. Marshfield, Mass.
HENRY A. PHILLIPS . . . . .	IV.	Superintendent, Worcester Division, Fitchburg R. R. Worcester, Mass.
ELEN H. RICHARDS, A. M. Boston, Mass.	V.	Instructor in Sanitary Chemistry, Mass. Institute of Technology.
HENRY L. RIPLEY . . . . . Care Horatio Adams, Box 2526, Boston, Mass.	I.	First Lieutenant, Third Cavalry, U. S. A., Post of San Antonio, Tex.
ROBERT A. SHALER . . . . . 609 Phenix Bldg., 138 Jackson St., Chicago, Ill.	I.	Of the Firm of Shailer & Schniglaui, Engineers and Contractors.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
C. EDWARD STAFFORD . . . Care Shoenberger & Co., Pittsburgh, Pa.	III.	Supt. Bessemer and Open Hearth Depart- ments, Juniata Iron and Steel Works.
SAMUEL E. TINKHAM . . . 58 Thornton St., Roxbury, Mass.	I.	Civil Engineer, City Engineer's Office, Boston.
FRANK W. VERY . . . . .	V.	Assistant Astronomer, Allegheny Observa- tory.
WEBSTER WELLS . . . . .	I.	Associate Professor of Mathematics, Mass. Institute of Technology.
RANDAL WHITTIER . . . . .	I.	(See Record of Class of 1871.)
FRANCIS H. WILLIAMS, M. D. Corner Newbury and Dart- mouth Sts., Boston, Mass.	V.	Assistant Professor of Materia Medica and Therapeutics, Harvard Med. School; Physician to Out-Patients at the Boston City Hospital.
LOUIS F. WOOD . . . . .	V.	Chemical, Color, and Varnish Manufac- turer.

## 1874.

HERBERT BARROWS . . . . .	I.	Real Estate First-Mortgage Loans. Reading, Mass.
GEORGE H. BARRUS . . . . .	II.	Expert and Consulting Steam Engineer. 95 Milk St., Boston, Mass.
WILLIAM T. BLUNT . . . . .	I.	Principal Inspector, U. S. Engineer's Office. Cleveland, Ohio.
GEORGE E. DOANE . . . . .	I.	Of the Firm of J. & G. E. Doane, Hard- ware. Middleboro', Mass.
WILLIAM B. DOWSE . . . . .	IV.	Of the Metropolitan Rubber Co. Wallingford, Conn.
JOSEPH S. EMERSON . . . . .	I.	Field Assistant, Government Survey. Honolulu, Hawaiian Islands.
ELIOT HOLBROOK . . . . .	I.	Gen. Superintendent, P. & L. E. R. R. 77 Fourth Ave., Pittsburgh, Pa.
AECHIRAU HONGMA . . . . .	I.	Civil Engineer. Tokyo, Japan.
CHARLES P. HOWARD . . . . .	I.	Secretary, J. L. Howard & Co., Dealers in Railway and Car Builders' Supplies. Hartford, Conn.
FRANK H. JACKSON . . . . .	III.	Mining and Hydraulic Engineer, of Firm J. P. Culver & Co. 45 So. Fort St., Los Angeles, Cal.
*WILLIS H. MYRICK . . . . .	II.	Died Oct. 17, 1875.
HERBERT B. PERKINS . . . . .	I.	Teacher of Mathematics. Oroville, Cal.
FRANK H. POND . . . . .	II.	Proprietor, Pond Engineering Co. 707 Market St., St. Louis, Mo.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
EDWARD S. SHAW . . . . 146 Franklin St., Boston, Mass.	I.	Consulting Engineer.
FRANCIS H. SILSBEE . . . . Lawrence, Mass.	II.	Superintendent, Cotton Dept., Pacific Mills.
*ARTHUR W. SWEETSER . . . .	I.	Died April 10, 1878.
*ROBERT C. WARE, Sci. and Lit.		Died June 25, 1883.
STEPHEN H. WILDER, Sci. and Lit. 64 W. Third St., Cincinnati, Ohio.		Attorney-at-Law.

## 1875.

SAMUEL E. ALLEN . . . . 67 Chauncy St., Boston, Mass.	I.	Agent for the Nashawannuck Manufacturing Co.
JAMES L. ARNOTT, Sci. and Lit. Thompsonville, Conn.		Divisio.. Engineer in charge of Construction, Burlington & Missouri River R. R., Lincoln, Neb.
AMOS J. BOYDEN . . . . 413 Walnut St., Phila., Pa.	IV.	Architect.
MOSES D. BURNET . . . . 708 James St., Syracuse, N. Y.	III.	Burnet & Westcott, Bankers and Brokers.
HENRY K. BURRISON . . . . Boston, Mass.	I.	Instructor in Drawing in the Mass. Institute of Technology.
CHRISTOPHER A. CHURCH . . . . Lewisburg, Greenbriar Co., W. Va.	I.	Sheep-farming.
FRANK S. DODGE . . . . Honolulu, Hawaiian Islands.	I.	Civil Engineer and Surveyor, Government Survey.
EDGAR S. DORR . . . . 14 Beacon St., Boston, Mass.	I.	Asst. Engineer, Sewer Department.
WILLIAM C. EDES . . . . Fourth and Townsend Streets, San Francisco, Cal.	I.	Civil Engineer.
CHARLES W. GOODALE . . . . Butte City, Mont.	III.	Mine Superintendent, Colorado Smelting and Mining Co.
EDWARD A. W. HAMMATT . . . . 5 Pemberton Sq., Boston, Mass.	I.	Civil and Hydraulic Engineer.
EDWARD A. HANDY . . . . 29 Cedar Ave., Cleveland, Ohio.	I.	Engineer, Lake Shore Division L. S. & M. S. Railway.
*JAMES H. HEAD . . . .	II.	Died Aug. 18, 1875.
THOMAS HIBBEARD . . . . 232 Beech St., Holyoke, Mass.	II.	Head Draughtsman, Deane Steam Pump Co.
*WILLIAM F. HUNTINGTON . . . .	I.	Died Aug. 7, 1875.



NAME AND RESIDENCE.	COURSE.	OCCUPATION.
L. P. KINNICUTT, S. D. (Harv.), 77 Elm St., Worcester, Mass.	V.	Professor of Applied Chemistry at Worcester Polytechnic Institute.
WILFRED LEWIS . . . . 3234 Powelton Ave., Philadelphia, Pa.	II.	Asst. Engineer, with William Sellers & Co., incorporated.
SAMUEL J. MIXTER, M. D. 180 Marlboro' St., Boston, Mass.	VIII.	Demonstrator of Anatomy, Harvard Medical School.
BENJAMIN A. OXNARD . . . Brooklyn, N. Y.	III.	Superintendent of Fulton Sugar Refinery.
THOMAS D. PLIMPTON . . . Walpole, Mass.	II.	Employed in the Manufacture of Woollen Goods.
WILLIAM A. PRENTISS, Sci. and Lit. Holyoke, Mass.		Of the Firm of Geo. W. Prentiss & Co., Manufacturers of Iron Wire.
FRANCIS T. SARGENT . . . 47 & 49 Liberty St., New York, N. Y.	II.	Broker and Contractor.
WELLAND F. SARGENT . . . 5316 Jefferson Ave., Hyde Park, Ill.	I.	Civil Engineer and Surveyor, 1010 and 1012 Chicago Opera House Building.
WILLIAM H. SHOCKLEY . . . Candalaria, Esmeralda Co., Nev.	III.	Superintendent and General Manager, Mount Diablo Mill and Mining Co.
JAMES B. STANWOOD . . . Cincinnati, Ohio.	II.	Director of Technical School and Mechanical Engineer.
H. L. J. WARREN† . . . . Castle, Eagle Co., Colo.	III.	Mining Engineer and Stock-raiser.
WILLIAM R. WEBSTER . . . 424 Walnut St., Phila., Pa.	III.	Civil Engineer.

1876.

CHARLES F. ALLEN . . . . Occidental Hotel, San Francisco, Cal.	III.	Mining Engineer and Metallurgist.
THOMAS ASPINWALL . . . . 12 Pearl St., Boston, Mass.	I.	Civil Engineer.
WILLIAM P. ATWOOD . . . . Belmont Ave., cor. Mansur St., Lowell, Mass.	V.	Chemist at the Hamilton Print Works.
THOMAS W. BALDWIN, A. B. Room 1, Exchange Block, Bangor, Me.	I.	Civil Engineer.
WALTER B. BARROWS . . . Washington, D. C.	VII.	First Asst. Ornithologist, U. S. Dept. of Agriculture.
AARON D. BLODGETT . . . . 383 Federal St., Boston, Mass.	II.	Manufacturing Electrician.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
JOSHUA B. F. BREED . . . 209 W. St. Catherine St., Louisville, Ky.	I.	Assistant City Engineer.
HARRY T. BUTTOLPH . . . Buffalo, N. Y.	I.	Assistant City Engineer, in charge of Pav- ing.
FREDERICK K. COPELAND . . . 74 W. Lake St., Chicago, Ill.	I.	Vice-President and Treasurer, Diamond Prospecting Co.
WILLIAM O. CROSBY . . . Boston, Mass.	VII.	Asst. Prof. of Mineralogy and Lithology, Mass. Institute of Technology.
WILLIS E. DAVIS . . . 211 Drumm St., San Francisco, Cal.	Sci. and Lit.	Davis & Cowell, Manufacturers of Santa Cruz Lime.
*CLARENCE L. DENNETT . . .	II.	Died June 5, 1878.
CHARLES R. FLETCHER . . . 88 Equitable Building, Boston, Mass.	V.	Consulting Chemist and Metallurgist.
JOHN R. FREEMAN . . . 31 Milk St., Boston, Mass.	I.	Civil Engineer and Inspector, Boston Man- ufacturers' Mutual Fire Insurance Co.
FRANCIS E. GALLOUPE . . . 30 Kilby St., Boston, Mass.	II.	Mechanical Engineer.
*ROBERT H. GOULD.	Metallurgy.	Died Nov. 19, 1878.
JOHN B. HENCK, JR. . . Longwood, Fla.	VIII.	Printer and Publisher.
FRANK W. HODGDON . . . Arlington, Mass.	I.	Asst. Engineer with the Harbor and Land Commissioners of Mass., Boston.
SUMNER HOLLINGSWORTH . . . Boston, Mass.	II.	President, Hollingsworth & Whitney Paper Co.
SILAS W. HOLMAN . . . Boston, Mass.	VIII.	Associate Professor of Physics, Mass. In- stitute of Technology.
ALFRED E. HUNT . . . 95 Fifth Ave., Pittsburgh, Pa.	III.	Of the Firm of Hunt & Clapp, Chemists and Metallurgical Engineers, Pittsburgh Testing Laboratory; Prest. of Pittsburgh Reduction Co.
WILLIAM W. JACQUES . . . 95 Milk St., Boston, Mass.	VIII.	Electrician of the Am. Bell Telephone Co., and Instructor Mass. Institute of Tech- nology.
SAMUEL JAMES, JR. . . . Denver, Colo.	III.	Ore Buyer for Globe Smelting & Refining Co.
ALFRED C. KILHAM . . . North Springfield, Mo.	II.	Employed in Motive Power Dept., St. Louis & San Francisco R. R.
J. AUSTIN KNAPP . . . . Brockton, Mass.	II.	Contractor and Manufacturer of Custom- Made Goodyear Welt Shoes.
THEODORE J. LEWIS, . . . 212 North Thirty-fourth St., Philadelphia, Pa.	II.	With the Standard Steel Works, 220 South Fourth St.
ALBERT H. LOW . . . . P. O. Box 2395, Denver, Colo.	V.	Chemist.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
CHARLES T. MAIN . . . Lawrence, Mass.	II.	Superintendent, Lower Pacific Mills.
ARTHUR L. MILLS. . . . 326 Elm St., Toledo, Ohio.	I.	Chief Engineer, T. St. L. & K. C. R. R.
WILLIAM E. NICKERSON . . 111 North Ave., Cambridge, Mass.	V.	Chemist.
DAVID W. PHIPPS . . . .	Phil.	Attorney-at-Law. Box 426, Seattle, Wash.
CHARLES F. RICHARD . . .	II.	Superintendent of the Lynn Gas & Elec- tric Co. Lynn, Mass.
HENRY RAEDER . . . . .	I.	Architect. 218 La Salle St., Chicago, Ill.
CHARLES L. RICH. . . . .	I.	Cashier, Monadnock National Bank. East Jaffrey, N. H.
*THOMAS W. ROBINSON . .	III.	Died Nov. 3, 1880.
CHARLES A. SAWYER, Sci. and Lit. Room 5, 125 Dearborn St., Chicago, Ill.		Real Estate.
THEODORE E. SCHWARZ. . .	III.	Superintendent, New Guston Co., L't'd. Red Mt., Ouray Co., Colo.
JULIUS H. SUSMANN . . . .	III.	Out of business. Bowen St., Newton Centre, Mass.
WALTER D. TOWNSEND . .	III.	Of the Firm of Morse, Townsend & Co., Merchants. Chemulpo, Korea.
CHARLES N. WAITE . . . .	V.	Superintendent Nelson Chemical Co. Newton Upper Falls, Mass.
HENRY M. WAITT . . . . .	I.	Bridge Engineer, with C. B. & Q. R. R. Chicago, Ill.
*ROBERT C. WARE . . . . .	Phil.	Died June 25, 1883.
HENRY B. WOOD . . . . .	I.	Assistant Engineer, Sewer Department. 14 Beacon St., Boston, Mass.

