

M. I. T. ANNUAL CATALOGUES AND BULLETINS
1888/89

01 OF 02

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

TWENTY-FOURTH
ANNUAL CATALOGUE

OF THE

OFFICERS AND STUDENTS,

WITH A

STATEMENT OF THE COURSES OF INSTRUCTION,

AND A LIST OF THE ALUMNI.

1888-1889.

BOSTON:
THOMAS TODD, PRINTER, CONGREGATIONAL HOUSE,
CORNER BEACON AND SOMERSET STREETS.

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1888.

CALENDAR FOR 1888-89.

School year began Monday, Sept. 24, 1888.
Second term will begin Tuesday, Jan. 29, 1889.
Degrees conferred Tuesday, May 28, 1889.
First Entrance Examinations { Thursday, May 30, 1889, and
Friday, May 31, 1889.
Second Entrance Examinations { Tuesday, Sept. 24, 1889, and
Wednesday, Sept. 25, 1889.
Examinations for Advanced Standing . . . Thursday, Sept. 26, 1889.
School year of 1889-90 will begin . . . Monday, Sept. 30, 1889.

CALENDAR FOR 1889-90.

School year will begin 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.

CONTENTS.

| | PAGE. |
|--|-------|
| Calendar , on opposite page, and, also, at page | 104 |
| Alphabetical Index | 183 |

MASSACHUSETTS INSTITUTE OF TECHNOLOGY :

| | |
|--|----|
| Brief Account of its Establishment | 6 |
| List of Members of the Corporation | 8 |
| List of Executive and Visiting Committees | 9 |
| Officers of Instruction | 12 |
| Faculty | 17 |
| Courses of Instruction : | |
| Regular Courses : General Statement and List | 18 |
| Regular Courses : Statements, and Schedules of Studies | 21 |
| Partial Course in Architecture | 28 |
| Five-Years' Regular Course | 42 |
| Advanced Courses | 42 |
| Special Courses | 43 |
| Requirements for Graduation | 44 |
| Requirements for Admission : | |
| Times of Examinations : | |
| For Admission to 1st Year | 44 |
| For Advanced Standing | 45 |
| Requirements : Regular Course, 1st Year | 45 |
| Requirements : Regular Course, 2d, 3d, and 4th Years | 49 |
| Requirements : Special Courses | 50 |
| Divided Examinations | 48 |
| Methods and Apparatus of Instruction : | |
| Ordinary Exercises | 51 |
| Written Examinations | 51 |

| | PAGE. |
|--|-------|
| Methods and Apparatus of Instruction (continued): | |
| Instruction in Mathematics | 52 |
| Instruction in Descriptive Geometry | 53 |
| Instruction in Drawing | 53 |
| Instruction in Modern Languages | 53 |
| Instruction in English | 54 |
| Instruction in History and Political Science | 54 |
| Instruction in Chemistry | 55 |
| The Kidder Laboratories of Chemistry | 58 |
| Instruction in Physics | 59 |
| The Rogers Laboratory of Physics | 60 |
| Instruction in Theoretical and Applied Mechanics | 61 |
| Laboratory of Applied Mechanics | 61 |
| Instruction in Civil Engineering | 62 |
| Instruction in Mechanical Engineering | 66 |
| Laboratory of Mechanical Engineering | 67 |
| Instruction in Shopwork | 69 |
| Mining and Metallurgical Laboratories | 69 |
| Instruction in Architecture | 72 |
| Architectural Museum | 73 |
| Instruction in Electrical Engineering | 73 |
| Instruction in Biology | 75 |
| Biological Laboratory | 77 |
| Instruction in Mineralogy | 77 |
| Instruction in Geology and Physical Geography | 78 |
| Instruction in Climatology | 80 |
| Instruction in Chemical Engineering | 80 |
| Instruction in Military Science and Tactics | 81 |
| Libraries | 82 |
| Schedule of Topics of Instruction | 83 |
| Regulations of the School: | |
| School Year | 104 |
| Calendar | 104 |
| Status of Students | 104 |
| Examinations | 104 |
| Attendance Paper | 105 |
| Bond or Deposit | 106 |
| Fees | 106 |
| Scholarships | 106 |
| Graduate Scholarships | 107 |
| Residence and Expenses | 107 |
| Attendance | 108 |
| Discipline | 108 |
| Register of Students: | |
| Graduate Students | 109 |
| Regular Students | 111 |

CONTENTS.

5

| | PAGE. |
|--|------------|
| Register of Students (continued) : | |
| Special Students | 124 |
| Summary | 133 |
| Students in School of Mechanic Arts | 134 |
| FREE COURSES OF INSTRUCTION : | |
| Objects and Scope | 135 |
| Conditions of Attendance | 135 |
| Subjects for 1888-89 | 136 |
| LOWELL FREE SCHOOL OF PRACTICAL DESIGN : | |
| Brief Account of the School | 137 |
| Course of Study | 137 |
| Requirements for Admission | 138 |
| Regulations of the School | 138 |
| Register of Students | 139 |
| ASSOCIATIONS OF THE ALUMNI : | |
| Alumni Association | 141 |
| Northwestern Association | 141 |
| Western Association | 141 |
| GRADUATES AND THEIR PRESENT OCCUPATIONS : | |
| List by Classes | 142 |
| Alphabetical List | 171 |
| TITLES OF THESES OF CLASS OF 1888 | 178 |

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

Historical Sketch. The foundation of the Massachusetts Institute of Technology was laid in a report by Professor 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 and chemical 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.

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.

TWO SUBSIDIARY SCHOOLS have been organized under the control of the Corporation of the Institute: one, the Lowell School of Practical Design, whose object and organization, with a list of present students, will be found by reference to p. 4; the other, the School of Mechanic Arts, which is essentially a high school with some of the familiar studies replaced by instruction in mechanical and free-hand drawing, and in carpentry, wood and iron turning, pattern-making, forging, chipping and filing, etc. The latter school will, by vote of the Corporation, be discontinued at the expiration of the current year.

Buildings. The buildings now occupied are, (1) the Rogers Building, on Boylston Street, devoted to the engineering departments and to instruction in mathematics, mechanics, literature, history, political science, geology, mineralogy, and physiology; (2) the New Building, corner of Boylston and Clarendon Streets, mainly devoted to the departments of chemistry, physics, electrical and civil engineering, and architecture, and to instruction in language; (3) a series of mechanical laboratories or workshops, with a room devoted to the Lowell School of Design; (4) a gymnasium and drill hall on Exeter Street.

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JAMES W. LOVELAND, S.B.,
Assistant in Analytical Chemistry.

AMOS E. WOODWARD, S.B.,
Assistant in Geology.

ALFRED J. WAKEMAN, Ph.B.,
Assistant in Chemical Analysis.

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- THEODORE B. MERRICK,
Instructor in Wood-work and Foundry-work.
- JAMES R. LAMBIRTH,
Instructor in Forging.
- ROBERT H. SMITH,
Instructor in Machine-Tool work.
- JOHN W. RAYMOND, JR.,
Assistant in Forging.
- CHARLES H. WESTCOTT,
Assistant in Wood-work.
- WILLIAM S. CARPENTER,
Assistant in Machine-Tool work.
-

LECTURERS FOR THE CURRENT YEAR.

- GEORGE W. BLODGETT, S.B., *on Applications of Electricity to Railway Working.*
- HENRY M. HOWE, A.M., S.B., *on Metallurgy.*
- C. HOWARD WALKER, *on History of Ornament.*
- 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.*
- ELIOT HOLBROOK, S.B., *on Railroad Maintenance.*
- DAVID A. GREGG, *on Fine Art.*
- ANTHONY C. WHITE, S.B., *on the Distribution of Electricity for Commercial Purposes.*
- EDWARD BLAKE, PH.B., *on the Construction and Applications of Electro-motors.*

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COURSES OF INSTRUCTION.

The SCHOOL OF INDUSTRIAL SCIENCE of 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 p. 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.

| | | |
|-------|---|--------|
| I. | CIVIL AND TOPOGRAPHICAL ENGINEERING | p. 22. |
| II. | MECHANICAL ENGINEERING | p. 24. |
| III. | MINING ENGINEERING | p. 26. |
| IV. | ARCHITECTURE | p. 28. |
| V. | CHEMISTRY | p. 30. |
| VI. | ELECTRICAL ENGINEERING | p. 32. |
| VII. | NATURAL HISTORY | p. 34. |
| VIII. | PHYSICS | p. 36. |
| IX. | GENERAL COURSE | p. 38. |
| X. | CHEMICAL ENGINEERING | p. 40. |

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 21), 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 (pp. 23 to 41), 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," pp. 51 to 82; and by referring, at the same time, to the "Schedule of Topics," pp. 83 to 104.

Options. Within each of these regular courses the student is given a considerable latitude of choice 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, p. 23, he may elect either Sanitary Engineering, Railroad Engineering and Management, or Geodesy; in Mechanical Engineering, p. 25, he may choose either Marine Engineering, Locomotive Construction, or Mill Engineering; and similarly for other courses. Inspection of the course—descriptions and schedules, pp. 23 to 41, 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 others; 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, pp. 83 to 104.

Advanced Courses of study may be pursued either with or without reference to the advanced degrees authorized by the Corporation. (See p. 42.)

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 p. 42.

Methods and Apparatus of Instruction. The statements on pp. 51 to 83 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 p. 83.)

REGULAR COURSES.

SCHEDULES OF PRESCRIBED AND OPTIONAL STUDIES.

FIRST YEAR.

COMMON TO ALL REGULAR COURSES.

| FIRST TERM. | SECOND TERM. |
|---|--|
| Solid Geometry. Algebra. General Chemistry. Chemical Laboratory. History of the English Language. English Composition. French (or German). Mechanical and Freehand Drawing. Military Drill. | Plane and Spherical Trigonometry. General Chemistry. Chemical Laboratory. Political History since 1815. French (or German). Mechanical and Freehand Drawing. Military Drill. |

For descriptions of the methods, etc., used in the above instruction, see pp. 51 to 56, and p. 81.

I.—CIVIL ENGINEERING.

This course is designed to give the student a training, both theoretical and practical, in the sciences and principles upon which the sound 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 of direction in 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, advanced surveying, together with the elements of construction, design, and the strength of materials, are taken up. Courses in the elements of mechanism, slide valve, and link motion, are also given during the second and third years. In the fourth year the student takes up the subjects of bridges, hydraulics, sanitary engineering, design, and strength of materials, as well as the advanced courses in railroads and geodesy.

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 pp. 62 to 66; and of the other topics, on pp. 51 to 83.

I.—CIVIL ENGINEERING.

| SECOND YEAR. | |
|---|---|
| FIRST TERM. | SECOND TERM. |
| Surveying and Drawing. Topographical Drawing. Descriptive Geometry. Descriptive Astronomy. Analytical Geometry. Physics. Political Economy. German. | Surveying and Drawing. Differential Calculus. Physics. Physical Geography. English Prose. German. <i>Options :</i> 1, 2. Elements of Mechanism. 3. Mineralogy. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Railroad Engineering, with Field-work and Drawing. Stereotomy. Advanced Surveying. Integral Calculus. General Statics. Physics : Lectures and Laboratory. Structural Geology. German. Literature. <i>Options :</i> 1, 2. Slide Valve and Link Motion. 3. Chemical Geology. | Railroad Engineering, with Field-work and Drawing. Advanced Surveying. Elements of Construction. Elementary Design. Spherical and Practical Astronomy. Physical Laboratory. Historical Geology. German. Strength of Materials. Kinematics and Dynamics. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Principles of Construction. Bridges and Roofs. Hydraulics. Sanitary and Hydraulic Field-work. Strength of Materials. Metallurgy of Iron. <i>Options :</i> 1. { Sanitary Engineering. { Bridge Design. { Railroad Management. 2. { Railroad Engineering and Management. { Bridge Design. { Least Squares. 3. { Geodesy. { Physical Laboratory. | Principles of Construction. Bridges and Roofs. European History. Thesis Work. <i>Options :</i> 1. { Hydraulic Engineering. { Machinery and Motors. { Bridge and Sanitary Design. { Bacteriology. 2. { Railroad Engineering. { Machinery and Motors. { Bridge Design. 3. { Hydraulic Engineering. { Geodesy and Map Projection. { Determinants. { Differential Equations. |

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 groundwork upon which to base a professional career. The more strictly professional work of the course may be classified as follows:—

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

2. 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, 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. An option is given among courses on marine engineering, locomotive construction, and mill engineering.

3. 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.

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

5. Mechanical 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 pp. 66-69, 61-62, and 51-60.)

II. — MECHANICAL ENGINEERING.

| FIRST YEAR. | |
|--|---|
| Same for all Courses. See p. 21. | |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Principles of Mechanism. Construction of Gear Teeth. Drawing. Carpentry and Wood Turning (shopwork). Analytic Geometry. Descriptive Geometry. Physics. Political Economy. German. | Mechanism of Mill Machinery. Mechanism of Shop Machinery. Drawing. Pattern Work (shopwork). Differential Calculus. Physics. English Prose. German. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Slide Valve. Link Motion. Thermodynamics. Steam Engineering. Drawing, Design, and Surveying. Forging (shopwork). Integral Calculus. General Statics. Physics: Lectures and Laboratory. German. | Steam Engineering. Drawing, Design, and Surveying. Mech. Engineering Laboratory. Forging, Chipping, and Filing (shopwork). Kinematics and Dynamics. Strength of Materials. Physical Laboratory. European History. German. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Mechanical Engineering. Hydraulics. Machine Design. Mech. Engineering Laboratory. Engine Lathe Work (shopwork). Strength of Materials. Metallurgy. Heating and Ventilation. <i>Options.</i> 1. Marine Engineering. 2. Locomotive Construction. 3. Mill Engineering. | Hydraulic Engineering. Mech. Engineering Laboratory. Engine Lathe Work (shopwork). Strength and Stability of Structures. Theory of Elasticity. Constitutional History. Thesis Work. <i>Options.</i> 1. Marine Engineering. 2. Locomotive Construction. 3. Mill Engineering. |

III.—MINING ENGINEERING.

This course is planned to prepare students for Mining, Geology, and Metallurgy, in accordance with the present demand for men. It is therefore laid out with three options. The first, for mine engineers, includes courses in calculus, applied mechanics, and motors. The second emphasizes the geological subjects, and leads towards the surveying of geological deposits, with special reference to their economical value. The third is devoted to the metallurgical and chemical sides of the profession.

The instruction in mining includes a course of lectures on the general character of the various deposits of useful minerals, and on the theory and practice of mining operations, such as prospecting, boring, sinking of shafts, driving of levels, different methods of working, hoisting, pumping, ventilation, etc. Ore-dressing and metallurgy are taken up in a course of lectures, accompanied by a series of continuous practical exercises in the mining and metallurgical laboratories in the concentration and smelting of ores. (See p. 69.)

A large amount of time is devoted in this course to chemistry, especially in its application to the analysis of inorganic compounds. A description of the methods is given on pp. 55 and 56.

After the first term of the second year, the study of mathematics and applied mechanics (see pp. 52 and 61) is confined to those following the first option, students in the second option devoting themselves throughout the remainder of the course more particularly to physical, chemical, geological, and zoölogical work, while those in the third make a specialty of metallurgy and metallurgical chemistry.

During the second and third year, German, physics, mineralogy, and geology are prescribed; and courses in physical geography, biology, history, etc., are laid down in the several options. (See pp. 69 and 51.)

III.—MINING ENGINEERING.*

| FIRST YEAR. | |
|--|--|
| Same for all Courses. See p. 21. | |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Chemical Analysis. Physics. German. Analytic Geometry. Surveying. Drawing. Blowpipe Analysis. | Chemical Analysis. Physics. German. Mineralogy and Blowpipe Analysis. <i>Options.</i> 1. Surveying; Diff. Calculus. 2. Physical Geography; Microscopy; Chemistry. 3. Surveying; Physical Geography; Chemistry. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Chemical Analysis. Geology. German. Mining. Physics : Lectures. <i>Options.</i> 1. Chemistry; Integral Calculus and Applied Mechanics. 2. Chemistry; Literature; Physical Laboratory; Zoölogy and Palæontology. 3. Literature; Analytical Methods; Physical Laboratory; Theoretical Chemistry. | Chemical Analysis. Assaying. German. Mining. Geology. European History. <i>Options.</i> 1. Applied Mechanics. 2. Chemistry; Physical Laboratory; Zoölogy and Palæontology. 3. Chemistry; Physical Laboratory. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Chemical Analysis. Mining Laboratory. Political Economy. Ore Dressing. Metallurgy. Memoirs. <i>Options.</i> 1. Applied Mechanics. 2. Special Geological Work. 3. Special Metallurgical Work. | Chemical Analysis. Political Economy. Metallurgy. Memoirs. <i>Options.</i> 1. Mining Laboratory; Motors. 2. Special Geological Work. 3. Mining Laboratory; Motors. |

* An extensive revision of this course is in progress.

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 pp. 52 and 61.)

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 gone over. Practice in architectural design is continued throughout the course. Instruction is given in sketching in black and white and water color, and 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. |
| Mechanical and Freehand Drawing. | Mechanical and Freehand Drawing. |
| Orders. | Graphical Statics. Materials. |
| Pencil Sketching. | Architectural History. |
| Pen and Ink. | Pen and Ink. |
| Architectural History. | Shades, Shadows, and Perspective. |
| German or French. | Charcoal Sketching. |
| Solid Geometry. | Original Design. |
| Logarithms. Plane Trigonometry. | German or French. |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Descriptive Geometry. | Stereotomy. |
| Heating and Ventilation. | Iron Construction. |
| Working Drawing. Specifications. | Schools, Theatres, and Churches. |
| Pen and Ink. | Problems in Construction. |
| Water Color Sketching. | Pen and Ink. |
| Problems in Construction. | Specifications and Contracts. |
| History of Ornament. | History of Ornament. |
| Original Design. | Water Color Sketching. |
| Lectures on the Fine Arts. | Original Design. |
| German or French. | German or French. |

See pp. 51, 72, and 50.

IV.—ARCHITECTURE.

| SECOND YEAR. | |
|---|--|
| FIRST TERM. | SECOND TERM. |
| Analytic Geometry. Descriptive Geometry. Political Economy. German. Physics. Architectural History. Orders. Pencil Sketching. Pen and Ink. | Differential Calculus. English Prose. German. Physics. Architectural History. Materials. Shades, Shadows, and Perspective. Pen and Ink. Charcoal Sketching. Original Design. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Integral Calculus. Applied Mechanics. German. Physics. Structural Geology. Working Drawings. Water Color Sketching. Pen and Ink. Original Design. | Applied Mechanics. European History. German. Physical Laboratory. Iron Construction. Stereotomy. Surveying. Water Color Sketching. Pen and Ink. Original Design. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Applied Mechanics. Advanced French. Acoustics. Heating and Ventilating. History of Ornament. Specifications. Problems in Construction. Water Color Sketching. Modeling. Lectures on Fine Arts. Original Design. | Constitutional History. Language. Specifications and Contracts. Problems in Construction. Schools, Theatres, Churches. History of Ornament. Modeling. Water Color Sketching. Original Design: Thesis Work. |

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 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 of 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 obliged 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 pp. 55-59.

V.—CHEMISTRY.

| FIRST YEAR. | |
|---|--|
| Same for all Courses. See p. 21. | |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Chemical Analysis. Theoretical Chemistry. Physics. German. Political Economy. Analytic Geometry. | Chemical Analysis. Mineralogy and Blowpipe Analysis. Physics. German. English Prose. <i>Options.</i> Differential Calculus. { Physical Geography. { Microscopy. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Chemical Analysis. Analytical Methods. Industrial Chemistry. Physics: Lectures and Laboratory. German. Literature. <i>Options.</i> Integral Calculus. Geology. General Physics (Electricity). Sanitary Chemistry. Industrial Chemistry. | Chemical Analysis. Theoretical Chemistry. Industrial Chemistry. Physical Laboratory. German. European History. <i>Options.</i> Physics. Geology. Sanitary Chemistry. Industrial Chemistry. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Chemical Analysis. Abstracts. Organic Chemistry. Physics. Metallurgy. <i>Options.</i> Physics. Language. Sanitary Chemistry. Textile Coloring. <i>Laboratory Options.</i> Analytical Laboratory. Organic Laboratory. Metallurgical Laboratory. Industrial Laboratory. | Organic Chemistry. Thesis Work. |

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, mathematics, and mechanical engineering.

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 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 middle of the second 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 the third year. Work in the physical laboratory commences 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, 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 pp. 59-61, 41, and 74.)

VI.—ELECTRICAL ENGINEERING.

| FIRST YEAR. | |
|---|--|
| Same for all Courses. See p. 19. | |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Physics : Lectures. Mechanics and Acoustics. Analytic Geometry. Descriptive Geometry. Mechanism. Carpentry and Wood-turning. Political Economy. German. | Physics : Lectures. Physical Laboratory. Acoustics. Differential Calculus. Mechanism. Drawing. Metal Turning. English Prose. German. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Physics : Lectures and Laboratory. Electricity : Readings. Integral Calculus. General Statics. Mechanical Engineering. Drawing. Literature. German. | Physical Lab. : Heat, Electricity. Electricity : Readings. Kinematics and Dynamics. Strength of Materials. Mechanical Engineering. Mech. Engineering Laboratory. Drawing. European History. German. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Technical Applications of Electricity to Telegraph, Telephone, Electric Lighting, etc. : Lectures. Phys. Lab. : Electrical Testing and Construction of Instruments. Testing of Telegraph Lines, Dynamo Machines, etc. Advanced Physics : Memoirs, etc. Photometry. Method of Least Squares. Mechanical Engineering. Mech. Engineering Laboratory. Applied Mechanics, Thermodynamics, Hydraulics, etc. | Technical Applications of Electricity. Advanced Physics, Memoirs, etc. Physical Research. Differential Equations. Calculus of Variations. Mech. Engineering Laboratory. Discussion of the Precision of Measurements. <i>Options.</i> 1. Quaternions. 2. Physical Laboratory. 3. Theory of Potential. |
| NOTE.—The student is advised to take Advanced German. | |

VII.—NATURAL HISTORY.

The object of this course is to afford a general education in the natural sciences,—physiology, zoölogy, mineralogy, geology, botany, bacteriology, etc.,—and in addition special opportunities in either biology or geology. It is intended (1) for those who are preparing for medical studies; (2) for those who wish to become specialists (geologists, zoölogists, bacteriologists, etc.); (3) for those who wish to fit themselves for teachers of, or desire a general education in, the natural sciences.

The two main divisions of the course are Biology, treating of plants, the lower animals, and man (living things); and Geology, dealing with the history of the earth, rocks, minerals, fossils, etc. (lifeless things). Beginning with a substantial foundation of chemistry, physics, drawing, and the modern languages, the subjects peculiar to the course are early introduced, although history, political economy, and literature receive due emphasis as essentials to broad training or auxiliaries to the scientific studies (see pp. 53 to 61).

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 professional study of medicine. To this end the student of biology is made familiar, not only with the essentials of physics and chemistry, but also with the comparative anatomy and physiology of the lower animals, especially vertebrates, and with bacteriology (see p. 75).

Abundant opportunities are secured for practical laboratory studies in the geological, biological, and mineralogical laboratories (see p. 77), while somewhat unusual advantages are offered by the library and museum of the Boston Society of Natural History (see p. 78).

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.

VII.—NATURAL HISTORY.

| FIRST YEAR. | |
|--|--|
| Same for all Courses. See p. 21. | |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Physics. Chemical Analysis. General Biology. Political Economy. German. 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. | Comparative Anatomy and Embryology. Physics. English Prose. Physical Geography. German. <i>Options.</i> 1. Volumetric Analysis and Sanitary Chemistry. 2. { Mineralogy and Blowpipe Analysis. { Natural History: Field Work. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Structural Geology. Physics. Zoölogy and Palæontology. English Literature. German. Botany (Cryptogamic). Natural History: Field Work. <i>Options.</i> 1. Biological Laboratory. 2. Geological Laboratory. | Historical Geology. Physical Laboratory. Zoölogy and Palæontology. Botany (Systematic). European History. German. Natural History: Field Work. <i>Options.</i> 1. Biological Laboratory. 2. Geological Laboratory. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| History of the Natural Sciences. Advanced German. Climatology. Higher Biology. Bibliography: Abstracts. Natural History: Field Work. <i>Options.</i> 1. { Comparative Physiology. { Microscopic Anatomy. 2. Geological Research. | Bacteriology. History of the Natural Sciences. The Teaching of Natural History. Advanced German. Natural History: Field Work. Higher Biology. Thesis Work. <i>Options.</i> 1. { Comparative Physiology. { Microscopic Anatomy. 2. Geological Research. |

VIII.—PHYSICS.

As distinguished from the professional or technical courses, e.g., those in Engineering, Architecture, etc., there are offered by the Institute courses of a purely scientific nature, of which this is one. It contains a series of studies adapted to those who wish to become teachers of physics, or who desire to begin upon a course in pure science 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, and organic chemistry, and chemical analysis, 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.

The 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 pp. 51-61.)

VIII.—PHYSICS.

| FIRST YEAR. | |
|--|--|
| Same for all Courses. See p. 21. | |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Physics: Lectures. Mechanics and Acoustics. Analytic Geometry. Chemical Analysis. Theoretical Chemistry. Descriptive Astronomy. Political Economy. German. | Physics: Lectures. Physical Laboratory. Acoustics and Electricity. Differential Calculus. Microscopy. English Prose. German. <i>Options.</i> 1. Chemistry. 2. General Theory of Equations and Determinants. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Physics: Lectures and Laboratory. Optics or Electricity: Readings. Integral Calculus. General Statics. Physical Laboratory. Literature. German. <i>Options.</i> 1 { Chemistry. Physiology of the Senses, or Shopwork. 2 { Analytic Geometry of Three Dimensions, or Advanced Algebra and Trigonometry. Physiology of the Senses, or Shopwork. | Physical Laboratory: Heat, Electricity, Optics, Electricity, or Heat: Readings. Kinematics and Dynamics. Strength of Materials. Theoretical Chemistry. European History. German. <i>Options.</i> 1. Chemistry. 2. Advanced Calculus. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Physical Laboratory. General Physics. Advanced Physics: Memoirs, etc. Principles of Scientific Investigation. History of Physical Science. Photography. Applied Mechanics: Thermodynamics. Method of Least Squares. <i>Options.</i> 1. Chemistry. 2. Definite Integrals. | Physical Research. General Physics. Advanced Physics: Memoirs, etc. Differential Equations. Discussion of the Precision of Measurements. <i>Options.</i> Physiological Measurements. Physical Laboratory. Quaternions. Theory of Potential. |

IX.—GENERAL STUDIES.

This course has been recently revised, 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 restricted in its range of 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 physical science makes a considerable demand upon the time and attention of the student. He is required to study chemistry one year; physics, two years; 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: (1) The more extended study of French and German; (2) a continuous course of historical study, directed especially towards the political and social history of England and the United States; (3) a more thorough acquaintance with English literature and with the models of style; (4) economics, including its theory and history, with courses in industrial and commercial history and geography, finance, and statistics; (5) social and political science, directing especial attention to the origin and development of institutions.

(See pp. 54 and 55.)

IX.—GENERAL STUDIES.

| FIRST YEAR. | | |
|--|--|--------------|
| Same for all Courses. See p. 21. | | |
| FIRST TERM. | SECOND YEAR. | SECOND TERM. |
| Physics. German. French. Polit. Hist. of England and the U. S. Political Economy. Shopwork. Analytic Geometry (Chief Course). <i>Options :</i> 1. Chemical Analysis. 2. General Biology. 3. Analytical Geometry. | Physics. German. French. Polit. Hist. of England and the U. S. Economic Problems. English Prose Literature. Physical Geography. <i>Options :</i> 1. Mineralogy and Blowpipe Anal. 2. Physiology and Plant Analysis. 3. Differential Calculus. | |
| FIRST TERM. | THIRD YEAR. | SECOND TERM. |
| Physics. German. French. History of the Renaissance. Statistics. Financial History of the U. S. Structural Geology. Zoölogy. English Literature. Commercial Geography, } Lectures. Anthropology. <i>Options :</i> 1. History of Architecture. 2. Shopwork: Forging. 3. Physical Laboratory. 4. Integral Calculus. 5. Lectures in French. | Physical Laboratory. German. French. Sociology. *Hist. of Commerce or of Industry. European Literature and Arts. Historical Geology. Zoölogy. <i>Options :</i> 1. History: England in the 16th and 17th Centuries. 2. Political Science: Theories of Socialism, Communism, Co-operation, and Profit-sharing. 3. Language: Lectures in French. 4. Literature: Chaucer to Shakespeare. | |
| FIRST TERM. | FOURTH YEAR. | SECOND TERM. |
| Comparative Politics. German. Constitutional History of England. Taxation. Administration. Logic and Elements of Philosophy. Literature: Elizabethan Age. Descriptive Astronomy, } Lectures. Climatology, History of Nat. Science, Railway Management, Commercial Practice, } <i>Options :</i> 1. History: The Era of the French Revolution. 2. Pol. Science: Stat. of Sociology. 3. Language: Special Work in French or German, or Elements of Spanish or Italian. 4. Literature: The 17th Century. | Advanced German. International Law. Business Law. U. S. Constitutional History. * Hist. of Commerce or of Industry. Banking and Finance. History of Economic Theory. Literature: Special Studies. Sanitary Science, Lectures. <i>Options :</i> 1. History: Studies in the Local History of the United States. 2. Political Science: European Systems of Administration. 3. Language: First Term's Work continued. 4. Literature: American Authors of the 19th 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 at the same time 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 scheme here presented has been perfected only as regards the instruction in the first three years. The instruction in the fourth year will be 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 general outline of required subjects in the fourth year has, however, been adopted. 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.

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. | |
|---|---|
| Same for all Courses. See p. 21. | |
| SECOND YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Principles of Mechanism. Construction of Gear Teeth. Analytic Geometry. Descriptive Geometry. Physics. Analytical Chemistry. German. | Mechanism of Mill Machinery. Mechanism of Shop Machinery. Drawing. Differential Calculus. Physics. German. English Prose. Analytical Chemistry. |
| THIRD YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Slide Valve, Link Motion. Thermodynamics. Steam Engineering. Integral Calculus. General Statics. Physics. German. Drawing. Industrial Chemistry. Literature. Elements of Organic Chemistry. | Steam Engineering. Drawing. Mechanical Engineering: Laboratory. Kinematics and Dynamics. Strength of Materials. Physical Laboratory. German. Industrial Chemistry: Lectures. Industrial Chemistry: Laboratory. European History. |
| FOURTH YEAR. | |
| FIRST TERM. | SECOND TERM. |
| Mechanical Engineering. Mechanical Engineering Laboratory. Strength of Materials. Metallurgy. Political Economy. Applied Chemistry: Lectures and Laboratory. Shopwork. | Mechanical Engineering Laboratory. Strength and Stability of Structures. Theory of Elasticity. Thermo-Chemistry. Fuels: Valuation and Composition. Shopwork. Applied Chemistry: Thesis. Memoirs. |

· 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, may 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 with 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, pp. 84 and 101. 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 p. 28, for admission to which the full entrance examinations are required (see pp. 44 to 48). Special students in Chemistry must pass the regular entrance examinations. (See pp. 44 and 48.)

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.

Students leaving the school before graduation shall be 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 Sept. 17, and will continue two days (see Calendar, p. 2). Attendance on both days of one examination or the other is required.

Entrance examinations were held in June, 1888, in New York City, Philadelphia, Chicago, Cincinnati, St. Louis, Washington, San Francisco, St. Paul, Nashville, Pittsburg, Kansas City, Montreal, and Santa Fé. Arrangements will probably be made for examining applicants in June, 1889, in the same cities. For detailed information, address the Secretary.

Applicants for *advanced standing*, that is for admission to classes beyond the first year, must pass the entrance examinations, exception being made of applicants from other colleges (see p. 49), and must present themselves for further examination (see p. 49) at 9 A.M. on the Thursday following the second entrance examination (see Calendar, p. 2).

Applications for admission to the regular and special courses 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 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.

TO THE REGULAR COURSES.

First Year.—To be admitted as a regular student in the first-years' 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 either 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. Much more importance will be attached to the applicant's ability to demonstrate new propositions than to reproduce the demonstrations of those propositions which he has learned in his text-book.

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.

5. *English Language and Literature.*—In the first subject the applicant will be expected to be reasonably well acquainted with the essentials of English grammar, and to be able to detect common errors in style; but it is recommended to teachers that in preparing candidates their chief attention be given to simple practical exercises in English composition.

Experience having shown that the specifying of books or of particular courses of study, in subjects where the methods of teaching vary so widely, proves a great inconvenience to many teachers in the arrangement of their classes, the above requirements have designedly been made as general as possible, in the hope that this course may lead to a more genuine style of preparation in English subjects, and to the avoidance of all "cramming" of text-books.

In Literature the applicant must give evidence that he has really read and is familiar with some of the classical English writers in prose and verse, and that he has at least a general knowledge of the place in English history of England's greatest writers.

6. *History.*—In 1889, applicants may present themselves in any one of the following subjects: (1) History of the Nineteenth Century—acquaintance with such a book as Mackenzie's Nineteenth Century and with current news will be necessary; (2) History of the North American Colonies and of the United States—Johnston's History of the United States is recommended, but not prescribed; (3) English History since 1660; (4) History of Greece and Rome. For (3) and (4) the text-books ordinarily used by preparatory schools will be satisfactory. P. V. N. Myers' Ancient History (latest edition) is recommended, but not prescribed. Candidates for admission are advised to choose the subject of United States History for preparation, if possible.

