M.I.T. ANNUAL CATALOGUES AND BULLETINS
1883/84 01 OF 02

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

NINETEENTH

ANNUAL CATALOGUE

OF THE

OFFICERS AND STUDENTS,

WITH A

STATEMENT OF THE COURSES OF INSTRUCTION,

And a List of the Alumni, and of the Members of the Society of Arts.

1883-1884.

BOSTON:
PRESS OF GEO. H. ELLIS, 141 FRANKLIN STREET.
1884.

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CALENDAR FOR 1883–84.

School year began,	Monday, Sept. 24, 1883.
Second term will begin,	Tuesday, Jan. 29, 1884.
Degrees conferred,	Tuesday, May 27, 1884.
First Entrance Examinations,	Thursday, May 29, 1884, and Friday, May 30, 1884.
Second Entrance Examinations,	Tuesday, Sept. 23, 1884, and Wednesday, Sept. 24, 1884.
Examinations for Advanced Standing,	Thursday, Sept. 25, 1884.
School year of 1884–85 will begin,	Monday, Sept. 29, 1884.

CALENDAR FOR 1884–85.

School year will begin,	Monday, Sept. 29, 1884.
Second term will begin,	Tuesday, Feb. 3, 1885.
Degrees conferred,	Tuesday, June 2, 1885.
First Entrance Examinations,	Thursday, June 4, 1885, and Friday, June 5, 1885.
Second Entrance Examinations,	Tuesday, Sept. 22, 1885, and Wednesday, Sept. 23, 1885.
Examinations for Advanced Standing,	Thursday, Sept. 24, 1885.
School year of 1885–86 will begin,	Monday, Sept. 28, 1885.

GENERAL SUMMARY.

STUDENTS AND GRADUATES: MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

STUDENTS.

School of Industrial Science,	443
School of Mechanic Arts,	56
School of Design,	62
Total,	561

GRADUATES.

School of Industrial Science,	322
School of Mechanic Arts,	18
School of Design,	98
Total,	438

CONTENTS.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

Historical Sketch. The foundation of the Massachusetts Institute of Technology was laid in a report by Prof. Wm. 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.

Of the three integral parts of the Institute, the SOCIETY OF ARTS was first organized, and has continued ever since to hold semi-monthly meetings from October to May of each year. A more detailed account of this society, with lists of its officers and members, will be found on pages 104 to 108.

THE SCHOOL OF INDUSTRIAL SCIENCE was opened in February, 1865, in temporary rooms in Mercantile Building, Summer Street, Boston, with twenty-seven pupils, of whom fourteen graduated with the diploma of the Institute of Technology in 1868. The growth of this school since its opening is shown in the lists of its graduates. Its present organization and condition, with an account of its courses of study and research, and with registers of its officers and students, will be found on pages 10 to 93. The first building of the Institute of Technology, now known as the Rogers Building, was erected on land conceded by the State, and was occupied by the chemical department in the spring of 1866. In the fall of the same year, the whole School of

Industrial Science, together with the Society of Arts, was removed to the same structure.

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 lists of graduates and present students, will be found on pages 100 to 103; the other, the School of Mechanic Arts, a full account of which will be found on pages 94 to 99.

Less formal action has been taken for carrying out the purposes of the founders of the Institute of Technology in the establishment of a MUSEUM OF ARTS. Varied and valuable collections have been made, which, taken together, would constitute no inconsiderable foundation for such a museum; but, thus far, this material has been divided, so that the portions especially relating to individual departments of study and research might be placed within easy reach of the students and teachers respectively concerned therewith. At the beginning of the present year, however, a hall one hundred and ten feet by thirty feet, in the new building of the Institute, was assigned to use as an Industrial Museum; and hereafter, as the means of the Institute permit, collections will be placed there, and arranged especially with reference to the purposes of instruction.

Buildings. The buildings now occupied are (1) the Rogers Building, on Boylston Street, devoted to the engineering departments and to instruction in mathematics, mechanics, geology, mineralogy, and physiology; (2) the New Building, corner of Boylston and Clarendon Streets, mainly devoted to the departments of chemistry, physics, and architecture, and to instruction in language, literature, and history; (3) a series of laboratories, drawing and recitation rooms, foot of Garrison Street, mainly devoted to work in the mechanic arts and to the instruction of the Mechanic Arts School and the Lowell School; (4) a gymnasium and drill hall, on Exeter Street. Floor plans of these buildings will be found on pages 130 to 142.

Extracts from Acts of the General Court of Massachusetts in Relation to the Massachusetts Institute of Technology.

Act of Incorporation. "William B. Rogers [and others named], their associates and successors, are hereby made a body corporate, by the name of the Massachusetts Institute of Technology, for the purpose of instituting and maintaining a Society of Arts, a Museum of Arts, and a School of Industrial Science, and aiding generally, by suitable means, the advancement, development, and practical application of sciences in connection with arts, agriculture, manufactures, and commerce."

Chapter 183, *Acts and Resolves of* 1861.