## 1877.

JOHN ALDEN . . . . .	V.	Chemist at the Pacific Mills Lawrence, Mass.
CHARLES S. BACHELDER . .	V.	Chemist Western Beet Sugar Co. Watsonville, Cal.
GEORGE BARTOL . . . . .	III.	In charge of Mill and Forge Dept., Otis Iron & Steel Works. Cleveland, Ohio.
J. WILLIAMS BEAL . . . . .	IV.	Architect. Mason Building, Boston, Mass.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
WILLIAM H. BEECHING, . . . 61 Blackstone St., Boston, Mass.	II.	Cork Manufacturer.
G. WALTER CAPEN . . . . 45 Kilby St., Boston, Mass.	IV.	Architect.
HENRY H. CARTER . . . . 14 Beacon St., Boston, Mass.	I.	Engineer in charge, Improved Sewerage Construction.
WILLIAM E. CHAMBERLIN . . . 6 Beacon St., Boston, Mass.	IV.	Of the Firm of Chamberlin & Whidden, Architects.
*GEORGE H. CHAPMAN . . . .	II.	Died Jan. 21, 1879.
LINUS FAUNCE . . . . .	II.	Assistant Professor of Drawing, Mass. In- stitute of Technology.
CHARLES H. FISHER . . . .	II.	
*WILLIAM C. FLINT . . . .	III.	Died June 14, 1881.
PIERCE P. FURBER . . . . 304 N. Eighth St., St. Louis, Mo.	IV.	Architect of Firm of Peabody, Stearns & Furber.
MARTIN GAY . . . . .	I.	Assistant Engineer, Department of Public Works of New York City.
JOSEPH P. GRAY . . . . . 125 Grand St., Lowell, Mass.	I.	Assistant Engineer in office of Propri- etors of Locks and Canals on Merrimack River.
EDMUND GROVER . . . . .	I.	Civil Engineer, 5 Pemberton Sq., Boston. East Walpole, Mass.
RICHARD A. HALE . . . . .	I.	Principal Assistant Engineer with the Essex Water Power Co.
JOHN E. HARDMAN . . . . . 158 Stackpole St., Lowell, Mass.	III.	Mining Engineer; Manager, Oldham Gold Co., Oldham, N. S.
HENRY D. HIBBARD . . . . .	III.	Supt. Steel Dept. Linden Steel Co. Pittsburgh, Pa.
WALTER JENNEY . . . . . 55 G St., So. Boston, Mass.	III.	Superintendent, Petroleum Refinery, Jen- ney Manufacturing Co.
*JOSEPH KIRK . . . . .	II.	Died July, 1886.
GEORGE W. KITTREDGE . . . P. C. & St. L. R. R., Pittsburgh, Pa.	I.	Engineer, Maintenance of Way P., C. & St. L. R. R.; and Eng'r Union Depot Co., of Columbus, Ohio.
CHARLES F. LAWTON . . . . Pittsburg, Gunnison Co., Kan.	I.	Engineering Department, A. T. & S. Fé R. R.
BENJAMIN C. MUDGE . . . . Room 30, Equitable Building, Boston, Mass.	I.	Contractor and Investment Broker.
CECIL H. PEABODY . . . . .	II.	Associate Professor of Steam Engineering, Mass. Institute of Technology.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
ARTHUR L. PLIMPTON . . . 81 Milk St., Boston, Mass.	I.	Chief Engineer, West End Street Railway.
HARRY C. SOUTHWORTH . . . Hancock, Lake Superior, Mich.	III.	Mining and Civil Engineering, Exploring, etc.
*CHARLES E. STEWART . . .	I.	Died Oct. 7, 1877.
THOMAS F. STIMPSON . . . Providence, R. I.	III.	Overseer, Printing Dept., Silver Spring Bleaching and Dyeing Co.
GEORGE F. SWAIN . . . Boston, Mass.	I.	Hayward Professor of Civil Engineering, Mass. Institute of Technology.
FRANK E. WIGGIN . . . Santa Fé, Argentine Republic.	I.	Engineer, <i>Ferro Carril de Sta Fé a las Colonias</i> .
FREDERICK W. WOOD . . . Steelton, Dauphin Co., Pa.	III.	General Manager, Pennsylvania Steel Com- pany.

## 1878.

WILLIAM B. ALLBRIGHT . . . Bellevue St., Dorchester, Mass.	V.	With Halstead & Co., Packers and Lard Refiners.
CHARLES M. BAKER . . . 74 Devonshire St., Boston, Mass.	IV.	With Chase & Barstow, Stock Brokers.
TAKUMA DAN . . . . .	III.	Director, Mieke Imperial Coal Mining Co. Chikugo, Japan.
CHARLES S. EATON . . . 219 Washington St., Boston, Mass.	IV.	In business.
ALFRED S. HIGGINS . . . 35 Howard St., Boston, Mass.	IV.	With R. R. Higgins & Co.
JULIAN A. KEBLER . . . 1657 Larimer St., Denver, Colo.	I.	General Manager, Colorado Fuel Co.
*FRANK H. MORGAN . . .	V.	Died Dec. 5, 1889.
EVERELL J. NICHOLS† . . .	I.	Burlington, Iowa.
FREDERICK H. PRENTISS . . . 2 Cortlandt St., New York, N. Y.	II.	Manager and Engineer, New York Steam Co.
JAMES RITCHIE . . . . .	I.	General Superintendent, McKeesport & Belle Vernon R. R. Pa.
JAMES W. ROLLINS, JR. . . West Roxbury, Mass.	I.	Civil Engineer.
C. D. SAWIN, M. D., Sci. and Lit. 349 Main St., Charlestown, Mass.		Physician and Surgeon to Massachusetts State Prison.



NAME AND RESIDENCE.	COURSE.	OCCUPATION.
PETER SCHWAMB . . . . . Boston, Mass.	II.	Associate Professor of Mechanism, Mass. Institute of Technology.
FREDERIC P. SPALDING . . . . . 444 Middlesex St., Lowell, Mass.	I.	Civil Engineer, City Engineer's Office, Boston.
ISAAC M. STORY . . . . . Somerville, Mass.	I.	Assistant Engineer, N. Y. & N. E. R. R.
EDMUND TANEY . . . . . Washington, D. C.	I.	With the U. S. Coast and Geodetic Survey.
LINWOOD O. TOWNE . . . . . Newtonville, Mass.	III.	With Highland Foundry Co., Boston High- lands.
EMILE F. WILLIAMS . . . . . 81 Franklin St., Boston, Mass.	I.	Of the Firm, Arthur Williams, Jr., & Co., Importers of East India and China Goods.
JAMES G. WOOLWORTH . . . . . Norwich, Conn.	V.	With Norwich Dyeing and Bleaching Co.

## 1879.

WALTER S. ALLEN . . . . . 13 Beacon St., Boston, Mass.	V.	Secretary, State Gas Commission.
SAMUEL T. BRALEY . . . . . 14 Park St., Rutland, Vt.	II.	Draughtsman, Howe Scale Co.
JOHN W. CABOT . . . . . Bellaire, Ohio.	III.	Superintendent, Steel Works Department, Bellaire Nail Works.
HARRY H. CAMPBELL . . . . . Steelton, Dauphin Co., Pa.	III.	Asst. Superintendent, Pennsylvania Steel Co.
FRED. S. COFFIN . . . . . 152 Congress St., Boston, Mass.	III.	Manager, Wool Department, Stoddard Lovering & Co.
W. OTIS DUNBAR . . . . . Altoona, Pa.	II.	In charge of Pennsylvania R. R. Test Room.
GEORGE W. FABENS . . . . . Ottumwa, Iowa.	I.	Division Roadmaster, Chicago, Burlington & Quincy R. R.
CHARLES S. GOODING . . . . . 28 School St., Boston, Mass.	II.	Mechanical Engineer and Draughtsman.
*ERNEST G. HARTWELL . . . . .	IV.	Died Sept. 22, 1889.
RAPHAEL M. HOSEA . . . . . 1657 Larimer St., Denver, Colo.	I.	Mining Engineer with the Colorado Fuel Co.
HORACE J. HOWE . . . . . Susquehanna, Pa.	I.	Assistant to Roadmaster, N. Y. L. E. & W. R. R.
FREDERICK B. KNAPP . . . . . Luxbury, Mass.	I.	Principal, Powder Point School.
FRED. H. LANE . . . . . 49 Leonard St., New York, N. Y.	II.	With Allen, Lane & Co., Agent for Woollen Mills.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
FRED. R. LORING . . . .	VII.	
64 Buckingham St., Cambridge, Mass.		
WILLIAM W. MACFARLANE	V.	Superintendent, Quaker City Dye Works.
110 Oxford St., Phila., Pa.		
ARTHUR H. METCALF . . .	II.	Mechanical Engineer.
Pawtucket, R. I.		
EDWIN C. MILLER . . . .	II.	Assistant Superintendent, Henry F. Miller & Sons' Piano Co
Wakefield, Mass.		
EDWARD H. OWEN, JR. . .	II.	
150 Crescent St., Waltham, Mass.		
WILLIAM H. PICKERING	VIII.	In charge of Boyden Department, Harvard College Observatory.
Observatory, Cambridge, Mass.		
GEORGE F. RIGGS . . . .	I.	With U. S. Coast Survey.
19 Jay St., Cambridgeport, Mass.		
FRANK G. STANTIAL . . .	V.	Superintendent, Cochrane Chemical Co., Everett, Mass.
WILLIAM S. STEARNS . . .	I.	Superintendent, Stearns & Foster Co.'s Cotton Factory, Cincinnati, Ohio.
ARTHUR M. WAITT . . . .	II.	Assistant-General Master Car Builder, L. S. & M. S. Ry.
Cleveland, Ohio.		

1880.