NOTE. After 1889 the requirement in History will be preparation in either (1) History of the United States; or (2) Ancient History (Greece, and Rome to the fall of the Empire). A thorough acquaintance with a text-book of the grade

of Alexander Johnston's History of the United States will be required in the former subject. In the latter, P. V. N. Myers' Ancient History (latest edition) is recommended; but the text-books ordinarily used in preparatory and high schools afford satisfactory preparation.

7. *Geography*. — The text-books intended for use in grammar schools fairly represent the amount of preparation required. Practice in freehand map-drawing from memory is strongly recommended.

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 at p. 44. 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 shall be 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 at p. 46).
- V. Plane Geometry.
- VI. French (or German, see p. 46).
- VII. English Language and Literature.
- VIII. History.
- IX. Geography.

NOTE. The applicant may take Solid Geometry, as at p. 46.
Details of the above requirements are given on pp. 45 to 48.

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.

Second, Third, and Fourth Years.—To be admitted as a regular student in either of these classes, the applicant for this advanced standing must have attained the proper age (eighteen, nineteen, and 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 p. 45, and applicants should present themselves at that time. (See pp. 45 to 48, and pp. 21 to 41.)

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 shall 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 be received provisionally

as regular students. The attention of such applicants is particularly called to the schedules of courses on pp. 21 to 41, and to the schedule of topics on pp. 84 to 104. 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 the differential calculus. In view of the large amount of highly technical work embraced in the courses in Mechanical and Electrical Engineering, it should be understood that only good scholars, who have paid much attention to mathematics, can hope to enter the third year on first coming to the Institute. It is exceedingly important that students applying for advanced standing in these courses should have had considerable practice in mechanical drawing.

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 p. 43), i. e., 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 pp. 84 to 104, the applicant may ascertain what the individual 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 the others required as preparation for that applied for.

Special students in Architecture must pass the regular entrance examination to the first-year class (p. 45), and are required to take as a minimum the full two-years' partial course given on p. 28, 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 p. 86.)

The four topics following are taken by all regular students:—

1. Solid and Spherical Geometry.
2. Advanced Algebra.
3. Logarithms and Plane and Spherical Trigonometry, with practical applications to the computation of triangles, and the solution of problems in latitude and longitude.
4. Plane Analytical Geometry, including the equations and properties of the point, right line, and circle, and of the parabola, ellipse, and hyperbola. (*Optional in the General Course.*)

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:—

1. Differential Equations, with applications to problems in Geometry.
2. The Theory of Probability and Method of Least Squares, including the adjustment of observations and the computation of probable errors.
3. Determinants.

As elective work, opportunities are afforded for the study of—

1. Advanced Algebra and Trigonometry, including De Moivre's Theorem and its applications.
2. The General Theory of Equations, with the solution of higher equations by methods of approximation.
3. Analytical 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.
4. An advanced course in the Calculus.

5. Definite Integrals, with the theory of the Gamma function.
6. Quaternions.

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 construction of such problems as shall illustrate the work of the class-room, and make him thoroughly familiar with this branch of mathematics.

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 reading, 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. In either case 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 an abstract study of the rules of grammar. French (see conditions of admission, p. 46) is continued through one year, and German through two years, for all regular students. In certain courses, especially in 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 Inductive and Deductive 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. All regular students are required, in their third year, to attend a course of instruction on some one great period in the history of English literature. More extended instruction in these subjects is given in course IX.

The Instruction in History and Political Science.—Instruction is given to all regular students in the following subjects: 1. Contemporary Political History, with some reference to Geography, and with individual examination of current discussions in periodical literature. 2. Mediæval and Modern European History, including a view of the mediæval papacy and empire, the free cities, and the rise of universities. 3. English and American Constitutional History. 4. Political Economy.

Further instruction is offered in the following topics: 1. The history of politics and social institutions in England and the United States. 2. Anthropology, the study of pre-historic man, fetishism, totemism, life in the stone age, and the relations of instinct to intellect. 3. Sociology, the historical development of the family, the organization of State and Church, and problems of ethnology. 4. Comparative Politics, including a presentation of the opinions of dominant political thinkers, as Plato, Aristotle, Machiavelli, Hobbes, and modern philosophers. 5. International Law, the intercourse between separate States, studied in the light of the foreign relations of the United States. 6. Financial and Tariff History of the United States, with special reference

to the relation of the tariff to important industries. Investigation is made in the original documents of the United States Government for the authority of statements. 7. History of Industry, including guilds, trades-unions, factory-system, strikes, arbitration, labor statistics. 8. History of Commerce. 9. Banking and Finance, including municipal finance. 10. History of Economic Theory, with a survey of the mercantilists and physiocrats, and the modern schools. 11. Statistics, including graphic representations by diagrams and cartograms. 12. 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 examination 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 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 re-

search. 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 held to the same examinations in the subjects 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 chem-

istry 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 preparations 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, a centrifugal dryer, filter-press, crystal dryer, furnace, and a variety of other apparatus. The laboratory devoted to textile coloring contains numerous jacketed kettles, baths, and dye-tubs, 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-two 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 general 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 Electricity, 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 Calorimetric 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 on 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, e. g., 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. It is especially full in those relating to electricity, and all new works of value on that subject are added as they appear. 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 laboratory work, 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 Laboratory of Applied Mechanics.—The object of this laboratory is to give to the students, as far as possible, the opportunity of becoming familiar, by actual test, with the

strength and elastic properties of the materials used in construction.

It is furnished with the following apparatus :—

1. An Olsen testing-machine of fifty thousand pounds capacity, capable of determining the tensile strength and elasticity of specimens not more than two feet long, and the compressive strength of short specimens.

2. A testing-machine of fifty thousand pounds capacity, capable of determining the transverse strength and stiffness of beams up to twenty-five feet in length, as well as of many of the framing-joints used in practice.

3. Machinery capable of determining the strength, twist, and deflection of shafting when subjected to such combinations of torsional and transverse loads as occur in practice, and while running.

4. Machinery for making time-tests of the transverse strength and deflection of full-size beams.

5. A machine for testing the tensile strength of mortars and cements.

6. Apparatus for testing the strength of ropes.

7. The accessory apparatus needed for measuring stretch, deflection, and twist.

The classes are divided into small sections when making tests with the machines.

All the experiments are so chosen as to make the student better acquainted with the resisting properties of materials, many of them forming part of some original research. Those on transverse strength and stiffness have also determined certain constants for use in construction, which had not previously been determined from tests on full-size pieces.

The Instruction in Civil Engineering is given by means of lectures and recitations, and by practice in the field and in the drawing-room. Visits are also made to works of interest, and to manufacturing establishments of various kinds.

In surveying, the use of the various instruments is taught mainly by actual work in the field, covering the adjustments

of the instruments, and the different 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, followed by topographical and map-drawing. The instruction in this branch is carried through the second and third years, the work in the second year being elementary in character, while that in the third year is more advanced, consisting in the theory and use of the plane-table, stadia, sextant, and solar compass.

The course in Roads and Railroads includes the survey, location, construction, and equipment of railroads; and the laying-out, building, and maintaining 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, profiles, and estimates are prepared by the students. In the fourth year 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 the subjects of theoretical hydraulics with its practical applications,—hydrology, rivers and canals, water-supply, water-power, foundations, coast and harbor works, and irrigation. A careful study is made of the principles of hydraulics, which are taken up in great detail, and their practical applications shown at every step. In hydrometry the student is made thoroughly familiar with the best methods, by actual practice in gauging rivers with instruments of various kinds, which have been provided for the use of the classes. The subjects of hydrology and irrigation are considered in detail, with reference to the conditions found in the United States. Special attention is given to the sources and supply of water, to its flow in natural and artificial channels, and to the methods of

collecting, storing, filtering, raising, and distributing water for domestic purposes, with practical details for carrying out such works. A study is also made of the control and improvement of rivers, of the construction of locks, dams, and canals, and of the utilization and distribution of water as a motive-power, excursions being made to the cities of Lowell, Lawrence, and Holyoke, for practical illustrations of this branch of engineering. Under coast and harbor works are considered the design and construction of harbors, docks, sea-walls, breakwaters, and jetties, the maintenance of channels, and the protection of coasts.

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, sanitary drainage for cities, and drainage and irrigation for agricultural purposes. 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 Principles of Construction, which extends through the second term of the third year and the whole of the fourth year, 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 in much detail. 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 goes 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. A laboratory for cement testing, fitted with all the necessary apparatus, is thus made use of by the students in Sanitary and Hydraulic Engineering. The study of Specifications and Contracts is taken up in connection with each of the special courses, and a variety of actual specifications are studied in detail, 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 from 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, and of

Mr. James T. Furber, General Manager of the Boston & Maine Railroad, the classes are able to inspect a great variety of engineering works, and to carry on field operations in specially favorable localities. The help thus received has been of great value.

In addition to the regular lectures of the school occasional lectures are given by prominent engineers in the active practice of their profession on 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 Working; by Mr. Eliot C. Clarke, on Sanitary Engineering; and by Mr. Edward S. Philbrick.

The Instruction in Mechanical Engineering is given by means of lectures and recitations, and by practice in the drawing-rooms and in the mechanical engineering laboratory. Frequent visits, also, are made 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 some of the more simple experiments, such as will impart to the students a familiarity with the manner of running the engines, taking indicator cards, and using the other apparatus in the laboratory. The later laboratory work takes very largely the form of original research; and it is intended that the students of this laboratory 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 style is adopted that is believed to be a good one, and is adhered to throughout; and early in their course the students are taught to use the "Blue process."

Besides the teaching done by the regular corps of instruct-

ors, lectures upon special subjects are given by gentlemen actively engaged in the profession. During the last school year lectures were given by Mr. James N. Lauder of the Old Colony Railroad, on the Locomotive; Mr. William O. Webber, on Lubricating Oils; Mr. C. J. H. Woodbury, on the Evolution of the Modern Mill; and Mr. David L. Barnes, on Locomotive Construction.

The Laboratory of Mechanical Engineering.— The objects to be accomplished by this laboratory are the following:—

1. To give to the students practice in such experimental work as they are liable to be called upon to perform in the practice of their profession, as boiler and engine tests, pump tests, calorimetric work, measurement of power, etc.

2. To give to the students practice in carrying on original investigations in mechanical engineering subjects, with such care and accuracy as to render the results of real value to the engineering community.

3. By publishing, from time to time, the results of such investigations, to add gradually to the common stock of knowledge.

The laboratory contains, as a portion of its equipment,—

1. An eighty-horse-power Porter-Allen engine, by which power is also furnished to the new building and to the mining department.

2. A sixteen-horse-power Harris-Corliss engine, used almost entirely for experimental purposes: this is furnished, in addition to its own automatic cut-off governor, with a throttle governor, so arranged that either can be used, the former being in addition so constructed that the speed of the engine can be varied at will.

The exhaust of each engine is connected with a surface condenser, and thence with a tank on scales, so that the water passing through the engines can be weighed.

3. An eight-horse-power steam engine used for giving instruction in valve-setting, etc.

4. Three surface condensers, one of which is arranged in sections, so that the condensing water can be made to traverse the length of the condenser, once, twice, or three times, at the option of the experimenter.

5. 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.

6. Several friction brakes.

7. A steam-pump, so arranged as to enable the students to make pump tests, indicating both the steam and the water cylinder, weighing the exhaust steam, and also the water pumped.

8. A six-inch Swain turbine-wheel, so arranged that it can be run under a head of fifteen feet, and that experiments can be made on the power exerted, the efficiency, etc., under different gates.

9. Several calorimeters of different kinds.

10. Two transmission dynamometers.

11. Cotton-machinery as follows: viz., two cards, a drawing-frame, a speeder, a fly-frame, a ring-frame, and a mule.

12. Apparatus for testing injectors.

13. A mercurial pressure column.

14. A mercurial vacuum column.

15. Apparatus for determining the quantity of steam issuing from a given orifice, or through a short tube, under a given difference of pressure.

16. Apparatus for testing dynamometers.

17. A good supply of indicators, planimeters, gauges, thermometers, anemometers, and other accessory apparatus.

18. Two horizontal tubular boilers and a large Babcock and Wilcox boiler.

Another boiler, a forty-horse-power Brown engine, a number of looms, and other apparatus in the mechanical laboratories on Garrison Street, are available for the purpose of experiment.

As examples of the work done in the laboratory, the following experiments are enumerated: Tests of the evapora-

tive power of boilers; tests of the effects of different cut-off, compression, back pressure, speed, etc., of engines under constant or variable loads; calorimetric tests; dynamometric measurements; investigations of the tension required in a belt to carry a given power, at a given speed, with no more than a given amount of slip; experiments on the efficiency of condensers under different conditions; on the efficiency of a turbine, etc.

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. Mechanical laboratories 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. These laboratories are now located in the building on Garrison Street, and are equipped as follows: —

The carpenter, 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 14 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 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 prohibited 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 this laboratory is in any sense of the word 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 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 ample storage-vaults, supply-room, and toilet-room attached.

The milling-room is supplied with four suites of milling-apparatus:—

I. 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.

II. 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.

III. A set of four amalgamating pans, 30, 18, 12, and 8 inches in diameter respectively, also a 36-inch settler, and a little automatic kieve for separating mercury from pulp.

IV. A set of three 40-gallon leaching-vessels, a set of four 8-gallon leaching-vessels, and two dynamos for deposition of metals.

This laboratory contains also the following auxiliary apparatus: A steam-engine, a Bogardus 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, furnaces for cupellation, furnaces for fusion, a blacksmith's forge, a melting-kettle, retorts, etc. The assay-room contains ten crucible furnaces, 12 x 12, all of which are jacketed with iron shells to insure good draught, stability, and durability; also two muffles 4 x 7, one muffle 3 x 6, four muffles 7 x 12, one muffle 8 x 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 in the past taken place as often as once in two years; and, since the year 1870, excursions have been made to Colorado, Lake Superior, Virginia, Vermont, Penn-

sylvania, 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.

The question as to whether attendance at a summer school of mines at the end of the second year and a summer school of metallurgy at the end of the third year, shall be required of the students, is now under consideration.

The valuable scientific library of the late Prof. Henry D. Rogers, of the University of Glasgow, presented to the Institute by Mrs. Rogers, is accessible to the students in geology and mining.

The Instruction in Architecture.—The instruction in this subject is practical as well as theoretical. Besides the scientific study of construction and materials, it comprises 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 practiced in 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 water-color; and evening classes are held during the winter for drawing, both from the 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, given 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 have been collected for this department, by means of a special fund raised for the purpose. To these collections large additions have been made, mostly by gifts. 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. The space thus gained 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 contains technical works and many 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 the authorities of 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 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 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 Signaling, 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 Company, on Electro-Motors; Mr. E. H. Hewins, of the New England Weston Electric Lighting Co., on Specifications and Contracts for Electric Lighting; Mr. C. J. H. Woodbury, of the Manufacturers' Mutual Fire

Insurance Company, 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. It is expected that these courses will be still further extended during the current year.

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 Company.

In order to provide for the wants of students seeking instruction in Electrical Engineering beyond that given in the under-graduate 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 Bacteriology.

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 Microorganisms, 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 Annisquam on Cape Ann, 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, to arrive at professional attainments in their specialties. The subjects offered at present are Comparative Physiology (including Microscopic Anatomy), Advanced Zoölogy, and Bacteriology. 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. Facilities somewhat unusual 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 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, and a rotating drum for smoked paper, a pendulum myograph, a moist chamber, a culture room, sterilizers, special microscopes and other bacteriological apparatus, etc. Frog-tanks and aquaria are also provided. The biological library is in the laboratory, and 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.

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 their blowpipe or chemical characters.

The instruction 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 interesting mineral localities.

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.

I. *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.

II. *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.

III. *Historical Geology.* — It is intended to give all the students in this branch a good general knowledge of the physical history of the earth. That the technical applications of geological knowledge may be suitably taught, the students are grouped into three classes.

One class is composed of those who are in the department of Civil Engineering. With these, special attention is given to those portions of geological history which determined the topographic and hydrographic features, with which their professional labors may be more or less associated.

Another class is for the students in the departments of Mining Engineering and Chemistry. Particular attention is here given to the geological history and the modes of occurrence of ore deposits and other mineral resources. This, added to portions of Structural and Chemical Geology previously taught, completes the class-room instruction in Economic Geology.

A third class includes the students in Natural History and in the General Course. With these 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 beings upon the earth. To be admitted to this class the student must have had the requisite instruction in Biology and Zoölogy.

The instruction combines both lectures and recitations. 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 efficient 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 by a general outline of Meteorology, and concluded by 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 will treat. Thermo-Chemistry and the Chemistry of Fuels are considered in separate courses of lectures. The laboratory instruction consists in 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, and particular attention will be paid to comparative tests of various means and appliances used in chemical manufactures.

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 or more first-year studies are required to attend, three times a week, an exercise in tactics, unless specially excused by the Faculty. A written and a drill examination are held at the middle and end of the year. 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. 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 fourteen 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 Boston Society of Natural History grants to the students of the Institute the full use of its valuable library. The unusual facilities of the Boston Public Library, of more than 506,000 volumes, are at the disposal of all students of the Institute. The collections of this library are of exceptional value, and contain the best scientific, literary, and technical publications of various countries, whether standard or special treatises, periodicals, or works of more purely literary or historical value; and new books are promptly bought on proper application to the authorities of the library. The library of the American Statistical Society is also kept at the Institute, and is available to students.

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.

The following sixteen pages form a schedule which includes the larger part of all the distinct topics or subjects of study taught in the School of Industrial Science. The various branches of study 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; in the second column, the name of the subject; in the third, the manner in which this 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 involving 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 who desires to be admitted to the topic under consideration, such requirements including, not merely the subjects referred to by number, but all subjects required as preparation for these. Thus, for instance, the requirements for 32 (Applied Mechanics) are 31 and 126; that for 31 is 30; that for 30 is 28A; that for 28A is 29A; those for 29A are 26 and 27; those for 26 and 27 are 1, 2, and 3 (the admission requirements in arithmetic, algebra, and plane geometry); that for 126 is 29A, which has already been

followed through. So that, to take up the topic 32 in Applied Mechanics, the applicant must be prepared to pass, or must have passed, in 26, 27, 28, 29A, 30, 31, 126, and in 1, 2, and 3. The sufficient reason for this is, that in topic 32 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.

By a careful consideration of the schedule, in connection with the pages on the "Methods and Apparatus of Instruction" (51 to 82), 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 through action of the Faculty.

Subjects numbered from 1 to 7 are the entrance requirements, full statements of which are given on pp. 44 to 48.

- | | |
|--------------------|----------------------------|
| 1. Arithmetic. | 5. English and Literature. |
| 2. Algebra. | 6. History. |
| 3. Plane Geometry. | 7. Geography. |
| 4. French. | |

| MATHEMATICS. | | | | | | | | | |
|--------------|---|-------------------------------------|--|---|-------|-------|---------------|-----------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 26 | Algebra | Rec. | { Wells, Skinner, } { French, Frizell. } | All reg. students . | 1 | 1 | 7 | 4 | (1) (2) (3) |
| 27 | Solid Geometry | Rec. | { Wells, Skinner, } { French, Frizell. } | All reg. students . | 1 | 1 | 8 | 4 | (1) (2) (3) |
| 28A | Plane Analytic Geometry | { Lect., } { Rec. } | { Runkle, Skinner, } { Bartlett. } | All reg. students . | 2 | 1 | 15 | 3 | (29A) |
| 28B | Plane Analytic Geometry | { Lect., } { Rec. } | { Skinner. } | VII, IX. | 2 | 1 | | | (26) |
| 29A | Logarithms, and Plane and Spherical Trigonometry | Rec. | { Wells, Skinner, } { French, Bartlett, } { Frizell. } | All reg. students . | 1 | 2 | 10 | 5 | (26) (27) |
| 29B | Spherical and Practical Astronomy | { Lect., } { Rec. } | { Skinner. } | I. | 3 | 2 | 10 | 2 | (31) |
| 30 | Differential Calculus | { Lect., } { Rec. } | { Runkle, Osborne, } { Bartlett. } | { All courses except } { VII. } | 2 | 2 | 15 | 3 | (28A) |
| 31 | Integral Calculus | { Lect., } { Rec. } | { Runkle, Osborne. } | { All courses except } { VII. } | 3 | 1 | 5 | 4 | (30) |
| 32 | Applied Mechanics (Statics and Stresses in Frames) | { Lect., } { Rec. } | { Sondericker. } | { I., II., III., IV., } { VI., VIII., X. } | 3 | 1 | 10 | 2 | (31) (126) |
| 33 | Applied Mechanics (Strength of Materials, Kinematics, and Dynamics) | { Lect., } { Rec. } | { Sondericker. } | { I., II., III., IV., } { VI., VIII., X. } | 3 | 2 | 15 | 3 | (32) |
| 34 | Applied Mechanics (Strength of Materials, Hydraulics, and Dynamics) | { Lect., } { Rec., } { Lab. } | { Lanza, Sondericker. } | { I., II., III., IV., } { VI., VIII., X. } | 4 | 1 | 15 | 3 | (33) |

| MATHEMATICS. | | | | | | | | | |
|--------------|---|-------------------------------------|--------------------------|-----------------------|-------|-------|---------------|-----------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 35 | Applied Mechanics (Strength of Materials, Dynamics and Machinery and Motors). | { Lect., Rec., Lab. } | Lanza, Sondericker. | I, II, III, X. . . | 4 | 2 | 15 | 3 | (34) |
| 36A | General Theory of Equations, | { Lect., Rec. } | Skinner. | VIII. | 2 | 2 | 15 | 2 | (29A) |
| 36B | Determinants | { Lect., Rec. } | Osborne. | I, VIII. | 2, 3 | 2 | 15 | 1 | (29A) |
| 37 | Advanced Algebra and Trigonometry | { Lect. } | Bartlett. | VIII. | 3 | 1 | 15 | 2 | (29A) |
| 38 | Analytic Geometry of Three Dimensions | { Lect., Rec. } | Wells. | VIII. | 3 | 1 | 15 | 2 | (30) |
| 39 | Advanced Calculus | { Lect., Rec. } | Wells. | VIII. | 3 | 2 | 15 | 3 | (31) (36B) |
| 40 | Definite Integrals | { Lect., Rec. } | Wells. | VIII. | 4 | 1 | 15 | 1 | (37) (39) |
| 41 | Differential Equations | { Lect., Rec. } | Osborne. | VI., VIII. | 4 | 2 | 15 | 3 | (31) |
| 42 | Theory of Probability and Method of Least Squares, | { Lect., Rec. } | Bartlett. | I, VI., VIII. | 4 | 1 | 15 | 2 | (31) |
| 43 | Quaternions | { Lect., Rec. } | Osborne. | VI. | 4 | 2 | 15 | 2 | (31) |

| DRAWING. | | | | | | | | | |
|--------------------------|---|--------------------------------------|-------------------------------------|---|-------|-------|---------------|-----------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 51 | Geometrical and Mechanical Drawing | { Lect., } { Draw. } | { Faunce, Burrison, } { Eaton. } | All reg. students . | 1 | 1 | 15 | 6 | |
| 52 | Descriptive Geometry | { Lect., } { Rec., } { Draw. } | Faunce. | I, II, IV, VI, X. | 2 | 1 | 15 | 5 | (27) (51) (53) |
| 53 | Freehand Drawing | Draw. | Adams. | All reg. students . | 1 | 1, 2 | 30 | 1 | |
| LITERATURE AND LANGUAGE. | | | | | | | | | |
| 60 | Hist. of English Language, and English Composition, | { Lect., } { Rec. } | Emery. | All reg. students . | 1 | 1 | 15 | 2 | (5) (6) |
| 61 | English Prose | { Lect., } { Rec. } | Emery. | All reg. students . | 2 | 2 | 15 | 2 | (60) |
| 62 | English Composition | Rec. | Emery. | IX. | 2 | 1 | 15 | 1 | (60) |
| 63A | English Literature | { Writ., } { Rdg. } | Atkinson. | { All courses except } { II. and IV. } | 3 | 1 | 15 | 2 | (61) |
| 63B | English Literature | { Writ., } { Rdg. } | Atkinson. | II., IV. | 4 | 2 | 15 | 2 | (61) |

| LITERATURE AND LANGUAGE. | | | | | | | | | |
|--------------------------|--|--|---|----------------------|-------|-------|------------------|--------------------|-----------------------|
| | Subject. | Lect. Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 64A | European Literature and Arts | Read. | Atkinson. | IX. | 3 | 2 | - | - | (74) |
| 64B | Literature (Special Studies) | Read. | Atkinson. | IX. | 4 | 1,2 | 30 | 2 | (63A) |
| 65 | French (grammar and trans- lation) | Rec. | { Luquiens, Dippold, Vogel, } Dreher. | All reg. students . | 1 | 1,2 | 30 | 3 | (4) |
| 66A | Advanced French | { Lect., Rec. } | Luquiens. | IX. | - | 1,2 | 30 | 3 | (65) |
| 66B | French Literature | { Lect., Rec. } | Luquiens. | IX. | 3 | 1,2 | 15 | 2 or 4 | (66A) |
| 67A | German (elementary) | Rec. | { Otis, Dippold, Vogel, Dreher. } | All reg. students . | 2 | 1,2 | 30 | 3 | (4) or (67A) |
| 67B | German (grammar and trans- lation) | Rec. | { Otis, Dippold, Vogel, Dreher. } | All reg. students . | 3 | 1,2 | 30 | 3 | (4) or (67A) |
| 69 | Language (French, German, Spanish, Italian) | { Lect., Rec. } | { Otis, Luquiens, Dippold. } | IV., V., VII., IX. . | 3,4 | 1,2 | 30 | 3 | (65) (67A) |

| HISTORY. | | | | | | | | | |
|----------|---|---|-------------------------------------|---|-------|-------|------------------|--------------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 70 | Political History since 1815 | { Lect., } { Rec. } | Levermore . . . | All reg. students | 1 | 2 | 15 | 2 | (60) |
| 71 | Political History of England and the United States . | { Lect., } { Rec. } | Levermore . . . | IX. | 2 | 1,2 | 30 | 3 | (70) |
| 72A | European History (General Survey) | { Lect., } { Rec. } | Atkinson | All reg. students ex- cept IX. | 3 | 2 | 15 | 2 | (70) |
| 72B | European History (General Survey) | { Lect., } { Rec. } | Atkinson | I. | 4 | 2 | 15 | 2 | (70) |
| 74 | History of the Renaissance | { Lect., } { Rec. } | Levermore | IX. | 3 | 1 | 15 | 3 | (71) |
| 75 | Modern History | Lect. | Atkinson | III. | 4 | 1,2 | 30 | 2 | (70) |
| 76 | Constitutional History of England and the United States | { Lect., } { Rec. } | { The President, } { Atkinson. } | IX. | 4 | 1,2 | 15 | 3 | (77) |

| ECONOMICS AND STATISTICS. | | | | | | | | | |
|---------------------------|---|---|--------------------------|---|-------|-------|------------------|--------------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 77 | Political Economy | { Lect., } { Rec. } | Dewey. | { I. to IX., inclu. } { X. } | 2 | 1 | 15 | 2 | (70) |
| 78 | Economic Problems | Lect. | Dewey. | IX. | 4 | 2 | 15 | 1 | (71) (77) |
| 79 | Financial History of the U. S. | { Lect., } { Rec. } | Dewey. | IX. | 3 | 1 | 15 | 2 | (77) |
| 80 | Commercial Geography | { Lect., } { Rec. } | Niles. | IX. | 3 | 1 | 5 | 2 | |
| 81 | History of Commerce | { Lect., } { Rec. } | Dewey. | IX. | 3 | 2 | 15 | 3 | (79) (87) (74) |
| 82 | Socialism and Cooperation | Lect. | Dewey. | IX. | 3 | 2 | 15 | 3 | (79) |
| 83 | Commercial Practice | Lect. | Dewey. | IX. | 4 | 1 | 15 | 2 | |
| 84 | Taxation | { Lect., } { Rec. } | Dewey. | IX. | 4 | 1 | 15 | 1 | (79) |
| 85 | Administration | { Lect., } { Rec. } | Dewey. | IX. | 4 | 1 | 15 | 1 | (79) |
| 86 | History of Economic Theory | { Lect., } { Rec. } | Dewey. | IX. | 4 | 2 | 15 | 2 | (84) |
| 87 | Statistics of U. S., and Graphic Methods | { Lect., } { Draw. } | Dewey. | IX. | 3 | 1 | 10 | 2 | (77) |
| 88 | Statistics of Sociology | Lect. | Dewey. | IX. | 4 | 1 | 15 | 4 | (79) (87) |
| 89 | Banking and Finance | { Lect., } { Rec. } | The President. | IX. | 4 | 2 | 15 | 2 | (77) (97) |

| POLITICAL SCIENCE. | | | | | | | | | |
|--------------------|---|-------------------------------------|--------------------------|-------------|-------|-------|---------------|-----------------|----------------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 95 | Sociology | { Lect., } { Rec. } | Levermore. | IX. | 3 | I | 15 | 3 | (277) |
| 96 | Comparative Politics | { Lect., } { Rec. } | Levermore. | IX. | 4 | I | 15 | 3 | (74) or (72A) |
| 97 | International Law | { Lect., } { Rec. } | Levermore. | IX. | 4 | 2 | 15 | 2 | (70) (72A) or (70) (74) |
| 98 | Logic and History of Philosophy | { Lect., } { Rec. } | Levermore. | IX. | 4 | I | 15 | 1 | |

| CHEMISTRY. | | | | | | | | | |
|------------|---------------------------------|-------------------------------------|--------------------------|---------------------------------------|--------|-------|---------------|-----------------|--|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 101 | General Chemistry | { Lect., } { Lab. } | Pope, Frost. | All reg. students | 1 | 1, 2 | 30 | 7, 6 | { (1) (2) (3) (4) (5) } { (6) (7) } |
| 102 | Chemical Analysis | { Lect., } { Lab. } | Drown. | { III, V, VII, } { VIII, IX, X, } | 2 | 1, 2 | 30 | - | (87) (101) |
| 103A | Theoretical Chemistry | { Lect., } { Rec. } | Pope. | { III, V, VII, } { VIII. } | 2 or 3 | 1 | 15 | 2 | (101) |
| 103B | Theoretical Chemistry | { Lect., } { Rec. } | Andrews. | V, VIII, X. | 3 | 2 | 15 | 1 | (103A) or (178A) |

| CHEMISTRY. | | | | | | | | | | |
|------------|--------------------------------|---|------------------------------|-----------------------|-------|-------|------------------|--------------------|-----------------------|--|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. | |
| 104 | Chemical Analysis | Lab. | Drown. | III, V, VII, VIII. | 3 | 1,2 | 30 | 1 | (90) (102) | |
| 106 | Analytical Methods | { Lect., Rec. } | Drown. | III, V. | 3 | 1 | 15 | 2 | (90) (102) | |
| 107 | Industrial Chemistry | Lect. | Norton. | V, X. | 3 | 1,2 | 30 | 2 | (51) (90) (102) | |
| 108 | Chemical Analysis | Lab. | Drown. | III, V, VIII. | 4 | 1 | 15 | - | (104) | |
| 109 | Chemical Analysis | Lab. | Drown. | III. | 4 | 2 | 15 | - | (108) | |
| 110A | Organic Chemistry | Lect. | Norton. | V. | 4 | 1,2 | 30 | 2 | (90) (103B) (104) | |
| 110B | Organic Chemistry | Lect. | Andrews. | X. | 3 | 1 | 15 | 1 | (101) (102) | |
| 111 | Organic Chemistry | Lab. | Norton, Andrews. | V. | 4 | 1,2 | 30 | 12 | (110A) | |
| 112 | Industrial Chemistry | Lab. | Norton, Smith. | V, X. | 4 | 1 | 15 | 12 | (102) (107) | |
| 113 | Sanitary Chemistry | Lab. | { Drown, Mrs. Richards. } | V, VII. | 3 | 1 0'2 | 15 | 6 | (102) | |
| 114 | Industrial Chemistry | Lab. | Norton, Smith. | V, X. | 3 | 1,2 | 15 | 6 | (102) (107) | |
| 115 | Sanitary Chemistry | Lab. | { Drown, Mrs. Richards. } | V. | 4 | 1 | 15 | 6 | (104) (106) | |
| 116 | Textile Coloring | Lab. | Norton, Smith. | V. | 4 | 1 | 15 | 6 | (114) | |

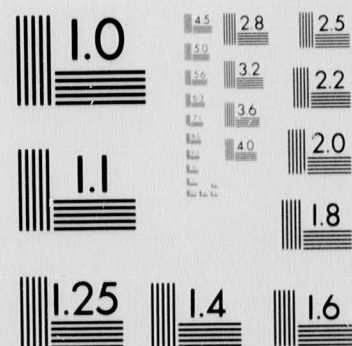
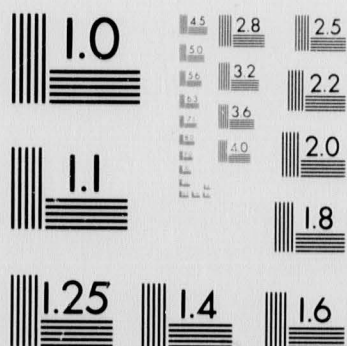
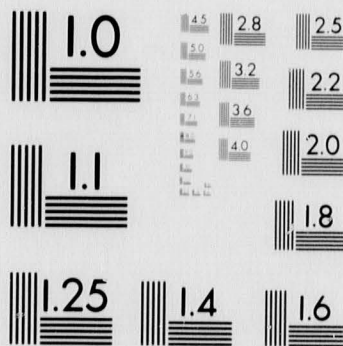
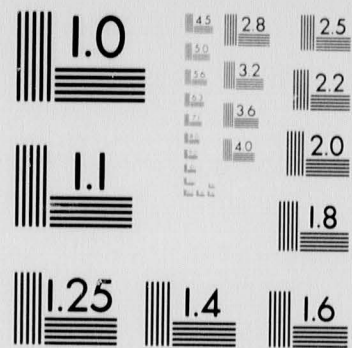
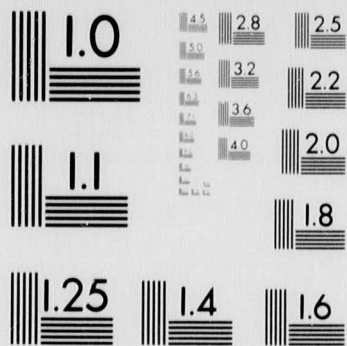
PHYSICS.

| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
|------|--|-------------------------------------|-------------------------------------|----------------------|--------|-------|---------------|-----------------|--------------------------------|
| 126 | Physics | Lect. | Cross. | All reg. students | 2 | 1,2 | 30 | 3 | (29A) |
| 127 | Descriptive Astronomy | Lect. | Clifford. | I, VIII, IX. | 2 or 4 | 1 | 15 | 1 | (29A) |
| 128 | Mechanics and Acoustics (in connection with 126) | { Lect., } { Rec. } | Clifford. | VI, VIII. | 2 | 1,2 | 30 | 2 | (29A) |
| 129 | Physical Laboratory | Lab. | Holman. | VI, VIII. | 2 | 2 | 15 | 2 | (28A) (126) ¹ (128) |
| 132A | Physics: Heat | Lect. | Holman. | All reg. students | 3 | 1 | 8 | 2 | (126) |
| 132B | Physical Laboratory | Lab. | Holman, Puffer. | All courses. | 3 | 1,2 | 22 | 2 | (28A or B) (132A) |
| 133 | Physical Laboratory | Lab. | Cross, Holman. | V, VIII. | 3 | - | - | - | (28A or B) (126) |
| 134 | Physical Laboratory | Lab. | Holman, Puffer. | VI. | 3 | 1,2 | 7 | 2 | (126) |
| 135 | Electricity | { Lect., } { Read. } | { Cross, Holman, } { Clifford. } | V, VI. | 3 | 1,2 | 15 | 3 | (126) |
| 136 | General Physics (optics or acoustics) | Read. | Cross, Clifford. | VIII. | 3 | 1,2 | 30 | 3 | (28) (87) (132B) |
| 137 | Advanced Physics (memoirs) | Read. | Cross, Holman. | VI, VIII. | 4 | 1,2 | 30 | 1 | (87) (132B) |
| 139A | Physical Laboratory | Lab. | Holman. | V. | 4 | 1 | 15 | 2 | (132B) |

¹The student must also be qualified to enter VI., as a regular, 2d year, 1st term.

| PHYSICS. | | | | | | | | | |
|----------|---------------------------------|--|-------------------------------|----------------------|-------|-------|------------------|--------------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw, or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 139B | Physical Laboratory . . . | Lab. | { Cross, Holman, Puffer. } | VI., VIII. . . . | 4 | 1, 2 | 15 | - | (132B) |
| 140A | History of Physical Science . | Read. | Cross. | VIII. | 4 | - | - | - | (87) (90) (132B) |
| 140B | Principles of Scientific Inves. | Read. | Cross. | VIII. | 4 | - | - | - | (140A) |
| 141 | General Physics | Read. | Cross, Holman. | VIII. | 4 | 1, 2 | - | - | (31) (87) (132B) (90) |
| 142 | Precision of Measurements . | Lect. | Holman. | VI., VIII. . . . | 4 | 1 | 10 | 2 | (42) (139) |
| 143 | Electrical Engineering . . . | Lect. | Cross. | VI. | 4 | 1, 2 | 15 | 4 | (134) (135) |
| 144 | Telegraph Engineering . . . | { Lect., Lab. } | Jacques. | VI. | 4 | 1 | - | - | (134) (135) |
| 145 | Railroad Signals | Lect. | Blodgett. | I., II., VI. . . . | 4 | 1 | - | - | (134) (135) |
| 146 | Dynamo and Motor Testing | Lect. | Puffer. | VI. | 4 | 1 | - | - | (134) (135) |
| 147 | Photometry | Lect. | Clifford | VI., VIII. . . . | 4 | 1 | - | - | (134) (135) |
| 148 | Theory of Potential | Read. | Clifford. | VI., VIII. . . . | 4 | 2 | 15 | 2 | (31) (135) |
| 149 | Heating and Ventilation . . | Lect. | Woodbridge. | I., II., IV., VII. . | 4 | 1 | 15 | 2 | |

| CIVIL ENGINEERING. | | | | | | | | | |
|--------------------|--|--|--|-----------------|-------|-------|---------------|-----------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 151A | Surveying | { Lect., Rec., Field, Draw. } | { Burton, Porter, Robbins, Stan- wood, Bardwell. } | I, III. | 2 | 1, 2 | 30 | 6 | (29A) (51) |
| 151B | Surveying | { Lect., Rec., Field, Draw. } | { Burton, Porter, Robbins, Stan- wood, Bardwell. } | II, IV. | 3 | 2 | 15 | 2 | (29A) (51) |
| 152 | Topographical Drawing . . | Draw. | Burton. | I, III. | 2 | 1 | 15 | 2 | (51) (53) |
| 153 | Surveying | { Lect., Field, Draw. } | { Furton, Porter, Robbins. } | I. | 3 | 1, 2 | 30 | 2 | (151A) (127)(152) |
| 154 | Geodesy | { Lect., Field. } | Burton. | I. | 4 | 1, 2 | 30 | 2 | (153) (29B) (31) |
| 155 | Map Projections | Draw. | Burton. | I. | 4 | 2 | 15 | 2 | (154) |
| 156 | Roads and Railroads . . . | { Lect., Rec. } | Allen. | I. | 3 | 2 | 15 | 3 | (151A) (152) |
| 157 | Railroad Fieldwork, and Drawing | { Field, Draw. } | Allen, Porte: | I. | 3 | 1, 2 | 30 | 4 | (151A) (152) |
| 158 | Railroad Engineering . . . | { Lect., Rec., Draw. } | Allen. | I. | 4 | 1 | 15 | 3 | (33)(156)(157)(160) |
| 159 | Railroad Management . . . | Lect. | Allen. | I. | 4 | 1 | 15 | 2 | (77) |



M. I. T. ANNUAL CATALOGUES AND BULLETINS

1888/89

02 OF 02

| CIVIL ENGINEERING. | | | | | | | | | |
|--------------------|---|---|----------------------------------|-------------|-------|-------|------------------|--------------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 160 | Stereotomy | { Lect., Draw. } | Por | I | 3 | 1 | 15 | 4 | (52) |
| 161 | Sanitary Engineering | { Lect., Rec. } | Porter. | I | 4 | 1 | 15 | 3 | (153) (160) (163) |
| 162 | Sanitary Designing and Fieldwork | { Draw., Field. } | Porter. | I | 4 | 2 | 10 15 | 2 2 | (161) (163) |
| 163 | Theoretical Hydraulics | { Lect., Rec. } | Swain. | I | 4 | 1 | 15 | 3 | (33) |
| 164 | Hydraulic Engineering | { Lect., Rec. } | Swain, Porter. | I | 4 | 2 | 15 | 4 | (163) (161) |
| 165 | Hydraulic Measurements | { Field., Draw. } | { Swain, Robbins, Stanwood. } | I | 4 | 1 | 5 | 3 | (163) |
| 166 | Elements of Construction | { Lect., Rec. } | Swain. | I | 3 | 2 | 15 | 2 | (32) (166) |
| 167 | Elementary Design | Draw. | { Swain, Robbins, Stanwood. } | I | 3 | 2 | 15 | 2 | (166) |
| 168 | Principles of Construction | { Lect., Rec. } | Swain. | I | 4 | 1,2 | 30 | 2 | (33) (167) |
| 169 | Bridges and Similar Structures | { Lect., Rec. } | Swain. | I | 4 | 1,2 | 30 | 2 | (33) (168) |
| 170 | Bridge Design | Draw. | { Swain, Robbins, Stanwood. } | I | 4 | 1,2 | 30 | 6 | (169) (167) (166). |

| MECHANICAL ENGINEERING. | | | | | | | | | |
|-------------------------|---|---------------------------------------|--|--------------------------------|-------|-------|---------------|-----------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 176 | Mechanism (must take also 28 and 52) | { Lect., Rec., Draw. } | { Schwamb, Purinton, Stephens. } | IL VI, X. | 2 | 1 | 15 | 4 | (29A) (51) |
| 177A | Mechanism (must take also 30) | { Lect., Rec., Draw. } | { Schwamb, Purinton, Stephens. } | IL, X. VI. | 2 | 2 | 15 | 9 | (176) |
| 177B | Mechanism | { Lect., Rec. } | { Schwamb, Purinton. } | I. | 2 | 2 | 15 | 2 | (29A) (51) |
| 178A | Mechanical Engineering (must take also 31, 32, and 132) | { Lect., Rec., Draw. } | { Peabody, Stephens. } | IL, X. VI. | 3 | 1 | 15 | 9 | (30) (177A) |
| 178B | Mechanical Engineering | { Lect., Rec. } | Peabody. | I. | 3 | 1 | 10 | 2 | (30) (177B) |
| 179 | Mechanical Engineering (must take also 33 and 132) | { Lect., Rec., Draw., Lab. } | { Peabody, Schwamb, Merrill. } | IL VI, X. | 3 | 2 | 15 | 11 | (178A) |
| 180A | Mechanical Engineering (must take also 34 and 35) | { Lect., Rec. } | { Lanza, Peabody, Schwamb. } | IL. | 4 | 1,2 | 30 | 5 | (179) |
| 180B | Mechanical Engineering (must take also 34) | { Lect., Rec. } | Lanza, Peabody. | VI. | 4 | 1 | 15 | 7 | (179) |

| MECHANICAL ENGINEERING. | | | | | | | | | |
|-------------------------|--------------------------------------|---|---------------------------------|-------------------------------|--------|--------|------------------|--------------------|-----------------------|
| | Subject. | Lect. Rec., Lab. Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 181 | Designing (must take also 34) | Draw. | Schwamb. | II. | 4 | I | 15 | 8 | (179) |
| 182 | Mechanical Engineering . . . | Lab. | { Lanza, Peabody, Merrill. } | II, X. VI. | 4 | 1, 2 | 30 | 5 3 | (179) |
| 183 | Carpentry and Wood-Turning | Shop. | Merrick. | II, VI, IX. | 2 | I | 15 | 4 | |
| 184 | Pattern Work | Shop. | Merrick. | II. | 2 | 2 | 7 | 4 | (183) |
| 185A | Forging | Shop. | Lambirth. | II, IX. | 3 | I 2 | 15 5 | 6 4 | |
| 185B | Chipping and Filing | Shop. | Smith. | II. | 3 4 | 2 1 | 10 4 | 4 6 | |
| 186 | Machine-Tool Work | Shop. | Smith. | II. | 4 | 1, 2 | 24 | 6 | (185B) |
| 187 | Metal Turning | Shop. | Smith. | VI, IX. | 2 | 2 | 15 | 2 | |

| MINING ENGINEERING. | | | | | | | | | |
|---------------------|--|---|--------------------------|-----------------------|-------|-------|------------------|--------------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of weeks. | Hours per Week. | Preparation Required. |
| 200 | Blowpipe Silver Assay . . . | Lab. | Richards. | III. | 2 | 1 | 15 | 1 | (101) |
| 201 | Mineralogy (including Blow- pipe Analysis and Crystal- lography) | { Lect., Lab. } | Crosby, Barton. | I, III, V, VII, IX. | 2 | 2 | 15 | 6 | (3) (101) |
| 202 | Mining Engineering . . . | Lect. | Richards, Clark. | III. | 3 | 1, 2 | 30 | 3 | (126) (151) (201) |
| 203 | Assaying by Fire | Lab. | Clark. | III, V. | 3 | 2 | 5 | 6 | (102) |
| 204 | Metallurgy of Iron | Lect. | Richards. | I, II, III, V, X. . . | 4 | 1 | 15 | 1 | (101) |
| 205 | Metallurgy | Lect. | Richards, Howe. | III, V, X. | 4 | 1 | 15 | 2 | (102) (201) |
| 206 | Mining and Metallurgy . . | Lab. | Richards, Clark. | III, V. | 4 | 1 | 15 | 8 | (104) (203) |
| 207 | Mining and Metallurgy . . | Lab. | Richards, Clark. | III. | 4 | 2 | 15 | 12 | (206) |
| 208 | Ore Dressing | Lect. | Richards. | III. | 4 | 1 | 6 | 3 | (126) |
| 209 | Metallurgy | Lect. | Richards, Clark. | III. | 4 | 2 | 15 | 3 | (205) |

| ARCHITECTURE. | | | | | | | | | |
|---------------|--|-------------------------------------|--------------------------|-------------------------|---------------|-------|---------------|-----------------|--|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 226 | Architectural History | { Lect., Rec., Draw. } | Homer. | { IV. (Partial) } | { } | 1, 2 | 30 | 1 | { (1) (2) (3) (4) (5) } { (6) (7) } |
| 227 | Architectural History | { Lect., Rec., Draw. } | Homer. | IX. | 3 | 1 | 15 | 2 | (51) (52) (53) |
| 228 | Orders | { Lect., Rec., Draw. } | Homer. | { IV. (Partial) } | { } | 1 | 15 | 2 | { (1) (2) (3) (4) (5) } { (6) (7) } |
| 229 | Shades, Shadows, and Perspective | { Lect., Rec., Draw. } | Homer. | { IV. (Partial) } | { } | 2 | 15 | 2 | (228) |
| 230 | Graphics | { Lect., Rec., Draw. } | Homer. | IV. (Partial) | 1 | 2 | 15 | 2 | (28B) |
| 231 | Materials | { Lect., Rec. } | Chandler. | { IV. (Partial) } | { } | 2 | 15 | 2 | (226) (228) |
| 232 | Working Draw. | { Lect., Rec., Draw. } | Chandler. | { IV. (Partial) } | { } | 1 | 15 | 1 | (231) |
| 233 | Iron Construction | { Lect., Rec., Draw. } | Chandler. | { IV. (Partial) } | { } | 2 | 15 | 1 | (232) |
| 234 | Stereotomy | { Lect., Rec., Draw. } | Homer. | { IV. (Partial) } | { } | 2 | 15 | 2 | (52) (228) |
| 235 | Specifications and Contracts | Lect. | Chandler. | { IV. (Partial) } | { } | 1, 2 | 30 | 1 | (231) |
| 236 | Problems in Construction | { Lect., Draw. } | Chandler. | { IV. (Partial) } | { } | 1, 2 | 30 | 1 | (231) |

| ARCHITECTURE. | | | | | | | | | |
|---------------|--|------------------------------------|--------------------------|--|------------|-------|---------------|-----------------|------------------------------------|
| | Subject. | Lect., Rec., Lab., Draw, or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 237 | Schools, Theatres, Churches } Hospitals, etc. . . . } | Lect., | Chandler. | { IV. { IV. (Partial) | { 4 { 2 | 2 | 15 | 1 | (232) |
| 238 | History of Ornament . . . | { Lect., { Draw. | Walker. | { IV. { IV. (Partial) | { 4 { 2 | 1,2 | 30 | 1 | (245) (226) (228) |
| 239 | Design | Draw. | Homer, Moore. | { IV. { IV. (Partial) | { 2 { 1 | 2 | 15 | 7 | (228) |
| 240 | Design | Draw. | Létang. | { IV. { IV. (Partial) | { 3 { 2 | 1,2 | 15 | 11.12 | (239) |
| 241 | Advanced Design | Draw. | Létang. | IV. | 4 | 1,2 | 30 | 19.25 | (240) |
| 242 | Pen and Ink | Draw. | Gregg. | { IV. { IV. (Partial) | { 2 { 1 | 1,2 | 30 | 1 | { (1) (2) (3) (4) (5) { (6) (7) |
| 243 | Pen and Ink | Draw. | Gregg. | { IV. { IV. (Partial) | { 3 { 2 | 1,2 | 30 | 1 | (242) |
| 244 | Pencil Sketching | Draw. | Chandler. | { IV. { IV. (Partial) | { 2 { 1 | 1 | 15 | 2 | { (1) (2) (3) (4) (5) { (6) (7) |
| 245 | Charcoal Sketching . . . | Draw. | Chandler. | { IV. { IV. (Partial) | { 2 { 1 | 2 | 15 | 2 | (244) |
| 246 | Water Color Sketching . . | | Turner. | { IV. { IV. (Partial) | { 3 { 2 | 1,2 | 30 | 2 | (245) |
| 247 | Water Color Sketching . . | | Turner. | IV. | 4 | 1,2 | 30 | 2 | (246) |

| NATURAL SCIENCES. | | | | | | | | | |
|-------------------|--|-------------------------------------|--------------------------|---------------------------------------|-------|-------|---------------|-----------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 250 | Physical Geography | Lect. | Niles. | I, III, V, VII, IX. | 2 | 2 | 15 | 3 | (7) |
| 251 | Geology (Elements of Lithology and Structural Geology) | { Lect., Lab. } | Crosby. | I, IV, VII, IX. . . | 3 | 1 | 15 | 2 | (101) |
| 252 | Geology (Lithological, Structural, and Chemical) | { Lect., Lab. } | Crosby. | I, III, V, VII. . . | 3 | 1 | 15 | 3 | (201) |
| 253 | Historical Geology | { Lect., Rec. } | Niles. | III, V, VII, IX. . . | 3 | 2 | 15 | 3 | (251) or (252) |
| 254 | Historical Geology | { Lect., Rec. } | Niles. | I. | 3 | 2 | 15 | 2 | (251) or (252) |
| 255 | Climatology | { Lect., Rec. } | Niles. | VII, IX. | 4 | 1 | 15 | 2 | |
| 261 | General Biology and Botany | { Lect., Rec., Lab. } | Sedgwick. | VII, IX. | 2 | 1,2 | 15 | 6 | (101) |
| 262 | Microscopy | { Lect., Rec., Lab. } | Sedgwick. | { III, V, VII, VIII, IX. } | 2 | 2 | 15 | 2 | |
| 264 | Comparative Anatomy and Embryology | { Lect., Rec., Lab. } | Gardiner. | VII. | 3 | 2 | 15 | 6 | (201) |

| NATURAL SCIENCES. | | | | | | | | | |
|-------------------|---|-------------------------------------|--------------------------|-----------------------|-------|-------|---------------|-----------------|-----------------------|
| | Subject. | Lect., Rec., Lab., Draw., or Field. | Professor or Instructor. | Taken by | Year. | Term. | No. of Weeks. | Hours per Week. | Preparation Required. |
| 265 | Biology of the Microorganisms | { Lect., Rec., Lab. } | Sedgwick. | VII. | 3 | 1 | 15 | 10 | (261) |
| 266 | Zoölogy and Palæontology | { Lect., Lab. } | Gardiner. | III, VII, IX. | 3 | 1,2 | 30 | 2 | |
| 270 | Comparative Physiology | { Lect., Rec., Lab. } | Sedgwick. | VII, | 4 | 1,2 | 30 | - | (264) |
| 271 | Microscopic Anatomy | { Lect., Lab. } | Gardiner. | VII. | 4 | 1,2 | 30 | 6 | (264) |
| 272 | Bacteriology and Sanitary Science | { Lect., Rec., Lab. } | Sedgwick. | I, VII, IX. | 4 | 2 | 15 | 2 | |
| 274 | Higher Biology | Lect. | Sedgwick. | VII. | 4 | 1,2 | 30 | 1 | (265) |
| 276 | Teaching of Natural Sciences | Lect. | Sedgwick. | VII. | 4 | 2 | 15 | 1 | |
| 277 | Anthropology | Lect. | Sedgwick. | VII, IX. | 3 | 1 | 15 | 1 | |
| 278 | History of Natural Sciences | Lect. | Sedgwick. | VII, IX. | 4 | 1 | 15 | 1 | |

REGULATIONS OF THE SCHOOL.

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 Jan. 28. On legal holidays, and on the Friday and Saturday following Thanksgiving Day, the exercises of the school are suspended.

CALENDAR FOR 1888-89.

| | |
|--|--|
| School year began | Monday, Sept. 24, 1888. |
| Second term will begin | Tuesday, Jan. 29, 1889. |
| Degrees conferred | Tuesday, May 28, 1889. |
| First Entrance Examinations | { Thursday, May 30, 1889, and Friday, May 31, 1889. |
| Second Entrance Examinations | { Tuesday, Sept. 24, 1889, and Wednesday, Sept. 25, 1889. |
| Examinations for Advanced Standing | Thursday, Sept. 26, 1889. |
| School year of 1889-90 will begin | Monday, Sept. 30, 1889. |

CALENDAR FOR 1889-90.

| | |
|--|--|
| School year will begin | 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. |

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, which will cover all the studies of the preceding term; and an annual examination in May, which in the first,

second, and third years will cover the studies of the entire year, except subjects finished during the first half year; and in the fourth year will cover 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 will be held on the Thursday and following days after the September entrance examinations, and at the time of the annual examinations. But any candidate for graduation, conditioned at the semi-annual examination of the fourth year, will be re-examined at such time previous to the first of March as may be convenient for the professor in whose subject he has 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 Oct. 10, and \$75 on or before Feb. 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.

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.— A scholarship for regular students has been 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.

Two scholarships were founded by the late James Savage, LL.D., the benefit of which is given to meritorious students on recommendation of the Faculty.

Two scholarships (of \$125 each) founded by the Massachusetts Charitable Mechanic Association are awarded to sons of present or past members of the Association.

A scholarship, founded by the contributions of residents of the town of Milton, is 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.

Joy 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.

The 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, is to be enjoyed by a third or fourth year student in Mechanical Engineering.

By a bequest of the late Richard Perkins of Boston the income of \$50,000 is available for aiding needy 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 such vacancies are to be filled may be obtained by addressing the Secretary of the State Board of Education, Boston.

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.

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 a 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.

GRADUATE STUDENTS.

CANDIDATE FOR ADVANCED DEGREE.

| NAME. | HOME. | RESIDENCE. |
|--|----------------------------|-------------------|
| Newell, Frederick Haynes, S.B., Mass. Inst. Technology. | <i>Bradford, Penn.</i> | Brookline. |
| Bolan, Thomas Vincent, A B., Georgetown College. | <i>Philadelphia, Penn.</i> | |
| Brownell, Ernest Henry, A.B., Brown University. | <i>Bristol, R. I.</i> | 28 Temple St. |
| Bryant, Alice Gertrude, B.A., Vassar College. | <i>Woburn.</i> | Woburn. |
| Burnham, Edward Clifton, A.B., Brown University. | <i>Pawtucket, R. I.</i> | 88 Waltham St. |
| Carmalt, Laurance Johnson, A.B., Yale University. | <i>New Haven, Conn.</i> | 46 Chestnut St. |
| Codman, Stephen Russell H., A.B., Harvard University. | <i>Boston.</i> | 17 Brimmer St. |
| Cogswell, Charles Northend, A.B., Harvard University. | <i>Cambridge.</i> | Cambridge. |
| Coolidge, Joseph Randolph, Jr., A.M., Harvard University. | <i>Boston.</i> | 65 Beacon St. |
| Curtis, Thomas Hamlin, A.B., Yale University. | <i>New Haven, Conn.</i> | 27 Appleton St. |
| Davis, Cornelius Schuyler, A.B., Union College. | <i>Schenectady, N. Y.</i> | |
| de Gersdorff, George Bruno, A.B., Harvard University. | <i>Cambridge.</i> | Cambridge. |
| Doak, John E., Ph.B., University of the Pacific. | <i>Stockton, Cal.</i> | 25 Woodbine St. |
| Donlon, Alphonsus John, A.B., Georgetown College. | <i>Albany, N. Y.</i> | 70 Chandler St. |
| Emery, Elwood Allan, B.L., University of Minnesota. | <i>Minneapolis, Minn.</i> | 202 Dartmouth St. |
| Emmons, Hamilton, Oxford University. | <i>Boston.</i> | 15 St. James Ave. |

| NAME. | HOME. | RESIDENCE |
|---|----------------------------|--------------------|
| Flint, Grover, A.B., Harvard University. | <i>New York, N. Y.</i> | 1 Oxford Terrace. |
| Gillon, Charles Joseph, A.B., St. John's College. | <i>Milford.</i> | Milford. |
| Hammett, Philip Melancthon, A.B., Harvard University. | <i>Newport, R. I.</i> | Cambridge. |
| Harris, Frederick Aug. W., A.B., Brown University. | <i>Providence, R. I.</i> | 226 W. Canton St. |
| Hayes, Harry Edgar, A.B., Harvard University. | <i>Boston.</i> | 3 Columbus Sq. |
| Holland, Francis J., M.A., St. Mary's College. | <i>Boston.</i> | 94 Pembroke St. |
| Maltby, Margaret Eliza, A.B., Oberlin College. | <i>Oberlin, O.</i> | 331 Columbus Ave. |
| Mann, Martha R., B.S., Wellesley College. | <i>Charlestown.</i> | Waverley House. |
| Mason, Elizabeth Spaulding, A.B., Smith College. | <i>Boston.</i> | 164 W. Chester Pk. |
| Miller, Nellie Rawson, M.A., Iowa State University. | <i>Boston.</i> | 144 W. Canton St. |
| Neave, Charles, A.B., Yale University. | <i>Cincinnati, O.</i> | 5 Oxford Terrace. |
| Richmond, Knight Cheney, B.P., Brown University. | <i>Providence, R. I.</i> | 79 Dartmouth St. |
| Roberts, William Jackson, A.B., Oregon State University. | <i>The Dalles, Oreg.</i> | 67 Chandler St. |
| Smith, Frank Warren, A.M., Harvard University. | <i>Dorchester.</i> | Mill St. |
| Storrow, Samuel, A.B., Harvard University. | <i>Boston.</i> | 417 Beacon St. |
| Vielé, Francis Stuart, A.B., Hobart College. | <i>Geneva, N. Y.</i> | 1 Yarmouth St. |
| Wood, George Bacon, A.B., Haverford College. | <i>Philadelphia, Penn.</i> | 11 St. James Ave. |
| Woodman, Caroline Augusta, A.B., Vassar College. | <i>Lewiston, Me.</i> | 18 Dartmouth St. |

REGULAR STUDENTS.

FOURTH YEAR.

| NAME. | COURSE. | HOMR. | RESIDENCE. |
|--------------------------------|---------|----------------------------|--------------------|
| Ayer, Arthur Whittier. | II. | <i>Somerville.</i> | Somerville. |
| Basford, George Marshall. | II. | <i>Boston.</i> | Parker Hill Ave. |
| Beach, Edward James. | V. | <i>Dubuque, Ia.</i> | 71 Rutland St. |
| Beaman, William Major. | I. | <i>Charlestown.</i> | Navy Yard. |
| Bellows, Arthur Benjamin. | II. | <i>Walpole, N. H.</i> | 306 Columbus Ave. |
| Bixby, Willard Goldthwaite. | II. | <i>Salem.</i> | Salem. |
| Bliss, Zenas Work. | II. | <i>Providence, R. I.</i> | 3 Oxford Terrace. |
| Borden, Charles Newton. | II. | <i>Fall River.</i> | 369 Columbus Ave. |
| Bradley, Frederick William. | VI. | <i>Lowell.</i> | Lowell. |
| Bulkley, Joseph Norman. | VI. | <i>New York, N. Y.</i> | 233 W. Canton St. |
| Capen, Frank Irving. | I. | <i>Stoughton.</i> | Stoughton. |
| Cilley, Frank Harvey. | I. | <i>Dorchester.</i> | 601 Dudley St. |
| Crabtree, Fred. | V. | <i>Lawrence.</i> | Lawrence. |
| Craigin, Henry Adams. | II. | <i>Roxbury.</i> | 1 Cedar Park. |
| Cromwell, Charles Hammond. | II. | <i>Baltimore, Md.</i> | 18 St. James Ave. |
| Cutter, Roland Norcross. | I. | <i>Winchester.</i> | Winchester. |
| Dame, Frank Libby. | VI. | <i>Boston.</i> | 19 Temple Pl. |
| Davenport, William Seaver. | V. | <i>Roxbury.</i> | 2 Homer Pl. |
| Davis, Arthur Lincoln. | II. | <i>San Francisco, Cal.</i> | 381 Columbus Ave. |
| Dodge, Charles Benjamin. | IX. | <i>Skowhegan, Me.</i> | 18 Temple St. |
| Durfee, Nathan. | II. | <i>Fall River.</i> | 369 Columbus Ave. |
| Dyar, Harrison Gray. | V. | <i>Rhinebeck, N. Y.</i> | 170 W. Chester Pk. |
| Edgett, Horace Peirce. | VIII. | <i>Beverly.</i> | Beverly. |
| Edwards, Arthur Vincent. | IV. | <i>Milton.</i> | Milton. |
| Fiske, Jonathan Parker Bishop. | VI. | <i>Auburndale.</i> | Auburndale. |
| French, Alfred Willard. | I. | <i>West Roxbury.</i> | West Roxbury. |
| French, Edward Vinton. | II. | <i>Lynn.</i> | Lynn. |
| French, Hollis. | VI. | <i>Boston.</i> | 200 Comm'wth Ave. |
| Gannett, Earl Warren. | VI. | <i>Omaha, Neb.</i> | 526 Columbus Ave. |
| Gilbert, James Porter. | V. | <i>Jamaica Plain.</i> | 244 Chestnut Ave. |
| Guppy, Benjamin Wilder. | I. | <i>Jamaica Plain.</i> | 8 Myrtle St. |
| Hart, Francis Russell. | VI. | <i>New Bedford.</i> | Forest Hills St. |
| Hobart, Henry Metcalf. | VI. | <i>Boston.</i> | 60 W. Rutland Sq. |
| Hobbs, Franklin Warren. | II. | <i>Brookline.</i> | Brookline. |
| Holman, Geo. Ulysses Grant. | VI. | <i>East Boston.</i> | 20 Chelsea St. |
| Hooker, Richard. | IV. | <i>Roxbury.</i> | 19 Whiting St. |
| Hopkins, Fred. Lewis. | V. | <i>Lawrence.</i> | 114 Chandler St. |
| Hunt, Harry Hampton. | VI. | <i>Melrose.</i> | Melrose. |
| Hutchins, Edward Sterns. | II. | <i>Providence, R. I.</i> | 5 St. James Ave. |
| Johnson, Lewis Elisha. | II. | <i>Waterloo, Ia.</i> | 37 Holyoke St. |
| Johnson, William Stone. | I. | <i>Saxonville.</i> | Saxonville. |
| Kilham, Walter Harrington. | IV. | <i>Beverly.</i> | Beverly. |
| Kinsman, Arthur Daniel. | VIII. | <i>Ipswich.</i> | East Somerville. |

| NAME. | COURSE. | HOME. | RESIDENCE. |
|------------------------------|---------|---------------------------|----------------------|
| Kunhardt, Lewis Henry. | II. | <i>Melrose Highlands.</i> | Melrose Highlands. |
| Lauder, George Burns. | VI. | <i>Concord, N. H.</i> | U. S. Hotel. |
| Laws, Frank Arthur. | VI. | <i>Brockton.</i> | Brockton. |
| Lewis, William Willett. | II. | <i>Hyde Park.</i> | Hyde Park. |
| Linzee, John William, Jr. | I. | <i>Boston.</i> | 3 Ashburton Pl. |
| Mildram, Samuel H. | I. | <i>Neponset.</i> | Wood St. |
| Mott, William Elton. | I. | <i>Burlington, N. J.</i> | 161 W. Brookline St. |
| Pike, Clayton Wilbur. | VI. | <i>Fryeburg, Me.</i> | 226 W. Canton St. |
| Power, Charles Whittlesey. | VI. | <i>Pittsfield.</i> | 19 Upton St. |
| Ranno, Fred Walter. | I. | <i>Manchester, N. H.</i> | 453 Columbus Ave. |
| Richardson, George Lynde. | I. | <i>San Rafael, Cal.</i> | 381 Columbus Ave. |
| Rounds, George Wadsworth. | VI. | <i>Malden.</i> | Malden. |
| Russel, Richard Lee. | I. | <i>Pottsville, Penn.</i> | 198 Beacon St. |
| Sanborn, Frank Edwin. | II. | <i>Roxbury.</i> | 103 Moreland St. |
| Sauveur, Albert. | III. | <i>Boston.</i> | 33 Yarmouth St. |
| Shepard, Edward Valentine. | I. | <i>Salem.</i> | Salem. |
| Snow, William Gage. | II. | <i>Watertown.</i> | Watertown. |
| Storrow, Samuel, A.B. | I. | <i>Boston.</i> | 417 Beacon St. |
| Thompson, Sanford Eleazer. | I. | <i>Newton Highlands.</i> | Newton Highlands. |
| Thorp, Frank Hall. | V. | <i>Bloomington, Ill.</i> | 285 Columbus Ave. |
| Thurber, William Bartlett. | IX. | <i>Plymouth.</i> | Plymouth. |
| Truesdell, Arthur Eugene. | VI. | <i>West Stockbridge.</i> | Newton. |
| Underhill, William Woodbury. | II. | <i>Winchester.</i> | Winchester. |
| Warner, Charles Henry. | VI. | <i>Fall River.</i> | 375 Columbus Ave. |
| Whipple, George Chandler. | I. | <i>Chelsea.</i> | Chelsea. |
| Whiting, Jasper. | III. | <i>Charlestown.</i> | 100 Main St. |
| Whitney, Frank Pope. | VI. | <i>Dorchester.</i> | 592 Adams St. |
| Williams, Robert Cardell. | III. | <i>Marquette, Mich.</i> | 116 Chandler St. |
| Williston, Arthur Lyman. | II. | <i>Cambridge.</i> | Cambridge. |
| Windett, Victor. | II. | <i>Chicago, Ill.</i> | 37 Holyoke St. |
| Wuichet, Walter Gebhart. | II. | <i>Dayton, O.</i> | 116 Chandler St. |

THIRD YEAR.

| | | | |
|-------------------------------|------|----------------------------|----------------------|
| Adams, Arthur Henry. | II. | <i>Watertown.</i> | Watertown. |
| Alden, Charles Henry, Jr. | IV. | <i>Boston.</i> | 202 Dartmouth St. |
| Atwood, Frank Wiley. | V. | <i>East Boston.</i> | 81 Lexington St. |
| Babb, Cyrus Cates. | I. | <i>Boston.</i> | 12 Somerset St. |
| Baker, Joseph Black. | VI. | <i>Newton.</i> | Newton. |
| Baldwin, Hiram Ellsworth. | I. | <i>Niles, O.</i> | 218 W. Sp'gfield St. |
| Bartlett, Spaulding. | V. | <i>Webster.</i> | 3 Oxford Terrace. |
| Batchelder, John Langdon, Jr. | VII. | <i>Jamaica Plain.</i> | Pond St. |
| Blood, John Balch. | VI. | <i>Newburyport.</i> | Newburyport. |
| Blume, Juan Cristóbal. | II. | <i>Lima - Peru.</i> | 84 Charles St. |
| Bolan, Thomas Vincent, A.B. | VI. | <i>Philadelphia, Penn.</i> | 70 Chandler St. |
| Bragg, Edward Franklin. | II. | <i>Taunton.</i> | 44 Chandler St. |
| Brand, Horace Lewis. | II. | <i>Chicago, Ill.</i> | 524 Columbus Ave. |
| Brown, Albert Frederick. | I. | <i>Roxbury.</i> | 106 Zeigler St. |
| Brown, Edward Dexter. | VI. | <i>Reading.</i> | Reading. |

REGISTER OF STUDENTS.