Grant of Public Lands. "When the Massachusetts Institute of Technology shall have been duly organized, located, and established, . . . there shall be appropriated and paid to its Treasurer each year, on the warrant of the Governor, for its endowment, support, and maintenance, one-third part of the annual interest or income which may be received from the fund created under and by virtue of the 130th chapter of the Acts of the 37th Congress, at the second session thereof, approved July 2, 1862 [giving public lands to the States in aid of instruction in Agriculture, the Mechanic Arts, and Military Science and Tactics]. . . . Said Institute of Technology, in addition to the objects set forth in its Act of Corporation [as above quoted], shall provide for instruction in military tactics."

Chapter 186, *Acts and Resolves of* 1863.

Power to confer Degrees. "The Massachusetts Institute of Technology is hereby authorized and empowered to award and confer degrees appropriate to the several courses of study pursued in said Institution, on such conditions as are usually prescribed in universities and colleges in the United States, and according to such tests of proficiency as shall best promote the interests of sound education in this Commonwealth."

Chapter 247, *Acts and Resolves of* 1868.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

MEMBERS OF THE CORPORATION.

President.

FRANCIS A. WALKER.

Treasurer.

JOHN CUMMINGS.

Secretary.

LEWIS WM. TAPPAN, Jr.

MARSHALL P. WILDER.
JOHN D. PHILBRICK.
HENRY B. ROGERS.
JAMES B. FRANCIS.
EDWARD ATKINSON.
JOHN D. RUNKLE.
CHARLES L. FLINT.
JOHN C. HOADLEY.
ALEXANDER H. RICE.
M. DENMAN ROSS.
FREDERICK W. LINCOLN.
JAMES L. LITTLE.
WILLIAM ENDICOTT, Jr.
SAMUEL K. LOTHROP.
JOHN M. FORBES.
EDWARD S. PHILBRICK.

THOMAS T. BOUVE.
SAMUEL D. WARREN.
HENRY P. KIDDER.
AUGUSTUS LOWELL.
HOWARD A. CARSON.
CHARLES J. PAINE.
CHARLES FAIRCHILD.
DAVID R. WHITNEY.
SAMUEL C. COBB.
HENRY D. HYDE.
ALEXANDER S. WHEELER.
FRANCIS H. WILLIAMS.
BENJAMIN P. CHENEY.
JAMES P. TOLMAN.
HOWARD STOCKTON.
MOSES WILLIAMS.

On the Part of the Commonwealth.

His Excellency, Governor GEORGE D. ROBINSON.

Hon. MARCUS MORTON, *Chief Justice of the Supreme Court.*

Hon. JOHN W. DICKINSON, *Secretary of the Board of Education.*

SCHOOL OF INDUSTRIAL SCIENCE.

OFFICERS OF INSTRUCTION.

FRANCIS A. WALKER, PH.D., LL.D., *President.*

JOHN D. RUNKLE, PH.D., LL.D.,
Walker Professor of Mathematics.

WILLIAM P. ATKINSON, A.M.,
Professor of English and History.

GEORGE A. OSBORNE, S.B.,
Professor of Mathematics.

JOHN M. ORDWAY, A.M.,
Professor of Metallurgy and Industrial Chemistry.

ROBERT H. RICHARDS, S.B.,
Professor of Mining Engineering, and Director of the Mining and Metallurgical Laboratories.

WM. RIPLEY NICHOLS, S.B.,
Professor of General Chemistry.

CHARLES P. OTIS, A.M., PH.D.,
Professor of Modern Languages.

CHARLES H. WING, S.B.,
Professor of Analytical Chemistry.

ALPHEUS HYATT, S.B., Custodian of Boston Society of Natural History,
Professor of Zoölogy and Palæontology.

WILLIAM H. NILES, PH.B., A.M.,
Professor of Geology and Geography.

CHARLES R. CROSS, S.B.,
Thayer Professor of Physics.

GAETANO LANZA, S.B., C.E.,
Professor of Theoretical and Applied Mechanics, in charge of the Department of Mechanical Engineering.

GEORGE L. VOSE, A.M., C.E.,
Hayward Professor of Civil and Topographical Engineering.

THEODORE M. CLARK, A.B.,
Professor of Architecture.

EUGENE LETANG,
Assistant Professor of Architecture.

JULES LUQUIENS, PH.D.,
Assistant Professor of Modern Languages.

SILAS W. HOLMAN, S.B.,
Assistant Professor of Physics.

WEBSTER WELLS, S.B.,
Assistant Professor of Mathematics.

WILLIAM O. CROSBY, S.B.,
Assistant Professor of Mineralogy and Lithology.

LEWIS M. NORTON, PH.D.,
Assistant Professor of Organic Chemistry.

GEORGE F. SWAIN, S.B.,
Assistant Professor of Civil Engineering.

WILLIAM T. SEDGWICK, PH.D.,
Assistant Professor of Biology.

HENRY K. BURRISON, S.B.,
Instructor in Mechanical Drawing.