GEORGE H. BARTON . . . .	III.	Instructor in Determinative Mineralogy, Boston, Mass. Mass. Institute of Technology.
CHARLES H. BROWN . . . .	I.	
8 Westland Ave., Boston, Mass.		
EDWIN E. CHASE . . . .	I.	United States Deputy Surveyor and Mining Engineer.
Central City, Colo.		
FREDERICK W. CLARK . . .	III.	In business.
231 Warren Ave., Chicago, Ill.		
GEORGE W. HAMILTON . . .	I.	With the Sewer Department.
14 Beacon St., Boston, Mass.		
LORING R. MILLEN . . . .	III.	Lumber Merchant and Manufacturer.
16 Beaver St., New York, N. Y.		
WILLIAM T. MILLER .	Elective.	Salesman, with Henry F. Miller & Sons' Piano Co.
156 Tremont St., Boston, Mass.		
*NATHANIEL C. SMALL . . .	V.	Died July 14, 1880.

## 1881.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
IRA ABBOTT . . . . .	I.	Vice-President and Assistant-Engineer, Windsor Hotel, Montreal, P. Q.
JOHN H. ALLEN . . . . .	III.	Metallurgist, El Paso Iron Works. El Paso, Tex.
*JAMES S. ATKINSON . . . . .	II.	Died Dec. 17, 1883.
AMOS BINNEY, A. B. . . . .	V.	Real Estate Agent, 31 Milk St., Boston. Walpole, Mass.
DAVID S. BISSELL . . . . .	III.	President, Duquesne Forge Co., Iron and Pittsburgh, Pa.
FRANK H. BRIGGS . . . . .	IX.	Broker in Merchandise, W. L. Montgom- ery & Co. 57 High St., Boston.
FRANK E. CAME . . . . .	I.	Assistant Engineer and Agent, Dominion Windsor Hotel, Montreal, P. Q.
FRANK D. CHASE . . . . .	III.	Chemist and Assayer. Parral, Mexico.
BENJAMIN G. COLLINS . . . . .	II.	Edgartown, Mass.
HARRY H. CUTLER . . . . .	II.	Superintendent and Manager, Newton and Newton, Mass.
F. GRAEF DARLINGTON . . . . .	IX.	Superintendent and Secretary, Cincinnati & Muskingum Valley Railway Co. 40 Putnam Ave., Zanesville, Ohio.
JOHN DUFF . . . . .	V.	Student, Harvard Medical School. 14 Sheafe St., Charlestown, Mass.
DAVID S. GODDARD . . . . .	III.	With Coburn Shuttle Co. Lowell, Mass.
*MARIE G. HOLMAN, A. M. . . . .	V.	Died May 5, 1885.
WALTER J. KOEHLER . . . . .	V.	Assistant Metallurgist, Broken Hill Pro- prietary Co., Limited. Broken Hill, N. S. W., Australia.
EDWIN J. LEWIS, JR. . . . .	IV.	Architect. 9 Park St., Boston, Mass.
WILLIAM B. LINDSAY, A.B. . . . .	V.	Professor of Chemistry, Dickinson College. Carlisle, Pa.
JAMES LUND . . . . .	V.	Superintendent, Indigo and Ammonia Dept., Cochrane Chemical Co. 66 James St., Malden, Mass.
GEORGE A. MOWER . . . . .	II.	Manager, English Branch, Crosby Steam Gage & Valve Co. 75 Queen Victoria St., Lon- don, Eng.
WEBSTER NORRIS . . . . .	III.	Chemist, Boston Rubber Shoe Co. Melrose, Mass.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
EVELYN W. ORDWAY . . . New Orleans, La.	V.	Professor of Chemistry and Physics, Newcomb College, Tulane University.
THEODORE PARKER . . . 417 No. Market St., Ottumwa, Iowa.	I.	Assistant Engineer, C. B. & Q. R. R.
NATHANIEL W. SHED . . . Pittsburgh, Pa.	V.	
WILLIAM R. SNEAD . . . 318 W. Chestnut St., Louis- ville, Ky.	IV.	Superintendent, the Snead Co. Iron Works.
HAROLD E. STEARNS . . . Montreal, P. Q.	II.	Treasurer, Dominion Wadding Co.
EDWARD R. WARREN . . . Crested Butte, Colo.	VII.	United States Deputy Mineral Surveyor.
CHARLES M. WILKES . . . St. Paul, Minn.	IV.	City Engineer's Office.
ARTHUR WINSLOW . . . Jefferson City, Mo.	III.	State Geologist.

1882.

CLARA P. AMES . . . . . Northampton, Mass.	V.	Teacher in Girls' Classical School.
THOMAS B. CARSON . . . . . 621 E. Fifteenth St., Daven- port, Iowa.	II.	With Bettendorf Metal Wheel Co.
EDWARD F. ELY, A. B. . . . . 36 Prospect St., Providence, R. I.	IV.	
GEORGE FAUNCE, A. B. . . . . Mansfield Valley, Allegheny Co., Pa.	III.	Assistant Superintendent of Pennsylvania Lead Co.'s Works.
*HARRY A. FOSS . . . . .	II.	Died Aug. 19, 1885.
CHARLES A. FRENCH . . . . . Boston, Mass.	III.	Instructor in Mathematics, Mass. Institute of Technology.
HOWARD V. FROST, Ph. D. . . . . Brooklyn, N. Y.	V.	Professor of Chemistry, Collegiate and Polytechnic Institute.
EDW. G. GARDINER, Ph. D. . . . . Boston, Mass.	VII.	Instructor in Biology, Mass. Institute of Technology.
FRANCIS P. HALL . . . . . Emporia, Kans.	V.	Stock-raising.
GEORGE L. HEINS . . . . . Temple Court, 7 Beckman St., New York, N. Y.	IV.	Architect.
CHARLES D. JENKINS . . . . . 32 Hawley St., Boston, Mass.	V.	Assistant State Inspector of Gas.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
JAMES W. JOHNSON . . . Riverside, Cal.	I.	City Engineer.
JOHN F. LOW . . . . . Chelsea, Mass.	V.	Gen'l Supt. of the Low Art Tile Co.
HARRY G. MANNING . . . Watertown, N. Y.	II.	With Eames Vacuum Brake Co.
GEORGE W. MANSFIELD . . 620 Atlantic Ave., Boston, Mass.	III.	With the Thomson-Houston Electric Co.
FRANK C. MORRISON† . . 89 Court St., Boston, Mass.	I.	Engineer and Draughtsman.
JAMES P. MUNROE . . . . 179 Devonshire St., Boston, Mass.	III.	Of the Firm of Jas. S. Munroe & Co., Paper Manufacturers.
CARRIE L. RICE . . . . . 2534 Arapahoe St., Denver, Colo.	V.	Teacher of Chemistry and Algebra, Denver High School.
WILLIAM T. RIPLEY . . . Rutland, Vt.	II.	
HENRY F. ROSS . . . . . Jamaica Plain, Mass.	III.	With Boston Thread & Twine Co.
JOHN H. ROSS . . . . . Jamaica Plain, Mass.	Elective.	Superintendent, Boston Thread & Twine Co.
GRENVILLE T. SNELLING† . 15 Rue de Buci, Paris, France.	IV.	<i>Dessinateur supplémentaire au Conservation du Plan de Paris pour l'Exposition de 1889.</i>
WALTER B. SNOW . . . . . Watertown, Mass.	II.	With B. F. Sturtevant, Jamaica Plain.
ANTHONY C. WHITE . . . 127 Purchase St., Boston, Mass.	VIII.	With American Bell Telephone Co.

## 1883.

HERBERT T. BARDWELL . . Parker Hill Ave., Boston, Mass.	I.	Civil Engineer.
GEORGE H. BRYANT . . . . Auburn, Ala.	II.	Professor of Mechanic Arts, Alabama Poly- technic Institute.
HARVEY S. CHASE . . . . Great Falls, N. H.	II.	Treasurer, Gas Light Co.; Superintendent, Water Works.
FRANK E. DAVIS . . . . . 18 Post Office Sq., Boston, Mass.	II.	With New England Weston Electric Light Co.
JOHN G. EPPENDORFF . . Buffalo, N. Y.	IV.	Interior Decorator and Designer.



NAME AND RESIDENCE.	COURSE.	OCCUPATION.
GEORGE J. FORAN . . . . . 111 Federal St., Boston, Mass.	II.	With Geo. F. Blake Manufacturing Co.
WILLIAM B. FULLER . . . . . City Hall Building, Duluth, Minn.	I.	City Engineer.
HORACE B. GALE . . . . . 3012 Lucas Ave., St. Louis, Mo.	II.	Professor of Dynamic Engineering, Wash- ington University.
GEORGE H. GUSTIN . . . . . 114 Jefferson Ave., Elizabeth, N. J.	III.	Chemist, Bowker Fertilizer Co.
FREDERIC O. HARRIMAN . . . . . Jaltipan, Mex.	I.	Civil Engineer and Contractor.
JAMES H. HUTCHINGS . . . . . 1672 Washington St., Boston, Mass.	II.	Real Estate.
HARVEY M. MANSFIELD . . . . . Fairfield, Me.	III.	Supt., Somerset Fibre Co.
ROBERT W. SCOTT . . . . . 44 N. Fourth St., Philadel- phia, Pa.	II.	Manufacturer of Blue Print Paper.
GEORGE A. SMITH . . . . . Arlington, Mass.	V.	Of the Firm of Thos. Strahan & Co., Manufacturers of Wall Paper, Chelsea, Mass.
FRANK TENNEY . . . . . Steelton, Dauphin Co., Pa.	III.	Purchasing Agent, Pennsylvania Steel Co.
CHARLES H. TOMPKINS, JR. . . . . Boise City, Idaho.	III.	Engineer and Manager, Idaho Mining and Irrigation Co.
GEORGE R. UNDERWOOD . . . . . Peabody, Mass.	V.	Supt., Upton Glue Works, Peabody.
DAVID WESSON . . . . . 225 Eighteenth St., Chicago, Ill.	V.	Chemist, with N. K. Fairbank & Co.
<b>1884.</b>		
CHARLES B. APPLETON . . . . . Brookline, Mass.	II.	In Draughting Office of E. D. Leavitt, Mech. Engineer, Cambridgeport.
HENRY F. BALDWIN . . . . . Port Jervis, N. Y.	II.	Roadmaster, Delaware Div., N. Y. L. E. & W. R. R.
FRED L. BARDWELL, B. S. . . . . Boston, Mass.	V.	Instructor in General Chemistry, Mass. Institute of Technology.
T. HARRIS BARTLETT† . . . . . Spokane Falls, Wash.	III.	Asst. Engineer, Northern Pacific R. R.
HENRY A. BOARDMAN . . . . . Providence, R. I.	V.	With the Silver Spring Bleaching and Dyeing Co.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
CHARLES C. BOTHFELD . . . Pittsburgh, Pa.	I.	With Pittsburgh Testing Laboratory.
W. FRANK CARR, B. S. . . . 50 Wright Block, Minne- apolis, Minn.	I.	Civil and Hydraulic Engineer ; Proprietor of Durham System House Drainage.
CHRISTOPHER J. CARVEN . . 1604 Dorchester Ave., Dor- chester, Mass.	I.	City Engineer's Office, Boston.
ROSCOE L. CHASE . . . . . 1336 Spring Garden St., Phila- delphia, Pa.	V.	Professor of Chemistry, Pennsylvania Mu- seum and School of Industrial Art.
ALFRED O. DOANE . . . . . Newtonville, Mass.	III.	Assistant City Engineer, City of Newton.
ALFRED L. FITCH . . . . . Fulton & Jefferson Sts., Chicago, Ill.	II.	With Charles F. Elmes.
GEORGE L. R. FRENCH . . . . Northampton, Mass.	I.	Division Engineer, Central Massachusetts Div., B. & M. R. R.
AUGUSTUS H. GILL . . . . . Care of Becker & Co., Leip- sic, Germany.	V.	Student at the University.
FRANK M. HAINES . . . . . Care of H. S. Husen, Ta- coma, Wash.	III.	Assistant Engineer, Northern Pacific R. R.
GEORGE H. HEYWOOD . . . . . 1251 West Taylor St., Chi- cago, Ill.	III.	Treasurer, Heywood & Morrill Rattan Co., 146 W. Washington St.
JAMES G. HOLDER, Ph. G. . . 119 Broad St., Lynn, Mass.	V.	Apothecary.
GEORGE F. KNAPP . . . . . Lock Box 43, Steelton, Dau- phin Co., Pa.	V.	Supt., Blast Furnaces, Pennsylvania Steel Co.
*AMY STANTIAL LUND . . . . Paris, France.	V.	Died Feb. 11, 1888.
CAPT. D. A. LYLE, U. S. A. . Paris, France.	III.	U. S. Commission, Paris Exposition.
PHILIP S. MORSE, A. B. . . . Salt Lake City, Utah.	III.	Germania Lead Works.
CHARLES O. PRESCOTT . . . . Milton, Mass.	V.	Teacher of Natural Science, Milton Acad- emy.
WILLIAM L. PUFFER . . . . . Boston, Mass.	III.	Instructor in Physics, Mass. Institute of Technology.
ARTHUR J. PURINTON . . . . Boston, Mass.	II.	Instructor in Mechanical Engineering, Mass. Institute of Technology.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
WILLIAM J. RICH . . . .	III.	4th Assistant Examiner, U. S. Patent Office. Washington, D. C.
FRANKLIN B. RICHARDS . .	III.	With Tod, Stambaugh & Co. Room 203, Perry Payne B'ld'g, Cleveland, Ohio.
C. SNELLING ROBINSON . .	III.	Chief Chemist, Joliet Works, Illinois Steel Co. 113 Eastern Ave., Joliet, Ill.
THEODORE W. ROBINSON . .	III.	Blast Furnace Dept., Illinois Steel Co. So. Chicago, Ill.
A. LAWRENCE ROTCH . . .	II.	Proprietor, Blue Hill Meteorological Ob- servatory, Readville, Mass. 3 Commonwealth Avenue, Boston, Mass.
JOSIAH P. RYDER . . . .	V.	Teacher, East Boston High School. 25 Saratoga St., East Bos- ton, Mass.
ALFRED STEBBINS, JR. . .	III.	Assistant Engineer, N. Y. & N. E. R. R. Walkhill St., Roslindale, Mass.
ELLIOT T. STURGIS . . . .	III.	With the Engineer Dept., New England Telephone & Telegraph Co. 50 Pearl St., Boston, Mass.
ALICE BROWN TYLER . . .	V.	Peters St., Roslindale, Mass.
HARRY W. TYLER . . . .	V.	Secretary, Mass. Institute of Technology. Peters St., Roslindale, Mass.
NAHUM WARD . . . . .	V.	Chemist with N. Ward Co. Mt. Seaver Ave., Roxbury, Mass.
WILLIAM M. WHITNEY . . .	II.	With Baxter D. Whitney, Manufacturer Winchendon, Mass. Wood-working Machinery.
FRANCIS C. WILLIAMS, JR.	I.	Topographer, Burlington & Missouri River Lincoln, Neb. R. R.