113

| NAME. | COURSE. | HOME. | RESIDENCE. |
|---------------------------------|---------|-----------------------------|---------------------|
| Brownell, Ernest Henry, A.B. | I. | <i>Bristol, R. I.</i> | 28 Temple St. |
| Burley, Harry Benjamin. | I. | <i>North Epping, N. H.</i> | 14 Holyoke St. |
| Burnham, Edw. Clifton, A.B. | II. | <i>Pawtucket, R. I.</i> | 88 Waltham St. |
| Butters, Robt. Greene Walker. | II. | <i>Haverhill.</i> | 369 Columbus Ave. |
| Calkins, Gary Nathan. | IX. | <i>Chicago, Ill.</i> | 171 W. Br'kline St. |
| Carlisle, Morten. | VI. | <i>Cincinnati, O.</i> | 306 Columbus Ave. |
| Carlton, Chester Vernon. | I. | <i>Milford, N. H.</i> | 564 Columbus Ave. |
| Carmalt, Laurance J., A.B. | I. | <i>New Haven, Conn.</i> | 46 Chestnut St. |
| Carney, James Andrew. | V. | <i>Lowell.</i> | Lowell. |
| Chapman, George Daniel. | II. | <i>Fitchburg.</i> | 369 Columbus Ave. |
| Clapp, Homer Crane. | II. | <i>South Boston.</i> | 729 E. Fourth St. |
| Clark, James, Jr. | VI. | <i>Louisville, Ky.</i> | 18 Yarmouth St. |
| Codman, Stephen R. H., A.B. | IV. | <i>Boston.</i> | 17 Brimmer St. |
| Crane, John Gooding. | I. | <i>Taunton.</i> | Taunton. |
| Creden, William Louis. | II. | <i>South Boston.</i> | 940 Broadway. |
| Curtis, William Goodwin. | I. | <i>Brooklyn, N. Y.</i> | 14 Holyoke St. |
| Davis, Cornelius Schuyler, A.B. | II. | <i>Schenectady, N. Y.</i> | |
| de Bullet, John Chas. 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. |
| DeWolf, John Oviatt. | II. | <i>Greenfield.</i> | 14 Winthrop St. |
| Dodge, Frederick Holmes. | II. | <i>Toledo, O.</i> | 171 W. Br'kline St. |
| Dore, Walter Joseph. | IX. | <i>Chicago, Ill.</i> | 15 St. James Ave. |
| Dunbar, Francis William. | VI. | <i>Canton.</i> | Canton. |
| du Pont, Pierre Samuel. | V. | <i>Philadelphia, Penn.</i> | 19 St. James Ave. |
| Dwellely, Edwin Forrest. | I. | <i>West Hanover.</i> | West Hanover. |
| Ellis, Walter. | VI. | <i>Newton.</i> | Newton. |
| Emery, Elwood Allan, B. L. | IV. | <i>Minneapolis, Minn.</i> | 202 Dartmouth St. |
| Fenn, William Henry. | I. | <i>Jersey City, N. J.</i> | 183 Warren Ave. |
| Flint, William Parker. | II. | <i>Brookline.</i> | Brookline. |
| Flood, Samuel Douglas. | II. | <i>Hyde Park, Ill.</i> | 35 St. James Ave. |
| Fuller, George Warren. | V. | <i>West Medway.</i> | 323 Columbus Ave. |
| Gilmore, George L. | II. | <i>Charlestown.</i> | 212 Bunker Hill St. |
| Glidden, John Willard. | II. | <i>De Kalb, Ill.</i> | 149 Worcester St. |
| Goodwin, Harry Manly. | VIII. | <i>Roxbury.</i> | 3 Townsend St. |
| Greenlaw, Frank Murray. | VI. | <i>Roxbury.</i> | 5 Willoughby Pl. |
| Hale, George Ellery. | VIII. | <i>Chicago, Ill.</i> | Dorchester. |
| Hall, Frederick Bellows. | II. | <i>Charlestown.</i> | 70 Winthrop St. |
| Hall, John Richardson. | VI. | <i>Brookline.</i> | Brookline. |
| Haskins, William. | III. | <i>Medford.</i> | Medford. |
| Hayden, Charles. | IX. | <i>Boston.</i> | 166 Newbury St. |
| Hayden, Sophia Gregoria. | IV. | <i>Jamaica Plain.</i> | 325 Lamartine St. |
| Hills, Leonard Mariner. | IX. | <i>Amherst.</i> | 312 Columbus Ave. |
| Hilton, George Albert. | II. | <i>Cambridge.</i> | Cambridge. |
| Horton, Sidney Ellsworth. | II. | <i>Windsor Locks, Conn.</i> | Hotel Dunbar. |
| Kendall, Francis Howe. | I. | <i>Belmont.</i> | Belmont. |
| Knight, Franklin. | I. | <i>Lynn.</i> | Lynn. |
| Koch, Charles Frederick. | II. | <i>Cincinnati, O.</i> | 107 Chandler St. |

| NAME. | COURSE. | HOME. | RESIDENCE. |
|-------------------------------|---------|----------------------------|--------------------|
| 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. |
| Mann, Bertram Haskell. | VI. | <i>Weymouth.</i> | Weymouth. |
| Martin, Waldo Allen. | II. | <i>Milton.</i> | Milton. |
| McConnell, George Bancroft. | I. | <i>Roxbury.</i> | 153 Blue Hill Ave. |
| Merrick, George Edward. | V. | <i>Holyoke.</i> | 357 Columbus Ave. |
| Metcalf, Frederick. | II. | <i>Providence, R. I.</i> | 69 Appleton St. |
| Mitchell, Everett Still. | I. | <i>Boston.</i> | 495 Tremont St. |
| Moody, Burdett. | I. | <i>Deadwood, Dak.</i> | 154 Warren Ave. |
| Moody, Frederick Clark. | II. | <i>Boston.</i> | 116 Appleton St. |
| Moore, Stephen Wallace. | II. | <i>Newton.</i> | Newton. |
| Mossman, William. | VI. | <i>Mattapan.</i> | Norfolk St. |
| Neave, Charles, A. B. | VI. | <i>Cincinnati, O.</i> | 5 Oxford Terrace. |
| Newell, Allan Hovey. | II. | <i>Stockton, Cal.</i> | 524 Columbus Ave. |
| Nims, Norman Granville. | IV. | <i>Keene, N. H.</i> | Somerville. |
| Norris, Clarence George. | I. | <i>Hyde Park.</i> | Hyde Park. |
| Noyes, Harry Lincoln. | I. | <i>Boone, Ia.</i> | Parker Hill Ave. |
| Noyes, Joseph Karr. | I. | <i>Binghamton, N. Y.</i> | 251 Columbus Ave. |
| Packard, George Arthur. | III. | <i>Wakefield.</i> | Wakefield. |
| Peyton, William Rowzee. | II. | <i>Duluth, Minn.</i> | 154 Warren Ave. |
| Poland, William Babcock. | I. | <i>Fort Sidney, Wyo.</i> | 115 Berkeley St. |
| Raymond, Edward Brackett. | VI. | <i>Somerville.</i> | Somerville. |
| Reed, William Breckenridge. | IV. | <i>Westfield.</i> | 524 Columbus Ave. |
| Rice, Calvin Winsor. | VI. | <i>Winchester.</i> | Winchester. |
| Richmond, Knight Cheney, B.P. | II. | <i>Providence, R.</i> | 79 Dartmouth St. |
| Ripley, Charles Edward. | II. | <i>Rutland, Vt.</i> | 157 W. Canton 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> | 707 E. Broadway. |
| Rogers, Minnie. | IX. | <i>Jamaica Plain.</i> | 325 Lamartine St. |
| Roots, Willard Holt. | IX. | <i>Little Rock, Ark.</i> | 55 Pinckney St. |
| Schmidt, Louis. | V. | <i>Cincinnati, O.</i> | 11 Bowdoin St. |
| Sherman, Charles Winslow. | I. | <i>Kingston.</i> | 111 Pembroke St |
| Simpson, Edmund Thomas. | V. | <i>Lowell.</i> | Lowell. |
| Slater, Howard Colfax. | II. | <i>Providence, R. I.</i> | 75 Warren Ave. |
| Sonnemann, George Adolph. | III. | <i>Boston.</i> | 228 Tremont St. |
| Southworth, Martin Otis. | VI. | <i>Stoughton.</i> | Stoughton. |
| Spaulding, Henry Plympton. | VI. | <i>Newton.</i> | Newton. |
| Spring, Andrew Hastings. | III. | <i>Somerville.</i> | Somerville. |
| Sturges, Benton. | IX. | <i>Chicago, Ill.</i> | 6 Louisburg Sq. |
| Sturtevant, Thomas Joseph. | VI. | <i>South Framingham.</i> | South Framingham. |
| Swanton, Frederic Worcester. | VI. | <i>Bath, Me.</i> | 457 Marlboro' St. |
| Tallant, George Payne. | II. | <i>San Francisco, Cal.</i> | 64 Mt. Vernon St. |
| Taylor, Gordon Hooker. | I. | <i>East Cambridge.</i> | East Cambridge. |
| Towne, John Henry. | IX. | <i>Stamford, Conn.</i> | 64 Mt. Vernon St. |
| Voorhees, Gardner Tufts. | II. | <i>Cambridgeport.</i> | Cambridgeport. |

| NAME. | COURSE. | HOME. | RESIDENCE. |
|--------------------------|---------|------------------|---------------------|
| Walker, Elton David. | I. | Taunton. | 188 W. Br'kline St. |
| Walker, Robert Turner. | IV. | Greenfield. | 14 Winthrop St. |
| Warren, Lyman Otis. | IV. | Brighton. | Brighton. |
| Wason, Leonard Chase. | VI. | Brookline. | Brookline. |
| Watson, Charles Morris. | VI. | Jamaica Plain. | 26 Greenough Ave. |
| White, Franklin Warren. | VII. | Boston. | 457 Marlboro' St. |
| Whitney, Willis Rodney. | V. | Jamestown, N. Y. | 41 Union Park. |
| Wilson, Arthur Robert. | I. | Oakland, Cal. | 188 W. Br'kline St. |
| Woodman, Andrew Whitney. | I. | Chelsea. | Chelsea. |

SECOND YEAR.

| | | | |
|---------------------------------|------|-----------------------|----------------------|
| Aiken, Charles Wilson. | II. | Franklin, N. H. | 306 Columbus Ave. |
| Ball, Robert Steele. | II. | Dublin, Ireland. | 76 Bartlett St. |
| Barnes, Rowland Hanaford. | III. | Waltham. | Waltham. |
| Barri, Joel Gray. | I. | Cambridgeport. | Cambridgeport. |
| Bassett, William Hastings. | V. | New Bedford. | 760 Tremont St. |
| Bissell, Robert Wilson. | I. | Pittsburg, Penn. | 8 St. James Ave. |
| Blanchard, Frederick Chambers. | II. | Dorchester. | 293 Commercial St. |
| Blinn, Alfred Millard. | IV. | Roxbury. | 55 Elm Hill Ave. |
| Bowen, Stephen. | II. | Roxbury. | 255 Warren St. |
| Boyd, Stephen Breed. | II. | Waterbury, Conn. | Malden. |
| Bradlee, Henry Goddard. | VI. | Boston. | 113 Beacon St. |
| Bradley, Harry Cyrus. | I. | Boston. | 29 Upton St. |
| Brainerd, Wallace Heber. | VI. | South Englewood, Ill. | 788 Dudley St. |
| Brown, William Channing. | VI. | West Bridgewater. | 90 W. Spr'gfield St. |
| Bryant, Dixie Lee. | VII. | Columbia, Tenn. | Newton Highlands. |
| Bryant, William Page. | X. | Charlestown. | 170 Bunker Hill St. |
| Bryden, George William. | II. | Chelsea. | Chelsea. |
| Bunker, Carl Hervey. | X. | Auburndale. | Auburndale. |
| Burns, Robert. | VI. | Somerville. | Somerville. |
| Burton, Frank Howard. | II. | Providence, R. I. | |
| Campbell, George Ashley. | I. | Derry, N. H. | 52 Chandler St. |
| Campbell, Jeremiah. | II. | Chelsea. | Chelsea. |
| Capen, Barnard, Jr. | VI. | South Boston. | 534 E. Fourth St. |
| Cater, Douglas Aymar. | II. | New York, N. Y. | 350 Columbus Ave. |
| Coggin, Frederick Griswold, Jr. | II. | Lake Linden, Mich. | 1 Beale St. |
| Cogswell, Charles Perkins, Jr. | I. | Norwich, Conn. | 385 Columbus Ave. |
| Cole, Fred Allen. | II. | Camden, Me. | Hotel Edinburgh. |
| Cole, Harrison Irving. | II. | Kingston. | Kingston. |
| Collins, Reuben Belknap. | I. | Dedham. | Dedham. |
| Conant, Roger Winthrop. | VI. | Gloucester. | 1943 Dorch. Ave. |
| Creden, Thomas Harold. | VI. | South Boston. | 940 Broadway. |
| Cunningham, Edward, Jr. | X. | East Milton. | East Milton. |
| Curtis, Thomas Hamlin, A.B. | I. | New Haven, Conn. | 20 St. James Ave. |
| Dana, Gorham. | II. | Dorchester. | 34 Glendale St. |
| Dart, William Cary. | X. | Providence, R. I. | Reservoir. |
| Dillingham, Charles Albert. | VI. | Old Town, Me. | 7 Concord Sq. |
| Dillon, Arthur James. | IV. | St. Louis, Mo. | 179 Warren Ave. |

| NAME. | COURSE. | HOME. | RESIDENCE. |
|------------------------------|---------|---------------------------|--------------------|
| Donlon, Alphonsus John, A.B. | VI. | <i>Albany, N. Y.</i> | 70 Chandler St. |
| Donn, Edward Wilton, Jr. | IV. | <i>Washington, D. C.</i> | 221 W. Canton St. |
| Dorr, Frank Hayes. | VI. | <i>Great Falls, N. H.</i> | 67 E. Brookline St |
| Douglass, Walter Bailey. | V. | <i>Lowell.</i> | Lowell. |
| Dow, Sterling Tucker. | V. | <i>Portland, Me.</i> | 663 Tremont St. |
| Dunham, Lewis Augustus. | I. | <i>De Pere, Wis.</i> | 665 Tremont St. |
| England, Paul Willard. | VI. | <i>Allston.</i> | 35 Gardner St. |
| Ensworth, Horace Hayden. | VI. | <i>Hartford, Conn.</i> | 112 Appleton St. |
| Favor, George Warren. | III. | <i>Chicago, Ill.</i> | 366 Columbus Ave. |
| Fiske, Henry Anthony. | X. | <i>Roxbury.</i> | 50 Elmors St. |
| Forbes, Howard Carleton. | X. | <i>Roxbury.</i> | Elm Hill Ave. |
| Füger, Frederic William. | II. | <i>Portland, Me.</i> | 221 W. Canton St. |
| Fuller, Will Spencer. | IX. | <i>Brighton.</i> | 15 Sparhawk St. |
| Garrison, Charles. | VI. | <i>Roxbury.</i> | 32 Linwood St. |
| Goodwin, Homer. | II. | <i>Roxbury.</i> | 62 Forest St. |
| Gottlieb, Albert Samuel. | II. | <i>Brooklyn, N. Y.</i> | 40 Rutland Sq. |
| Greer, Medorem William. | VI. | <i>Boston.</i> | 12 Bond St. |
| Hamilton, Edgar Lockwood. | III. | <i>Fond du Lac, Wis.</i> | 312 Columbus Ave. |
| Hammond, Charles Frederick. | I. | <i>Detroit, Mich.</i> | 68 St. James Ave. |
| Hansen, Charles. | II. | <i>Chicago, Ill.</i> | 219 Caledonia St. |
| Harwood, Harry Adams. | I. | <i>Boston.</i> | 192 W. Newton St. |
| Hatch, Arthur Elliott. | I. | <i>Charlestown.</i> | 160 Main St. |
| Hathaway, Herbert Emerson. | V. | <i>Fall River.</i> | 15 St. James Ave. |
| Hawley, George Burton. | VI. | <i>Hartford, Conn.</i> | 408 Columbus Ave. |
| Hawley, William Church. | VI. | <i>Malden.</i> | Malden. |
| Hersam, Ernest Albert. | V. | <i>Stoneham.</i> | Stoneham. |
| Highlands, John Ashley. | II. | <i>Fall River.</i> | 23 Berwick Pk. |
| Hilliard, John Dunlap, Jr. | VI. | <i>Provincetown.</i> | 28 Dwight St. |
| Holmes, Eugene Albe. | II. | <i>Medford.</i> | Medford. |
| Holmes, Francis Clinton. | IX. | <i>Plymouth.</i> | 20 Yarmouth St. |
| Holmes, George Alfred. | X. | <i>Newton Centre.</i> | Newton Centre. |
| Hooper, George Kennard. | II. | <i>Roxbury.</i> | 29 Dorset St. |
| Hopton, Walter Edwin. | II. | <i>Bridgeport, Conn.</i> | 82 Appleton St. |
| Howard, Frank Wallace. | II. | <i>Hyde Park.</i> | Hyde Park. |
| Howland, Arthur. | II. | <i>West Newton.</i> | West Newton. |
| Jacobs, Arthur Lincoln. | II. | <i>Melrose Highlands.</i> | Melrose Highlands. |
| Jordan, Harry Warren. | X. | <i>Kennebunk, Me.</i> | 37 Winthrop St. |
| Kauffman, Milton Henry. | V. | <i>Chicago, Ill.</i> | 24 Greenwich Pk. |
| Keating, William Edward. | VI. | <i>Melrose.</i> | Melrose. |
| Keene, Thomas Means. | I. | <i>Chelsea.</i> | Chelsea. |
| Keene, William Faintoate. | I. | <i>Saugatuck, Conn.</i> | 733 Tremont St. |
| Kimball, Herbert Sawyer. | X. | <i>Roxbury.</i> | 22 Highland Ave. |
| Knowles, Morris, 2d. | I. | <i>Lawrence.</i> | Lawrence. |
| Lawrence, William Henry. | IV. | <i>Dorchester.</i> | 34 Sumner St. |
| 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. |
| Liddell, Major. | VI. | <i>Denver, Colo.</i> | 729 Tremont St. |

| NAME. | COURSE. | HOME. | RESIDENCE. |
|--------------------------------|---------|------------------------------|-------------------|
| Mansfield, Arthur Newhall. | VIII. | <i>Wakefield.</i> | Wakefield. |
| Mansfield, Henry Kimball. | I. | <i>Salem.</i> | Salem. |
| March, Clement. | I. | <i>Cambridge.</i> | Cambridge. |
| McKenna, Alex. George. | V. | <i>Allegheny, Penn.</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>Chicago, Ill.</i> | Cambridge. |
| Nickerson, Ernest. | II. | <i>Newton Centre.</i> | Newton Centre. |
| Norton, Fred Elmer. | II. | <i>Little Rock, Ark.</i> | 55 Pinckney St. |
| Otis, Hamilton. | I. | <i>San Francisco, Cal.</i> | Quincy. |
| Oxford, Geo. Henry Kimball. | VI. | <i>Cambridgeport.</i> | Cambridgeport. |
| Palmer, William Irving. | VI. | <i>Winchester.</i> | Winchester. |
| Pierce, Arthur Woodbury. | VI. | <i>Bardezag, Turkey.</i> | Auburndale. |
| Pratt, Nathan Raymond. | I. | <i>Sudbury.</i> | Sudbury. |
| Punchard, William Henry. | IV. | <i>Chelsea.</i> | 53 Gloucester St. |
| Putnam, John. | VI. | <i>Sandwich.</i> | 18 Upton St. |
| Ramsey, Allan. | VII. | <i>Cincinnati, O.</i> | 5 Walnut 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> | 67 Chandler St. |
| Rooney, John Anthony. | IV. | <i>Hyde Park.</i> | Hyde Park. |
| Rose, Frederick Holland. | II. | <i>Alexandria Bay, N. Y.</i> | 78 Rutland St. |
| Sager, Oscar Frank. | II. | <i>Charlestown.</i> | 52 School St. |
| Sargent, William Henry. | V. | <i>Brewer Village, Me.</i> | 7 Concord Sq. |
| Schieffelin, Schuyler. | VI. | <i>New York, N. Y.</i> | Hotel Oxford. |
| Shattuck, Arthur Forrest. | V. | <i>Winchester.</i> | Winchester. |
| Smith, Edwin Clarence. | II. | <i>Newton.</i> | Newton. |
| Snyder, Frederick Titcomb. | VI. | <i>Chicago, Ill.</i> | 87 Rutland Sq. |
| Spencer, Theodore. | VI. | <i>Cambridge.</i> | Cambridge. |
| Spooner, George Howard. | VI. | <i>New Bedford.</i> | 760 Tremont St. |
| Stickney, William. | VI. | <i>Chelsea.</i> | Chelsea. |
| Stix, Sol. Henry. | IV. | <i>Cincinnati, O.</i> | 335 Columbus Ave. |
| Stix, Sylvan Louis. | IV. | <i>New York, N. Y.</i> | 335 Columbus Ave. |
| Stoddard, Arthur Bates. | V. | <i>Taunton.</i> | Taunton. |
| Swan, James. | II. | <i>Dorchester.</i> | Arcadia St. |
| Trowbridge, Walter Bacon. | II. | <i>Newton.</i> | Newton. |
| Tyler, Clifford Molineaux. | I. | <i>Brookline.</i> | Brookline. |
| Vaillant, George Wightman. | I. | <i>New York, N. Y.</i> | 7 Newbury St. |
| Verges, Francisco Luis. | I. | <i>Arroyo, Porto Rico.</i> | Hotel Cluny. |
| Vielé, Francis Stuart, A.B. | VI. | <i>Geneva, N. Y.</i> | 1 Yarmouth St. |
| Wait, Henry Heileman. | VI. | <i>Chicago, Ill.</i> | 82 Myrtle St. |
| Walker, James Wilson Grimes. | I. | <i>Washington, D. C.</i> | 249 Beacon St. |
| Warner, George Menzies. | VI. | <i>Fall River.</i> | 375 Columbus Ave. |

| NAME. | COURSE. | HOME. | RESIDENCE. |
|--------------------------------|---------|------------------------------|-------------------|
| Warren, Joseph Adams. | I. | <i>Cumberland Mills, Me.</i> | 118 Chandler St. |
| Warren, William. | I. | <i>Brighton.</i> | Academy Hill. |
| Waterman, Charles Clarence. | VI. | <i>Charlestown.</i> | 80 Green St. |
| Weed, Henry Townsend. | V. | <i>Brooklyn, N. Y.</i> | 145 W. Newton St. |
| Weston, William Hutchinson. | III. | <i>Boston.</i> | Hotel Royal. |
| Wetherbee, Charles Phelps. | II. | <i>Detroit, Mich.</i> | Somerville. |
| White, Annie Elizabeth. | V. | <i>Roxbury.</i> | 233 Highland St. |
| White, Hartley Laurington. | I. | <i>Brookville.</i> | Brookville. |
| White, James Francis. | VI. | <i>Waterbury, Conn.</i> | 271 Columbus Ave. |
| Wilder, Salmon Willoughby, Jr. | X. | <i>Lowell.</i> | Lowell. |
| Wilson, Fred Allan. | II. | <i>Nahant.</i> | Dorchester. |
| Wood, Charles Hancock. | II. | <i>Brookline.</i> | Brookline. |
| Young, Harry Hayward. | II. | <i>Roxbury.</i> | 516 Warren St. |

FIRST YEAR.

| | | |
|-------------------------------|---------------------------|--------------------|
| Adams, Frank William. | <i>Newtonville.</i> | Newtonville. |
| Adams, William Linville. | <i>East Boston.</i> | 111 Eutaw St. |
| Alger, Francis, Jr. | <i>Boston.</i> | 41 Bowdoin St. |
| Allen, Orren. | <i>Denver, Colo.</i> | 12 St. James Ave. |
| Andrews, Edmund Lathrop. | <i>Chicago, Ill.</i> | 86 Mt. Vernon St. |
| Atkins, George Herbert. | <i>Somerville.</i> | Somerville. |
| Atwood, Joshua, 3d. | <i>So. Boston.</i> | 397 E. Fifth St. |
| Baker, George William. | <i>Hartford, Conn.</i> | 592 Tremont St. |
| Ballard, Hetty Orrilla. | <i>Roslindale.</i> | Brown Ave. |
| Barker, Eustis Herbert. | <i>Newton.</i> | Newton. |
| Bassett, Eugene Lyman. | <i>Mattapan.</i> | 105 Richmond St. |
| Bates, Walter Edwin. | <i>Lynn.</i> | Lynn. |
| Beal, Charles Alston. | <i>Abington.</i> | Abington. |
| Beckler, Alice Hooper. | <i>So. Boston.</i> | 590 E. Seventh St. |
| Bell, Alfred Whitney. | <i>West Newton.</i> | West Newton. |
| Bigelow, Charles Hudson. | <i>Salem.</i> | 235 Warren St. |
| Bourne, Phillips Payson. | <i>Foxboro'.</i> | Foxboro'. |
| Braden, William. | <i>Washington, D. C.</i> | 4 Claremont Pk. |
| Braman, Samuel Noyes. | <i>Wayland.</i> | Wayland. |
| Brown, Bertha Millard. | <i>Roxbury.</i> | 16 Holborn St. |
| Brown, Glenn Charles. | <i>Tower, Minn.</i> | 34 Rutland Sq. |
| Brown, William Franklin Snow. | <i>Portland, Me.</i> | 137 Pembroke St. |
| Buchholz, Charles Egmont. | <i>Hempstead, N. Y.</i> | 385 Columbus Ave. |
| Buckley, James Pinkney. | <i>Detroit, Mich.</i> | 7 Newbury St. |
| Burbank, Philip Mountfort. | <i>Waltham.</i> | Waltham. |
| Burnham, Charles Morton. | <i>Waltham.</i> | Waltham. |
| Burnham, Guy Johnston. | <i>Gloucester.</i> | Gardner St. |
| Burnham, Harry Atwood. | <i>Waltham.</i> | Waltham. |
| Burrage, Severance. | <i>West Newton.</i> | West Newton. |
| Capron, William Cargill. | <i>Hartford, Conn.</i> | 592 Tremont St. |
| Card, Huber David. | <i>Willimantic, Conn.</i> | West Medford. |

| NAME. | HOME. | RESIDENCE. |
|--------------------------------|--------------------------------|--------------------|
| Carney, George Sydney. | <i>Lowell.</i> | Lowell. |
| Carr, Andrew Sanborn. | <i>Somerville.</i> | Somerville. |
| Center, Harry Price. | <i>Ottawa, Ill.</i> | 12 Holyoke St. |
| Chaffee, William. | <i>Glendale.</i> | Newton. |
| Chapin, George Edwin. | <i>Charlestown.</i> | 2 Wallace Ct. |
| Chase, Charles Harris. | <i>Stoneham.</i> | Stoneham. |
| Chase, Richard Davenport. | <i>New Bedford.</i> | 760 Tremont St. |
| Childs, Arthur Francis. | <i>St. Albans, Vt.</i> | 611 Tremont St. |
| Church, Albert Kingsley. | <i>Lawrence.</i> | 29 Dartmouth St. |
| Chute, Will Young. | <i>Minneapolis, Minn.</i> | 152 Huntington Av. |
| Clogher, Arthur William. | <i>Boston.</i> | 62 Berkeley St. |
| Cioudman, Percy Lemont. | <i>Cumberland Mills, Me.</i> | |
| Cody, Lewis Philip. | <i>Grand Rapids, Mich.</i> | 137 Pembroke St. |
| Colby, John Mason, Jr. | <i>East Boston.</i> | 117 Trenton St. |
| Congdon, Carey. | <i>New London, Conn.</i> | 20 Union Park. |
| Cunningham, Frederick Haskell. | <i>Bolton.</i> | Wellesley Hills. |
| Curtin, John Andrew. | <i>Boston.</i> | 6 Rutland St. |
| Damren, William Henry. | <i>Lawrence.</i> | Lawrence. |
| Davis, Albert Gould. | <i>Bangor, Me.</i> | 10 St. James Ave. |
| Davis, Bertram Hubbard. | <i>Ashland.</i> | Bellevue St. |
| Davis, Carleton Emerson. | <i>Newton Centre.</i> | Newton Centre. |
| Davis, Charles Staples. | <i>Somerville.</i> | Somerville. |
| Davis, Frank Irvin. | <i>East Boston.</i> | 96 Trenton St. |
| Dean, Arthur Warren. | <i>Taunton.</i> | Taunton. |
| de Carvalho, Raul Rezende. | <i>Rio de Janeiro, Brazil.</i> | 9 Caledonia St. |
| Dennett, William Hartley. | <i>Saco, Me.</i> | 37 Winthrop St. |
| Dodge, Samuel Douglass. | <i>Arlington.</i> | Arlington. |
| Doe, Haven. | <i>Salmon Falls, N. H.</i> | 303 Columbus Ave. |
| Dorr, George, Jr. | <i>Mattapan.</i> | 286 Norfolk St. |
| Dresser, Henry Chester. | <i>Southbridge.</i> | 524 Columbus Ave. |
| du Bois, Barron Potter. | <i>Portsmouth, N. H.</i> | 303 Columbus Ave. |
| Dye, Robert Collyer. | <i>Chicago, Ill.</i> | 67 Chandler St. |
| Ely, Sumner Boyer. | <i>Chicago, Ill.</i> | 35 St. James Ave. |
| Fairfield, Herbert George. | <i>Chelsea.</i> | Chelsea. |
| Faivey, John Joseph. | <i>E. Somerville.</i> | E. Somerville. |
| Ferriday, James McKeen. | <i>Pomfret, Conn.</i> | 301 Marlboro' St. |
| Fitz, Charles Frederick, Jr. | <i>Watertown.</i> | Watertown. |
| Forbush, Gayle Tilton. | <i>Natick.</i> | Natick. |
| Foster, William Wallace. | <i>Boston.</i> | 6 Berwick Park. |
| Francis, Frederick Leighton. | <i>Fitchburg.</i> | Hotel Albemarle. |
| French, Allen. | <i>Boston.</i> | 200 C'm'w'lth Av. |
| French, Edward Rutledge. | <i>Waterbury, Conn.</i> | 75 Chandler St. |
| Frisbie, Walter Levi. | <i>Waterbury, Conn.</i> | 67 Chandler St. |
| Fuller, Charles Edward. | <i>Wellesley.</i> | Wellesley. |
| Fuller, Frederic Beecher. | <i>Concord, N. H.</i> | 27 St. James Ave. |
| Gallison, William Edward. | <i>Chelsea.</i> | Chelsea. |

| NAME. | HOME. | RESIDENCE. |
|--------------------------------|------------------------------|-------------------|
| Gamble, William Burt. | <i>Detroit, Mich.</i> | 26 St. James Ave. |
| Gill, Edward Paddington. | <i>Baltimore, Md.</i> | 26 St. James Ave. |
| Gillon, Charles Joseph, A.B. | <i>Milford.</i> | Milford. |
| Gilmore, Howard. | <i>North Easton.</i> | North Easton. |
| Godchaux, Albert. | <i>New Orleans, La.</i> | 84 Chandler St. |
| Goodell, George Haskell. | <i>Salem.</i> | Salem. |
| Goodkind, Leo. | <i>St. Paul, Minn.</i> | 7 Holyoke St. |
| Gore, Henry Watson, Jr. | <i>Roxbury.</i> | 31 Savin St. |
| Graves, Charles William. | <i>Exeter, N. H.</i> | 5 Ashburton Pl. |
| Gray, Edward Wyllys Taylor. | <i>New York, N. Y.</i> | 117 Berkeley St. |
| Gray, William Palmer. | <i>Richmond, Va.</i> | 12 St. James Ave. |
| Green, William Wilcox. | <i>Blue Island, Ill.</i> | 310 Columbus Ave. |
| Grimes, Charles Browning. | <i>East Boston.</i> | 55 Monmouth St. |
| Hafer, Edward. | <i>Cincinnati, O.</i> | 4 Yarmouth St. |
| Hall, Albert Percival, | <i>Chicago, Ill.</i> | Cambridge. |
| Hall, Edward Childs, Jr. | <i>Watertown.</i> | Watertown. |
| Hart, Albert Lewis. | <i>Boston.</i> | 117 Pinckney St. |
| Hartshorn, Horace Crosby. | <i>Somerville.</i> | Somerville. |
| Harvey, Frederic Hall. | <i>Galt, Cal.</i> | 97 Pembroke St. |
| Hawkins, David Spaulding. | <i>Steubenville, O.</i> | 46 Union Park. |
| Heywood, Albert Samuel. | <i>Worcester.</i> | 408 Columbus Ave. |
| Hillman, Meredith P. G. | <i>Cadiz, Ky.</i> | 165 W. Canton St. |
| Holland, Charles Pray. | <i>Brockton.</i> | Brockton. |
| Hopkins, Prescott Andrews. | <i>Newburyport.</i> | 11 St. James Ave. |
| Houghton, Herbert Allen. | <i>Hudson.</i> | 92 Chandler St. |
| Howland, Frederick Hoppin. | <i>Providence, R. I.</i> | 198 Beacon St. |
| Hoxie, Frederick Jerome. | <i>Phenix, R. I.</i> | 385 Columbus Ave. |
| Hunt, John Francis. | <i>South Weymouth.</i> | So. Weymouth. |
| Huntoon, Daniel Thomas Vose. | <i>Canton.</i> | Hotel Thorndike. |
| Huntzinger, Benjamin Franklin. | <i>Pottsville, Penn.</i> | 309 Columbus Ave. |
| Hutchinson, William Spencer. | <i>Mattapan.</i> | Morton St. |
| Iglesias, Eugenio Tomás. | <i>St. John, Porto Rico.</i> | 570 Columbus Ave. |
| Ingraham, George Hunt. | <i>New Bedford.</i> | 369 Columbus Ave. |
| Johnson, Henry Lewis. | <i>Roslindale.</i> | Metropolitan Ave. |
| Johnson, Jesse Folsom. | <i>Ipswich.</i> | Danversport. |
| Johnston, William Atkinson. | <i>Belmont.</i> | Belmont. |
| Jones, Bayard Franklin. | <i>Kansas City, Mo.</i> | Cambridgeport. |
| Kales, William Robert. | <i>Chicago, Ill.</i> | 86 Mt. Vernon St. |
| Kelsey, James Hiram. | <i>Boston.</i> | 52 Pleasant St. |
| Kendall, William Roy. | <i>Kansas City, Mo.</i> | Berkeley St. |
| Keyes, George Shepard. | <i>Concord.</i> | Concord. |
| King, Warren Dudley. | <i>Peabody.</i> | Peabody. |
| Knudsen, Augustus Francis. | <i>Kanai, Hawaiian Isds.</i> | Hotel Cluny. |
| Koch, Armand David. | <i>Milwaukee, Wis.</i> | 179 Warren Ave. |
| Ladd, Harry Abbot. | <i>Sante Fé, N. M.</i> | 75 Warren Ave. |
| Lambert, Wallace Corliss. | <i>Lowell.</i> | Lowell. |

REGISTER OF STUDENTS.