ELLEN H. RICHARDS, A.M., S.B.,
Instructor in Chemistry and Mineralogy.

ALFRED E. BURTON, S.B.,
Instructor in Topographical Engineering.

ARTHUR N. WHEELOCK, A.M.,
Instructor in English.

PETER SCHWAMB, S.B.,
Instructor in Mechanical Engineering and Director of the Workshops.

CHARLES H. FISHER, S.B.,
Instructor in Mechanical Engineering.

CECIL H. PEABODY, S.B.,
Instructor in Applied Mechanics.

DWIGHT PORTER, PH.B.,
Instructor in Mechanical Drawing and Mathematics.

WM. H. PICKERING, S.B.,
Instructor in Physics.

WALTER S. ALLEN, S.B.,
Instructor in Chemical Analysis.

EDWARD F. ELY, A.B., S.B.,
Instructor in Architecture.

FREDERICK W. CLARK, S.B.,
Instructor in the Mining and Metallurgical Laboratories.

SAMUEL G. STEPHENS,
Instructor in Mechanical Engineering.

S. HOMER WOODBRIDGE, A.M.,
Instructor in Ventilation and Assistant in Physics.

GEN. HOBART MOORE,
Instructor in Military Tactics.

WILLIAM W. JACQUES, S.B., PH.D.,
Instructor in Telegraph Engineering.

EVELYN M. ORDWAY, S.B.,
Assistant in Biology.

JAMES LUND, S.B.,
Assistant in Chemical Analysis.

HOWARD V. FROST, S.B.,
Assistant in General Chemistry.

GEORGE H. BARTON, S.B.,
Assistant in Geology.

CLEMENT W. ANDREWS, A.M.,
Assistant in Organic Chemistry.

CHARLES A. FRENCH, S.B.,
Assistant in Mathematics.

JOHN G. EPPENDORFF, S.B.,
Assistant in Applied Mechanics.

GEORGE R. UNDERWOOD, S.B.,
Assistant in Chemical Analysis.

FERDINAND J. SMITH, B.S.,
Assistant in General Chemistry.

CHARLES O. PRESCOTT,
Assistant in General Chemistry.

Lecturers for the Current Year.

ARTHUR ROTCH, A.B.,
Lecturer in the Theory of Decorative Painting.

E. P. TREADWELL,
Lecturer in the Practice of Decorative Painting.

FACULTY.

FRANCIS A. WALKER, *President.*
JOHN D. RUNKLE.
WILLIAM P. ATKINSON.
GEORGE A. OSBORNE.
JOHN M. ORDWAY.
ROBERT H. RICHARDS.
WILLIAM RIPLEY NICHOLS.
CHARLES P. OTIS.
CHARLES H. WING.
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CHARLES R. CROSS.
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GEORGE L. VOSE.
THEODORE M. CLARK.
EUGENE LETANG.
JULES LUQUIENS.
SILAS W. HOLMAN.
WEBSTER WELLS, *Secretary.*
WILLIAM O. CROSBY.
LEWIS M. NORTON.
GEORGE F. SWAIN.
WILLIAM T. SEDGWICK.
PETER SCHWAMB.

JAMES P. MUNROE, *Registrar.*

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 and Natural Sciences and their applications, Pure and Applied Mathematics, Drawing, the English, French, German, and other Modern Languages, History, Political Economy, and International and Business Law. These studies and exercises are so arranged as to offer a liberal and practical education in preparation for active pursuits, as well as a thorough training for most of the scientific professions.

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. Details of the courses are given at pages 18 to 32.

I.	CIVIL AND TOPOGRAPHICAL ENGINEERING.
II.	MECHANICAL ENGINEERING.
III, A.	MINING ENGINEERING.
III, B.	GEOLOGY AND MINING.
IV.	ARCHITECTURE.
V, A, B, C.	CHEMISTRY.
VI.	METALLURGY.
VII, A.	NATURAL HISTORY.
VII, B.	PREPARATORY TO THE PROFESSIONAL STUDY OF MEDICINE.
VIII, A.	PHYSICS.
VIII, B.	ELECTRICAL ENGINEERING.
IX, A, B, C.	GENERAL COURSES.

The first six of these courses are of a distinctly professional character, as is also the Course VIII, B.

Course III, B. the alternative course in mining, differs from the Course III, A. chiefly in the substitution of Zoölogy, Palæontology, Botany, Industrial Chemistry, and work in the Physical Laboratory for the Mathematics of the last three years of the course. It is thus adapted to those who prefer a larger amount of the natural sciences to the continued study of pure and applied mathematics.

Course V, A. is arranged for those who wish to continue the study of Mathematics beyond the first year, and to make a special study of Organic Chemistry. Course V, B. is for those who prefer a large amount of the natural sciences, and Course V, C. for those whose aim is the pursuit of Industrial Chemistry.

Course VI. is similar to the courses in Chemistry, but has more particular reference to the production and working of the metals.