**1885.**

CHARLES R. ALLEN . . . .	V.	Teacher of Science in New Bedford High School. New Bedford, Mass.
DAVID BAKER . . . . .	III.	Supt., Blast Furnace Dept., Maryland ex- tension, Pennsylvania Steel Co. Sparrow's Pt., Md.
EDWARD R. BENTON, Ph. D.	IV.	Superintendent for McKim, Mead & White, Architects. Newton Centre, Mass.
HEYWOOD COCHRAN . . . .	II.	Draughtsman, with Louisville Bridge and Iron Co. Louisville, Ky.
EDWARD H. DEWSON, JR. .	II.	Master Mechanic, St. Joseph & Grand Island R. R. St. Joseph, Mo.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
FREDERICK FOX, JR., S. M. . 77 State St., Portland, Me.	V.	Student of Chemistry, Leipsic, Germany.
THOMAS W. FRY . . . .	II.	With Diamond Prospecting Co., 74 and 76 W. Lake St.
ROBERT R. GOODRICH . .	III.	Mining Engineer. Coit, W. Va.
WALTER K. HARRINGTON .	I.	Supt. of Green Bay & Fort Howard Water Works Co. Green Bay, Wis.
ELEAZER B. HOMER . . .	IV.	Instructor in Architecture, Mass. Institute of Technology. Boston, Mass.
FRANK H. LORD . . . .	II.	With the Wainwright Manufacturing Co. Medford, Mass.
TRACY LYON . . . . .	II.	Of the Firm of Robert Bement & Co., Engineers and Contractors. Corner Fourth and Wacouta Streets, St. Paul, Minn.
HUGH MACRAE . . . . .	III.	President, Linville Improvement Co., Lin- ville, N. C.
HENRY MARTIN . . . . .	V.	With Richards Paper Co. Gardiner, Me.
ALLYNE L. MERRILL . . .	II.	Instructor in Mechanical Engineering, Mass. Institute of Technology. Cambridge, Mass.
*EBEN G. MERRILL . . . .	I.	Died Oct. 12, 1887.
EVERETT MORSS . . . . .	III.	With Morss & Whyte, Wire Workers. 323 Marlboro' St., Boston, Mass.
FREDERICK H. NEWELL .	III.	With U. S. Arid Land Survey, Washing- ton, D. C. Boston, Mass.
JOSEPH E. NUTE . . . . .	I.	Superintendent of Distribution, United Gas Improvement Co. 295 Eighth St., Jersey City, N. J.
MARCELLA I. O'GRADY . .	IX.	Instructor in Biology, Vassar College. Poughkeepsie, N. Y.
FRANK A. PICKERNELL . .	VI.	With American Telephone & Telegraph Co. New York, N. Y.
RICHARD H. PIERCE, A. B.	VI.	Agent for United Edison Manufacturing Co. in Wisconsin. R. 45, New Insurance Build- ing, Milwaukee, Wis.
NEWBERT M. RANDALL .	III.	Assistant Chemist, Pennsylvania Steel Co. Steelton, Pa.
OTIS T. STANTIAL . . . .	III.	Chemist, Crane Bros. Manufacturing Co. 52 Judd St., Chicago, Ill.
HENRY P. TALBOT . . . .	V.	Student in the University. Liebig Strasse 8, Leipsic, Germany.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
GEORGE P. VANIER . . . Steelton, Pa.	III.	Chemist, Pennsylvania Steel Co.
ERASTUS WORTHINGTON, JR. Dedham, Mass.	I.	Civil Engineer, Water Works and Sewer- age Construction.

## 1886.

GEORGE P. ABORN . . . Warren, Mass.	II.	With the Knowles Pump Works.
ARTHUR C. ANTHONY . . . 27 Kilby St., Boston, Mass.	III.	Special Agent for the Commonwealth In- surance Co. of New York.
DANA P. BARTLETT . . . Boston, Mass.	VI.	Instructor in Mathematics, Mass. Institute of Technology.
BIRNEY C. BATCHELLER . . . 71 Broadway, New York, N. Y.	II.	Superintendent of the Pneumatic Dynamite Gun Co.
WILLIAM L. BRAINERD . . . 230 La Salle St., Chicago, Ill.	IV.	Architect.
JOHN K. BURGESS . . . . . 45 South Angell St., Provi- dence, R. I.	II.	Wood Fibre Manufacturer.
CHARLES L. BURLINGHAM . . . 2207 Calumet Ave., Chicago, Ill.	III.	Asst. Supt. Chicago & Aurora Smelting & Refining Co.
WM. H. CHADBOUFN, JR. . . . . 30 Summer St., Dorchester, Mass.	III.	Mining Engineer.
WILLIAM L. CHURCH . . . . . 139 Adams St., Chicago, Ill.	VI.	General Superintendent of Chicago Edison Co.
HARRY E. H. CLIFFORD . . . . . Boston, Mass.	VI.	Instructor in Physics, Mass. Institute of Technology.
LOUIS R. COBB . . . . . City Hall Building, Chicago, Ill.	I.	Assistant Engineer, Street Department, Board of Public Works.
FRANCIS H. CRANE . . . . . 65 Sears Building, Boston, Mass.	VI.	Consulting Engineer, Emerson Power Scale Co.
LOUIS F. CUTTER . . . . . Winchester, Mass.	I.	Assistant Engineer, Boston Sewer Depart- ment,
CHARLES C. DOE . . . . . 224 Commonwealth Ave., Boston, Mass.	VII.	Student at Harvard Medical School.
ORRIN S. DOOLITTLE . . . . . 148 No. Fourth St., Reading, Pa.	V.	Chemist, Philadelphia & Reading R. R. Co.



NAME AND RESIDENCE.	COURSE.	OCCUPATION.
JAMES C. DUFF . . . . 13 Grand Ave., Milwaukee, Wis.	V.	Analytical and Consulting Chemist
GEORGE W. FARMER . . . . 915 Monroe St., Topeka, Kans.	II.	Air Brake Inspector, A. T. & S. F. R. R.
EDWARD S. FOSS . . . . Orange, Los Angeles Co., Cal.	V.	Pacific Branch, Globe Pharmaceutical Association.
FRED E. FOSS, A. B. . . . St. Paul, Minn.	I.	Chief Clerk in office of President's Asst., C. St. P. & K. C. R. R.
THEODORE R. FOSTER . . . . Galesburg, Ill.	II.	Asst. to Master Mechanic, Galesburg Div., C. B. & Q. R. R.
ALEX. S. GARFIELD . . . . Lexington, Mass.	II.	With Thomson Electric Welding Co., Paris, France.
D. LEWIS K. HATHAWAY . . . . Warren, Mass.	II.	Draughtsman at Knowles Pump Works.
EDWARD E. HIGGINS . . . . 202 Main St., Buffalo, N. Y.	VI.	General Agent in New York State, Sprague Electric Railway & Motor Co.
WILLIAM J. HOPKINS . . . . 620 Atlantic Ave., Boston, Mass.	VI.	With Thomson-Houston Elec. Co., Rail- way Dept.
WALTER R. INGALLS . . . . 229 Ocean St., Lynn, Mass.	III.	Mining Engineer.
WILLIAM F. JORDAN . . . . Rochester, N. Y.	I.	Assistant Engineer, Buffalo, Rochester & Pittsburgh R. R.
C. BELLE KENNEY . . . . 111 Saratoga St., East Boston, Mass.	V.	Teacher of Science, Mt. Holyoke College.
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CHARLES W. POWER . . . . 127 Purchase St., Boston, Mass.	VI.	Assistant Electrician, American Bell Tele- phone Co.
FRED W. RANNO . . . . . Toledo, Ohio.	I.	Assistant Engineer L. S. & M. S. R. R.
GEORGE L. RICHARDSON . . . San Bernardino, Cal.	I.	Civil Engineer.

## 190 MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
GEORGE W. ROUNDS . . . Harvard Sq., Cambridge, Mass.	VI.	Railway Dept., Thomson-Houston Elec. Co.
RICHARD L. RUSSEL . . . 17 St. James Ave., Boston, Mass.	I.	Graduate Student, Mass. Institute of Tech- nology.
FRANK E. SANBORN . . . 103 Moreland St., Roxbury, Mass.	II.	Assistant in Drawing, Mass. Institute of Technology.
ALBERT SAUVEUR . . . Steelton, Pa.	III.	With the Pennsylvania Steel Co.
EDWARD V. SHEPARD . . . 61 Lafayette St., Salem, Mass.	I.	With I. K. Harris, Civil Engineer & Sur- veyor, Lynn, Mass.
WILLIAM G. SNOW . . . Watertown, Mass.	II.	With B. F. Sturtevant, Jamaica Plain, Mass.
DELIA STICKNEY . . . 8 Centre St., Cambridge- port, Mass.	V.	Instructor in Chemistry, Cambridge English High School.
GEORGE G. STONE . . . 3179 Ashland Ave., Chicago, Ill.	III.	In the Chemical Laboratory of the Union Steel Co.
RALPH SWEETLAND . . . Natick, Mass.	II.	With Thomson-Houston Co.
SANFORD E. THOMPSON . . . Canatunk Falls, Somerset Co., Maine.	I.	With Moosehead Pulp and Paper Co.
FRANK H. THORP . . . 285 Columbus Ave., Bos- ton, Mass.	V.	Assistant in Industrial Chemistry, Mass. Institute of Technology.
WILLIAM B. THURBER . . . Plymouth, Mass.	IX.	Graduate Student, Mass. Institute of Tech- nology.
ARTHUR E. TRUESDELL . . . 422 Pierce St., Sioux City, Ia.	VI.	With Sioux City Electric Co.
WILLIAM W. UNDERHILL . . . 45 Kilby St., Boston, Mass.	II.	Draughtsman, Smead Warming & Ventila- ting Co.
CHARLES H. WARNER . . . 120 Beacon Hill Ave., Lynn, Mass.	VI.	With Thomson-Houston Electric Co.
GEORGE C. WHIPPLE . . . Chelsea, Mass.	I.	Assistant Engineer, Boston Water Works.
JASPER WHITING . . . 3179 Ashland Ave., Chicago, Ill.	III.	In Chemical Laboratory of Union Steel Co.