121

| NAME. | HOME. | RESIDENCE. |
|---------------------------------|----------------------------|--------------------|
| Lane, William Honer. | <i>Medford.</i> | Medford. |
| Lenz, Charles Otto. | <i>Providence, R. I.</i> | 312 Shawmut Ave. |
| Linder, John Farlow. | <i>Newton.</i> | Newton. |
| Litchfield, Walter Dyer. | <i>Boston.</i> | 28 Worcester Sq. |
| Littlefield, Ralph Russell. | <i>Avon.</i> | Avon. |
| Lobenstine, Horace Greeley. | <i>Boston.</i> | 141 Warren Ave. |
| Look, Moses Jerome. | <i>Boston.</i> | 11 Harwich St. |
| Low, George Francis. | <i>Peabody.</i> | Peabody. |
| Lukes, George Holt. | <i>Racine, Wis.</i> | 396 N'thampton St. |
| Lukes, Joseph Brian. | <i>Racine, Wis.</i> | 396 N'thampton St. |
| Lyon, Joseph Palmer. | <i>Hanover, Conn.</i> | 385 Columbus Ave. |
| Manahan, Elmer Gove. | <i>Lawrence.</i> | Lawrence. |
| Manley, Laurence Bradford. | <i>West Roxbury.</i> | West Roxbury. |
| Mann, Forrest Clin'on. | <i>Rockland.</i> | Rockland. |
| Mansfield, Richard Herbert, Jr. | <i>Lynn.</i> | Lynn. |
| Marcy, Willard Adna. | <i>Newton Upper Falls.</i> | Newton Upper F'ls. |
| Marsh, Alden Pope. | <i>Peabody.</i> | Peabody. |
| Mathews, Albert Prescott. | <i>So. Evanston, Ill.</i> | 708 Tremont St. |
| May, George Henry. | <i>Newton Centre.</i> | Newton Centre. |
| Maynard, Fred Bell. | <i>Somerville.</i> | Somerville. |
| McCaw, Wallace Eugene. | <i>Macon, Ga.</i> | 507 Columbus Ave. |
| Merrill, Frank Henry. | <i>Newburyport.</i> | Newburyport. |
| Merrill, George Albert. | <i>Newburyport.</i> | Newburyport. |
| Meserve, Frederick Hill. | <i>Dover, N. H.</i> | 3 Yarmouth St. |
| Meserve, William Curtis. | <i>Dover, N. H.</i> | 3 Yarmouth St. |
| Messenger, William Henry. | <i>East Boston.</i> | 286 Princeton St. |
| Metcalf, Leonard. | <i>Cambridge.</i> | Cambridge. |
| Milburn, Charles Coad. | <i>Washington, D. C.</i> | 354 Columbus Ave. |
| Miller, Herbert Stanley. | <i>Elizabeth, N. J.</i> | 169 W. Newton St. |
| Mirick, George Landon. | <i>Everett.</i> | Everett. |
| Mitchell, Benjamin Merwin. | <i>So. Britain, Conn.</i> | 507 Columbus Ave. |
| Möllmann, Rudolph Clarence. | <i>Philadelphia, Penn.</i> | 2 Ashburton Pl. |
| Moody, Herbert Raymond. | <i>Chelsea.</i> | Chelsea. |
| Morrill, Asa Hall. | <i>Neponset.</i> | 2 High St. |
| Morse, John Gavit. | <i>Salem.</i> | Salem. |
| Newkirk, Walter Matthew. | <i>Newark, O.</i> | 309 Columbus Ave. |
| Newman, Andrew Parker, Jr. | <i>Roxbury.</i> | 19 Montrose St. |
| Nilson, Leonard Johan. | <i>Chelsea.</i> | 7 Com'onw'lth Ave. |
| Norcross, Josiah Crosby. | <i>Lowell.</i> | Lowell. |
| Norris, Walter Henry. | <i>Melrose.</i> | Melrose. |
| Norton, Francis Cobb. | <i>Rockland, Me.</i> | 34 Rutland Sq. |
| Noyes, Edmund Horatio. | <i>Arlington.</i> | Arlington. |
| Nutter, Charles Latham. | <i>East Bridgewater.</i> | East Bridgewater. |
| Ober, Arthur Joseph. | <i>West Medford.</i> | West Medford. |
| Osgood, George Frederick. | <i>Lawrence.</i> | Lawrence. |
| Paraschos, Nicholas Theophanis. | <i>Athens, Greece.</i> | 34 Chester Sq. |

| NAME. | HOME. | RESIDENCE. |
|------------------------------|---------------------------------|-----------------------|
| Park, Charles Francis. | <i>Taunton.</i> | Taunton. |
| Parker, Charles Brunel. | <i>Cambridgeport.</i> | Cambridgeport. |
| Parkes, Harry Charles. | <i>Chicago, Ill.</i> | 10 Berwick Park. |
| Parsons, Fred Hull. | <i>So. Norwalk, Conn.</i> | 75 Chandler St. |
| Paul, Robert Hallam. | <i>La Crosse, Wis.</i> | 115 Berkeley St. |
| Payne, Albert Bronson, Jr. | <i>Nashville, Tenn.</i> | 507 Columbus Ave.. |
| Peck, Henry Lyman. | <i>Brookfield Centre, Conn.</i> | 12 Holyoke St. |
| Perkins, Frank Edison. | <i>Boston.</i> | 14 Appleton St. |
| Perry, Hiram Edmund. | <i>Sandwich.</i> | 195 W. Canton St. |
| Pettee, Eugene Everett. | <i>Whitman.</i> | Whitman. |
| Phillips, Henry Morton. | <i>Wrentham.</i> | 298 Columbus Ave.. |
| Pierce, Arthur Gilbert. | <i>East Boston.</i> | 26 Bremen St. |
| Pollard, Albert Abner. | <i>Roxbury.</i> | 32 Whiting St. |
| Pope, Macy Stanton. | <i>East Machias, Me.</i> | 5 Pelham St. |
| Potter, Daniel Frederic. | <i>South Braintree.</i> | South Braintree. |
| Potter, Herbert Sturgis. | <i>Newton.</i> | Newton. |
| Pratt, Dana Moore. | <i>South Hanson.</i> | South Hanson. |
| Quevedo, Narciso Tadeo. | <i>Guatemala, C. A.</i> | Worcester. |
| Ranlett, Arthur Grover. | <i>San Francisco, Cal.</i> | 153 W. Canton St.. |
| Rhodes, Frederick Leland. | <i>Winchester.</i> | Winchester. |
| Richardson, Fred Boyd. | <i>Abington.</i> | Abington. |
| Richardson, Preston. | <i>Barrington, R. I.</i> | 16 Truro St. |
| Robertson, Andrew Robert. | <i>Glasgow, Scotland.</i> | 84 Charles St. |
| Rogers, George Daniel. | <i>Salem.</i> | Salem. |
| Rowell, George Freeman. | <i>Peabody.</i> | Peabody. |
| Sanborn, George Waldo. | <i>Charlestown.</i> | 81 Elm St. |
| Sargent, Albert Francis, Jr. | <i>Malden.</i> | Malden. |
| Saunders, Robert Thomson. | <i>Chelsea.</i> | Chelsea. |
| Scales, William Edward. | <i>Newton.</i> | Newton. |
| Schiller, Norman Perry. | <i>Washington, D. C.</i> | Parker House. |
| Schneider, Ferdinand Turton. | <i>Washington, D. C.</i> | 323 Columbus Ave.. |
| Sears, Charles Maxwell. | <i>Boston.</i> | 32 Chester Sq. |
| Shaw, Edmund. | <i>Rockland.</i> | Rockland. |
| Shepherd, Frank Cummings. | <i>Gloucester.</i> | 41 W. Newton St. |
| Sherman, Le Roy Kempton. | <i>Chicago, Ill.</i> | 113 W. Chester Pk.. |
| Shute, Harry Damon. | <i>Boston.</i> | 137 Newbury St. |
| Skinner, Theodore Hobart. | <i>Boston.</i> | 4 Yarmouth St. |
| Slade, James Henry, Jr. | <i>Quincy Point.</i> | Quincy Point. |
| Smith, Robert Russell. | <i>Berkeley, Cal.</i> | 129 Dartmouth St.. |
| Snow, Richard Barclay. | <i>New Bedford.</i> | 83 Pinckney St. |
| Squires, George Burt. | <i>Manistee, Mich.</i> | 14 Chester Park. |
| Stambaugh, Philip Sheridan. | <i>Youngstown, O.</i> | 36 Crawford St. |
| Stearns, Henry Foster. | <i>Pawtucket, R. I.</i> | |
| Stritzinger, Frederick G. | <i>Norristown, Pa.</i> | 85 W. Spr'gfield St.. |
| Studley, Fred Butler. | <i>Rockland.</i> | Rockland. |
| Sutton, Stansbury. | <i>Pittsburg, Penn.</i> | 204 Dartmouth St. |

REGISTER OF STUDENTS.

123

| NAME. | HOMR. | RESIDENCE. |
|-------------------------------|---------------------------|---------------------|
| Sweetser, Ralph Hayes. | <i>Portsmouth, N. H.</i> | 15 Putnam St. |
| Swift, Humphrey Hathaway, Jr. | <i>New York, N. Y.</i> | Cambridge. |
| Sylvester, Edmund Quincy, Jr. | <i>Hanover.</i> | Hanover. |
| Sylvester, Joseph Smith. | <i>Hanover.</i> | Hanover. |
| Taft, Arthur Guild. | <i>Dedham.</i> | Dedham. |
| Taylor, Robert Robinson. | <i>Wilmington, N. C.</i> | 62 Phillips St. |
| Thalheimer, William Coolidge. | <i>Cincinnati, Ohio.</i> | Newton Centre. |
| Thompson, Charles Edwin. | <i>Glens Falls, N. Y.</i> | |
| Tidd, Winthrop Lowe. | <i>Taunton.</i> | Taunton. |
| Vining, John Franklin. | <i>South Weymouth.</i> | South Weymouth. |
| Vining, Louis Bradford. | <i>South Weymouth.</i> | South Weymouth. |
| Waitt, Charles Green. | <i>Malden.</i> | Malden. |
| Wales, Thomas Crane, Jr. | <i>Boston.</i> | Hotel Royal. |
| Walker, Francis. | <i>Boston.</i> | 237 Beacon St. |
| Wallace, Charles Frederic. | <i>Roxbury.</i> | 62 Forest St. |
| Wallace, Frederic Appleton. | <i>Lynnfield.</i> | Lynnfield. |
| Wardner, Herbert Leavitt. | <i>Dorchester.</i> | Mt. Bowdoin Ave. |
| Warner, Murray. | <i>St. John, N. B.</i> | 298 Columbus Ave. |
| Warner, Philip Augustus. | <i>West Newton.</i> | West Newton. |
| Waterman, Harry Cushing. | <i>Hanover.</i> | Hanover. |
| Waterman, Richard, Jr. | <i>Chicago, Ill.</i> | 218 W. Canton St. |
| Weis, Samuel Washington. | <i>New Orleans, La.</i> | 75 Warren Ave. |
| Wells, Channing McGregor. | <i>Southbridge.</i> | 28 Dwight St. |
| Wells, Edward Castle. | <i>Quincy, Ill.</i> | 153 W. Canton St. |
| Wendell, George Vincent. | <i>Cambridgeport.</i> | Cambridgeport. |
| Wentworth, Charles T. | <i>Roxbury.</i> | 46 Sherman St. |
| Whiting, David. | <i>Wilton, N. H.</i> | 153 W. Canton St. |
| Whitman, Edward Payson. | <i>Cambridge.</i> | Cambridge. |
| Whittemore, Frank Irving. | <i>Cambridge.</i> | Cambridge. |
| Willard, Bryant. | <i>Santa Fe, N. M.</i> | 116 Chandler St. |
| Williams, Harry Nye. | <i>Cleveland, O.</i> | Hoffman House. |
| Withington, Arthur Amos. | <i>Newburyport.</i> | Newburyport. |
| Wooffindale, Warren Herbert. | <i>Charlestown.</i> | 257 Bunker Hill St. |
| Worthington, Arthur Morton. | <i>Dedham.</i> | Dedham. |
| Yoerg, Frank. | <i>St. Paul, Minn.</i> | 23 Milford St. |
| Yorke, George Marshall. | <i>Lowell.</i> | Lowell. |

SPECIAL STUDENTS.

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

| | | |
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| App. Mech., Applied Mechanics. | Eng., English. | Mil., Military Drill. |
| Arch., Architecture. | Fr., French. | Min., Mining Eng. |
| Arch.(part.), Partial course in Arch. | Geol., Geology. | Org. Chem., Organic Chemistry. |
| Ast., Astronomy. | Germ., German. | Phys., Physics. |
| Biol., Biology. | H. and V., Heating and Ventilation. | Physiol., Physiology. |
| Chem., General and Analytic Chemistry. | Hist., History. | P. E., Political Economy. |
| Civ. Eng., Civil Engineering. | Ind. Chem., Industrial Chemistry. | Pol. Sci., Polit. Science. |
| Clim., Climatology. | Lit., Literature. | R. R. Man., R. R. Management. |
| Dr., Drawing. | Math., Mathematics. | Shop., Shopwork. |
| D. G., Desc. Geometry. | Mech., Mechanism. | Surv., Surveying. |
| Elect., Electrical Eng. | Mech Eng., Mechanical Eng. | Th. Chem., Theoretical Chemistry. |
| El. Fr., Element. French. | M. and A., Mechanics and Acoustics. | Zoöl., Zoölogy. |
| | Met., Metallurgy. | |

| NAME. | HOME. | RESIDENCE. |
|---|--------------------------|-------------------|
| Adams, William Hussey, Math., Chem., Germ., Phys., P. E., Th. Chem. | <i>Newburyport.</i> | Newburyport. |
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| Tilson, Willard Curtis, Chem., Geol., Germ. | <i>Malden.</i> | Malden. |
| Tuttle, Herbert Charles, Chem., Germ., Ind. Chem. | <i>West Newton.</i> | West Newton. |
| Vance, Joseph McArthur, Arch. (part.) | <i>Chattanooga, Tenn.</i> | 195 W. Canton St. |
| Wait, Edward Riggs, Arch. (part.), Shop. | <i>Glens Falls, N. Y.</i> | 271 Columbus Ave. |
| Waite, Henry Matson, Math., Phys., D. G., Germ., Civ. Eng., Ast. | <i>Toledo, O.</i> | 352 Columbus Ave. |
| Walker, Ambrose, Math., Fr., Arch., P. E. | <i>Boston.</i> | 237 Beacon St. |
| Walker, Charles Richard, Chem., Ind. Chem., Phys., Met. | <i>Cambridgeport.</i> | Cambridgeport. |
| Webb, Harry Storrs, Math., Chem., Dr., Eng., El. Fr., Mil. | <i>Cincinnati, O.</i> | 9 Union Park. |
| Webber, Scott Adams, Arch. (part.) | <i>St. Louis, Mo.</i> | Waltham. |

| NAME. | HOME. | RESIDENCE. |
|--|----------------------------|--------------------|
| Weiller, Ludwig M., Arch. (part.), Shop. | <i>New York, N. Y.</i> | 366 Columbus Ave. |
| Welch, James J., Math., Phys., D. G., Germ., P. E., Surv., Ast. | <i>Salem.</i> | Salem. |
| Welch, Thaddeus Stephens, Math., D. G., Germ., Mech., Phys., Shop. | <i>Augusta, Me.</i> | 5 Myrtle Pl. |
| Wetherbee, George Henry, Jr., Math., Phys., D. G., Germ., Surv., Ast. | <i>East Marshfield.</i> | East Marshfield. |
| White, Joseph Foster, Math., Chem., Th. Chem. | <i>Brookline.</i> | Brookline. |
| Whitley, Charles Walter, Chem., Math., Germ., Mech., Phys., P. E., D. G., M. and A. | <i>Englewood, Ill.</i> | 87 W. Rutland Sq. |
| Whitney, Clarence Edgar, Fr., Math., Germ., Mech., Phys., D. G., P. E. | <i>Hartford, Conn.</i> | 2 Columbus Sq. |
| Wilkinson, Melville Lincoln, Math., Mech., Phys., Shop. | <i>St. Paul, Minn.</i> | 13 Oxford Terrace. |
| Williams, Jeanette Webster, Biol. | <i>Newton Lower Falls.</i> | Newton Lower Falls |
| Wills, Mary Bradford, Math., Chem., Germ., Biol. | <i>Roxbury.</i> | 149 Roxbury St. |
| Wilson, Benjamin Franklin, Jr., Phys., Min., P. E., Chem., Met. | <i>Norfolk, Va.</i> | 16 Upton St. |
| Winsor, Mary Pickard, Zool. | <i>Winchester.</i> | 151 Boylston St. |
| Wood, George Bacon, A.B., Shop., Math., Mech. Eng., Phys., App. Mech. | <i>Philadelphia, Penn.</i> | 11 St. James Ave. |
| Wood, John Delano, Hist., R. R. Man., Lit., Pol. Sci., Biol. | <i>New Bedford.</i> | 134 Marlboro' St. |
| Woodman, Caroline A., A.B., Phys., Mic. Anat., Physiol. | <i>Lewiston, Me.</i> | 18 Dartmouth St. |
| Woodward, Harvey G., Clim., Chem., Geol., Min. | <i>Boston.</i> | 34 Union Park. |
| Wray, Charles Henry, Arch. (part.) | <i>St Louis, Mo.</i> | 28 Union Park. |
| Yardley, Thomas Henry, Arch. (part.) | <i>Newport, R. I.</i> | 46 Chestnut St. |

SUMMARY: SCHOOL OF INDUSTRIAL SCIENCE.

| | |
|--------------------------------------|-------|
| GRADUATE STUDENTS | 34 |
| REGULAR STUDENTS, 4th year | 74 |
| " " 3d " | 120 |
| " " 2d " | 144 |
| " " 1st " | 251 |
| SPECIAL STUDENTS | 237 |
| | <hr/> |
| | 860 |
| Deduct names counted twice | 33 |
| | <hr/> |
| Total | 827 |

REGULAR STUDENTS IN THE SCHOOL OF MECHANIC ARTS.

SECOND YEAR.

| NAME. | HOME. | RESIDENCE |
|----------------------|----------------------------|-------------------|
| Barrows, George S. | <i>Philadelphia, Penn.</i> | 8 St. James Ave. |
| Breed, Stephen A. | <i>Lynn.</i> | Lynn. |
| Burrell, George A. | <i>East Bridgewater.</i> | East Bridgewater. |
| Fuller, Arthur B. | <i>Middleton.</i> | Hotel Lyndeboro. |
| Lincoln, Louis L. | <i>Taunton.</i> | Taunton. |
| Noyes, H. Lester. | <i>Abington.</i> | Abington. |
| Porter, Edward A. | <i>Calais, Me.</i> | 51 Warren Ave. |
| Sherman, Edward F. | <i>New Haven, Conn.</i> | 70 Chandler St. |
| Webster, Laurence J. | <i>Boston.</i> | 232 Newbury St. |

SPECIAL STUDENTS.

| | | |
|--|--------------------------|-------------------|
| Ashworth, Fred N., Shop., Draw. | <i>East Somerville.</i> | East Somerville. |
| Elder, George J., Shop., Draw. | <i>East Boston.</i> | 12 Falcon St. |
| Emery, Howard B., Shop., Draw. | <i>Roxbury.</i> | 3 Fremont Place. |
| Gilson, Henry Y., Eng., Fr., Shop., Draw. | <i>Somerville.</i> | Somerville. |
| Hall, Frederic D., Shop., Draw. | <i>East Boston.</i> | 43 White St. |
| Killilea, James J., Shop., Draw. | <i>East Boston.</i> | 163 Webster St. |
| Lyman, Moses, Jr., Shop., Draw. | <i>Waverly, N. Y.</i> | 290 Columbus Ave. |
| Paine, Cecil E., Draw., Eng., Fr., Math., Shop. | <i>Portland, Me.</i> | Jamaica Plain. |
| Talbot, Frederic E., Shop. | <i>Providence, R. I.</i> | |
| Weld, Edward M., Shop. | <i>Dedham.</i> | Dedham. |
| Wright, Ernest V., Eng., Phys., Fr. | <i>Boston.</i> | 423 Shawmut Ave. |

Total 20

FREE COURSES OF INSTRUCTION.

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 1888-89 are on the following subjects:—

I. *Elementary Electrical Measurements.*—Ten laboratory exercises by Associate Professor Holman, on Fridays from 7 to 9 P.M., beginning Nov. 2.

II. *Descriptive Geometry.*—Twelve lectures by Assistant Professor Faunce, on Mondays and Wednesdays at 7.45 P.M., beginning Nov. 5.

III. *Hot Air and Gas Engines.*—Twelve lectures by Assistant Professor Peabody, on Tuesdays and Thursdays at 7.30 P.M., beginning Nov. 6.

IV. *The History of Commerce.*—Twelve lectures by Assistant Professor Dewey, on Mondays and Fridays at 7.30 P.M., beginning Nov. 12.

V. Twelve lectures in *French* on literary men and matters, by Associate Professor Luquiens, on Tuesdays and Fridays at 7.30 P.M., beginning Nov. 27.

VI. *Bacteriology, with Special Reference to its Sanitary Relations.*—Twelve lectures by Associate Professor Sedgwick, on Mondays and Fridays at 7.30 P.M., beginning Jan. 7.

VII. *The Industrial and Sanitary Examination of Water.*—Twelve lectures by Professor Drown, on Mondays and Wednesdays at 7.30 P.M., beginning Jan. 7.

VIII. *English Politics.*—Twelve lectures by Assistant Professor Levermore, on Tuesdays and Thursdays at 7.30 P.M., beginning Jan. 8.

IX. *Mineral Deposits and Methods of Mining.*—Twelve lectures by Assistant Professor Clark, on Tuesdays and Thursdays at 7.30 P.M., beginning Jan. 10.

X. *Methods of Multiplying and Reproducing Drawings for Publication.*—Six lectures and six drawing exercises by Assistant Professor Burton, on Tuesdays and Thursdays at 7.30 P.M., beginning Jan. 10.

LOWELL SCHOOL OF PRACTICAL DESIGN.

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, paper-hangings, 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 Miss Delphina Weston.

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 President of the Institute.

Regulations of the School.—The next school-year will begin on Sept. 30, 1889. 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. 24, 1889. 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.

LOWELL SCHOOL OF PRACTICAL DESIGN.

STUDENTS.

| NAME. | HOME. | RESIDENCE. |
|-----------------------|-------------------------|---------------------|
| Allen, Maud A. | <i>Roxbury.</i> | 4 Grosvenor Pl. |
| Baker, Grace T. | <i>Weymouth.</i> | Weymouth. |
| Bates, Elizabeth E. | <i>Newton.</i> | Newton. |
| Brooks, Jenny. | <i>Salem.</i> | Salem. |
| Brown, Louis H. | <i>Leominster.</i> | Leominster. |
| Cain, Leonard L. | <i>West Hingham.</i> | West Hingham. |
| Campbell, Annie P. | <i>Plymouth.</i> | 140 Chandler St. |
| Carr, Benjamin K. | <i>Cambridgeport.</i> | Cambridgeport. |
| Chaffee, Florence G. | <i>Boston.</i> | 194 W. Br'kline St. |
| Choate, Jeanette H. | <i>West Somerville.</i> | West Somerville. |
| Clark, Louis W. | <i>Middleboro'.</i> | Middleboro'. |
| Cohn, Luona. | <i>Boston.</i> | 84 Waltham St. |
| Connor, Katherine L. | <i>South Boston.</i> | 8 Pacific St. |
| Dansereau, William W. | <i>Marlboro'.</i> | Marlboro'. |
| Emery, Mary E. | <i>Charlestown.</i> | 27 Green St. |
| Ford, Myron P. | <i>East Weymouth.</i> | East Weymouth. |
| French, Grace E. | <i>Rockland.</i> | Rockland. |
| Frost, M. Edith. | <i>Somerville.</i> | Somerville. |
| Hawes, Nellie L. | <i>Dorchester.</i> | Harrison Sq. |
| Hill, Clinton M. | <i>Scugus.</i> | Saugus. |
| Howell, Charlotte E. | <i>Millville, N. J.</i> | 40 Berkeley St. |
| Hunt, William C. | <i>New Bedford.</i> | New Bedford. |
| Josephs, Ella F. | <i>Quincy.</i> | Quincy. |
| Ladd, Lizzie A. | <i>Needham.</i> | Needham. |
| Lamprey, Belle. | <i>Charlestown.</i> | 137 High St. |
| Lord, Walter L. | <i>Brookline.</i> | Brookline. |
| Low, Mary L. | <i>Essex.</i> | Essex. |
| Luce, Fred A. | <i>Haverhill.</i> | Haverhill. |
| Lyman, Mary W. | <i>Bolton.</i> | Bolton. |
| Lynch, Michael J. | <i>Boston.</i> | 45 Emerald St. |
| Mair, George R. | <i>Ashmont.</i> | Alban St. |
| McDuffie, Charles C. | <i>Haverhill.</i> | Haverhill. |
| Means, Harry F. | <i>South Boston.</i> | 104 1-2 Dorch. St. |

| NAME. | HOME. | RESIDENCE. |
|------------------------|---------------------------|-------------------|
| Meehan, W. Ferdinand. | <i>Melrose Highlands.</i> | Melrose Highlands |
| Moore, Fred C. | <i>Newton Highlands.</i> | Newton Highlands |
| Morse, Edith O. | <i>Salem.</i> | 140 Chandler St. |
| Newton, Annie H. | <i>Cambridge.</i> | Cambridge. |
| Parsons, Winslow A. | <i>Saugus.</i> | Saugus. |
| Philbrick, Lizzie. | <i>Newton Centre.</i> | Newton Centre. |
| Pratt, Walter F. | <i>North Weymouth.</i> | North Weymouth. |
| Prouty, Annah R. | <i>Chelsea.</i> | Chelsea. |
| Ray, Frank L. | <i>Eastport.</i> | 137 W. Canton St. |
| Sanford, C. Ernest. | <i>Fall River.</i> | Fall River. |
| Sidelinger, William F. | <i>Quincy Point.</i> | Quincy Point. |
| Snow, Warren F. | <i>Brewster.</i> | 35 Concord Sq. |
| Stanwood, Ethel. | <i>Wellesley Hills.</i> | Wellesley Hills. |
| Stearnes, Lillian. | <i>Everett.</i> | Everett. |
| Stetson, Clarabel. | <i>Roxbury.</i> | 7 Rockland St. |
| Thacher, Elizabeth M. | <i>Dorchester.</i> | Stoughton St. |
| Thompson, Hathorn J. | <i>Elmira, N. Y.</i> | |
| West, Frederick W. | <i>Haverhill.</i> | Haverhill. |
| Total | | 51 |

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 School of Industrial Science.

Its officers for the current year are:

President: FRANCIS H. WILLIAMS, '73.

Vice-President: DAVID A. LYLE, '84.

Secretary: FREDERICK W. CLARK, '80.

Executive Committee: THE PRESIDENT, VICE-PRESIDENT AND SECRETARY, A. LAWRENCE ROTCH, '84, C. FRANK ALLEN, '72.

NORTHWESTERN ALUMNI ASSOCIATION.

President: EDWARD C. POTTER, '80, "The Rookery," Chicago, Ill.

Secretary: SOLOMON STURGES, '87, Northwestern National Bank, Chicago, Ill.

WESTERN ALUMNI ASSOCIATION.

Treasurer: E. W. ROLLINS, P. O. Box 2157, Denver, Col.

GRADUATES

FROM THE

SCHOOL OF INDUSTRIAL SCIENCE.

With the exception of names marked with a † the addresses have been corrected to 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 p. 18.