Course VII, A. in Natural History affords an appropriate general training for those whose ulterior object is the special pursuit of Geology, Mineralogy, Botany, or Zoölogy. Course VII, B. has been established, in order to supply a thorough preparation for the study of Medicine. In it marked attention is given to the study of Physics, Chemistry, Biology, and the Modern Languages. The anatomy and physiology of the animal organism is studied in great detail, and the biological side of sanitary science will receive thorough consideration.

Course VIII, A. in Physics, is based on the physical and mathematical sciences, and offers suitable training for persons who desire to pursue the study of physical science, and for those who intend to teach Physics or to enter upon any of its various practical applications. Course VIII, B. in Electrical Engineering, based upon Physics and Mechanical Engineering, has been established for the benefit of those who wish to enter upon any of the branches of Electrical Engineering. The theory of electricity, electrical measurements, and the technical applications of electricity, are fully discussed.

The general courses, IX, A, B, and C, have been established for such students as may not intend to adopt a distinctly scientific profession, and yet may desire to obtain an education through studies of a predominantly scientific character. These courses are especially intended for young men who desire a preparation for active life, which shall be liberalizing in its tendencies, but without any influence to alienate them from the ideas, tastes, and habits which are appropriate to practical business pursuits. Each of these

courses contains a solid body of scientific study, and of scientific field or laboratory work. In the first, Physics, with the requisite Mathematics, predominates among the scientific studies; in the second, Chemistry, with the closely related sciences of Botany and Physiology; in the third, Geology, with Botany and Zoölogy, and with field work and laboratory practice especially with the microscope.

Advanced courses of study may be pursued either with or without reference to the higher degree of Doctor of Science which has been authorized by a vote of the Corporation.

Students who find it advantageous to take fewer studies in any year than are prescribed in a single course may continue in the School a fifth year to make up the studies required for a degree.

At the request of the Woman's Educational Association of Boston, and with its generous co-operation, special laboratories for the instruction of women were provided in 1876, the design being to afford facilities for the study of Chemical Analysis, Industrial Chemistry, Mineralogy, and Biology. Through the changes made during the past year, these and better opportunities for the higher education of women in scientific pursuits are now offered in the Kidder Laboratories of Chemistry, and in the Physical, Biological, and other Laboratories; and the Margaret Cheney Memorial Reading Room has been opened for the use of young women who may be students in the School.

Women who are properly qualified are admitted to any of the courses of the School.

Free evening courses of scientific and literary instruction, open to both sexes, are given each year, being supported by the trustee of the Lowell Institute. Details may be found at page 92.

The following pages contain the schedules of the distribution of studies throughout the whole of the various courses given in the School of Industrial Science.

The first year for all courses is the same, and contains subjects which are considered essential as preliminary train-

ing and 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.

A clear idea of the nature and amount of the work to be done in any of the regular courses may be obtained by considering in connection with the schedule of that course — as given on one of the following sixteen pages — the statements in regard to the various branches of study (*e.g.*, Chemistry, Physics, Mathematics, etc.), as given in the pages descriptive of the "Methods and Apparatus of Instruction," pages 35 to 56, and by referring, at the same time, to the "Schedule of Topics," given on pages 63 to 71.

The paragraphs on the "Methods and Apparatus of Instruction" supply a general outline of the character of instruction given, of the methods by which it is 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 applicant for special courses, or to the special student, in affording him 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 may afford suitable preparation for those towards which the course is directed.

REGULAR COURSES.

SCHEDULES OF PRESCRIBED STUDIES.

I. CIVIL ENGINEERING.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Surveying: Compass and Transit.	Levelling; Profiles.
Plotting from Notes.	Elements of Topography.
Analytic Geometry.	Advanced Geometrical Drawing.
Descriptive Geometry.	Differential Calculus.
Physics.	Physics.
Descriptive Astronomy.	Physical Geography.
Modern History.	Modern History.
English Literature.	English Literature.
German.	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Railroad Engineering.	Railroad Engineering.
Advanced Field Work.	Topography and Map Work.
Topographical Drawing.	Use of the Sextant in Surveys.
Integral Calculus.	Kinematics and Dynamics.
General Statics.	Strength of Materials.
Physics: Lectures and Laboratory.	Physics: Laboratory Work.
Structural Geology.	Historical Geology.
Constitutional History.	Political Economy.
German.	German.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Principles of Construction.	Principles of Construction.
Details of Practice.	Study of actual works.
Hydraulic Engineering.	Hydraulic Engineering.
Sanitary Engineering.	Specifications and Contracts.
Coast and Harbor Works.	Theory of Elasticity.
Strength of Materials.	Dynamics completed.
Metallurgy.	Building Materials.
Geodetic Projections.	Plane Table Practice.
Practice in Design.	Thesis Work.