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
FRANK P. WHITNEY . . . Adams St., Dorchester, Mass.	VI.	In Railway Dept., Thomson-Houston Elec- tric Co.
ROBERT C. WILLIAMS . . . Crescent City, Fla.	III.	Orange Raising.
ARTHUR L. WILLISTON . . . 15 Berkeley St., Cambridge, Mass.	II.	Graduate Student, Mass. Institute of Tech- nology.
VICTOR WINDETT . . . . . 2522 Calumet Ave., Chicago, Ill.	II.	With Illinois Steel Co.
CAROLINE A. WOODMAN, A. B. . . . . Wellesley, Mass.	VII.	Instructor in Physiology, Wellesley College.
WALTER G. WUICHET . . . . . 346 W. First St., Dayton, Ohio.	II.	In Shops of W. P. Callahan & Co., Oil Mill Machinery.

Alumni will confer a favor by informing the Secretary of the Faculty of any change of address or occupation.

Other persons who have been connected with the Institute for one year or more will also confer a favor by informing the Secretary of the Faculty of their address and occupation.

It should be noticed that the graduates comprise but about one fifth of all the students who have in the past been connected with this school.

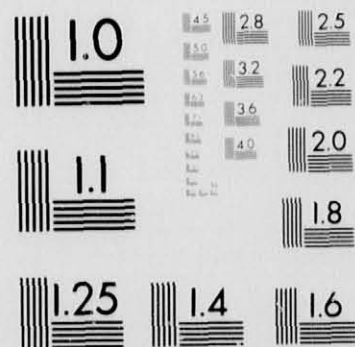
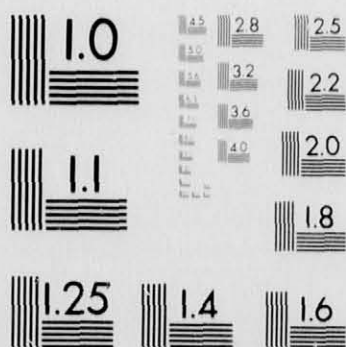
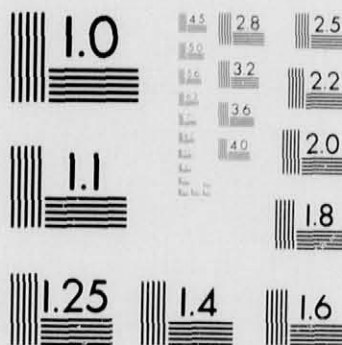
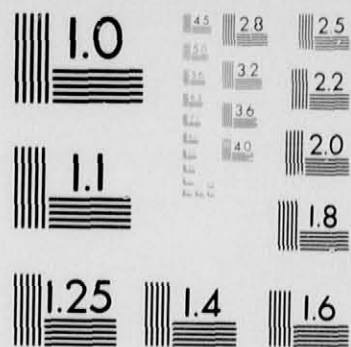
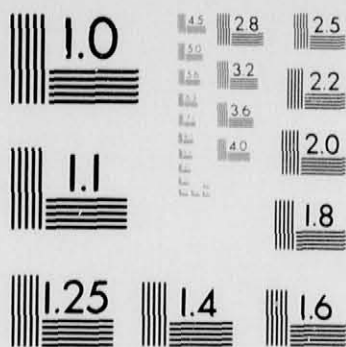
SUMMARY.

Class of 1868 . . . . .	14	Class of 1879 . . . . .	23
" " 1869 . . . . .	5	" " 1880 . . . . .	8
" " 1870 . . . . .	10	" " 1881 . . . . .	28
" " 1871 . . . . .	17	" " 1882 . . . . .	24
" " 1872 . . . . .	12	" " 1883 . . . . .	18
" " 1873 . . . . .	26	" " 1884 . . . . .	36
" " 1874 . . . . .	18	" " 1885 . . . . .	27
" " 1875 . . . . .	27	" " 1886 . . . . .	59
" " 1876 . . . . .	43	" " 1887 . . . . .	58
" " 1877 . . . . .	32	" " 1888 . . . . .	77
" " 1878 . . . . .	19	" " 1889 . . . . .	75
Total . . . . .	656		
Deduct names counted twice . . . . .	<u>2</u>		
	654		



## ALPHABETICAL LIST OF GRADUATES.

NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Abbott, Ira . . . . .	I.	1881	Bigelow, Henry F. . . . .	IV.	1888
Aborn, George P. . . . .	II.	1886	Binney, Amos . . . . .	V.	1881
Alden, John . . . . .	V.	1877	Bird, Herbert S. . . . .	V.	1888
Allbright, William B. . . . .	V.	1878	Bissell, David S. . . . .	III.	1881
Allen, Charles F. . . . .	III.	1876	Bixby, Willard G. . . . .	II.	1889
Allen, C. Frank . . . . .	I.	1872	Blake, William B. . . . .	I.	1887
Allen, Charles R. . . . .	V.	1885	Blanchard, Winslow . . . . .	II.	1888
Allen, John H. . . . .	III.	1881	Bliss, Zenas W. . . . .	II.	1889
Allen, Samuel E. . . . .	I.	1875	Blodgett, Aaron D. . . . .	II.	1876
Allen, Walter S. . . . .	V.	1879	Blodgett, George W. . . . .	I.	1873
Ames, Clara P. . . . .	V.	1882	Blunt, William T. . . . .	I.	1874
Anthony, Arthur C. . . . .	III.	1886	Boardman, Henry A. . . . .	V.	1884
Appleton, Charles B. . . . .	II.	1884	Borden, Charles N. . . . .	II.	1889
Appleton, Ellery C. . . . .	III.	1868	Bothfeld, Charles C. . . . .	I.	1884
Armington, George A. . . . .	II.	1887	Boyden, Amos J. . . . .	IV.	1875
Arnott, James L. Sci. and Lit.		1875	Brace, Walter C. . . . .	III.	1887
Aspinwall, Thomas . . . . .	I.	1876	Bradlee, Arthur T. . . . .	II.	1888
Atkinson, James S. . . . .	II.	1881	Bradley, Frederick W. . . . .	VI.	1889
Atwood, William P. . . . .	V.	1876	Brainerd, Dwight . . . . .	IX.	1887
Austin, Amory . . . . .	V.	1873	Brainerd, Frederick H. . . . .	III.	1889
Bachelor, Charles S. . . . .	V.	1877	Brainerd, Henry B. . . . .	IX.	1887
Baker, Charles M. . . . .	IV.	1878	Brainerd, William L. . . . .	IV.	1886
Baker, David . . . . .	III.	1885	Braley, Samuel T. . . . .	II.	1879
Baker, William H. . . . .	I.	1869	Breed, Joshua B. F. . . . .	I.	1876
Baldwin, Henry F. . . . .	II.	1884	Brewster, Benjamin E. . . . .	III.	1872
Baldwin, Thomas W. . . . .	I.	1876	Bridges, Luther W. . . . .	II.	1889
Bardwell, Fred L. . . . .	V.	1884	Briggs, Frank H. . . . .	IX.	1881
Bardwell, Herbert T. . . . .	I.	1883	Brotherton, William E. . . . .	V.	1873
Barrows, Herbert . . . . .	I.	1874	Brown, Charles H. . . . .	I.	1880
Barrows, Walter B. . . . .	VII.	1876	Bryant, George H. . . . .	II.	1883
Barrus, George H. . . . .	II.	1874	Bryant, Henry F. . . . .	I.	1887
Bartlett, Dana P. . . . .	VI.	1886	Bulkley, Joseph N. . . . .	VI.	1889
Bartlett, Sidney R. . . . .	VII.	1887	Burgess, Frank G. . . . .	I.	1887
Bartlett, T. Harris . . . . .	III.	1884	Burgess, John K. . . . .	II.	1886
Bartol, George . . . . .	III.	1877	Burlingham, Charles L. . . . .	III.	1886
Barton, Charles A. . . . .	II.	1887	Burnet, Moses D. . . . .	III.	1875
Barton, George H. . . . .	III.	1880	Burrison, Henry K. . . . .	I.	1875
Basford, George M. . . . .	II.	1889	Buttolph, Benjamin G. . . . .	II.	1888
Batcheller, Birney C. . . . .	II.	1886	Buttolph, Harry T. . . . .	I.	1876
Bates, Henry D. . . . .	IV.	1888	Cabot, John W. . . . .	III.	1879
Beach, Edward J. . . . .	V.	1889	Came, Frank E. . . . .	I.	1881
Beal, Foster E. L. . . . .	I.	1871	Cameron, Julian A. . . . .	II.	1887
Beal, J. Williams . . . . .	IV.	1877	Campbell, Harry H. . . . .	III.	1879
Beeching, William H. . . . .	II.	1877	Capen, G. Walter . . . . .	IV.	1877
Bellows, Arthur B. . . . .	II.	1889	Carleton, Elbridge S. . . . .	IV.	1888
Benton, Edward R. . . . .	IV.	1885	Carney, Frank D. . . . .	III.	1887



M. I. T. ANNUAL CATALOGUES AND BULLETINS

1889/90

03 OF 03

NAME AND RESIDENCE.	COURSE.	OCCUPATION.
FRANK P. WHITNEY . . . Adams St., Dorchester, Mass.	VI.	In Railway Dept., Thomson-Houston Electric Co.
ROBERT C. WILLIAMS . . . Crescent City, Fla.	III.	Orange Raising.
ARTHUR L. WILLISTON . . . 15 Berkeley St., Cambridge, Mass.	II.	Graduate Student, Mass. Institute of Technology.
VICTOR WINDETT . . . . . 2522 Calumet Ave., Chicago, Ill.	II.	With Illinois Steel Co.
CAROLINE A. WOODMAN, A.B. Wellesley, Mass.	VII.	Instructor in Physiology, Wellesley College.
WALTER G. WUICHER . . . 346 W. First St., Dayton, Ohio.	II.	In Shops of W. P. Callahan & Co., Oil Mill Machinery.

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SUMMARY.