1868.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------------|--|
| ELLERY C. APPLETON, Crescent Beach, Rever., Mass. | III. | |
| WHITNEY CONANT, Long Branch, N. J. | III. | Secretary, Long Branch Water-Supply Company. |
| *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., Io. | 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. | Draughtsman, in the employ of the George F. Blake M'fg Company. |
| WILLIAM E. HOYT, Rochester, N. Y. | I. | Chief Engineer, Buffalo, Rochester & Pittsburg R. R. Co. |
| ROBERT H. RICHARDS, Boston, Mass. | III. | Professor of Mining and Metallurgy, Mass. Institute of Technology. |
| WALTER H. SEARS, 35 Congress St., Boston, Mass. | I. | Civil Engineer |
| *CHARLES A. SMITH. | I. | Died February 4, 1884. |
| JOSEPH STONE, 85 Milk St., Boston, Mass. | I. | In business. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------------|--|
| BRYANT P. TILDEN,† Carrington, D. T. | III. | Chief Engineer, Jamestown & Northern Railroad. |
| JAMES P. TOLMAN, 164 High St., Boston, Mass. | III. | President, Samson Cordage Works. |
| 1869. | | |
| WILLIAM H. BAKER,† E. Las Vegas, N. M. | I. | Assistant Engineer, New Mexico Division, A., T. & S. F. R. R. |
| HOWARD A. CARSON, 21 Hamilton St., cor. Franklin, Boston, Mass. | I. | Civil Engineer. |
| J. RAYNER EDMANDS, Cambridge, Mass. | II. | In charge of Time Service at Harvard College Observatory. |
| *WILLIAM RIPLEY NICHOLS. | V. | Died July 14, 1886. |
| CHANNING WHITAKER, 23, 24, and 25 P. O. Building, Lowell, Mass. | II. | Mill and Steam Engineering, Construction, Consultation, and Expert Work. |
| 1870. | | |
| *EDWARD K. CLARK. | II. | Died September 10, 1878. |
| CHARLES R. CROSS, Boston, Mass. | Sci. and Lit. | Thayer Professor of Physics, Massachusetts 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 Railroad. |
| 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 Railroad. |
| DANIEL W. WILLARD, 55 Broadway, New York, N. Y. | II. | Of the firm of Babb, Cook & Willard, Architects. |
| LAURENCE F. J. WRINKLE, Virginia City, Nev. | III. | Mining Engineer. |
| 1871. | | |
| FOSTER E. L. BEAL,† Fitchburg, Mass. | I. | Fruit Farming. |
| ADDISON CONNOR, A.B.,† New York, N. Y. | I. | In the Public Works Department. |
| *HENRY M. CUTLER. | I. | Died May 16, 1877. |

144 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|--|
| *ELMER FAUNCE. | III. | Died July 6, 1882. |
| EDWARD H. FOOTE, 10 N. Market St., Boston, Mass. | I. | Of the firm of Skilton, Foote & Co., Manufacturers of Pickles. |
| 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 Met- allurgy, Mass. Institute Tech. |
| ALBERT H. HOWLAND, A.M., 12 West St., Boston, Mass. | I. | Civil Engineer. |
| G. RUSSELL LINCOLN, Pottstown, Penn. | III. | Chemist, Pottstown Iron Co. |
| WILLIAM A. PIKE, 2525 University Avenue 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, O. | 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 December 5, 1878. |
| ISAIAH S. P. WEEKS, Lincoln, Neb. | I. | Chief Engineer, Burlington & Missouri River Railroad in Nebraska. |
| RANDAL WHITTIER, 444 W. Jefferson St., Louis- ville, Ky. | V. | Cashier, Kentucky Branch office, N. Y. Life Insurance Company. |
| 1872. | | |
| C. FRANK ALLEN, Boston, Mass. | I. | Assistant Professor of R. R. Engineer- ing, Mass. Institute of Technology. |
| BENJAMIN E. BREWSTER, Cheyenne, Wyoming Ter. | III. | Manager, War Bonnet Live Stock Co. |
| WILLIAM B. DODGE, Columbus, O. | I. | Scale Inspector, P. C. & St. L. R. R., and Chicago, St. L. & P. R. R. |
| FREDERIC A. EMMERTON, Joliet, Ill. | V. | Supt. Blast Furnaces, Joliet Steel Co. |
| JAMES A. HERRICK, 6 Crosby Sq., Bishopsgate St., London, Eng. | V. | Agent for a Gas Producer. |
| JAMES M. HODGE, Bristol, Tenn. | III. | Chief Engineer, Bristol & So. Atlantic R. R. |
| BRADFORD H. LOCKE, Central City, Colo. | III. | Mining Engineer. |
| CHAS. S. MINOR, S.D. (Harv.), Boston, Mass. | V. | Assistant Professor of Histology and Embryology, Harvard Med. School. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|---------------|---|
| MAURICE B. PATCH, Lake Linden, Mich. | III. | Superintendent, Calumet & Hecla Smelting Company. |
| WALTER SHEPARD, A.B., Arion St., Dorchester, Mass. | I. | Assistant Engineer, Boston & Albany Railroad. |
| RICHARD H. SOULE, A.B., Englewood, N. J. | II. | |
| CLARENCE S. WARD, Allston, Mass. | III. | Lawyer. |
| 1873. | | |
| AMORY AUSTIN, A.B., 14 Kilby St., Boston, Mass. | V. | Analytic and Sanitary Chemist. |
| GEORGE W. BLODGETT, Auburndale, Mass. | I. | Assistant Engineer, B. & A. R. R., and Consulting Electrician. |
| WILLIAM E. BROTHERTON, Cincinnati, O. | V. | Book-keeper, Second National Bank. |
| *SAMUEL A. FABENS, Jr. | I. | Died March 14, 1875. |
| SAMUEL M. FELTON, Jr., 21 Cortlandt St., New York, N. Y. | I. | First Vice-President of N. Y., L. E. & W. R. R. Co. |
| FREDERICK L. FISHER, Medway, Mass. | I. | Insurance Agent and Broker, 35 Kilby Street, Boston. |
| FREDERICK GUILD, Jr., Boston, Mass. | Sci. and Lit. | With Whittier Machine Company, 1176 Tremont St. |
| W. DALE HARRIS, 14 Metcalf St., Ottawa, Can. | I. | Chief Engineer, P. P. J. Railway; Consulting Engineer, M. & W. Railway; Chief Engineer, O. & G. V. Railway. |
| CLARENCE L. HOWES, A.B., M.D., † | II. | Physician. |
| Hanover, Mass. | | |
| *WILLIAM P. JEWETT. | I. | Died January 4, 1884. |
| *WILLIAM A. KIMBALL. | II. | Died December, 1887. |
| *WILLIAM C. MAY. | V. | Died March 11, 1878. |
| FRANK B. MORSE, Murphy's, Cal. | I. | Superintendent, Willard Mining Company. |
| CHARLES O. PARSONS, 77 State St., Boston, Mass. | III. | Mining Engineer. |
| GEORGE PHILLIPPS, † Marshfield, Mass. | III. | Mining Engineer. |
| HENRY A. PHILLIPS, Worcester, Mass. | IV. | Superintendent, Worcester Division, Fitchburg R. R. |
| ELLEN 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. SHAILER, 609 Phoenix 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., Pittsburg, Penn. | III. | Supt. Bessemer and Open Hearth Departments, Juniata Iron and Steel Works. |
| SAMUEL E. TINKHAM, 58 Thornton St., Roxbury, Mass. | I. | Civil Engineer, City Engineer's Office, Boston. |
| FRANK W. VERY, Allegheny, Penn. | V. | Assistant Astronomer, Allegheny Observatory. |
| WEBSTER WELLS, Boston, Mass. | 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 Dartmouth Sts., Boston, Mass. | V. | Assistant Professor of Materia Medica and Therapeutics, Harvard Medical School. Physician to out-patients at the Boston City Hospital. |
| LOUIS F. WOOD, 34 Oliver St., Boston, Mass. | V. | Chemical, Color, and Varnish Manufacturer. |
| 1874. | | |
| HERBERT BARROWS, Reading, Mass. | I. | Real Estate First-Mortgage Loans. |
| GEORGE H. BARRUS, 95 Milk St., Boston, Mass. | II. | Expert and Consulting Steam Engineer. |
| WILLIAM T. BLUNT, Cleveland, O. | I. | Principal Inspector, U. S. Engineer's Office. |
| GEORGE E. DOANE, Middleboro', Mass. | I. | Of the firm of J. & G. E. Doane, Hardware. |
| WILLIAM B. DOWSE, 160 Congress St., Boston, Mass. | IV. | Of the Metropolitan Rubber Company. |
| JOSEPH S. EMERSON, Honolulu, Hawaiian Islands. | I. | Field Assistant, Government Survey. |
| ELIOT HOLBROOK, 77 4th Ave., Pittsburg, Penn. | I. | Gen. Superintendent, P. & L. E. R. R. |
| AECHIRAU HONGMA,† Tokyo, Japan. | I. | Civil Engineer. |
| CHARLES P. HOWARD, Hartford, Conn. | I. | Secretary, J. L. Howard & Co., Dealers in Railway and Car Builders' Supplies. |
| FRANK H. JACKSON, Brighton, Mass. | III. | Civil and Mining Engineer, Fairview, Los Angeles Co., Cal. |
| *WILLIS H. MYRICK. | II. | Died October 17, 1875. |
| HERBERT B. PERKINS, 1516 Eighth St., Oakland, Cal. | I. | |
| FRANK H. POND, 707 Market St., St. Louis, Mo. | II. | Proprietor, Pond Engineering Company. |
| EDWARD S. SHAW, 5 Pemberton Sq., Boston, Mass. | I. | Consulting Engineer. |

GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE. 147

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------------|--|
| 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, 64 West Third St., Cincinnati, O. | Sci. and Lit. | Attorney-at-Law. |

1875.

| | | |
|---|---------------|--|
| SAMUEL E. ALLEN, 65 Chauncy St., Boston, Mass. | I. | Agent for the Nashawannuck Manufacturing Company. |
| JAMES L. ARNOTT, Thompsonville, Conn. | Sci. and Lit. | Division Eng'r in charge of Construction, Burlington & Missouri River R. R., Lincoln, Neb. |
| AMOS J. BOYDEN, 413 Walnut St., Phila., Penn. | IV. | Architect. |
| MOSES D. BURNET, Syracuse, N. Y. | III. | Burnet & Metcalf, Bankers and Brokers. |
| HENRY K. BURRISON, Boston, Mass. | I. | Instructor in Drawing in the Mass. Institute of Technology. |
| CHRISTOPHER A. CHURCH, Lewisburg, Greenbriar County, W. Va. | I. | Sheep-farming. |
| FRANK S. DODGE, Honolulu, H. I. | I. | Civil Engineer and Surveyor, Government Survey. |
| EDGAR S. DORR, 14 Beacon St., Boston, Mass. | I. | Asst. Engineer, Sewer Department. |
| WILLIAM C. EDES,† Boston, Mass. | I. | Civil Engineer. |
| CHARLES W. GOODALE, Butte City, M. T. | III. | Mine Superintendent, Colorado Smelting and Mining Company. |
| EDWARD A. W. HAMMATT, 5 Pemberton Sq., Boston, Mass. | I. | Civil and Hydraulic Engineer. |
| EDWARD A. HANDY, Laredo, Tex. | I. | Engineer, Northern Division, Mexican National Railway. |
| *JAMES H. HEAD. | II. | Died August 18, 1875. |
| THOMAS HIBBARD, 232 Beech St., Holyoke, Mass. | II. | Head Draughtsman, Deane Steam Pump Company. |
| *WILLIAM F. HUNTINGTON. | I. | Died August 7, 1877. |
| L. P. KINNICUTT, S.D. (Harv.), Worcester, Mass. | V. | Professor of Applied Chemistry at Worcester Polytechnic Institute. |
| WILFRED LEWIS, 3234 Powelton Ave., Philadelphia, Penn. | 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. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|---|---|
| BENJAMIN A. OXNARD, Brooklyn, N. Y. | III. | Superintendent of Fulton Sugar Refinery. |
| THOMAS D. PLIMPTON,† Hyde Park, Mass. | II. | Employed in the Manufacture of Woolen 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 and 49 Liberty St., New York, N. Y. | II. | Broker and Contractor. |
| WELLAND F. SARGENT, Pullman, Ill. | I. | In charge of Civil Engineering Department, Pullman Palace Car Co. |
| WILLIAM H. SHOCKLEY, Candalaria, Esmeralda Co., Nev. | III. | Superintendent and General Manager, Mount Diablo Mill and Mining Company. |
| JAMES B. STANWOOD, First National Bank, Cincinnati, O. | II. | Steam Engineering, New York, N. Y. |
| H. L. J. WARREN,† Castle, Eagle Co., Colo. | III. | Mining Engineer and Stock Raiser. |
| WILLIAM R. WEBSTER, 424 Walnut St., Phila., Penn. | III. | Civil Engineer and Bridge Inspector. |

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 Tremont St., Boston, Mass. | II. | Manufacturing Electrician. |
| JOSHUA B. F. BREED, 1026 Fourth Av., Louisville, Ky. | I. | Draughtsman, City Engineer's Department. |
| HARRY T. BUTTOLPH, Buffalo, N. Y. | I. | Assistant City Engineer, in charge of Paving. |
| FREDERICK K. COPELAND, 74 W. Lake St., Chicago, Ill. | I. | Vice-President and Treasurer, Diamond Prospecting Company. |
| WILLIAM O. CROSBY, Boston, Mass. | VII. | Asst. Prof. of Mineralogy and Lithology, Mass. Inst. of Technology. |

GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE. 149

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------------|--|
| 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 Manufacturers' Mutual Fire Insur- ance Co. |
| FRANCIS E. GALLOUPE, 30 Kilby St., Boston, Mass. | II. | Mechanical Engineer. |
| *ROBERT H. GOULD. | Metallurgy. | Died November 19, 1878. |
| JOHN B. HENCK, JR., Longwood, Fla. | VIII. | Printer and Publisher. |
| FRANK W. HODGDON, Arlington, Mass. | I. | Asst. Eng'r with the Harbor and Land Commissioners of Mass., Boston. |
| SUMNER HOLLINGSWORTH, Boston, Mass. | II. | President, Hollingsworth & Whitney Paper Company. |
| SILAS W. HOLMAN, Boston, Mass. | VIII. | Associate Professor of Physics, Mass. Institute of Technology. |
| ALFRED E. HUNT, 95 Fifth Ave., Pittsburg, Penn. | III. | Of the firm of Hunt & Clapp, Chemists and Metallurgical Engineers, Pitts- burg Testing Laboratory. |
| WILLIAM W. JACQUES, 95 Milk St., Boston, Mass. | VIII. | Elect'n of the Am. Bell Tele. Co., and Inst'r, Mass. Inst. of Tech. |
| SAMUEL JAMES, JR., P. O. Box 303, Salt Lake City, Utah. | III. | Superintendent, Germania Lead Works. |
| ALFRED C. KILHAM, North Springfield, Mo. | II. | Employed in Motive Power Dept., St. Louis & San Francisco R. R. |
| J. AUSTIN KNAPP, Abington, Mass. | II. | Of the firm of J. B. Knapp & Co. |
| THEODORE J. LEWIS, 212 North Thirty-fourth St., Philadelphia, Penn. | II. | With the Standard Steel Works, 220 South Fourth St. |
| ALBERT H. LOW, P. O. Box 2395, Denver, Colo. | V. | Chemist. |
| CHARLES T. MAIN, Lawrence, Mass. | II. | Superintendent, Lower Pacific Mills. |
| ARTHUR L. MILLS, 326 Elm St., Toledo, O. | I. | Chief Engineer, T., St. L. & K. C. R. R. |
| WILLIAM E. NICKERSON,† 351 Broadway, N. Somerville, Mass. | V. | Chemist. |
| DAVID W. PHIPPS, Box 426, Seattle; Washington Ter. | Phil. | Attorney-at-Law. |

150 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|--------------|---|
| CHARLES F. PRICHARD, Lynn, Mass. | II. | Superintendent of the Lynn Gas-Light Company. |
| HENRY RAEDER, 218 La Salle St., Chicago, Ill. | I. | Architect. |
| CHARLES L. RICH, East Jaffrey, N. H. | I. | Cashier, Monadnock National Bank. |
| *THOMAS W. ROBINSON. | III. | Died November 3, 1880. |
| CHARLES A. SAWYER, Sci. and Lit. Room 5, 125 Dearborn St., Chicago, Ill. | Real Estate. | |
| THEODORE E. SCHWARZ, Red Mt., Ouray Co., Colo. | III. | Superintendent, Yankee Girl Mining Company. |
| JULIUS H. SUSMANN, 105 Walnut Ave., Roxbury, Mass. | III. | Merchant, Boston, Mass. |
| WALTER D. TOWNSEND, Chemulpo, Korea. | III. | Of the firm of Morse, Townsend & Co., Merchants. |
| CHARLES N. WAITE, Newton Upper Falls, Mass. | V. | Superintendent, Nelson Chemical Com- pany. |
| HENRY M. WAITT, Chicago, Ill. | I. | Bridge Engineer, with C., B. & Q. R. R. |
| *ROBERT C. WARE. | Phil. | Died June 25, 1883. |
| HENRY B. WOOD, 14 Beacon St., Boston, Mass. | I. | Assistant Engineer, Sewer Department. |
| 1877. | | |
| JOHN ALDEN, Lawrence, Mass. | V. | Chemist at the Pacific Mills. |
| CHARLES S. BACHELDER,† San Francisco, Cal. | V. | Exchange Teller in the Pacific Bank. |
| GEORGE BARTOL, Cleveland, O. | III. | In charge of Mill and Forge Dept., Otis Iron and Steel Works. |
| J. WILLIAMS BEAL, Mason Building, Boston, Mass. | IV. | Architect. |
| WILLIAM H. BEECHING, 61 Blackstone St., Boston, Mass. | II. | Cork Manufacturer. |
| G. WALTER CAPEN, Canton, Mass. | IV. | Architect. |
| HENRY H. CARTER, 14 Beacon St., Boston, Mass. | I. | Chief Engineer, Boston Sewer Dept. |
| WILLIAM E. CHAMBERLIN, 6 Beacon St., Boston, Mass. | IV. | Of the firm of Chamberlin & Whidden, Architects. |
| *GEORGE H. CHAPMAN. | II. | Died January 21, 1879. |
| LINUS FAUNCE, Boston, Mass. | II. | Assistant Professor of Drawing, Mass. Institute of Technology. |
| CHARLES H. FISHER,† 49 P. O. B'ld'g, Lowell, Mass. | II. | Mechanical Engineer. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|--|
| *WILLIAM C. FLINT. | III. | Died June 14, 1881. |
| PIERCE P. FURBER, 304 N. Eighth St., St. Louis, Mo. | IV. | Manager, office of Peabody & Stearns, Architects. |
| MARTIN Gay, W. New Brighton, Staten Island, N. Y. | 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 Proprietors of Locks and Canals on Merrimack River. |
| EDMUND GROVER, 5 Somerset St., Boston, Mass. | I. | Engineer in office "Grade Crossings," Massachusetts Railroads. |
| RICHARD A. HALE, Lawrence, Mass. | I. | Principal Assistant Engineer with the Essex Water Power Company. |
| JOHN E. HARDMAN, 158 Stackpole St., Lowell, Mass. | III. | Mining Engineer; Manager, Oldham Gold Co., Oldham, N. S. |
| HENRY D. HIBBARD, Pittsburg, Penn. | III. | Supt. Steel Dept., Linden Steel Co. |
| WALTER JENNEY, 55 G St., South Boston, Mass. | III. | Superintendent, Petroleum Refinery, Jenney Manufacturing Company. |
| *JOSEPH KIRK. | II. | Died July, 1886. |
| GEORGE W. KITREDGE, 2 Carson St., Pittsburg, Penn. | I. | Engineer, Maintenance of Way, Pitts., Cin. & St. Louis R. R.; and Eng'r, Union Depot Co., Columbus, O. |
| CHARLES F. LAWTON,† Cañon City, Colo. | I. | Engineering Department, A., T. & S. Fé R. R. |
| BENJAMIN C. MUDGE, 70 Kilby St., Boston, Mass. | I. | N. E. Sales Agent for H. R. Worthington's Hydraulic Works, etc. |
| CECIL H. PEABODY, Boston, Mass. | II. | Assistant Professor of Steam Engineering, Mass. Institute of Technology. |
| ARTHUR L. PLIMPTON, 42 Congress St., Boston, Mass. | I. | Street Railway Surveyor and Engineer. |
| HARRY C. SOUTHWORTH, Hancock, Lake Superior, Mich. | III. | Mining and Civil Engineering, Exploring, etc. |
| *CHARLES E. STEWART. | I. | Died October 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., Penn. | III. | Superintendent, Pennsylvania Steel Company. |

1878.

| | | |
|--|----|---|
| WILLIAM B. ALLBRIGHT, Bellevue St., Dorchester, Mass. | V. | With Halstead & Co., Packers and Lard Refiners. |
|--|----|---|

152 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|---------------|--|
| CHARLES M. BAKER, 74 Devonshire St., Boston, Mass. | IV. | With Chase & Barstow, Stock Brokers. |
| TAKUMA DAN, Chikugo, Japan. | III. | General Supt., Mieke Imperial Coal Mines. |
| 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 Company. |
| FRANK H. MORGAN, 178 State St., Ithaca, N. Y. | V. | Instructor in Quantitative Analytical Chemistry, Cornell University. |
| EVERELL J. NICHOLS, Burlington, Io. | I. | Engineer Corps, Chicago, Burlington & Quincy Railroad. |
| FREDERICK H. PRENTISS, 2 Cortlandt St., New York, N. Y. | II. | Manager and Engineer, New York Steam Company. |
| JAMES RITCHIE, 30 Euclid Ave., Cleveland, O. | I. | Principal Assistant Engineer, Cleveland & Mahoning Valley R. R. Company. |
| JAMES W. ROLLINS, Jr., West Roxbury, Mass. | I. | Engineer in charge, Adirondack Railroad, Saratoga, N. Y. |
| C. D. SAWIN, M.D., 349 Main St., Charlestown, Mass. | Sci. and Lit. | Physician and Surgeon to Massachusetts State Prison. |
| PETER SCHWAMB, Boston, Mass. | II. | Associate Prof. of Mechanism, Mass. Institute of Technology. |
| FREDERIC P. SPALDING, 444 Middlesex St., Lowell, Mass. | I. | Civil Engineer, City Engineer's Office, Boston, Mass. |
| ISAAC M. STORY, Somerville, Mass. | I. | Assistant Engineer, N. Y. & N. E. Railroad. |
| EDMUND TANEY,† Washington, D. C. | I. | With the U. S. Coast and Geodetic Survey. |
| LINWOOD O. TOWNE, Newtonville, Mass. | III. | Assayer, Chemist, and Mining Engineer. |
| EMILE F. WILLIAMS, 230 Washington St., Boston, Mass. | I. | |
| JAMES G. WOOLWORTH, Norwich, Ct. | V. | With Norwich Dyeing and Bleaching Company. |
| 1879. | | |
| WALTER S. Allen, 13 Beacon St., Boston, Mass. | V. | Secretary, State Gas Commission. |
| SAMUEL T. BRALEY, Rutland, Vt. | II. | Draughtsman, Howe Scale Company. |
| JOHN W. CABOT, Bellaire, O. | III. | Superintendent, Steel Works Department, Bellaire Nail Works. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|--|
| HARRY H. CAMPBELL, Steelton, Dauphin Co., Penn. | III. | Superintendent, Open Hearth Department, Pennsylvania Steel Company. |
| FRED. S. COFFIN, 52 Congress St., Boston, Mass. | III. | Manager, Wool Department, Stoddard Loving & Co. |
| W. OTIS DUNBAR, Altoona, Penn. | II. | In charge of Pennsylvania Railroad Test Room. |
| GEORGE W. FABENS, Ottumwa, Ia. | I. | Division Roadmaster, Chicago, Burlington & Quincy Railroad. |
| CHARLES S. GOODING, 28 School St., Boston, Mass. | II. | Mechanical Engineer and Draughtsman. |
| ERNEST G. HARTWELL, 68 Devonshire St., Boston, Mass. | IV. | With Hartwell & Richardson, Architects. |
| RAPHAEL M. HOSEA, 1657 Larimer St., Denver, Colo. | I. | Engineer, Colorado Fuel Company and Denver Fuel Company. |
| HORACE J. HOWE, Elmira, N. Y. | I. | Engineer, N. Y., L. E. & W. Railroad. |
| FREDERICK B. KNAPP, Duxbury, Mass. | I. | Principal, Scientific Preparatory School. |
| FRED. H. LANE, Room 101, 26 Broadway, New York, N. Y. | II. | With Standard Oil Company. |
| FRED. R. LORING,† 8 Greenwich Park, Boston, Mass. | VII. | Studying in Germany. |
| WILLIAM W. MACFARLANE, 110 Oxford St., Phila., Penn. | V. | Assistant Superintendent, Quaker City Dye Works. |
| ARTHUR H. METCALF, Pawtucket, R. I. | II. | Mechanical Engineer. |
| EDWIN C. MILLER, Wakefield, Mass. | II. | Assistant Superintendent, Henry F. Miller & Sons' Piano Company. |
| EDWARD H. OWEN, Jr.,† 150 Crescent St., Waltham, Mass. | II. | Unemployed. Out of health. |
| WILLIAM H. PICKERING, Observatory, Cambridge, Mass. | VIII. | In charge of Boyden Department, Harvard College Observatory. |
| GEORGE F. RIGGS, 19 Jay St., Cambridgeport, Mass. | I. | |
| FRANK G. STANTIAL, Melrose, Mass. | V. | Superintendent, Cochrane Chemical Company, Everett, Mass. |
| WILLIAM S. STEARNS, Wyoming, O. | I. | Superintendent, Stearns & Foster Co.'s Cotton Factory, Cincinnati, O. |
| ARTHUR M. WAITT, 41 Dwight St., Boston, Mass. | II. | Assistant Master Car Builder, Boston & Maine Railroad, Salem, Mass. |
| 1880. | | |
| GEORGE H. BARTON, Boston, Mass. | III. | Instructor in Determinative Mineralogy, Mass. Institute of Technology. |

154 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|-----------|--|
| CHARLES H. BROWN, 688 Shawmut Ave., Boston, Mass. | I. | |
| EDWIN E. CHASE, Central City, Colo. | I. | United States Deputy Surveyor and Mining Engineer. |
| FREDERICK W. CLARK, Boston, Mass. | III. | Assistant Professor of Mining and Met- allurgy, Mass. Institute of Tech. |
| GEORGE W. HAMILTON, 14 Beacon St., Boston, Mass. | I. | With the Sewer Department. |
| LORING R. MILLEN, Savannah, Ga. | III. | Wholesale Lumber Dealer, Stillwell, Pike & Millen. |
| WILLIAM T. MILLER, 156 Tremont St., Boston, Mass. | Elective. | Salesman, with Henry F. Miller & Sons' Piano Company. |
| *NATHANIEL C. SMALL. | V. | Died July 14, 1880. |
| 1881. | | |
| IRA ABBOTT, Windsor Hotel, Montreal, P. Q. | I. | Vice-President and Assistant Engineer, Dominion Bridge Company. |
| JOHN H. ALLEN, Argentine, Kan. | III. | Assistant Metallurgist, Kansas City Smelting and Refining Company. |
| *JAMES S. ATKINSON. | II. | Died December 17, 1883. |
| AMOS BINNEY, A.B., Walpole, Mass. | V. | In business. |
| DAVID S. BISSELL, Pittsburg, Penn. | III. | Of Boyle & Bissell, Iron and Stone Brokers. |
| FRANK H. BRIGGS, 25 Hotel Berkeley, Boston, Mass. | IX. | Broker, 57 High Street, Boston, Mass. |
| FRANK E. CAME, Windsor Hotel, Montreal, P. Q. | I. | Assistant Engineer and Agent, Domin- ion Bridge Company. |
| FRANK D. CHASE, Care Russell & Co., Shanghai, China. | III. | Chemist and Assayer. |
| BENJAMIN G. COLLINS, Edgartown, Mass. | II. | |
| HARRY H. CUTLER, Newton, Mass. | II. | Superintendent and Manager, Newton Electric Light and Power Company. |
| F. GRAEF DARLINGTON, 40 Putnam Ave., Zanesville, O. | IX. | Superintendent and Secretary, Cincin- nati & Muskingum Valley Railway Co. |
| JOHN DUFF, 14 Sheafe St., Charlestown, Mass. | V. | Student, Harvard Medical School. |
| DAVID S. GODDARD, Lowell, Mass. | III. | With Coburn Shuttle Company. |
| *MARIE G. HOLMAN, A.M. | V. | Died May 5, 1885. |
| WALTER J. KOEHLER,† Broken Hill, N. S. W., Australia. | V. | Ass't Superintendent, Smelting Works, Broken Hill Proprietary Co. |
| EDWIN J. LEWIS, J., 9 Park St., Boston, Mass. | IV. | Architect. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|---|
| WILLIAM B. LINDSAY, A.B., Carlisle, Penn. | V. | Professor of Chemistry, Dickinson College. |
| JAMES LUND, 66 James St., Malden, Mass. | V. | Superintendent, Indigo and Ammonia Dept., Cochrane Chemical Co. |
| GEORGE A. MOWER,† 75 Queen Victoria St., London, Eng. | II. | Manager, English Branch, Crosby Steam Gage and Valve Co. |
| WEBSTER NORRIS, Melrose, Mass. | III. | Chemist, Boston Rubber Shoe Co. |
| EVELYN W. ORDWAY, New Orleans, La. | V. | Professor of Chemistry and Physics, Newcomb College, Tulane Univ. |
| THEODORE PARKER, Burlington, Ia. | I. | Assistant Engineer, C., B. & Q. R. R. |
| NATHANIEL W. SHED,† Nashua, N. H. | V. | Chemist, with the Nashua Iron and Steel Co. |
| 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, Little Rock, Ark. | III. | Assistant State Geologist. |
| 1882. | | |
| CLARA P. AMES, Northampton, Mass. | V. | Teacher in Girls' Classical School. |
| THOMAS B. CARSON, 119, 121, and 123 Third Street, Des Moines, Ia. | II. | Wholesale Agricultural Implements. |
| EDWARD F. ELY, A.B., 36 Prospect St., Providence, R. I. | IV. | |
| GEORGE FAUNCE, A.B., Mansfield Valley, Allegheny Co., Penn. | III. | Assistant Superintendent of Pennsylvania Lead Company's Works. |
| *HARRY A. FOSS. | II. | Died August 19, 1885. |
| CHARLES A. FRENCH, Boston, Mass. | III. | Instructor in Mathematics, Massachusetts Institute of Technology. |
| HOWARD V. FROST, Ph.D., Boston, Mass. | V. | Instructor in General Chemistry. |
| EDW. G. GARDINER, Ph.D., Boston, Mass. | VII. | Instructor in Biology, Massachusetts Institute of Technology. |
| FRANCIS P. HALL, Emporia, Kan. | V. | Stock-raising. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|-----------|---|
| GEORGE L. HEINS, Temple Court, 7 Beekman St., New York, N. Y. | IV. | Architect. |
| CHARLES D. JENKINS, 32 Hawley St., Boston, Mass. | V. | Assistant State Inspector of Gas. |
| JAMES W. JOHNSON, Riverside, Cal. | I. | Civil Engineer. |
| JOHN F. LOW, Chelsea, Mass. | V. | Of the firm of J. G. & J. F. Low, Art Tile Works. |
| HARRY G. MANNING, Watertown, N. Y. | II. | With Eames Vacuum Brake Co. |
| GEORGE W. MANSFIELD, 178 Devonshire St., Boston, Mass. | III. | With the Thomson-Houston Electric Co. |
| FRANK C. MORRISON,† 89 Court St., Boston, Mass. | I. | Engineer and Draughtsman. |
| JAMES P. MUNROE, 10 Batavia St., Boston, Mass. | III. | Secretary, Massachusetts Institute of Technology. |
| CARRIE L. RICE, 2922 Champa St., Denver, Colo. | V. | Teacher of Chemistry and Algebra, Denver High School. |
| WILLIAM T. RIPLEY, Center Rutland, Vt. | II. | Superintendent, Ripley Sons' Whole- sale Marble Works. |
| HENRY F. ROSS, Jamaica Plain, Mass. | III. | With Boston Thread and Twine Co. |
| JOHN H. ROSS, Jamaica Plain, Mass. | Elective. | Superintendent, Boston Thread and Twine Co. |
| GRENVILLE T. SNELLING, 15 Rue de Bucy, Paris, Fr. | IV. | <i>Dessinateur supplémentaire au Conser- vation du Plan de Paris pour l'Expo- sition de 1889.</i> |
| WALTER B. SNOW, Watertown, Mass. | II. | With B. F. Sturtevant, Jamaica Plain. |
| ANTHONY C. WHITE, 141 Pearl St., Boston, Mass. | VIII. | With American Bell Telephone Co. |

1883.

| | | |
|--|-----|---|
| HERBERT T. BARDWELL, Box 1265, Springfield, Mass. | I. | Assistant in Civil Engineering, Mass. Inst. Technology. |
| GEORGE H. BRYANT, Auburn, Ala. | II. | Professor of Mechanic Arts, Alabama Polytechnic Institute. |
| HARVEY S. CHASE, Great Falls, N. H. | II. | Supt., Gas Light Co.; and Great Falls Manufacturing Co.'s 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, 5 Banning Block, Duluth, Minn. | I. | City Engineer. |
| HORACE B. GALE, 2645 Washington Ave., St. Louis, Mo. | II. | Professor of Dynamic Engineering, Washington University. |
| GEORGE H. GUSTIN, Port Royal, S. C. | III. | Chemist, Baldwin Fertilizer Co. |
| FREDERIC O. HARRIMAN, Jaitipan, Mex. | I. | Civil Engineer and Contractor. |
| JAMES H. HUTCHINGS, 1672 Washington St., Boston, Mass. | II. | In business. |
| HARVEY M. MANSFIELD, Fairfield, Me. | III. | Supt., Somerset Fibre Company. |
| ROBERT W. SCOTT, 44 N. Fourth St., Philadelphia, Penn. | II. | Manufacturer of Blue Print Paper. |
| GEORGE A. SMITH, Arlington, Mass. | V. | Of the firm of Thos. Strahan & Co., Manufacturers of Wall Paper, Chel- sea, Mass. |
| FRANK TENNEY, Steelton, Dauphin Co., Penn. | III. | Purchasing Agent, Penn. Steel Com- pany. |
| CHARLES H. TOMPKINS, Jr., Boise City, Idaho. | III. | Assistant Engineer, Idaho Mining and Irrigation Company. |
| 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. |

1884.

| | | |
|--|------|---|
| CHARLES B. APPLETON, Brookline, Mass. | II. | In Draughting Office of E. D. Leavitt, Jr., Mech. Engineer, Cambridgeport. |
| HENRY F. BALDWIN, Birmingham, Ala. | II. | Roadmaster, S. & N. Ala. Div., Louis- ville & Nashville 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 Company. |
| CHARLES C. BOTHFELD, Pittsburg, Penn. | I. | With Pittsburg Testing Laboratory. |
| W. FRANK CARR, B. S., 14 Vanderburgh Block, Minne- apolis, Minn. | I. | Civil and Hydraulic Engineering, Agent for Durham System House Drainage. |