II. MECHANICAL ENGINEERING.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Principles of Mechanism.	Mechanism of Mill Machinery.
Mechanism of Shop Machinery.	Construction of Gear Teeth.
Drawing.	Slide Valve. Link Motion.
Carpentry, Wood Turning, and Pattern Work (shopwork).	Drawing.
Analytic Geometry.	Foundry Work (shopwork).
Descriptive Geometry.	Differential Calculus.
Physics.	Physics.
Modern History.	Physical Geography.
English Literature.	Modern History.
German.	English Literature.
	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Thermodynamics.	Steam Engineering.
Steam Engineering.	Drawing.
Drawing.	Mechanical Engineering Laboratory.
Blacksmithing (shopwork).	Chipping and Filing (shopwork).
Integral Calculus.	Kinematics and Dynamics.
General Statics.	Strength of Materials.
Physics: Lectures and Laboratory.	Physical Laboratory.
Descriptive Astronomy.	Political Economy.
Constitutional History.	German.
German.	

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Hydraulic Engineering.	Hydraulic Engineering.
Machine Design.	Construction and Equipment of Mills and Machine Shops.
Mechanical Engineering Laboratory.	Mech. Engineering Laboratory.
Engine Lathe Work (shopwork).	Machine Design.
Strength of Materials.	Engine Lathe Work (shopwork).
Hydraulics.	Hydraulics.
Metallurgy.	Theory of Elasticity.
	Dynamics completed.
	Building Materials.
	Thesis Work.

III, A. MINING ENGINEERING.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Lect. and Lab.	Blowpipe Analysis and Mineralogy.
Surveying.	Chemical Analysis: Lect. and Lab.
Field Practice.	Surveying.
Analytic Geometry.	Differential Calculus.
Modern History.	Physics.
English Literature.	Physical Geography.
Physics.	German.
German.	

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Mining.	Mining.
Chemical Analysis: Lect. and Lab.	Chemical Analysis.
Assaying.	Kinematics and Dynamics.
Integral Calculus.	Strength of Materials.
General Statics.	Physical Laboratory.
Physics: Lectures and Laboratory.	Historical Geology.
Structural and Chemical Geology.	Political Economy.
Constitutional History.	German.
German.	

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Mining Laboratory: Work upon Gold, Silver, Copper, and Lead Ores in quantity.	Mining Laboratory.
Chemical Analysis.	Chemical Analysis.
Metallurgy, Lectures.	Metallurgy, Lectures.
Drawing.	Ore Dressing, Lectures.
Strength of Materials.	Welding and Tempering (shop-work).
Dynamics completed.	Building Materials.
Memoirs.	Thesis Work.

III, B. GEOLOGY AND MINING.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Lect. and Lab.	Blowpipe Analysis and Mineralogy.
Chemical Philosophy.	Chemical Analysis.
Surveying.	Physics.
Field Practice.	Physical Geography.
Modern History.	Botany.
English Literature.	Zoölogy and Palæontology.
Physics.	Modern History.
German.	English Literature.
	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Mining.	Mining.
Assaying.	Chemical Analysis.
Chemical Analysis: Laboratory.	Industrial Chemistry.
Chem. Analysis: Special Methods.	Physical Laboratory.
Zoölogy and Palæontology.	Historical Geology.
Physics: Lectures and Laboratory.	Political Economy.
Structural and Chemical Geology.	German.
Constitutional History.	
German.	

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Mining Laboratory: Work upon Gold, Silver, Copper, and Lead Ores in quantity.	Mining Laboratory.
Chemical Analysis.	Chemical Analysis.
Metallurgy, Lectures.	Metallurgy, Lectures.
Drawing.	Ore Dressing, Lectures.
Physics.	Welding and Tempering (shop-work).
Memoirs.	Building Materials, Lectures.
	Thesis Work.

IV. ARCHITECTURE.

FIRST YEAR.

FIRST TERM.*	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Materials.	Original Design.
Greek and Roman Architectural History.	Common Constructions.
The Orders and their applications.	Mediæval or Modern Architectural History.
Drawing.	Perspective.
Tracing and Sketching.	Drawing.
Analytic Geometry.	Sketching.
Physics.	Differential Calculus.
Descriptive Geometry.	Physics.
Modern History.	Physical Geography.
English Literature.	Modern History.
German.	English Literature.
	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Original Design.	Original Design.
Sketching and Water Color.	The Decorative Arts: Stained Glass, Fresco Painting, Tiles, Terra Cotta, etc.
Working Drawings and Framing.	Sketching and Water Color.
Integral Calculus.	Surveying.
General Statics.	Iron Construction.
Structural Geology.	Kinematics and Dynamics.
Physics: Lectures and Laboratory Work.	Strength of Materials.
Constitutional History.	Stereotomy.
German.	Physical Laboratory.
	Political Economy.
	German.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Advanced Original Design.	Advanced Original Design.
Ornament and Decoration.	Planning.
Sketching and Water Color.	Schools, Theatres, and Churches.
Problems in Construction.	Problems in Construction.
Specifications: Carpentry, etc.	Specifications and Contracts.
Strength of Materials.	Building Materials.
Stability of Structures.	Advanced French.
Ventilation, Heating, Acoustics.	Thesis Work.
Advanced French.	