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" " 1870 . . . . .	10	" " 1881 . . . . .	28
" " 1871 . . . . .	17	" " 1882 . . . . .	24
" " 1872 . . . . .	12	" " 1883 . . . . .	18
" " 1873 . . . . .	26	" " 1884 . . . . .	36
" " 1874 . . . . .	18	" " 1885 . . . . .	27
" " 1875 . . . . .	27	" " 1886 . . . . .	59
" " 1876 . . . . .	43	" " 1887 . . . . .	58
" " 1877 . . . . .	32	" " 1888 . . . . .	77
" " 1878 . . . . .	19	" " 1889 . . . . .	75
Total . . . . .	656		
Deduct names counted twice . . . . .	2		
			654

## ALPHABETICAL LIST OF GRADUATES.

NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Abbott, Ira . . . . .	I.	1881	Bigelow, Henry F. . . . .	IV.	1888
Aborn, George P. . . . .	II.	1886	Binney, Amos . . . . .	V.	1881
Alden, John . . . . .	V.	1877	Bird, Herbert S. . . . .	V.	1888
Allbright, William B. . . . .	V.	1878	Bissell, David S. . . . .	III.	1881
Allen, Charles F. . . . .	III.	1876	Bixby, Willard G. . . . .	II.	1889
Allen, C. Frank . . . . .	I.	1872	Blake, William B. . . . .	I.	1887
Allen, Charles R. . . . .	V.	1885	Blanchard, Winslow . . . . .	II.	1888
Allen, John H. . . . .	III.	1881	Bliss, Zenas W. . . . .	II.	1889
Allen, Samuel E. . . . .	I.	1875	Blodgett, Aaron D. . . . .	II.	1876
Allen, Walter S. . . . .	V.	1879	Blodgett, George W. . . . .	I.	1873
Ames, Clara P. . . . .	V.	1882	Blunt, William T. . . . .	I.	1874
Anthony, Arthur C. . . . .	III.	1886	Boardman, Henry A. . . . .	V.	1884
Appleton, Charles B. . . . .	II.	1884	Borden, Charles N. . . . .	II.	1889
Appleton, Ellery C. . . . .	III.	1868	Bothfeld, Charles C. . . . .	I.	1884
Armington, George A. . . . .	II.	1887	Boyden, Amos J. . . . .	IV.	1875
Arnott, James L. Sci. and Lit.		1875	Brace, Walter C. . . . .	III.	1887
Aspinwall, Thomas . . . . .	I.	1876	Bradlee, Arthur T. . . . .	II.	1888
Atkinson, James S. . . . .	II.	1881	Bradley, Frederick W. . . . .	VI.	1889
Atwood, William P. . . . .	V.	1876	Brainerd, Dwight . . . . .	IX.	1887
Austin, Amory . . . . .	V.	1873	Brainerd, Frederick H. . . . .	III.	1889
Bachelor, Charles S. . . . .	V.	1877	Brainerd, Henry B. . . . .	IX.	1887
Baker, Charles M. . . . .	IV.	1878	Brainerd, William L. . . . .	IV.	1886
Baker, David . . . . .	III.	1885	Braley, Samuel T. . . . .	II.	1879
Baker, William H. . . . .	I.	1869	Breed, Joshua B. F. . . . .	I.	1876
Baldwin, Henry F. . . . .	II.	1884	Brewster, Benjamin E. . . . .	III.	1872
Baldwin, Thomas W. . . . .	I.	1876	Bridges, Luther W. . . . .	II.	1889
Bardwell, Fred L. . . . .	V.	1884	Briggs, Frank H. . . . .	IX.	1881
Bardwell, Herbert T. . . . .	I.	1883	Brotherton, William E. . . . .	V.	1873
Barrows, Herbert . . . . .	I.	1874	Brown, Charles H. . . . .	I.	1880
Barrows, Walter B. . . . .	VII.	1876	Bryant, George H. . . . .	II.	1883
Barrus, George H. . . . .	II.	1874	Bryant, Henry F. . . . .	I.	1887
Bartlett, Dana P. . . . .	VI.	1886	Bulkley, Joseph N. . . . .	VI.	1889
Bartlett, Sidney R. . . . .	VII.	1887	Burgess, Frank G. . . . .	I.	1887
Bartlett, T. Harris . . . . .	III.	1884	Burgess, John K. . . . .	II.	1886
Bartol, George . . . . .	III.	1877	Burlingham, Charles L. . . . .	III.	1886
Barton, Charles A. . . . .	II.	1887	Burnet, Moses D. . . . .	III.	1875
Barton, George H. . . . .	III.	1880	Burrison, Henry K. . . . .	I.	1875
Basford, George M. . . . .	II.	1889	Buttolph, Benjamin G. . . . .	II.	1888
Batcheller, Birney C. . . . .	II.	1886	Buttolph, Harry T. . . . .	I.	1876
Bates, Henry D. . . . .	IV.	1888	Cabot, John W. . . . .	III.	1879
Beach, Edward J. . . . .	V.	1889	Came, Frank E. . . . .	I.	1881
Beal, Foster E. L. . . . .	I.	1871	Cameron, Julian A. . . . .	II.	1887
Beal, J. Williams . . . . .	IV.	1877	Campbell, Harry H. . . . .	III.	1879
Beeching, William H. . . . .	II.	1877	Capen, G. Walter . . . . .	IV.	1877
Bellows, Arthur B. . . . .	II.	1889	Carleten, Elbridge S. . . . .	IV.	1888
Benton, Edward R. . . . .	IV.	1885	Carney, Frank D. . . . .	III.	1887



## LIST OF GRADUATES.

193

NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Carr, W. Frank . . . . .	I.	1884	Dan, Takuma . . . . .	III.	1878
Carson, Howard A. . . . .	I.	1869	Darlington, F. Graef . . . . .	IX.	1881
Carson, Thomas B. . . . .	II.	1882	Davenport, William S. . . . .	V.	1889
Carter, Henry H. . . . .	I.	1877	Davis, Arthur L. . . . .	II.	1889
Carven, Christopher J. . . . .	I.	1884	Davis, Frank E. . . . .	II.	1883
Center, David A. . . . .	VI.	1888	Davis, Willis E. . . . .	Sci. and Lit.	1876
Chadbourn, William H., Jr. . . . .	III.	1886	Day, Sarah L. . . . .	V.	1887
Chamberlin, William E. . . . .	IV.	1877	Dennett, Clarence L. . . . .	II.	1876
Chapman, George H. . . . .	II.	1877	Devens, Richard . . . . .	II.	1888
Chase, Edwin E. . . . .	I.	1880	Dewson, Edward H., Jr. . . . .	II.	1885
Chase, Frank D. . . . .	III.	1881	Doane, Alfred O. . . . .	III.	1884
Chase, Harvey S. . . . .	II.	1883	Doane, George E. . . . .	I.	1874
Chase, Roscoe L. . . . .	V.	1884	Dodge, Charles B. . . . .	IX.	1889
Child, Stephen . . . . .	I.	1888	Dodge, Frank S. . . . .	I.	1875
Church, Christopher A. . . . .	I.	1875	Dodge, William B. . . . .	I.	1872
Church, William L. . . . .	VI.	1886	Doe, Charles C. . . . .	VII.	1886
Cilley, Frank H. . . . .	I.	1889	Doolittle, Orrin S. . . . .	V.	1886
Clafin, George E. . . . .	VI.	1888	Dorr, Edgar S. . . . .	I.	1875
Clark, Edward K. . . . .	II.	1870	Dowse, William B. . . . .	IV.	1874
Clark, Frederick W. . . . .	III.	1880	Duff, James C. . . . .	V.	1886
Clifford, Harry E. H. . . . .	VI.	1886	Duff, John . . . . .	V.	1881
Cobb, Louis R. . . . .	I.	1886	Dunbar, W. Otis . . . . .	II.	1879
Cobb, Sylvanus H. . . . .	VI.	1888	Durfee, Nathan . . . . .	II.	1889
Cochran, Heywood . . . . .	II.	1885	Dutton, Edgar F. . . . .	VI.	1888
Coffin, Fred S. . . . .	III.	1879	Dyar, Harrison G. . . . .	V.	1889
Colby, Russell H. . . . .	V.	1888	Eastman, Henry F. . . . .	II.	1888
Cole, Fred B. . . . .	II.	1888	Eaton, Charles S. . . . .	IV.	1878
Cole, Winthrop . . . . .	II.	1887	Edes, William C. . . . .	I.	1875
Collins, Benjamin G. . . . .	II.	1881	Edmands, J. Rayner . . . . .	II.	1869
Collins, Bertrand R. T. . . . .	II.	1888	Edwards, Arthur V. . . . .	IV.	1889
Collins, Edward, Jr. . . . .	VI.	1888	Ellsworth, Alfred B. . . . .	I.	1888
Conant, Henry J. . . . .	II.	1887	Ely, Edward F. . . . .	IV.	1882
Conant, Whitney . . . . .	III.	1868	Emerson, Joseph S. . . . .	I.	1874
Conner, Arthur J. . . . .	V.	1888	Emmerton, Frederic A. . . . .	V.	1872
Connor, Addison . . . . .	I.	1871	Eppendorff, John G. . . . .	IV.	1883
Cooley, Helen . . . . .	V.	1887	Eppes, Richard, Jr. . . . .	II.	1888
Copeland, Frederick K. . . . .	I.	1876	Fabens, George W. . . . .	I.	1879
Crabtree, Fred . . . . .	V.	1889	Fabens, Samuel A., Jr. . . . .	I.	1873
Craigin, Henry A. . . . .	II.	1889	Farmer, George W. . . . .	II.	1886
Crane, Francis H. . . . .	VI.	1886	Faunce, Elmer . . . . .	III.	1871
Cromwell, Charles H. . . . .	II.	1889	Faunce, George . . . . .	III.	1882
Crosby, William O. . . . .	VII.	1876	Faunce, Linus . . . . .	II.	1877
Cross, Charles R. . . . .	Sci. and Lit.	1870	Felton, Samuel M., Jr. . . . .	I.	1873
Curtis, Ralph E. . . . .	II.	1887	Ferguson, Louis A. . . . .	VI.	1888
Curtis, Russell H. . . . .	I.	1870	Firth, Frank R. . . . .	I.	1868
Cushing, William C. . . . .	I.	1887	Fish, Walter C. . . . .	VI.	1887
Cutler, Harry H. . . . .	II.	1881	Fisher, Charles H. . . . .	II.	1877
Cutler, Henry M. . . . .	I.	1871	Fisher, Frederick L. . . . .	I.	1873
Cutter, Louis F. . . . .	I.	1886	Fiske, Jonathan P. B. . . . .	VI.	1889
Cutter, Roland N. . . . .	I.	1889	Fitch, Alfred L. . . . .	II.	1884
Dame, Frank L. . . . .	VI.	1889	Fletcher, Charles R. . . . .	V.	1876

NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Flint, Bertram P. . . . .	II.	1888	Haines, Frank M. . . . .	III.	1884
Flint, William C. . . . .	III.	1877	Hale, Richard A. . . . .	I.	1877
Foote, Edward H. . . . .	I.	1871	Hall, Albert F. . . . .	II.	1868
Foque, Theodore A. . . . .	II.	1888	Hall, Francis P. . . . .	V.	1882
Foran, George J. . . . .	II.	1883	Hamblet, George W. . . . .	II.	1888
Forbes, Eli . . . . .	Sci. and Lit.	1868	Hamilton, George W. . . . .	I.	1880
Foss, Edward S. . . . .	V.	1886	Hammatt, Edward A. W. . . . .	I.	1875
Foss, Fred E. . . . .	I.	1886	Handy, Edward A. . . . .	I.	1875
Foss, Harry A. . . . .	II.	1882	Hardman, John E. . . . .	III.	1877
Foster, Theodore R. . . . .	II.	1886	Harriman, Frederic O. . . . .	I.	1883
Fox, Frederick, Jr. . . . .	V.	1885	Harrington, Walter K. . . . .	I.	1885
Fox, John M. . . . .	VI.	1887	Harris, W. Dale . . . . .	I.	1873
Freeman, John R. . . . .	I.	1876	Harris, William L. . . . .	VII.	1888
French, Alfred W. . . . .	I.	1889	Hartwell, Ernest G. . . . .	IV.	1879
French, Charles A. . . . .	III.	1882	Harvey, George L. . . . .	II.	1888
French, Edward V. . . . .	II.	1889	Hastings, Charles F. . . . .	III.	1888
French, George L. R. . . . .	I.	1884	Hathaway, D. Lewis K. . . . .	II.	1886
French, Hollis . . . . .	VI.	1889	Hathaway, Savory C., Jr. . . . .	VI.	1888
Frost, Howard V. . . . .	V.	1882	Head, James H. . . . .	II.	1875
Fry, Thomas W. . . . .	II.	1885	Heath, George L. . . . .	V.	1888
Fukuzawa, Stejiro . . . . .	I.	1888	Heins, George L. . . . .	IV.	1882
Fuller, Frank L. . . . .	I.	1871	Henck, John B., Jr. . . . .	VIII.	1876
Fuller, James E., Jr. . . . .	IV.	1888	Herrick, Edward W. . . . .	II.	1888
Fuller, William B. . . . .	I.	1883	Herrick, James A. . . . .	V.	1872
Furber, Pierce P. . . . .	IV.	1877	Heywood, George H. . . . .	III.	1884
Gale, Horace B. . . . .	II.	1883	Hibbard, Henry D. . . . .	III.	1877
Galloupe, Francis E. . . . .	II.	1876	Hibbard, Thomas . . . . .	II.	1875
Gannett, Earl W. . . . .	VI.	1889	Higgins, Alfred S. . . . .	IV.	1878
Gardiner, Edward G. . . . .	VII.	1882	Higgins, Edward E. . . . .	VI.	1886
Garfield, Alexander S. . . . .	II.	1886	Hildreth, William O. . . . .	II.	1887
Gay, Joseph B. . . . .	IV.	1887	Hinman, Charles W. . . . .	III.	1870
Gay, Martin . . . . .	I.	1877	Hobart, Henry M. . . . .	VI.	1889
Gerrish, William H. . . . .	II.	1888	Hobart, James C. . . . .	II.	1887
Gilbert, James P. . . . .	V.	1889	Hobbs, Franklin W. . . . .	II.	1889
Gill, Augustus H. . . . .	V.	1884	Hodgdon, Frank W. . . . .	I.	1876
Gilman, Charles C. . . . .	III.	1868	Hodge, James M. . . . .	III.	1872
Gleason, Walter H. . . . .	V.	1887	Holbrook, Elliot . . . . .	I.	1874
Goddard, David S. . . . .	III.	1881	Holder, James G. . . . .	V.	1884
Goodale, Charles W. . . . .	III.	1875	Hollingsworth, Sumner . . . . .	II.	1876
Gooding, Charles S. . . . .	II.	1879	Holman, George U. G. . . . .	VI.	1889
Goodrich, Robert R. . . . .	III.	1883	Holman, Marie Glover . . . . .	V.	1881
Gould, Robert H. Metallurgy.		1876	Holman, Silas W. . . . .	VIII.	1876
Gray, Joseph P. . . . .	I.	1877	Holton, Edward C. . . . .	V.	1888
Greene, Charles E. . . . .	I.	1868	Homer, Eleazer B. . . . .	IV.	1885
Greene, Irving G. . . . .	I.	1888	Hongma, Aechirau . . . . .	I.	1874
Gross, Harold G. . . . .	VII.	1888	Hooker, Richard . . . . .	IV.	1889
Grover, Edmund . . . . .	I.	1877	Hopkins, Frederick L. . . . .	V.	1889
Guild, Frederick, Jr. Sci. and Lit.		1873	Hopkins, William J. . . . .	VI.	1886
Guppy, Benjamin W. . . . .	I.	1889	Horn, Henry J., Jr. . . . .	I.	1888
Gustin, George H. . . . .	III.	1883	Hosea, Raphael M. . . . .	I.	1879
Hadaway, William S., Jr. VIII.		1887	Howard, Charles P. . . . .	I.	1874

## LIST OF GRADUATES.

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NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Howe, Henry M. . . . .	III.	1871	Lewis, Wilfred . . . . .	II.	1875
Howe, Horace J. . . . .	I.	1879	Lewis, William W. . . . .	II.	1889
Hoves, Clarence L. . . . .	II.	1873	Lincoln, G. Russell . . . . .	III.	1871
Howland, Albert H. . . . .	I.	1871	Lindsay, William B. . . . .	V.	1881
Hoyt, William E. . . . .	I.	1868	Linzee, John W., Jr. . . . .	I.	1889
Hunt, Alfred E. . . . .	III.	1876	Livermore, William D. . . . .	V.	1887
Hunt, Harry H. . . . .	VI.	1889	Locke, Bradford H. . . . .	III.	1872
Huntington, William F. . . . .	I.	1875	Locke, Frank L. . . . .	I.	1886
Hussey, Oren S. . . . .	II.	1887	Lord, Frank H. . . . .	II.	1885
Hutchings, James H. . . . .	II.	1883	Loring, Fred. R. . . . .	VII.	1879
Hutchins, Edward S. . . . .	II.	1889	Loring, Harrison, Jr. . . . .	II.	1889
Ingalls, Walter R. . . . .	III.	1886	Loveland, James W. . . . .	V.	1888
Jackson, Frank H. . . . .	III.	1874	Low, Albert H. . . . .	V.	1876
Jacques, William W. . . . .	VIII.	1876	Low, John F. . . . .	V.	1882
James, Frank M. . . . .	II.	1888	Low, Wilson H. . . . .	V.	1886
James, Samuel, Jr. . . . .	III.	1876	Lufkin, Elgood C. . . . .	II.	1886
Jenkins, Charles D. . . . .	V.	1882	Lund, Amy Stantial . . . . .	V.	1884
Jenney, Walter . . . . .	III.	1877	Lund, James . . . . .	V.	1881
Jewett, William P. . . . .	I.	1873	Lyle, David A. . . . .	III.	1884
Johnson, James W. . . . .	I.	1882	Lynde, James P. . . . .	IX.	1886
Johnson, Lewis E. . . . .	II.	1889	Lyon, Tracy . . . . .	II.	1885
Johnson, William S. . . . .	I.	1889	Macfarlane, William W. . . . .	V.	1879
Jones, Arthur W. . . . .	VI.	1888	MacRae, Hugh . . . . .	III.	1885
Jones, Edward A. . . . .	II.	1887	Main, Charles T. . . . .	II.	1876
Jordan, Edwin O. . . . .	VII.	1888	Mann, Arthur S. . . . .	I.	1888
Jordan, William F. . . . .	I.	1886	Manning, Harry G. . . . .	II.	1882
Kebler, Julian A. . . . .	I.	1878	Mansfield, George W. . . . .	III.	1882
Kendall, Charles B. . . . .	V.	1887	Mansfield, Harvey M. . . . .	III.	1883
Kenney, C. Belle . . . . .	V.	1886	Martin, Henry . . . . .	V.	1885
Keough, William T. . . . .	II.	1888	Mason, Sampson D. . . . .	I.	1870
Kilham, Alfred C. . . . .	II.	1876	May, William C. . . . .	V.	1873
Kilham, Walter H. . . . .	IV.	1889	McKim, Alexander R. . . . .	I.	1886
Kimball, William A. . . . .	II.	1873	McLauthlin, George V. . . . .	V.	1888
Kinnicutt, Leonard P. . . . .	V.	1875	Merrell, Charles G. . . . .	V.	1888
Kinsman, Arthur D. . . . .	VIII.	1889	Merriam, Harry B. . . . .	I.	1886
Kirk, Joseph . . . . .	II.	1877	Merriam, Henry P. . . . .	VI.	1886
Kittredge, George W. . . . .	I.	1877	Merrill, Allyne L. . . . .	II.	1885
Knapp, Frederick B. . . . .	I.	1879	Merrill, Eben G. . . . .	I.	1885
Knapp, George F. . . . .	V.	1884	Merrill, N. Frederick . . . . .	V.	1870
Knapp, J. Austin . . . . .	II.	1876	Metcalf, Arthur H. . . . .	II.	1879
Koehler, Walter J. . . . .	V.	1881	Mildram, Samuel H. . . . .	I.	1889
Kunhardt, Lewis H. . . . .	II.	1889	Millen, Loring R. . . . .	III.	1880
Lane, Fred. H. . . . .	II.	1879	Miller, Edward F. . . . .	II.	1886
Lauder, George B. . . . .	VI.	1889	Miller, Edwin C. . . . .	II.	1879
Lawrence, John A. McC. . . . .	II.	1886	Miller, William T. . . . .	Elective.	1880
Laws, Frank A. . . . .	VI.	1889	Mills, Arthur L. . . . .	I.	1876
Lawton, Charles F. . . . .	I.	1877	Minot, Charles S. . . . .	V.	1872
Leach, Albert E. . . . .	II.	1886	Mixer, Samuel J. . . . .	VIII.	1875
Lee, George S. . . . .	I.	1888	Moore, Frank A. . . . .	IV.	1888
Lewis, Edwin J., Jr. . . . .	IV.	1881	Moore, Harry C. . . . .	II.	1888
Lewis, Theodore J. . . . .	II.	1876	Morgan, Frank H. . . . .	V.	1878

NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Morrison, Frank C. . . . .	I.	1882	Prentiss, Wm. A. Sci. and Lit.		1875
Morse, Frank B. . . . .	I.	1873	Prescott, Charles O. . . . .	V.	1884
Morse, Philip S. . . . .	III.	1884	Prichard, Charles F. . . . .	II.	1876
Morss, Everett . . . . .	III.	1885	Puffer, William L. . . . .	III.	1884
Mosman, Philip A. . . . .	III.	1887	Purinton, Arthur J. . . . .	II.	1884
Mott, William E. . . . .	I.	1889	Raeder, Henry . . . . .	I.	1876
Mower, George A. . . . .	II.	1881	Randall, Newbert M. . . . .	III.	1885
Mudge, Benjamin C. . . . .	I.	1877	Ranno, Fred W. . . . .	I.	1889
Mulliken, Samuel P. . . . .	V.	1887	Ray, John . . . . .	II.	1888
Mumford, Edgar H. . . . .	II.	1886	Reynolds, George F. . . . .	II.	1886
Munroe, James P. . . . .	III.	1882	Rice, Carrie L. . . . .	V.	1882
Myrick, Willis H. . . . .	II.	1874	Rich, Charles L. . . . .	I.	1876
Newell, Frederick H. . . . .	III.	1885	Rich, William J. . . . .	III.	1884
Nichols, Everell J. . . . .	I.	1878	Richards, Ellen H. . . . .	V.	1873
Nichols, William R. . . . .	V.	1869	Richards, Franklin B. . . . .	III.	1884
Nickerson, Addison D. . . . .	I.	1888	Richards, Robert H. . . . .	III.	1868
Nickerson, William E. . . . .	V.	1876	Richardson, Charles F. . . . .	II.	1886
Norris, George L. . . . .	III.	1887	Richardson, George L. . . . .	I.	1889
Norris, Webster . . . . .	III.	1881	Richardson, Herbert A. . . . .	V.	1887
Noyes, Arthur A. . . . .	V.	1886	Riggs, George F. . . . .	I.	1879
Nute, Joseph E. . . . .	I.	1885	Ripley, Henry L. . . . .	I.	1873
O'Grady, Marcella I. . . . .	IX.	1885	Ripley, William T. . . . .	II.	1882
Orday, Evelyn W. . . . .	V.	1881	Ritchie, James . . . . .	I.	1878
Owen, Edward H., Jr. . . . .	II.	1879	Robb, Russell . . . . .	VI.	1888
Oxnard, Benjamin A. . . . .	III.	1875	Robbins, Arthur G. . . . .	I.	1886
Parker, Theodore . . . . .	I.	1881	Roberts, Odin B. . . . .	II.	1883
Parsons, Charles O. . . . .	III.	1873	Robinson, C. Snelling . . . . .	III.	1884
Patch, Maurice B. . . . .	III.	1872	Robinson, Theodore W. . . . .	III.	1884
Patterson, Geo. W., Jr. . . . .	VI.	1887	Robinson, Thomas W. . . . .	III.	1876
Peabody, Cecil H. . . . .	II.	1877	Rollins, Edward W. . . . .	III.	1871
Pearson, Edwin R. . . . .	VI.	1888	Rollins, James W., Jr. . . . .	I.	1878
Perkins, Herbert B. . . . .	I.	1874	Ross, Henry F. . . . .	III.	1882
Peters, Quintard . . . . .	IX.	1887	Ross, John H. . . . .	Elective	1882
Peterson, Charles A. . . . .	VI.	1888	Rotch, A. Lawrence . . . . .	II.	1884
Phillipps, George . . . . .	III.	1873	Rounds, George W. . . . .	VI.	1889
Phillips, Henry A. . . . .	IV.	1873	Russel, Richard L. . . . .	I.	1889
Phipps, David W. . . . .	Phil.	1876	Russell, L. Kimball . . . . .	V.	1886
Pickering, William H. . . . .	VIII.	1879	Ryder, Josiah P. . . . .	V.	1884
Pickernell, Frank A. . . . .	VI.	1885	Sabine, Annie W. . . . .	VIII.	1888
Pierce, Edward L., Jr. . . . .	II.	1886	Safford, Frederick H. . . . .	VI.	1888
Pierce, Herbert F. . . . .	I.	1888	Sanborn Frank E. . . . .	II.	1889
Pierce, Richard H. . . . .	VI.	1885	Sargent, Francis T. . . . .	II.	1875
Pike, Clayton W. . . . .	VI.	1889	Sargent, Welland F. . . . .	I.	1875
Pike, William A. . . . .	I.	1871	Sauveur, Albert . . . . .	III.	1889
Plimpton, Arthur L. . . . .	I.	1877	Sawin, Chas. D. Sci. and Lit.		1878
Plimpton, Thomas D. . . . .	II.	1875	Sawyer, Alfred H. . . . .	II.	1888
Pond, Frank H. . . . .	II.	1874	Sawyer, Charles A. Sci. and Lit.		1876
Pool, George B. . . . .	VI.	1888	Sayer, Frederick L. . . . .	II.	1888
Power, Charles W. . . . .	VI.	1889	Schwamb, Peter . . . . .	II.	1878
Pratt, George H. . . . .	V.	1871	Schwarz, Franz H. . . . .	II.	1887
Prentiss, Frederick H. . . . .	II.	1878	Schwarz, Theodore E. . . . .	III.	1876

NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Scott, Robert W.	II.	1883	Stone, George G.	III.	1889
Sears, Henry D.	VI.	1887	Stone, Joseph	I.	1868
Sears, Walter H.	I.	1868	Story, Isaac M.	I.	1878
Seavey, John F.	II.	1886	Stoughton, Augustus B.	II.	1886
Shailer, Robert A.	I.	1873	Sturgis, Elliot T.	III.	1884
Shaw, Edward S.	I.	1874	Sully, John M.	VI.	1888
Shaw, Walter K.	II.	1888	Susmann, Julius H.	III.	1876
Shed, Nathaniel W.	V.	1881	Swain, George F.	I.	1877
Shepard, Edward V.	I.	1889	Sweetland, Ralph	II.	1889
Shepard, Frank E.	II.	1887	Sweetser, Arthur W.	I.	1874
Shepard, Walter	I.	1872	Taintor, Giles	VI.	1887
Shepard, William E.	VI.	1886	Talbot, Henry P.	V.	1885
Shockley, William H.	III.	1875	Talbot, Marion	IX.	1888
Sillsbee, Francis H.	II.	1874	Taney, Edmund	I.	1878
Simpson, James E.	III.	1886	Taylor, William M.	II.	1886
Sjöström, Ivar L.	I.	1888	Tenney, Frank	III.	1883
Small, Nathaniel C.	V.	1880	Thomas, Edward G.	II.	1887
Smith, Charles A.	I.	1868	Thompson, Frederick	I.	1887
Smith, Charles P.	II.	1887	Thompson, Sanford E.	I.	1889
Smith, Clarence W.	V.	1888	Thompson, Walter S.	I.	1887
Smith, Edward M.	II.	1888	Thorp, Frank H.	V.	1889
Smith, George A.	V.	1883	Thurber, William B.	IX.	1889
Smith, Harry E.	V.	1887	Tilden, Bryant P.	III.	1868
Smith, J. Waldo	I.	1887	Tillinghast, Theodore F.	I.	1870
Smith, Walter W.	II.	1871	Tinkham, Samuel E.	I.	1873
Snead, William R.	IV.	1881	Tolman, James P.	III.	1868
Snelling, Grenville T.	IV.	1882	Tompkins, Charles H., Jr.	III.	1883
Snow, Walter B.	II.	1882	Towne, Linwood O.	III.	1878
Snow, William G.	II.	1889	Towne, Walter I.	VI.	1888
Soule, Richard H.	II.	1872	Townsend, Walter D.	III.	1876
Souther, Henry, Jr.	III.	1877	Trowbridge, Almarin, Jr.	II.	1871
Southworth, Harry C.	III.	1877	Truesdell, Arthur E.	VI.	1889
Spalding, Frederic P.	I.	1878	Tucker, Greenleaf R.	V.	1887
Spaulding, Hollon C.	II.	1887	Tucker, H. Judson	VI.	1887
Sprague, Timothy W.	III.	1887	Turnbull, Charles D.	II.	1886
Stafford, C. Edward	III.	1873	Turner, Edmund K.	I.	1870
Stantial, Frank G.	V.	1879	Twombly, Alexander H.	II.	1887
Stantial, Otis T.	III.	1885	Tyler, Alice Brown	V.	1884
Stanwood, James B.	II.	1875	Tyler, Harry W.	V.	1884
Stanwood, James H.	I.	1887	Underhill, William W.	II.	1889
Stearns, Harold E.	II.	1881	Underwood, George R.	V.	1883
Stearns, William S.	I.	1879	Van Alstine, David	II.	1886
Stebbins, Alfred, Jr.	III.	1884	Vanier, George P.	III.	1885
Stebbins, Theodore	VI.	1886	Very, Frank W.	V.	1873
Stetson, Frank O.	V.	1888	Vielé, Maurice A.	II.	1886
Stewart, Chas. E.	I.	1877	Vorce, Clarence B.	I.	1888
Stickney, Delia	V.	1889	Vose, Ralph	VI.	1887
Stimpson, Thomas F.	III.	1877	Waite, Charles N.	V.	1876
Stoddard, Henry F.	II.	1887	Waitt, Arthur M.	II.	1879
Stone, Charles A.	VI.	1888	Waitt, Henry M.	I.	1876
Stone, Charles F.	III.	1871	Ward, Clarence S.	III.	1872



NAME.	COURSE.	CLASS.	NAME.	COURSE.	CLASS.
Ward, Nahum . . . .	V.	1884	Wilkes, Charles M. . . .	IV.	1881
Ware, Robert C. . . .	Sci and Lit.	1874	Willard, Daniel W. . . .	II.	1870
Warner, Charles H. . . .	VI.	1889	Williams, Arthur S. . . .	VI.	1888
Warren, A. Sydney . . . .	III.	1888	Williams, Emile F. . . .	I.	1878
Warren, Edward R. . . .	VII.	1881	Williams, Francis C., Jr. . . .	I.	1884
Warren, H. L. J. . . .	III.	1875	Williams, Francis H. . . .	V.	1873
Webster, Edwin S. . . .	VI.	1888	Williams, Robert C. . . .	III.	1889
Webster, William R. . . .	III.	1875	Williams, Sidney . . . .	I.	1887
Weeks, Isaiah S. P. . . .	I.	1871	Williston, Arthur L. . . .	II.	1889
Weil, Charles L. . . .	II.	1888	Wilson, Elwood J. . . .	III.	1886
Wells, Webster . . . .	I.	1873	Windett, Victor . . . .	II.	1889
Wesson, David . . . .	V.	1883	Winslow, Arthur . . . .	III.	1881
Whipple, George C. . . .	I.	1889	Wood, Charles . . . .	I.	1886
Whitaker, Channing . . . .	II.	1869	Wood, Frederick W. . . .	III.	1877
White, Anthony C. . . .	VIII.	1882	Wood, Henry B. . . .	I.	1876
Whiting, Jasper . . . .	III.	1889	Wood, Louis F. . . .	V.	1873
Whitmore, Walter G. . . .	VI.	1887	Woodbury, Charles H. . . .	II.	1886
Whitney, Frank P. . . .	VI.	1889	Woodman, Caroline A. . . .	VII.	1889
Whitney, Granger . . . .	III.	1887	Woodward, Amos E. . . .	III.	1888
Whitney, William A. . . .	I.	1887	Woolworth, James G. . . .	V.	1878
Whitney, William M. . . .	II.	1884	Worcester, Venor F. . . .	II.	1886
Whittier, Randal . . . .	V.	1871	Worthington, Erastus, Jr. . . .	I.	1885
Wiggin, Frank E. . . .	I.	1877	Wrinkle, Laurence F. J. . . .	III.	1870
Wilcox, Herbert A. . . .	III.	1887	Wuichet, Walter G. . . .	II.	1889
Wilder, C. Morris . . . .	VI.	1886	Young, Fred. R. . . .	III.	1886
Wilder, Steph. H. . . .	Sci. and Lit.	1874	Young, John E. . . .	I.	1888

## Titles of Theses

OF SUCCESSFUL CANDIDATES FOR THE DEGREE OF  
BACHELOR OF SCIENCE, MAY, 1889.

---

- GEORGE MARSHALL BASFORD,  
An Experimental Study of the Deflection of Parallel Rods at Different Speeds. (*With E. V. French.*)
- EDWARD JAMES BEACH,  
The Estimation of the Glycerine present in Soap Lye, and a Comparison of the Methods for its Recovery.
- ARTHUR BENJAMIN BELLOWS,  
An Investigation of the Strength of Eyes, as used in Boiler Stays.
- WILLARD GOLDTHWAITE BIXBY,  
Experiments on the Strength of Cast-Iron Gear-Teeth.
- ZENAS WORK BLISS,  
Some Tests on the Tensile Strength and Modulus of Elasticity of Hard-Drawn Copper Wire.
- CHARLES NEWTON BORDEN,  
Tests on a *Wright* Compound Engine at the Troy Cotton and Woollen Manufactory, Fall River, Mass. (*With N. Durfee.*)
- FREDERICK WILLIAM BRADLEY,  
An Experimental Study of a Weston Dynamo Machine. (*With H. H. Hunt.*)
- FREDERICK HUBBARD BRAINERD,  
Experiments on the *Ruby Basin* Gold and Silver Ores, to find a Working Process.
- LUTHER WADSWORTH BRIDGES,  
An Experimental Investigation of the Friction and Breaking Strength of U. S. Standard Bolts and Nuts. (*With R. Sweetland.*)
- JOSEPH NORMAN BULKLEY,  
The Efficiency of Alternating Current Transformers. (*With G. B. Lauder.*)

- FRANK HARVEY CILLEY,  
Methods of Operating High Grades and Steep Inclines on Railways.
- FRED CRABTREE,  
The Direct Determination of Aluminum in Iron Alloys.
- HENRY ADAMS CRAIGIN,  
Some Questions Concerning the Transmission of Power by Ropes.  
(*With W. G. Snow.*)
- CHARLES HAMMOND CROMWELL,  
Experiments on Carding under Varying Conditions.
- ROLAND NORCROSS CUTTER,  
Projects for Improving the Drainage of Low Districts in Boston.
- FRANK LIBBY DAME,  
An Investigation of the Motions of the Electrodes of the Microphone Transmitter.
- WILLIAM SEAVER DAVENPORT,  
The Action of Phosphoric Anhydride and Alcohols on Aromatic Bases.
- ARTHUR LINCOLN DAVIS,  
Some Tests on the Motive Power of a Cable Railroad.
- CHARLES BENJAMIN DODGE,  
A History of the French Customs.
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