158 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|---------|---|
| CHRISTOPHER J. CARVEN, 1604 Dorchester Ave., Dor- chester, Mass. | I. | City Engineer's Office, Boston. |
| ROSCOE L. CHASE, 1336 Spring Garden St., Phila- delphia, Penn. | V. | Professor of Chemistry, Penn. Museum and School of Industrial Art. |
| ALFRED O. DOANE, Newtonville, Mass. | III. | Assistant City Engineer, City of New- ton. |
| ALFRED L. FITCH, 85 Seeley Ave., Chicago, Ill. | II. | With Charles F. Elmes. |
| GEORGE L. R. FRENCH, St. Johnsbury, Vt. | I. | Engineer, Bridges and Track, St. Johnsbury & Lake Champlain Div., B. & M. R. R. |
| AUGUSTUS H. GILL, care of Becker & Co., Leipzig, Germany. | V. | Student at the University. |
| FRANK M. HAINES,† Boston, Mass. | III. | Assistant Engineer, Northern Pacific R. R. |
| GEORGE H. HEYWOOD, 3135 Vernon Ave., Chicago, Ill. | III. | Treasurer, Heywood & Morrill Rattan Co., 146 W. Washington St. |
| JAMES G. HOLDER, 119 Broad St., Lynn, Mass. | V. | Apothecary. |
| GEORGE F. KNAPP, Lock Box 43, Steelton, Dau- phin Co., Penn. | V. | Supt., Blast Furnaces, Penn. Steel Co. |
| *AMY STANTIAL LUND. | V. | Died February 11, 1888. |
| CAPT. D. A. LYLE, U. S. A., Box 2253, Boston, Mass. | III. | Inspector of Ordnance, United States Army. |
| PHILIP S. MORSE, A.B., Gunnison, Colo. | III. | With the Tomichi Valley Smelting Co. |
| CHARLES O. PRESCOTT, Plymouth, Mass. | V. | Teacher of Chemistry. |
| 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. |
| WILLIAM J. RICH, Lowell, Mass. | III. | Office, Proprietors of Locks and Canals on Merrimack River. |
| FRANKLIN B. RICHARDS, Rooms 6 and 7 Mercantile Bank Bld'g, Cleveland, O. | III. | With Tod, Stambaugh & Co. |
| C. SNELLING ROBINSON, Fourth Avenue West, Duluth, Minn. | III. | Analytical Consulting Chemist and Assayer. |
| THEODORE W. ROBINSON, 118 Eastern Ave, Joliet, Ill. | III. | Chemist, Joliet Steel Company. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|---|
| A. LAWRENCE ROTCH, 3 Commonwealth Avenue, Boston, Mass. | II. | Proprietor, Blue Hill Meteorological Observatory, Readville, Mass. |
| JOSIAH P. RYDER, 25 Saratoga St., East Boston, Mass. | V. | Teacher, East Boston High School. |
| ALFRED STEBBINS, Jr.,† 187 West St., N. Y. City. | III. | Office of Engineer of Buildings and Bridges, N. Y., L. E. & W. R. R. |
| ELLIOT T. STURGIS, Cheyenne, Wyoming. | III. | With R. S. Van Tassell, in coal business. |
| ALICE BROWN TYLER, 9 Friedrichstr., Erlangen, Germany. | V. | |
| HARRY W. TYLER, 9 Friedrichstr., Erlangen, Germany. | V. | Student at the University. |
| NAHUM WARD, Mt. Seaver Ave., Roxbury, Mass. | V. | Chemist, with N. Ward Co. |
| WILLIAM M. WHITNEY, Winchendon, Mass. | II. | With Baxter D. Whitney, Manufac- turer Wood-working Machinery. |
| FRANCIS C. WILLIAMS, Jr., Lincoln, Neb. | I. | Draughtsman, Burlington & Missouri River Railroad. |
| 1885. | | |
| CHARLES R. ALLEN, New Bedford, Mass. | V. | Teacher of Science in New Bedford High School. |
| DAVID BAKER, Sparrow's Pt., Md. | III. | Supt., Blast Furnace Dept., Maryland extension, Pennsylvania Steel Co. |
| EDWARD R. BENTON, Ph.D., Newton Centre, Mass. | IV. | Superintendent, for McKim, Mead & White, Architects. |
| HEYWOOD COCHRAN, Louisville, Ky. | II. | Draughtsman, with Louisville Bridge and Iron Company. |
| EDWARD H. DEWSON, Jr., St. Joseph, Mo. | II. | Master Mechanic, St. Joseph & Grand Island R. R. |
| FREDERICK FOX, Jr., S.M., 77 State St., Portland, Me. | V. | Student of Chemistry, Leipzig, Ger- many. |
| THOMAS W. FRY, 546 Cleveland Ave., Chicago, Ill. | II. | With Diamond Prospecting Co., 74 and 76 W. Lake St. |
| ROBERT R. GOODRICH, Stone Cliff, W. Va. | III. | Mining Engineer. |
| WALTER K. HARRINGTON, Green Bay, Wis. | I. | Supt. of Green Bay & Fort Howard Water Works Company. |
| ELEAZER B. HOMER, Boston, Mass. | IV. | Instructor in Architecture, Mass. Insti- tute of Technology. |
| FRANK H. LORD, Medford, Mass. | II. | With the Wainwright Manufacturing Company. |

160 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|---|
| TRACY LYON, Corner Fourth and Waconta Sts., St. Paul, Minn. | II. | Engineer with Robert Bement & Co. |
| HUGH MACRAE, Wilmington, N. C. | III. | Mining Engineer. |
| HENRY MARTIN, Mass. Institute of Technology, Boston, Mass. | V. | Water Analyst, State Board of Health. |
| ALYNE L. MERRILL, Cambridge, Mass. | II. | Instructor in Mechanical Engineering, Mass. Institute of Technology. |
| *EBEN G. MERRILL. | I. | Died October 12, 1887. |
| EVERETT MORSS, 323 Marlboro' St., Boston, Mass. | III. | With Morss & Whyte, Wire Workers. |
| FREDERICK H. NEWELL, Boston, Mass. | III. | Graduate Student, Mass. Institute of Technology. |
| JOSEPH E. NUTE, 295 Eighth St., Jersey City, N. J. | I. | Superintendent of Distribution, United Gas Improvement Company. |
| MARCELLA I. O'GRADY, Bryn Mawr, Penn. | IX. | Fellow in Biology. |
| FRANK A. PICKERNELL, New York, N. Y. | VI. | With American Telephone and Tele- graph Company. |
| RICHARD H. PIERCE, A.B., The Rookery, Chicago, Ill. | VI. | Agent for Edison Light Company. |
| NEWBERT M. RANDALL, Steelton, Penn. | III. | Assistant Chemist, Pennsylvania Steel Company. |
| OTIS T. STANTIAL, 50 Waubausia Ave., Chicago, Ill. | III. | Chemist, North Chicago Rolling Mill Company. |
| HENRY P. TALBOT, Leplay Strasse 8, Leipzig, Germany. | V. | Student in the University. |
| GEORGE P. VANIER, Steelton, Penn. | III. | Chemist, Pennsylvania Steel Company. |
| ERASTUS WORTHINGTON, Jr., Dedham, Mass. | I. | Civil Engineer, Water Works and Sewerage Construction. |
| 1886. | | |
| GEORGE P. ABORN, Warren, Mass. | II. | With the Knowles Pump Works. |
| ARTHUR C. ANTHONY, 33 Nassau St., N. Y. City. | III. | Inspector for the Commonwealth Insur- ance Company. |
| DANA P. BARTLETT, Boston, Mass. | VI. | Instructor in Mathematics, Mass. Inst. of Technology. |
| PIRNEY C. BATCHELLER, Fort Hamilton, N. Y. Harbor. | II. | With the Pneumatic Dynamite Gun Company. |

GRADUATES : SCHOOL OF INDUSTRIAL SCIENCE. 161

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|---|
| WILLIAM L. BRAINERD, 68 Devonshire St., Boston, Mass. | IV. | Draughtsman, with Hartwell & Richardson, Architects. |
| JOHN K. BURGESS, Saugerties-on-Hudson, N. Y. | II. | With the Barclay Fibre Company. |
| CHARLES L. BURLINGHAM, 2207 Calumet Ave., Chicago, Ill. | III. | Supt.'s Assistant, Chicago and Aurora Smelting and Refining Company. |
| WM. H. CHADBOURN, Jr., Wilmington, N. C. | III. | Skinner & Chadbourn, Engineers and Contractors. |
| WILLIAM L. CHURCH, Chicago, Ill. | VI. | Superintendent of Meter Department, Chicago Edison Company. |
| HARRY E. H. CLIFFORD, Boston, Mass. | VI. | Instructor in Physics, Mass. Inst. of Technology. |
| LOUIS R. COBB, City Hall Building, Chicago, Ill. | I. | Assistant Engineer, Street Department, Board of Public Works. |
| FRANCIS H. CRANE, 88 Mason Building, Boston, Mass. | VI. | With William O. Webber, Consulting Engineer. |
| LOUIS F. CUTTER, Winchester, Mass. | I. | Assistant Engineer, Boston Sewer Department. |
| CHARLES C. DOE, 224 Commonwealth Ave., Boston, Mass. | VII. | Student at Harvard Medical School. |
| ORRIN S. DOOLITTLE, Altoona, Penn. | V. | In Laboratory of the Pennsylvania Railroad. |
| JAMES C. DUFF, 13 Grand Ave., Milwaukee, Wis. | V. | Analytical and Consulting Chemist. |
| GEORGE W. FARMER, Topeka, Kan. | II. | In the shops of the Atchison, Topeka, & Santa Fé Railroad. |
| EDWARD S. FOSS, Boston, Mass. | V. | Assistant in General Chemistry, Mass. Institute of Technology. |
| FRED E. FOSS, A.B., St. Paul, Minn. | I. | Assistant Engineer, Maintenance of Way, C., St. P. & K. C. R. R. |
| THEODORE R. FOSTER, Aurora, Ill. | II. | Office of Mechanical Engineer, C., B. & Q. R. R. |
| ALEX. S. GARFIELD, Lynn, Mass. | II. | With Thomson Electric Welding Co. |
| D. LEWIS K. HATHAWAY, Warren, Mass. | II. | Draughtsman at Knowles Pump Works. |
| EDWARD E. HIGGINS, 202 Main St., Buffalo, N. Y. | VI. | General Agent for New York State, Sprague Electric Railway and Motor Company. |
| WILLIAM J. HOPKINS, 141 Pearl St., Boston, Mass. | VI. | Electrician, with American Bell Telephone Company. |
| WALTER R. INGALLS, 229 Ocean St., Lynn, Mass. | III. | Mining Engineer, Leadville, Colo. |

162 GRADUATES : SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|---------|---|
| WILLIAM F. JORDAN, Rochester, N. Y. | I. | Engineer's Office, Buffalo, Rochester & Pittsburg R. R. |
| C. BELLE KENNEY, 111 Saratoga St., East Boston, Mass. | V. | Teacher of Chemistry, Mt. Holyoke Seminary and College. |
| JOHN A. McC. LAWRENCE, 1364 South Thirteenth St., Denver, Colo. | II. | Machinist in shops of the Denver & Rio Grande R. R. |
| ALBERT E. LEACH, 87 Milk St., Boston, Mass. | II. | Solicitor of Patents, with W. B. H. Dowse, Counsellor-at-Law. |
| FRANK L. LOCKE, 7 Eaton St., Boston, Mass. | I. | In City Engineer's Office, Boston, Mass. |
| WILSON H. LOW, Eighteenth and Blackwell Sts., Chicago, Ill. | V. | Chemist, with N. K. Fairbank & Co. |
| ELGOOD C. LUFKIN, Lockport, N. Y. | II. | With Holly Manufacturing Company. |
| JAMES P. LYNDE, 37 and 39 Main St., Palmer, Mass. | IX. | Druggist. |
| ALEX. R. MCKIM, Manchester, Eng. | I. | With Olive & Partington's Sulphite Paper Pulp Mills. |
| HARRY B. MERRIAM, Room N, Union Depot, Denver, Colo. | I. | Assistant to Division Engineer, Union Pacific Railway. |
| HENRY P. MERRIAM, 11 Charlton St., New York, N. Y. | VI. | Superintendent, Pneumatic Dynamite Gun Company. |
| EDWARD F. MILLER, Boston, Mass. | II. | Assistant in Mechanical Engineering, Mass. Institute of Technology. |
| EDGAR H. MUMFORD, Leavenworth, Kan. | II. | District Foreman, Union Pacific R'y Co. |
| ARTHUR A. NOYES, S.M., Newburyport, Mass. | V. | Student of Chemistry, Leipzig, Germany. |
| EDWARD L. PIERCE, Jr., Bennington, N. H. | II. | With the Monadnock Paper Mills. |
| GEORGE F. REYNOLDS, Chicago, Ill. | II. | With the M. C. Bullock Manufacturing Company. |
| CHARLES F. RICHARDSON, 13 Holyoke House, Cam- bridge, Mass. | II. | Student at Harvard Law School. |
| ARTHUR G. ROBBINS, Boston, Mass. | I. | Instructor in Civil Engineering, Mass. Institute of Technology. |
| L. KIMBALL RUSSELL, Mass. Institute of Technology, Boston, Mass. | V. | Water Analyst, State Board of Health. |

GRADUATES : SCHOOL OF INDUSTRIAL SCIENCE. 163

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|---------|--|
| JOHN F. SEAVEY, Lowell, Mass. | II. | In City Engineer's Office. |
| WILLIAM E. SHEPARD,† Hartford, Conn. | VI. | Assistant Electrician, with the Schuyler Electric Light Company. |
| JAMES E. SIMPSON, 163 Haverhill St., Lawrence, Mass. | III. | With J. R. Simpson & Co. |
| THEODORE STEBBINS, 532 South Twenty-fifth Ave., Omaha, Neb. | VI. | Electrician. |
| AUGUSTUS B. STOUGHTON, 411 Walnut St., Philadelphia, Penn. | II. | Attorney-at-Law, Patents and Patent Causes. |
| WILLIAM M. TAYLOR, Indianapolis, Ind. | II. | With Chandler & Taylor, Phœnix Machine Works. |
| CHARLES D. TURNBULL, Boston, Mass. | II. | With Hecht Brothers & Co., Wool Dealers. |
| DAVID VAN ALSTINE, 710 Fourteenth St., Louisville, Ky. | II. | With Snead & Bibb, Architectural Iron Works. |
| MAURICE A. VIELÉ, B.S., 103 St. Nicholas Ave., New York, N. Y. | II. | Engineer Corps, new Croton Aqueduct. |
| C. MORRIS WILDER, Cincinnati, O. | VI. | In electrical business. |
| ELWOOD J. WILSON, Pueblo, Colo. | III. | Chemist, Philadelphia Smeiting and Refining Co. |
| CHARLES WOOD, 200 W. Fourth St., Cincin- nati, O. | I. | Assistant Engineer, Cin., Han. & Day- ton R.R. |
| CHARLES H. WOODBURY, 22 School St., Boston, Mass. | II. | Artist. |
| VERNOR F. WORCESTER, 14 Park St., Rutland, Vt. | II. | In Draughting Dept. of the Howe Scale Company. |
| FRED. R. YOUNG, 157 Summer St., Boston, Mass. | III. | |
| 1887. | | |
| GEORGE A. ARMINGTON, 102 Adelbert St., Cleveland, O. | II. | Instructor in Mech. Engineering, Case School of App. Science. |
| SIDNEY R. BARTLETT, 13 Arlington St., Boston, Mass. | VII. | Student, Harvard Dental School. |
| CHARLES A. BARTON, 14 Wadsworth Ave., Waltham, Mass. | II. | Assistant to City Engineer, Waltham. |

164 GRADUATES : SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|--|
| WILLIAM B. BLAKE, Louisville, Ky. | I. | In Engineer Dept., J., M. & I. R. R. |
| WALTER C. BRACE, P. O. Box 752, Pueblo, Colo. | III. | Secretary, Pueblo Sampling Works Co. |
| HENRY B. BRAINERD, 103 St. François Xavier, Mont- real, P. Q. | IX. | Treasurer, Dominion Cartridge Co. |
| DWIGHT BRAINERD, 103 St. François Xavier, Mont- real, P. Q. | IX. | Sup't, Hamilton Powder Co. |
| HENRY F. BRYANT, Room 2, Town Hall, Brookline, Mass. | I. | With A. H. French, Civil Engineer. |
| FRANK G. BURGESS, 222 Sutter St., San Francisco, Cal. | I. | Engineering Dep't, Southern Pacific R. R. Co. |
| JULIAN A. CAMERON, Graniteville, Mass. | II. | With Abbot Worsted Mills. |
| FRANK D. CARNEY, Steelton, Penn. | III. | With Pennsylvania Steel Company. |
| WINTHROP COLE, West Wareham, Mass. | II. | With Tremont Nail Company. |
| HENRY J. CONANT, West Lynn, Mass. | II. | With Thomson-Houston Electric Light- ing Company. |
| HELEN COOLEY, Little Britain, N. Y. | V. | |
| RALPH E. CURTIS, Newburyport, Mass. | II. | Assistant in Mechanical Engineering, Mass. Institute of Technology. |
| WILLIAM C. CUSHING, A.B., Fourteenth and Main Sts., Louisville, Ky. | I. | Ass't Engineer, J., M. & I. R. R. |
| SARAH L. DAY, A.B., 280 Newbury St., Boston, Mass. | V. | |
| WALTER C. FISH, 7 Park St., Lynn, Mass. | VI. | With Thomson Electric Welding Co. |
| JOHN M. FOX, New York, N. Y. | VI. | With Western Electric Co., 70 Trinity Pl. |
| JOSEPH B. GAY, 68 Devonshire St., Boston, Mass. | IV. | With Hartwell & Richardsor, Archi- tects. |
| WALTER H. GLEASON, 12 Faneuil Hall Market, Boston, Mass. | V. | With W. Gleason & Co., Fruit Com- missioners. |
| WILLIAM S. HADAWAY, JR., 7 Park St., Lynn, Mass. | VIII. | Sup't, Motor Dep't, Thomson-Houston Electric Co. |

GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE. 165

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|---|
| WILLIAM O. HILDRETH, Boston, Mass. | II. | Ass't in Mechanical Engineering, Mass. Institute of Technology. |
| JAMES C. HOBART, 56 Plum St., Cincinnati, O. | II. | With the James L. Haven Co. |
| OREN S. HUSSEY, Orange, N. J. | II. | With Thos. A. Edison. |
| EDWARD A. JONES, 7 East St., Pittsfield, Mass. | II. | With E. D. Jones, Millwright and Mfr. of Paper Machinery. |
| CHARLES B. KENDALL, Passaic, N. J. | V. | Chemist at Passaic Print Works. |
| WILLIAM D. LIVERMORE, Charles St., Providence, R. I. | V. | With Silver Springs Bleaching and Dyeing Co. |
| PHILIP A. MOSMAN, 212 N. Hickory St., Joliet, Ill. | III. | Ass't in Laboratory of Joliet Steel Co. |
| SAMUEL P. MULLIKEN, Leipzig, Germany. | V. | Student. |
| GEORGE L. NORRIS, Chicago, Ill. | III. | Ass't Chemist, North Chicago Rolling Mill Company. |
| GEO. W. PATTERSON, Jr., A.B., 18 Story St., Cambridge, Mass. | VI. | Student at Harvard Law School. |
| QUINTARD PETERS, 488 Peachtree Street, Atlanta, Ga. | IX. | With S. M. Inman & Co., Cotton Buyers. |
| HERBERT A. RICHARDSON, Mass. Inst. of Technology, Boston, Mass. | V. | Water Analyst, State Board of Health. |
| FRANZ H. SCHWARZ, Lawrence, Mass. | II. | Draughtsman at Lower Pacific Mills. |
| HENRY D. SEARS, 141 Pearl St., Boston, Mass. | VI. | With American Bell Telephone Co. |
| FRANK E. SHEPARD, 15 Ashland Street, Dorchester, Mass. | II. | Ass't Inspector of Boilers, U. S. Steam-boat Inspection Service. |
| CHARLES P. SMITH, Norwich, Conn. | II. | Draughtsman, C. B. Rogers & Co., Manufacturers of Wood-working Machinery. |
| HARRY E. SMITH, Milwaukee, Wis. | V. | In Laboratory of C., M. & St. P. R. R. |
| J. WALDO SMITH, Holyoke, Mass. | I. | Ass't Eng'r in Hydraulic Dep't of Holyoke Water Power Company. |
| HENRY SOUTHER, Jr., Steelton, Penn. | III. | With the Penn. Steel Co. |
| HOLLON C. SPAULDING, 620 Atlantic Ave., Boston, Mass. | II. | Agent, Motor Dep't, Thomson-Houston Electric Co. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|--|---------|--|
| TIMOTHY W. SPRAGUE, 178 Devonshire St., Boston, Mass. | III. | |
| JAMES H. STANWOOD, 2 Boylston Place, Boston, Mass. | I. | Ass't in Civil Engineering, Mass. Institute of Technology. |
| HENRY F. STODDARD, Fort Hamilton, N. Y. | II. | With Pneumatic Dynamite Gun Co. |
| GILES TAINTOR, 150 Court St., Keene, N. H. | VI. | Manager, Keene Telephone Exchange. |
| EDWARD G. THOMAS, Orange, N. J. | II. | In Private Laboratory of Thomas A. Edison. |
| FREDERICK THOMPSON, 1322 N. Y. Ave., Washington, D. C. | I. | Ass't Engineer, Richmond & Danville R. R. System. |
| WALTER S. THOMPSON, Box 296, Cheney, Wash. | I. | Draughtsman, N. P. R. R. |
| GREENLEAF R. TUCKER, City Hospital, Boston, Mass. | V. | Chemist and Apothecary. |
| H. JUDSON TUCKER, 510 W. 30th St., N. Y. City. | VI. | With Sprague Electric Motor Co. |
| ALEXANDER H. TWOMBLY, 39 High St., Charlestown, Mass. | II. | In a paper mill. |
| RALPH VOSE, McClellan, N. J. | VI. | Ass't Electrician, with Bergmann & Co. |
| WALTER G. WHITMORE, 139 and 141 Adams St., Chicago, Ill. | VI. | Electrician for Chicago Edison Co. |
| GRANGER WHITNEY, Box 34, Steelton, Penn. | III. | With Pennsylvania Steel Co. |
| WILLIAM A. WHITNEY, Sunapee, N. H. | I. | Sup't, Lake Sunapee Wood Pulp Co. |
| HERBERT A. WILCOX, Soudan, St. Louis Co., Minn. | III. | Chemist, Minnesota Iron Co. |
| SIDNEY WILLIAMS, St Paul, Minn. | I. | With Eastern R. R. Co. of Minn. |
| 1888. | | |
| HENRY D. BATES, Boston, Mass. | IV. | Engaged in publishing the <i>Technology Architectural Review</i> . |
| HENRY F. BIGELOW, Clinton, Mass. | IV. | Architect. |
| HERBERT S. BIRD, Joliet, Ill. | V. | With the Joliet Steel Works. |
| WINSLOW BLANCHARD, Park St., Dorchester, Mass. | II. | Draughtsman, Boston Heating Company. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|---|
| ARTHUR T. BRADLEE, 113 Beacon St., Boston, Mass. | II. | Arlington Mills, Lawrence, Mass. |
| BENJAMIN G. BUTTOLPH, 165 West Canton St., Boston, Mass. | II. | Draughtsman, Boston Manufacturers' Mutual Fire Insurance Company. |
| ELBRIDGE S. CARLETON, Rochdale, Mass. | IV. | With the Rochdale Mills. |
| DAVID A. CENTER, Gloucester, Mass. | VI. | |
| STEPHEN CHILD, 10 Tremont St., Boston, Mass. | I. | With M. M. Tidd, Civil Engineer. |
| GEORGE E. CLAFLIN, Hartford, Conn. | VI. | With Waterhouse Electric and Manu- facturing Company. |
| SYLVANUS H. COBB, 232 Fairmount Ave., Hyde Park, Mass. | VI. | With the Standard Electric Company of Vermont. |
| RUSSELL H. COLBY, Waverley House, City Sq., Charlestown. | V. | Assistant Chemist, Massachusetts State Board of Health. |
| FRED B. COLE, Kingston, Mass. | II. | Assistant in Drawing, Mass. Institute of Technology. |
| BERTRAND R. T. COLLINS, Kezar Falls, Me. | II. | Assistant in Mechanical Engineering, Mass. Institute of Technology. |
| EDWARD COLLINS, Jr., 985 Adams St., Mattapan, Mass. | VI. | Assistant in Physics, Mass. Institute of Technology. |
| ARTHUR J. CONNER, Boston, Mass. | V. | Assistant in Industrial Chemistry, Mass. Institute of Technology. |
| RICHARD DEVENS, Clinton, Mass. | II. | With Clinton Wire Cloth Company. |
| EDGAR F. DUTTON, 534 Warren St., Boston, Mass. | VI. | With F. M. Kimball & Co., Electrical Engineers. |
| HENRY F. EASTMAN, 54 Thorndike St., Lowell, Mass. | II. | |
| ALFRED B. ELLSWORTH, care of Union Bridge Company, Buffalo, N. Y. | I. | Inspecting Engineer, Illinois Central R. R. |
| RICHARD EPPES, Jr., Cor. Pearl and Hudson Sts., Nashville, Tenn. | II. | With the National Manufacturing Co. |
| LOUIS A. FERGUSON, 139-141 Adams St., Chicago, Ill. | VI. | Electrician, in charge of Underground Department, Chicago Edison Co. |
| BERTRAM P. FLINT, Pencoyd, Penn. | II. | In charge of Testing Department, Pen- coyd Iron Works. |
| THEODORE A. FOQUE, 40 Eastman Ave., Minneapolis, Minn. | II. | With Minn., St. Paul & Sault Ste. Marie R. R. |

168 GRADUATES : SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|--|
| STEJIRO FUKUZAWA, Tokyo, Japan. | I. | Civil Engineer. |
| JAMES E. FULLER, Jr., 31 Chatham St., Worcester, Mass. | IV. | Architectural Draughtsman with Fuller & Delano, Architects. |
| WILLIAM H. GERRISH, 126 Pawtucket St., Lowell, Mass. | II. | Mechanical Engineer for Lancaster Slate Company. |
| IRVING G. GREENE, 87 Garden St., Lawrence, Mass. | I. | With the State Board of Health. |
| HAROLD G. GROSS, 23 Union Park, Boston, Mass. | VII. | Student at Harvard Medical School. |
| GEORGE W. HAMBLET, 500 Lowell St., Lawrence, Mass. | II. | Assistant in Mechanical Engineering, Mass. Institute of Technology. |
| WILLIAM L. HARRIS, 6 Louisburg Square, Boston. | VII. | Student, Harvard Medical School. |
| GEORGE L. HARVEY, 1702 Prairie Ave., Chicago, Ill. | II. | Traveling in Europe. |
| CHARLES F. HASTINGS, West Newton, Mass. | III. | Assistant in Mining and Metallurgy, Mass. Institute of Technology. |
| SAVORY C. HATHAWAY, Jr., 510 W. Thirtieth St., N. Y. City. | VI. | With Sprague Electric Railway Motor Company. |
| GEORGE L. HEATH, Everett, Mass. | V. | Assistant in Sanitary Chemistry, Mass. Institute of Technology. |
| EDWARD W. HERRICK, Northampton, Mass. | II. | With B. F. Sturtevant, Jamaica Plain, Mass. |
| EDWARD C. HOLTON, Winchester, Mass. | V. | Assistant in General Chemistry, Mass. Institute of Technology. |
| HENRY J. HORN, Jr., St. Paul, Minn. | I. | Assistant Engineer, C., St. P. & K. C. R. R. |
| FRANK M. JAMES, 36 East Third St., St. Paul, Minn. | II. | Draughtsman, St. P., M. & Man. R. R. |
| ARTHUR W. JONES, Lynn, Mass. | VI. | In the Motor Dept., Thomson-Houston Electric Co. |
| EDWIN O. JORDAN, Auburndale, Mass. | VII. | Graduate Student, Mass. Institute of Technology. |
| WILLIAM T. KEOUGH, East Boston, Mass. | II. | With the Atlantic Works. |
| GEORGE S. LEE, Jamaica Avenue, Revere, Mass. | I. | With F. L. Fuller, Civil Engineer, 12 Pearl St., Boston. |
| JAMES W. LOVELAND, 25 Princeton St., East Boston, Mass. | V. | Assistant in Quantitative Analysis, Mass. Institute of Technology. |
| ARTHUR S. MANN, 284 Friend St., Boston, Mass. | II. | Draughtsman with Blake Manufacturing Company. |
| GEORGE V. MCLAUTHLIN, Providence, R. I. | V. | In Printing Department, Silver Spring Bleaching and Dyeing Company. |

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|--|
| CHARLES G. MERRELL, Box 786, Cincinnati, O. | V. | Chemist with W. S. Merrell Chemical Company. |
| FRANK A. MOORE, 25 Catherine St., Worcester, Mass. | IV. | Instructor in Architecture, Mass. Institute of Technology. |
| HARRY C. MOORE, Elm St., Brookline, Mass. | II. | With A. H. French, Civil Engineer. |
| ADDISON D. NICKERSON, 224 Federal St., Boston, Mass. | I. | In Engineering Department N. Y. & N. E. R. R. |
| EDWIN R. PEARSON, Lynn, Mass. | VI. | With the Thomson-Houston Electric Co. |
| CHARLES A. PETERSON, A.B., Philadelphia, Penn. | VI. | Instructor in Electrical Engineering, University of Pennsylvania. |
| HERBERT F. PIERCE, Lawrence, Mass. | I. | Asst. Engineer, State Board of Health. |
| GEORGE B. POOL, Forest Hills, Mass. | VI. | |
| JOHN RAY, Boston, Mass. | II. | |
| RUSSELL ROBB, Lynn, Mass. | VI. | With Thomson Electric Welding Company. |
| ODIN B. ROBERTS, A.B., 81 Mt. Vernon St., Boston, Mass. | II. | Student, Harvard Law School. |
| ANNIE W. SABINE, M.A., 10 Dana St., Cambridge, Mass. | VIII. | |
| FREDERICK H. SAFFORD, Wolfeborough, N. H. | VI. | Instructor, Brewster Free Academy. |
| ALFRED H. SAWYER, Concord, Mass. | II. | Draughtsman, with the Hinkley Locomotive Co., Boston. |
| FREDERICK L. SAYER, 29 Bowdoin St., Boston, Mass. | II. | With the Geo. F. Blake Manufacturing Company. |
| WALTER K. SHAW, Lexington, Mass. | II. | |
| IVAR L. SJÖSTRÖM, Boston, Mass. | I. | In Bridge Department, Boston & Maine Railroad. |
| CLARENCE W. SMITH, A.B., York Haven, Penn. | V. | Chemist, York Haven Paper Company and Susquehanna Water and Paper Company. |
| EDWARD M. SMITH, North Hampton, N. H. | II. | |
| FRANK O. STETSON, 16 Park St., Nashua, N. H. | V. | Chemist, with Nashua Iron and Steel Company. |
| CHARLES A. STONE, Bellevue St., Newton, Mass. | VI. | With Thomson Electric Welding Company. |
| JOHN M. SULLY, Butte City, Mont. | VI. | Engineer, with B. & M. Consolidated Copper and Silver Manufacturing Co. |

170 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME AND RESIDENCE. | COURSE. | OCCUPATION. |
|---|---------|--|
| MARION TALBOT, A.M, 66 Marlboro' St., Boston, Mass. | IX. | . |
| WALTER I. TOWNE, Topsfield, Mass. | VI. | |
| CLARENCE B. VORCE, 30 Spring St., Hartford, Conn. | I. | With Engineer on Improvement of N. Y., N. H. & H. and N. Y. & N. E. R. Rs. |
| A. SYDNEY WARREN, Shrewsbury, Vt. | III. | On U. S. Geological Survey. Plane Table Work. |
| EDWIN S. WEBSTER, care Kidder, Peabody & Co., Boston, Mass. | VI. | |
| CHARLES L. WEIL, Philadelphia, Penn. | II. | Assistant Editor of the <i>American Wool Reporter</i> . |
| ARTHUR S. WILLIAMS, 15 Arlington St., Boston, Mass. | VI. | With N. E. Tel. and Tel. Co. |
| AMOS E. WOODWARD, East Somerville, Mass. | III. | Assistant in Geology, Mass. Institute of Technology. |
| JOHN E. YOUNG, Danielsonville, Conn. | I. | |

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 | | |
| Total | | | 581 |
| Deduct names counted twice | | | 2 |

ALPHABETICAL LIST OF GRADUATES.