V, A. CHEMISTRY.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Lect. and Lab.	Chemical Analysis.
Chemical Philosophy.	Blowpipe Analysis and Mineralogy.
Analytic Geometry.	Differential Calculus.
Physics.	Physics.
Modern History.	Modern History.
English Literature.	English Literature.
German.	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Laboratory Work.	Chemical Analysis: Laboratory Work.
Chem. Analysis: Special Methods.	Industrial Chemistry: Lectures.
Assaying.	Drawing.
Work with the Microscope.	Physical Geography.
Physics: Lectures and Laboratory.	Physical Laboratory.
Constitutional History.	Political Economy.
German.	German.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Organic Chemistry: Lectures.	Studies for this term, including Thesis work, will be specially assigned to each student.
Organic Chemistry: Laboratory Work.	
Metallurgy: Lectures.	
Abstracts of Memoirs.	
Physics.	
Optional Studies.	

V, B AND C. CHEMISTRY.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Lectures and Laboratory Work.	Chemical Analysis.
Chemical Philosophy.	Blowpipe Anal. and Mineralogy.
Descriptive Astronomy.	Botany, Systematic and Structural.
Physics.	Physical Geography.
Modern History.	Physics.
English Literature.	Modern History.
German.	English Literature.
	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Laboratory Work.	Chemical Analysis: Laboratory Work.
Chem. Analysis: Special Methods.	Industrial Chemistry: Lectures.
Work with the Microscope.	Drawing.
Assaying.	Physical Laboratory.
Physics: Lectures and Laboratory.	Historical Geology.
Structural and Chemical Geology.	Political Economy.
Constitutional History.	German.
German.	

FOURTH YEAR.—FIRST TERM.

COURSE B.	COURSE C.
Organic Chemistry: Lectures.	Organic Chemistry: Lectures.
Chemistry: Laboratory Work.	Chemistry: Laboratory Work.
Metallurgy: Lectures and Laboratory Work.	Industrial Chemistry: Laboratory Work.
Abstracts of Memoirs.	Metallurgy: Lectures.
Physics.	Abstracts of Memoirs.
Optional Studies.	Physics.
	Optional Studies.

FOURTH YEAR.—SECOND TERM.

Studies for this term, including Thesis work, will be specially assigned to each student.

VI. METALLURGY.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Chemical Philosophy.	Chemical Analysis.
Chemical Analysis: Lect. and Lab.	Blowpipe Analysis and Mineral'gy.
Descriptive Astronomy.	Botany.
Physics.	Zoölogy and Palæontology.
Modern History.	Physical Geography.
English Literature.	Physics.
German.	Modern History.
	English Literature.
	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis.	Chemical Analysis.
Biology.	Industrial Chemistry: Lectures.
Physics: Lectures and Laboratory.	Physical Laboratory.
Structural and Chemical Geology.	Animal Physiology.
Constitutional History.	Historical Geology.
Zoölogy and Palæontology.	Political Economy.
Assaying.	German.
German.	

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis.	Chemical Analysis.
Metallurgy.	Metallurgy and Ore Dressing.
Mining Laboratory: Work upon Gold, Silver, Copper, and Lead Ores in quantity.	Mining Laboratory.
Drawing.	Building Materials.
Applied Physics.	Thesis Work.
Blacksmithing (shopwork).	
Abstracts of Memoirs.	

VII, A. NATURAL HISTORY.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Physics.	Chemical Analysis.
Chemical Analysis: Lectures and Laboratory Work.	Blowpipe Analysis and Mineralogy.
Chemical Philosophy.	Botany.
General Biology.	Zoölogy and Palæontology.
Free-hand Drawing.	Physical Geography.
Descriptive Astronomy.	Drawing.
Modern History.	Physics.
English Literature.	Modern History.
German.	English Literature.
	German.

A part of the summer vacation is to be devoted to field work in Botany, Zoölogy, or Geology.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis or Analytic Geometry.	Historical Geology.
Biology.	Political Economy.
Cryptogamic Botany.	Study of Memoirs or Differential Calculus.
Structural and Chemical Geology.	Anatomical Laboratory.
Physics: Lectures and Laboratory.	Animal Physiology.
Constitutional History.	Physical Laboratory.
Zoölogy and Palæontology.	German.
German.	

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Special Work in Zoölogy, Biology, Botany, or Geology.	Laboratory Work.
Drawing with the Microscope.	History of Natural Sciences.
Original Investigation.	Industrial Geography and Meteorology.
Physiological Chemistry.	Original Investigation.
Field Work.	Field Work.
	Thesis Work.

VII, B. PREPARATORY TO THE PROFESSIONAL STUDY OF MEDICINE.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Lectures and Laboratory.	Chemical Analysis.
Chemical Philosophy.	Physics.
Physics.	General Biology.
General Biology.	Mineralogy.
Free-hand Drawing.	Physical Geography.
Descriptive Astronomy.	Free-hand Drawing.
Modern History.	Modern History.
English Literature.	English Literature.
German.	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Comparative Anatomy.	Animal Physiology and Histology.
Animal Physiology and Histology.	Chemical Analysis.
Physics.	Physical Laboratory.
Chemical Analysis.	Historical Geology.
Ventilation, Heating, Drainage.	Embryology of the Chick.
Geology.	Political Economy.
Constitutional History.	German.
German.	The Latin of Natural Science.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Animal Physiology and Histology.	Advanced work in Physics, Chemistry, or Physiology.
Advanced Work in Physics.	Readings of Memoirs in the French and German.
Heredity: Lectures.	Meteorology.
Readings of Memoirs in the French and German.	Germs and Germicides.
Practice in Research.	History of the Biological Sciences.
Thesis Work.	Thesis Work.

VIII, A. PHYSICS.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Physics: Lectures.	Physics: Lectures.
Physical Laboratory.	Physical Laboratory.
Analytic Geometry.	Differential Calculus.
Descriptive Geometry.	Chemical Analysis.
Chemical Analysis: Lect.	Botany.
Descriptive Astronomy.	Physical Geography.
Modern History.	Modern History.
English Literature.	English Literature.
German.	German.
	General Physics. Reading, determined by particular work of each student.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Physical Laboratory.	Physical Laboratory.
General Physics: Optics, or Acoustics.	General Physics: Optics, or Acoustics.
Integral Calculus.	Advanced Physics, Memoirs, etc.
General Statics.	History of Physical Sciences.
Biology.	Kinematics and Dynamics.
Chemical Philosophy.	Strength of Materials.
Chemical Laboratory.	Chemical Laboratory.
Constitutional History.	Political Economy.
German.	German.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Physical Laboratory.	Physical Research.
General Physics: Electricity.	General Physics: Acoustics, or Optics.
Lantern Projections.	Advanced Physics, Memoirs, etc.
Photography.	Principles of Scientific Investigation.
History of Physical Sciences.	Advanced Mathematics.
Practical Astronomy.	Meteorology.
Applied Mechanics: Thermodynamics, Hydraulics, etc.	
Chemical Laboratory, Chemical Applications of Physics.	

VIII, B. ELECTRICAL ENGINEERING.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Physics: Lectures.	Physics: Lectures.
General Physics: Mechanics.	Physical Lab.: General Work.
Analytic Geometry.	Differential Calculus.
Descriptive Geometry.	Shopwork: Metal Turning.
Carpentry, Wood Turning, and Pattern Work: (Shopwork).	Physical Geography.
Modern History.	Modern History.
English Literature.	English Literature.
German.	German.
Mechanism.	General Phys.: Electr., Acoustics.
	Mechanism.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Physical Laboratory: Optics, Electricity, Heat.	Physical Lab.: Electricity, Heat. Special Methods in Photometry.
General Physics: Electricity.	General Physics: Electricity.
Descriptive Astronomy.	Advanced Physics, Memoirs, etc.
Integral Calculus.	History of Physical Sciences.
General Statios.	Kinematics and Dynamics.
Mechanical Engineering.	Strength of Materials.
Drawing.	Mechanical Engineering.
Constitutional History.	Mech. Engineering Laboratory.
German.	Drawing.
	Political Economy.
	German.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Physical Laboratory, Electrical Testing and Construction of Instruments.	Physical Research.
Testing of Telegraph Lines, Dynamo Machines, etc.	Technical Applications of Electricity.
Technical Applications of Electricity to Telegraph, Telephone, Electric Lighting, etc.	Advanced Physics, Memoirs, etc.
Photography.	Principles of Scientific Investigation.
History of Physical Science.	Advanced Mathematics.
Mech. Engineering Laboratory.	
Applied Mechanics, Thermodynamics, Hydraulics, etc.	

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

IX, A. GENERAL COURSE.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Physics.	Physics.
Descriptive Astronomy.	Physical Laboratory.
Scientific Reading, to be assigned individually.	Differential Calculus or Physical Geography.
Analytic Geometry or Chemical Philosophy.	Industrial Chemistry: Lectures.
Work with the Microscope.	Modern History.
Modern History.	English Literature.
English Literature.	Elements of Political Economy.
German.	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Physical Laboratory.	Physical Laboratory.
General Physics: Special work.	General Physics: Special work.
Integral Calculus and Applied Mechanics, or Structural Geology.	History of Physical Science.
Constitutional History.	Applied Mech. or Histor. Geology.
Political History of the United States.	International Law.
German.	Constitutional Hist. of England.
Advanced French.	Political Economy.
	German.
	Advanced French.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Physical Laboratory.	Work in Physics, to be assigned individually.
General Physics.	Industrial Geography.
Applied Mechanics or Philosophy of Science.	Business Law.
Special Study in English History and Literature.	Advanced German.
Special Studies in the Const. History of the United States.	Spanish, Italian, or Advanced French.
Special Studies in Finance.	Thesis Work.
Advanced German, Spanish, Italian, or Advanced French.	

Some of the above-stated studies may be replaced by others, with the consent of the Faculty, whenever good reason can be shown for the substitution in any special case.