| NAME. | COURSE. | CLASS. | NAME. | COURSE. | CLASS. |
|-----------------------|---------------|--------|------------------------|---------|--------|
| Abbott, Ira | I | 1881 | Baldwin, George H. | III | 1880 |
| Aborn, George P. | II | 1886 | Batcheller, Birney C. | II | 1886 |
| Alden, John | V | 1877 | Bates, Henry D. | IV | 1888 |
| Allbright, William B. | V | 1878 | Beal, Foster E. L. | I | 1871 |
| Allen, Charles F. | III | 1876 | Beal, J. Williams | IV | 1877 |
| Allen, C. Frank | I | 1872 | Beeching, William H. | II | 1877 |
| Allen, Charles R. | V | 1885 | Benton, Edward R. | IV | 1885 |
| Allen, John H. | III | 1881 | Bigelow, Henry F. | IV | 1888 |
| Allen, Samuel E. | I | 1875 | Binney, Amos. | V | 1881 |
| Allen, Walter S. | V | 1879 | Bird, Herbert S. | V | 1888 |
| Ames, Clara P. | V | 1882 | Bissell, David S. | III | 1881 |
| Anthony, Arthur C. | III | 1886 | Blake, William B. | I | 1887 |
| Appleton, Charles B. | II | 1887 | Blanchard, Winslow | II | 1888 |
| Appleton, Ellery C. | III | 1868 | Blodgett, Aaron D. | II | 1876 |
| Arnold, George A. | II | 1887 | Blodgett, George W. | I | 1873 |
| Arnott, James L. | Sci. and Lit. | 1875 | Blunt, William T. | I | 1874 |
| Aspinwall, Thomas | I | 1876 | Boardman, Henry A. | V | 1884 |
| Atkinson, James S. | II | 1881 | Bothfeld, Charles C. | I | 1884 |
| Atwood, William P. | V | 1876 | Boyden, Amos J. | IV | 1875 |
| Austin, Amory. | V | 1873 | Brace, Walter C. | III | 1887 |
| Bachelor, Charles S. | V | 1877 | Bradlee, Arthur T. | II | 1888 |
| Baker, Charles M. | IV | 1878 | Brainerd, Dwight | IX | 1887 |
| Baker, David | III | 1885 | Brainerd, Henry B. | IX | 1887 |
| Baker, William H. | I | 1869 | Brainerd, William L. | IV | 1886 |
| Baldwin, Henry F. | II | 1884 | Braley, Samuel T. | II | 1879 |
| Baldwin, Thomas W. | I | 1876 | Breed, Joshua B. F. | I | 1876 |
| Bardwell, Fred L. | V | 1884 | Brewster, Benjamin E. | III | 1872 |
| Bardwell, Herbert T. | I | 1883 | Briggs, Frank H. | IX | 1881 |
| Barrows, Herbert | I | 1874 | Brotherton, William E. | V | 1873 |
| Barrows, Walter B. | VII | 1876 | Brown, Charles H. | I | 1880 |
| Barrus, George H. | II | 1874 | Bryant, George H. | II | 1883 |
| Bartlett, Dana P. | VI | 1886 | Bryant, Henry F. | I | 1887 |
| 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 |

172 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

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

GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE. 173

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

174 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME. | COURSE. | CLASS. | NAME. | COURSE. | CLASS. |
|------------------------|---------|--------|------------------------|----------|--------|
| Hosea, Raphael M. | I | 1879 | Livermore, William D. | V | 1887 |
| Howard, Charles P. | I | 1874 | Locke, Bradford H. | III | 1872 |
| Howe, Henry M. | III | 1871 | Locke, Frank L. | I | 1886 |
| Howe, Horace J. | I | 1879 | Lord, Frank H. | II | 1885 |
| Howes, Clarence L. | II | 1873 | Loring, Fred. R. | VII | 1879 |
| Howland, Albert H. | I | 1871 | Loveland, James W. | V | 1888 |
| Hoyt, William E. | I | 1868 | Low, Albert H. | V | 1876 |
| Hunt, Alfred E. | III | 1876 | Low, John F. | V | 1882 |
| Huntington, William F. | I | 1875 | Low, Wilson H. | V | 1886 |
| Hussey, Oren S. | II | 1887 | Lufkin, Elgood C. | II | 1886 |
| Hutchings, James H. | II | 1883 | Lund, Amy Stantial | V | 1884 |
| Ingalls, Walter R. | III | 1886 | Lund, James | V | 1881 |
| Jackson, Frank H. | III | 1874 | Lyle, David A. | III | 1884 |
| Jacques, William W. | VIII | 1876 | Lynde, James P. | IX | 1886 |
| James, Frank M. | II | 1888 | Lyon, Tracy | II | 1885 |
| James, Samuel, Jr. | III | 1876 | Macfarlane, William W. | V | 1879 |
| Jenkins, Charles D. | V | 1882 | MacRae, Hugh | III | 1885 |
| Jenney, Walter | III | 1877 | Main, Charles T. | II | 1876 |
| Jewett, William P. | I | 1873 | Mann, Arthur S. | I | 1888 |
| Johnson, James W. | I | 1882 | Manning, Harry G. | II | 1882 |
| Jones, Arthur W. | VI | 1888 | Mansfield, George W. | III | 1882 |
| Jones, Edward A. | II | 1887 | Mansfield, Harvey M. | III | 1883 |
| Jordan, Edwin O. | VII | 1888 | Martin, Henry | V | 1885 |
| Jordan, William F. | I | 1886 | Mason, Sampson D. | I | 1870 |
| Kebler, Julian A. | I | 1878 | May, William C. | V | 1873 |
| Kendall, Charles B. | V | 1887 | McKim, Alexander R. | I | 1886 |
| Kenney, C. Belle | V | 1886 | McLauthlin, George V. | V | 1888 |
| Keough, William T. | II | 1888 | Merrell, Charles G. | V | 1888 |
| Kilham, Alfred C. | II | 1876 | Merriam, Harry B. | I | 1886 |
| Kimball, William A. | II | 1873 | Merriam, Henry P. | VI | 1886 |
| Kinnicutt, Leonard P. | V | 1875 | Merrill, A'lyne L. | II | 1885 |
| Kirk, Joseph | II | 1877 | Merrill, Eben G. | I | 1885 |
| Kittredge, George W. | I | 1877 | Merrill, N. Frederick | V | 1870 |
| Knapp, Frederick B. | I | 1879 | Metcalf, Arthur H. | II | 1879 |
| Knapp, George F. | V | 1884 | Millen, Loring R. | III | 1880 |
| Knapp, J. Austin | II | 1876 | Miller, Edward F. | II | 1886 |
| Koehler, Walter J. | V | 1881 | Miller, Edwin C. | II | 1879 |
| Lane, Fred. H. | II | 1879 | Miller, William T. | Elective | 1880 |
| Lawrence, John A. McC. | II | 1886 | 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 |
| Lewis, Wilfred | II | 1875 | Morrison, Frank C. | I | 1882 |
| Lincoln, G. Russell | III | 1871 | Morse, Frank B. | I | 1873 |
| Lindsay, William B. | V | 1881 | Morse, Philip S. | III | 1884 |

GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE. 175

| NAME. | COURSE. | CLASS. | NAME. | COURSE. | CLASS. |
|-------------------------|---------------|--------|------------------------|---------------|--------|
| Morss, Everett | III | 1885 | Prichard, Charles F. | II | 1876 |
| Mosman, Philip A. | III | 1887 | Puffer, William L. | III | 1884 |
| Mower, George A. | II | 1881 | Purinton, Arthur J. | II | 1884 |
| Mudge, Benjamin C. | I | 1877 | Raeder, Henry | I | 1876 |
| Mulliken, Samuel P. | V | 1887 | Randall, Newbert M. | III | 1885 |
| Mumford, Edgar H. | II | 1886 | Ray, John | II | 1888 |
| Munroe, James P. | III | 1882 | Reynolds, George F. | II | 1886 |
| Myrick, Willis H. | II | 1874 | Rice, Carrie L. | V | 1882 |
| Newell, Frederick H. | III | 1885 | Rich, Charles L. | I | 1876 |
| Nichols, Everell J. | I | 1878 | Rich, William J. | III | 1884 |
| Nichols, William R. | V | 1869 | Richards, Ellen H. | V | 1873 |
| Nickerson, Addison D. | I | 1888 | Richards, Franklin B. | III | 1884 |
| Nickerson, William E. | V | 1876 | Richards, Robert H. | III | 1868 |
| Norris, George L. | III | 1887 | Richardson, Charles F. | II | 1886 |
| 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 |
| Ordway, 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 | 1888 |
| 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 | Russell, L. Kimball | V | 1886 |
| Phillips, Henry A. | IV. | 1873 | Ryder, Josiah P. | V | 1884 |
| Phipps, David W. | Phil. | 1876 | Sabine, Annie W. | VIII | 1888 |
| Pickering, William H. | VIII | 1879 | Safford, Frederick H. | VI | 1888 |
| Pickernell, Frank A. | VI | 1885 | Sargent, Francis T. | II | 1875 |
| Pierce, Edward L., Jr. | II | 1886 | Sargent, Welland F. | I | 1875 |
| Pierce, Herbert F. | I | 1888 | Sawin, Chas. D. | Sci. and Lit. | 1878 |
| Pierce, Richard H. | VI | 1885 | Sawyer, Alfred H. | II | 1888 |
| Pike, William A. | I | 1871 | Sawyer, Charles A. | Sci. and Lit. | 1876 |
| Plimpton, Arthur L. | I | 1877 | Sayer, Frederick L. | II | 1888 |
| Plimpton, Thomas D. | II | 1875 | Schwamb, Peter | II | 1878 |
| Pond, Frank H. | II | 1874 | Schwarz, Franz H. | II | 1887 |
| Pool, George B. | VI | 1888 | Schwarz, Theodore E. | III | 1876 |
| Pratt, George H. | V | 1871 | Scott, Robert W. | II | 1883 |
| Prentiss, Frederick H. | II | 1878 | Sears, Henry D. | VI | 1887 |
| Prentiss, Wm. A. | Sci. and Lit. | 1875 | Sears, Walter H. | I | 1868 |
| Prescott, Charles O. | V | 1884 | Seavey, John F. | II | 1886 |

176 GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE.

| NAME. | COURSE. | CLASS. | NAME. | COURSE. | CLASS. |
|------------------------|---------|--------|---------------------------|---------------|--------|
| 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, 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, Walter S. | I | 1887 |
| Smith, Clarence W. | V | 1888 | Tilden, Bryant P. | III | 1868 |
| Smith, Edward M. | II | 1888 | Tillinghast, Theodore F. | I | 1870 |
| Smith, George A. | V | 1883 | Tinkham, Samuel E. | I | 1873 |
| Smith, Harry E. | V | 1887 | Tolman, James P. | III | 1868 |
| Smith, J. Waldo | I | 1887 | Tompkins, Charles H., Jr. | III | 1883 |
| Smith, Walter W. | II | 1871 | Towne, Linwood O. | III | 1878 |
| Snead, William R. | IV | 1881 | Towne, Walter J. | VI | 1888 |
| Snelling, Grenville T. | IV | 1882 | Townsend, Walter D. | III | 1876 |
| Snow, Walter B. | II | 1882 | Trowbridge, Almarin, Jr. | II | 1871 |
| Soule, Richard H. | II | 1872 | Tucker, Greenleaf R. | V | 1887 |
| Souther, Henry, Jr. | III | 1887 | Tucker, H. Judson | VI | 1887 |
| Southworth, Harry C. | III | 1877 | Turnbull, Charles D. | II | 1886 |
| Spalding, Frederic P. | I | 1878 | Turner, Edmund K. | I | 1870 |
| Spaulding, Hollon C. | II | 1887 | Twombly, Alexander H. | II | 1887 |
| Sprague, Timothy W. | III | 1887 | Tyler, Alice Brown | V | 1884 |
| Stafford, C. Edward | III | 1873 | Tyler, Harry W. | V | 1884 |
| Stantial, Frank G. | V | 1879 | Underwood, George R. | V | 1883 |
| Stantial, Otis T. | III | 1885 | Van Alstine, David | II | 1886 |
| Stanwood, James B. | II | 1875 | Vanier, George P. | III | 1885 |
| Stanwood, James H. | I | 1887 | Very, Frank W. | V | 1873 |
| Stearns, Harold E. | II | 1881 | Vielé, Maurice A. | II | 1886 |
| Stearns, William S. | I | 1879 | Vorce, Clarence B. | I | 1888 |
| Stebbins, Alfred, Jr. | III | 1884 | Vose, Ralph | VI | 1887 |
| Stebbins, Theodore | VI | 1886 | Waite, Charles N. | V | 1876 |
| Stetson, Frank O. | V | 1888 | Waitt, Arthur M. | II | 1879 |
| Stewart, Charles E. | I | 1877 | Waitt, Henry M. | I | 1876 |
| Stimpson, Thomas F. | III | 1877 | Ward, Clarence S. | III | 1872 |
| Stoddard, Henry F. | II | 1887 | Ward, Nahum | V | 1884 |
| Stone, Charles A. | VI | 1888 | Ware, Robert C. | Sci. and Lit. | 1874 |
| Stone, Charles F. | III | 1871 | Warren, A. Sydney | III | 1888 |
| Stone, Joseph | I | 1868 | Warren, Edward R. | VII | 1881 |
| Story, Isaac M. | I | 1878 | Warren, H. L. J. | III | 1875 |
| Stoughton, Augustus B. | II | 1886 | Webster, Edwin S. | VI | 1888 |

GRADUATES: SCHOOL OF INDUSTRIAL SCIENCE. 177

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

TITLES OF THESES

OF SUCCESSFUL CANDIDATES FOR THE DEGREE OF
BACHELOR OF SCIENCE, JUNE, 1888.

- HENRY DODGE BATES,
Design for a Reformatory Prison.
- HENRY FORBES BIGELOW,
Design for an Episcopal Church, with Parish House and Rectory
attached.
- HERBERT STETSON BIRD,
Action of Di-halogen Compounds upon Sodium-acetanilide.
- WINSLOW BLANCHARD,
An Experimental Study of the Steam Injector. (*With A. T.
Bradlee.*)
- ARTHUR TISDALE BRADLEE,
An Experimental Study of the Steam Injector. (*With W. Blan-
chard.*)
- BENJAMIN GILBERT BUTTOLPH,
Experiments upon the Flow of Steam through a Tube.
- ELBRIDGE STOYLE CARLETON,
Design for a Music Hall.
- DAVID ALLEN CENTER,
The Relation of Increase of Illuminating Power to Increase of Cur-
rent and Energy consumed in Incandescent Lights. (*With L. A.
Ferguson.*)
- STEPHEN CHILD,
Design for a System of Sewerage for the City of Newton, Mass.
(*With H. F. Pierce.*)
- GEORGE EDWIN CLAFLIN,
A Study of Commercial Storage Batteries. (*With E. F. Dutton.*)
- SYLVANUS HALE COBB,
The Efficiency of various Incandescent Lamps. (*With G. B. Pool.*)

- RUSSELL HAWES COLBY,
The Preparation of the Aromatic Ethers, and the Action of Nitric Acid upon them.
- FRED BAKER COLE,
Experiments on the Relative Temperature of the different Tubes of a Horizontal Multitubular Boiler. (*With H. C. Moore.*)
- BERTRAND ROBSON TORSEY COLLINS,
A Design for a Rotary Steam Press with Automatic, Pressure-equalizing Mechanism.
- EDWARD COLLINS, JR.,
The Influence of Metals on Electro-magnetic Induction.
- ARTHUR JEWETT CONNER,
The Chemistry of the Drying Oils.
- RICHARD DEVENS,
Experiments on Single Roller Carding for Coarse Numbers.
- EDGAR FULTON DUTTON,
A Study of Commercial Storage Batteries. (*With G. E. Claffin.*)
- HENRY FRENCH EASTMAN,
Experiments upon the Strength of Pulleys, Keys, and Set Screws. (*With W. H. Gerrish.*)
- ALFRED BURNHAM ELLSWORTH,
Design for a Double Track Railroad Truss Bridge of 132 Feet Span.
- RICHARD EPPES, JR.,
The Strength and other Properties of a Mild Steel at Varying Temperatures.
- LOUIS ALOYSIUS FERGUSON,
The Relation of Increase of Illuminating Power to Increase of Current and Energy consumed in Incandescent Lights. (*With D. A. Center.*)
- BERTRAM PIERREPONT FLINT,
Tests on the Strength and other Properties of Rope.
- THEODORE ALBERT FOQUE,
An Experimental Determination of the Proper Angles for Cutting Tools.
- STEJIRO FUKUZAWA,
The Narrow Gauge Railroad *vs.* the Standard Gauge.
- JAMES EDWARD FULLER, JR.,
Design for a County Court and Record House, with Jail and House of Correction.
- WILLIAM HENRY GERRISH,
Experiments upon the Strength of Pulleys, Keys, and Set Screws. (*With H. F. Eastman.*)

- IRVING GALEN GREENE,
A Design and Estimate for a Stone Arch of 90 Feet Span.
- HAROLD GORDON GROSS,
A Biological Study of the Charles River at Charles River Village and Newton Upper Falls, and of the Water Supply of Newton, Mass.
- GEORGE WARREN HAMBLET,
Transmission of Power by Ropes. (*With F. M. James.*)
- WILLIAM LINCOLN HARRIS,
A Biological Study of the Water Supply of Waltham, Mass., and of the Charles River at Waltham and Watertown.
- GEORGE LYON HARVEY,
A Design for a Petroleum Engine.
- CHARLES FREDERICK HASTINGS,
The Amalgamation and Chlorination of Low-grade Gold Ores.
- SAVORY CLIFTON HATHAWAY, JR.,
An Experimental Study of Harcourt's Pentane Lamp and some other Standards of Light. (*With E. K. Pearson.*)
- GEORGE LINCOLN HEATH,
Experiments on Electrolytic Bleaching.
- EDWARD WEBSTER HERRICK,
Experiments and Tests on the Standard Oil Engine. (*With J. Ray.*)
- EDWARD CLAPP HOLTON,
The Products of the Distillation of Rosin with Lime.
- HENRY JOHN HORN, JR.,
A Comparison of the Cost of Earth Embankment with Pile and Trestle Bridges at Various Heights.
- FRANK MORRIS JAMES,
Transmission of Power by Ropes. (*With G. W. Hamblet.*)
- ARTHUR WINSLOW JONES,
A Study of the Motions of the Electrodes of a Microphone Transmitter.
- EDWIN OAKES JORDAN,
Thermal Stimuli as a Source of Reflex Action.
- WILLIAM THOMAS KEOUGH,
A Design for some Marine Crank, Tunnel and Propeller Shafting.
- GEORGE STRICKLAND LEE,
Tables of Standard Sizes of Wooden Stringers, \pm Beams and Built Girders for Plate Girder Bridges.
- JAMES WALLACE LOVELAND,
The Determination of Slag in Iron and Steel.

- ARTHUR SIMONDS MANN,
The Indicator; an Experimental Investigation of some of its Errors.
- GEORGE VINCENT McLAUTHLIN,
The Action of Chromium Compounds in Mordanting Wool.
- CHARLES GEORGE MERRELL,
A Study on the Iodophenols.
- FRANK ASHBURTON MOORE,
A Design for a Public Library.
- HARRY CHURCHILL MOORE,
Experiments on the Relative Temperature of the different Tubes of
a Horizontal, Multitubular Boiler. (*With F. B. Cole.*)
- ADDISON DOANE NICKERSON,
A Study of the Question of a Tunnel to East Boston. (*With J. E.
Young.*)
- EDWIN RICHTER PEARSON,
An Experimental Study of Harcourt's Pentane Lamp, and some
other Standards of Light. (*With S. C. Hathaway, Jr.*)
- CHARLES ALBERT PETERSON (*A.B., Harvard University*),
The Distribution of Potential around the Collectors of Dynamo
Machines. (*With W. I. Towne*)
- HERBERT FRANK PIERCE,
Design for a System of Sewerage for the City of Newton, Mass.
(*With S. Child.*)
- GEORGE BALDWIN POOL,
The Efficiency of various Incandescent Lamps. (*With S. H. Cobb.*)
- JOHN RAY,
Experiments and Tests on the Standard Oil Engine. (*With E. W.
Herrick.*)
- RUSSELL ROBB,
The Inverse Electro-Motive Force of the Voltaic Arc.
- ODIN BARNES ROBERTS (*A.B., Harvard University*),
A Report of Tests made on the Hull, Engine, and Boiler of the
Steam Yacht "Gleam." (*With F. L. Sayer.*)
- ANNIE WARE SABINE (*M.A., Ohio State University*),
The Strength of Current produced by the Microphone, as determined
by Pressure and Material of Electrodes.
- FREDERICK HOLLISTER SAFFORD,
A Study of Specific Inductive Capacity, with Different Rates of
Charge.
- ALFRED HENRY SAWYER,
Experiments on the Performance of a Windmill. (*With W. K.
Shaw.*)

- FREDERICK LINCOLN SAYER,
A Report of Tests made on the Hull, Engine, and Boiler of the
Steam Yacht "Gleam." (*With O. B. Roberts.*)
- WALTER KEITH SHAW,
Experiments on the Performance of a Windmill. (*With A. H. Sawyer.*)
- IVAR LUDWIG SJÖSTRÖM,
Railway Accidents.
- CLARENCE WRIGHT SMITH (*A.B., Harvard University*),
The Action of Dilute Nitric Acid on certain Substituted Aromatic
Ortho Amido Compounds.
- EDWARD MORRIS SMITH,
An Investigation of the Vertical Throw in Locomotive Drivers.
- FRANK OWEN STETSON,
The Direct Determination of Alumina in the Presence of Iron.
- CHARLES AUGUSTUS STONE,
Efficiency of Alternating Current Transformers. (*With E. S. Webster.*)
- JOHN MURCHISON SULLY,
The Smelting of an Argentiferous Lead Ore, by the Precipitation
Process.
- MARION TALBOT (*A.M., Boston University*),
The Determination of Organic Matter in Air.
- WALTER IRVING TOWNE,
The Distribution of Potential around the Collectors of Dynamo
Machines. (*With C. A. Peterson.*)
- CLARENCE BROWNING VORCE,
A Theoretical and Practical Discussion of the Subject of Rail Joints.
- ALGERNON SYDNEY WARREN,
Report of Tests on Gold Ore from the Ruby Basin, Black Hills.
- EDWIN SIBLEY WEBSTER,
Efficiency of Alternating Current Transformers. (*With C. A. Stone.*)
- CHARLES LEWIS WEIL,
A Design for certain parts of a Machine arranged especially for
Planing Locomotive Frames.
- ARTHUR SHEPARD WILLIAMS,
The Strength of the Induced Current in a Magneto Telephone as
affected by the Strength of the Magnet.
- AMOS ERASTUS WOODWARD,
On the Beneficiating of Copper Fines from Capelton, Canada, and a
Design for a Mill.
- JOHN EBEN YOUNG,
A Study of the Question of a Tunnel to East Boston. (*With A. D. Nickerson.*)

ALPHABETICAL INDEX.

| | | | |
|--|-----------------|---|------------------------|
| Acoustics, Instruction in | 60, 93 | Dates of Examinations | 44 |
| Admission, Requirements for, School of Industrial Science | 44 | Degrees, Requirements for the | 44 |
| Admission, Requirements for, to Advanced Standing | 49 | Degrees, Advanced | 42 |
| Admission, Requirements for, Graduates of Colleges | 49 | Deposit, Requirements in regard to | 106 |
| Admission, Requirements for, to Special Courses | 50 | Description of Courses | 18, 19 |
| Admission, Requirements for, Lowell School of Design | 138 | Descriptive Geometry, Instruction in | 53, 87 |
| Admission, Requirements for, Society of Arts | 6 | Design, Lowell School of | 137 |
| Advanced Courses | 20, 42 | Discipline | 108 |
| Age of Applicants for Admission | 45, 49 | Dismissal, Honorable | 44 |
| Algebra, Requirements in, for Admission | 46 | Divided Examinations | 48 |
| Alumni Associations, Officers, etc. | 141 | Doctors' Degrees | 42 |
| Alumni, Alphabetical List of | 171 | Drawing, Instruction in | 53, 87 |
| Alumni, List of, by Classes | 142 | Drill, Instruction in | 81 |
| Apparatus of Instruction | 20, 51 | Drill Hall | 7, 81 |
| Applied Mechanics, Instruction in | 61, 85 | Economics and Statistics, Schedule of Topics in | 90 |
| Applied Mechanics, Laboratory of Architects, Boston Society of | 73 | Electrical Engineering, Instruction in, 32, 73, 94 | |
| Architecture, Instruction in | 28, 72, 100 | Electrical Engineering, Schedule of Course in | 33 |
| Architecture, Schedule of Course in | 29 | Electrical Engineering, Schedule of Topics in | 94 |
| Architecture, Schedule of Topics in | 100 | English, Instruction in | 54, 87, 88 |
| Architecture, Partial Course in | 28, 43, 51, 100 | English Language and Literature, Requirements in, for Admission | 47 |
| Architectural Museum | 73 | Entrance, Requirements for | 44, 48, 49, 50, 84 |
| Architectural Library | 73 | Evening Courses | 135 |
| Arithmetic, Requirements in, for Admission | 45 | Examinations, Nature of | 51 |
| Arts, Society of | 6 | Examinations for Admission, Dates of | 44 |
| Attendance, Requirements in regard to | 108 | Examinations for Admission, Place of | 44 |
| Attendance Paper, Presentation of | 105 | Examinations for Admission, Fee for Extra | 45 |
| Bachelor of Science, Degree of | 18, 44 | Examinations for Admission in other cities | 45 |
| Biology, Instruction in | 34, 75, 103 | Examinations for Admission, Divided | 48 |
| Biological Laboratory | 77 | Examinations, Semi-annual | 104 |
| Blowpipe Analysis, Instruction in | 77, 99 | Examinations, Annual | 104 |
| Board, Cost of | 108 | Examinations for Conditioned Students | 105 |
| Bond, Requirements in regard to | 106 | Examinations for Graduation | 105 |
| Books, etc., Cost of | 108 | Examinations, Intermediate | 105 |
| Breakage, Rules in regard to | 106, 108 | Examinations for Lowell School of Design | 138 |
| Buildings, Description of | 7 | Excursions | 57, 64, 65, 66, 71, 76 |
| Calendar | 2, 104 | Executive Committee | 9 |
| Charter | 6 | Expenses | 107 |
| Chemical Engineering, Instruction in, 40, 55, 80 | | Faculty, List of Members | 17 |
| Chemical Engineering, Schedule of Course in | 41 | Fees, School of Industrial Science | 106 |
| Chemistry, Instruction in | 30, 55, 91 | Fees for Extra Examinations | 45 |
| Chemistry, Schedule of Course in | 31 | Fine Arts, Museum of | 73 |
| Chemistry, Schedule of Topics in | 91 | First-Year's Course | 21 |
| Chemistry, Special Students in | 43, 51, 56 | Five-Years' Regular Courses | 20, 42 |
| Chemical Laboratories | 30, 58 | Free Courses of Instruction, Conditions of Attendance | 135 |
| Civil Engineering, Instruction in, 18, 22, 62, 95 | | Free Courses of Instruction, List of Subjects for 1888-1889 | 136 |
| Civil Engineering, Schedule of Course in, 18, 23 | | French, Requirements in, for Admission, 46 | |
| Civil Engineering, Schedule of Topics in, 95 | | French, Instruction in | 53, 88 |
| Climatology, Instruction in | 80, 102 | General Studies, Instruction in | 38, 54 |
| College Graduates, Admission of | 49 | General Studies, Schedule of Course in | 39 |
| Committees | 9 | Geodesy, Geology, and Topography, Course in | 22, 65 |
| Conditions of Admission | 44, 138 | Geography, Requirements in, for Admission | 48 |
| "Conditions" from Semi-annual Examinations | 105 | Geography, Physical, Instruction in | 78, 102 |
| "Conditions" from Annual Examinations | 105 | Geology, Instruction in | 78, 102 |
| "Conditions" for Candidates for Graduation | 105 | Geometry, Requirements in, for Admission | 46 |
| Conteris, Table of | 3 | German, Instruction in | 53, 88 |
| Corporation, Members of | 8 | German, Requirements in, for Admission | 46 |
| Corporation, Committees of | 9, 10 | Graduates of Colleges, Privileges granted to | 49 |
| Courses of Instruction | 18 | Graduate Scholarships | 107 |
| Crystallography, Instruction in | 77, 99 | Graduate Students, List of | 109 |
| Damage to Apparatus | 107 | Graduates, List of, School of Industrial Science | 142, 171 |

| | | | |
|---|----------------|---|-----------------|
| Graduation, Requirements for | 44 | Partial Course in Architecture, | 28, 43, 51, 100 |
| Greek, Requirements in | 49 | Physical Geography, Instruction in | 78, 102 |
| Gymnasium | 7, 81 | Physics, Instruction in | 36, 59, 93 |
| Historical Sketch | 6 | Physics, Schedule of Course in | 37 |
| History, Instruction in | 54, 89 | Physics, Schedule of Topics in | 93 |
| History, Requirements in, for Admission, | 47 | Physics, Library of | 61 |
| History, Schedule of Topics in | 88 | Physics, Rogers Laboratory of | 32, 36, 60 |
| Holidays | 104 | Physics, Study of before entrance | 49 |
| Hours of Attendance | 108 | Physiology, Instruction in | 79, 103 |
| Hydraulic Engineering, Instruction in | 63, 96 | Political Science, Instruction in | 54, 90 |
| Instruction, Methods of | 20, 51 | Political Science, Schedule of Topics in | 90 |
| Instruction, Officers of | 12 | Preparation for the School | 48 |
| Italian, Instruction in | 53, 88 | Prizes, Architectural | 7 |
| Kidder Laboratories of Chemistry | 58 | Railroad Engineering, Instruction in, | 22, 63, 95 |
| Language, Instruction in | 53, 88 | Recess | 104 |
| Latin, Requirements in | 49 | Register of Students of the Institute | 109 |
| Lecturers for the current year, List of | 16 | Register of Students, Lowell School of Design | 139 |
| Lectures, Occasional | 66, 67, 74 | Regular Courses | 18 |
| Library, General | 82 | Regular Students, List of | 111 |
| Library, Boston Public | 82 | Regular Students, becoming Special | 105 |
| Library of Boston Society of Nat. Hist. | 82 | Regulations | 104 |
| Library, Architectural | 73 | Residence | 107 |
| Library, Wm. Ripley Nichols Chemical | 59 | Rogers, Prof. Wm. B. | 6 |
| Library, Physical | 61 | Rogers Laboratory of Physics | 32, 36, 60 |
| Library, Rogers | 72 | Rooms, Cost of | 108 |
| Library, Biological | 77 | Sanitary Engineering, Instruction in | 64, 96 |
| Library of American Statistical Association | 55, 82 | Schedule of Courses | 21 |
| Libraries, Private | 82 | Schedule of Courses, Description of | 19 |
| Literature, Requirements in, for Admission | 47 | Schedule of Topics | 20, 50, 83 |
| Literature and Language, Schedule of Topics in | 87 | Schedule of Topics, Description of | 20, 50, 83 |
| Logic, Instruction in | 54, 90 | Scholarships | 106 |
| Lowell School of Practical Design | 137 | Scholarship, Sherwin | 106 |
| Lowell Free Courses of Instruction | 135 | Scholarships, Savage | 106 |
| Master of Science, Degree of | 42 | Scholarships, Mass. Char. Mech. Assoc. | 106 |
| Mathematics, Instruction in | 52, 85 | Scholarship, Milton | 106 |
| Mathematics, Schedule of Topics | 85 | Scholarships, Joy | 106 |
| Mechanic Arts, Instruction in the | 69, 98 | Scholarship, Mirrlees | 107 |
| Mechanics, Theoretical and Applied, In- struction in | 61, 85 | Scholarships, Perkins | 107 |
| Mechanical Engineering, Instruction in | 24, 66, 69, 97 | Scholarships, State of Massachusetts | 107 |
| Mechanical Engineering, Schedule of Course in | 25 | Scholarships, Graduate | 107 |
| Mechanical Engineering, Schedule of Topics in | 97 | Scholarships, Conditions governing their award | 107 |
| Mechanical Engineering Laboratory | 24, 67 | Scholarships, Time of award | 107 |
| Mechanical Laboratories | 68, 69 | School of Industrial Science | 6, 11 |
| Metallurgy, Instruction in | 69, 99 | School of Mechanic Arts | 7, 134 |
| Metallurgical Laboratory | 69 | Shops, Description of | 69 |
| Methods of Instruction | 20, 51 | Shopwork | 24, 69, 98 |
| Microscopy, Instruction in | 60, 75, 103 | Society of Arts | 6 |
| Military Science and Tactics, Instruc- tion in | 81 | Spanish, Instruction in | 53, 88 |
| Mineralogy, Instruction in | 77, 99 | Special Students, Register of | 124 |
| Mining Engineering, Instruction in, | 26, 69, 99 | Special Students, becoming Regular | 105 |
| Mining Engineering, Schedule of Course in | 27 | Special Courses | 43, 50 |
| Mining Engineering, Schedule of Top- ics in | 99 | Special Courses, Requirements for Admis- sion | 50 |
| Mining Laboratory | 69 | Special Courses, Requirements for Admis- sion, in Detail | 85 |
| Modern Languages, Instruction in | 53, 88 | Status of Students, Determination of | 104 |
| Museum of Arts | 6 | Summary of Students | 133, 134, 140 |
| Museum of Fine Arts | 73 | Summary of Graduates | 170 |
| Natural History, Instruction in | 34, 75 | Summer Courses | 22, 65, 72 |
| Natural History, Schedule of Course in | 35 | Tardiness | 108 |
| Natural History, Boston Society of, | 34, 77, 80, 82 | Teachers, Facilities offered to | 43, 58 |
| Natural Sciences, Schedule of Topics | 102 | Testing Machines | 62, 65 |
| Nichols, Wm. Ripley, Library | 59 | Theses | 44 |
| Officers of Instruction | 12 | Theses, Titles of, Class of 1888 | 178 |
| Options | 19 | Topics, Schedule of | 20, 50, 83 |
| | | Uniforms for Drill | 81 |
| | | Vacation Work | 22, 65, 72 |
| | | Visiting Committees | 10 |
| | | Women, Admission of | 45 |
| | | Year, School | 104 |
| | | Zoology, Instruction in | 76, 103 |