IX, B. GENERAL COURSE.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Chemical Analysis: Lect. and Lab.	Chemical Analysis.
Chemical Philosophy.	Mineralogy.
Physics.	Botany.
Descriptive Astronomy.	Physics.
Modern History.	Physical Geography.
English Literature.	Modern History.
German.	English Literature.
	Elements of Political Economy.
	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Organic Chemistry.	Organic Chemistry.
Reading in Chemistry.	Animal Physiology.
Biology.	Physical Laboratory.
Physical Laboratory.	History of Physical Science.
Structural and Chemical Geology.	International Law.
Constitutional History.	Constitutional Hist. of England.
Political Hist. of the United States.	Political Economy.
German.	German.
Advanced French.	Advanced French.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Industrial Chemical Laboratory.	Work in Chemistry, to be assigned individually.
Special Study in English History and Literature.	Industrial Geography.
Special Studies in Constitutional History of the United States.	Business Law.
Special Studies in Finance.	Advanced German.
Advanced German.	Italian, Spanish, or Advanced French.
Italian, Spanish, or Advanced French.	Thesis Work.

Some of the above-stated studies may be replaced by others, with the consent of the Faculty, whenever good reason can be shown for the substitution in any special case.

IX, C. GENERAL COURSE.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Algebra.	Plane and Spherical Trigonometry.
Solid Geometry.	General Chemistry.
General Chemistry.	Chemical Laboratory.
Chemical Laboratory.	Modern History.
Rhetoric.	English Literature.
English Composition.	French.
French.	Mechanical Drawing.
Mechanical Drawing.	Military Drill.
Military Drill.	

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Physics.	Mineralogy.
Surveying.	Botany.
Topographical Drawing.	Zoölogy and Palæontology.
Descriptive Astronomy.	Physical Geography.
Chemical Analysis.	Physics.
Modern History.	Topographical Drawing.
English Literature.	Chemical Laboratory.
German.	Modern History.
	English Literature.
	Elements of Political Economy.
	German.

THIRD YEAR.

FIRST TERM.	SECOND TERM.
Zoölogy and Palæontology.	Historical Geology.
Structural and Chemical Geology.	Map Drawing.
Field Geology.	Field Geology.
Advanced Mineralogy.	Animal Physiology.
Biology.	Physical Laboratory.
Physical Laboratory.	History of Physical Science.
Constitutional History.	International Law.
Political History of the United States.	Constitutional Hist. of England.
	Political Economy.
German.	German.
Advanced French.	Advanced French.

FOURTH YEAR.

FIRST TERM.	SECOND TERM.
Laboratory Work in Geology.	Work in Geology and Mineralogy, to be assigned individually.
Drawing with the Microscope.	Map Drawing.
Metallurgy.	Thesis Work.
Special Study in English History and Literature.	Industrial Geography.
Special Studies in Constitutional History of the United States.	Advanced German.
Special Studies in Finance.	Italian, Spanish, or Advanced French.
Advanced German.	
Italian, Spanish, or Advanced French.	

Some of the above-stated studies may be replaced by others, with the consent of the Faculty, whenever good reason can be shown for the substitution in any special case.

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. (See pages 17 and 60.) All special students in Architecture, however, are required to take in full, as a minimum, the following course of two years' duration, no other special students in architectural subjects being admitted: —

SCHEDULE OF SPECIAL COURSE IN ARCHITECTURE.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
The Orders, and their Applications.	Original Design.
Sketching and Water-Color.	Sketching and Water-Color.
Mechanical Drawing.	Common Constructions.
Materials.	Projections.
Greek and Roman Architectural History.	Shades, Shadows and Perspective.
	Elementary Mechanics.
	Mediæval or Modern Arch. History.

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Original Design.	Original Design.
Sketching and Water-Color.	Specifications and Contracts.
Specifications.	Planning.
Ornament and Decoration.	Iron Construction.
Problems in Construction.	Building Materials.
Ventilation, Heating, Acoustics.	Scholos, Theatres, Churches.
	Surveying.
	Problems in Construction.

ADVANCED COURSES.

The particular course of study which a candidate for the degree of Doctor of Science wishes to pursue must be submitted in writing to the Faculty, and must meet with approval. The minimum term of residence of candidates for this degree will be two years, but 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 degree of Doctor of Science, may be pursued by graduates of the Institute without preliminary examination, or by Bachelors of other institutions, who may satisfy the Faculty, by examination or otherwise, that they are qualified to take with advantage the course proposed.

REQUIREMENTS FOR GRADUATION.

The degree, Bachelor of Science (S.B.) 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 approved by the Faculty, to whom it must be submitted for examination on or before May 10th, except it be dependent on laboratory work, in which case it must be presented two days after the close of the respective laboratories.

The degree, Doctor of Science (S.D.), is awarded for proficiency in complete Advanced Courses of study.

Students leaving the school before graduation should apply for an honorable dismission, to which they shall be entitled, if their record for conduct, attention to studies, and scholarship is satisfactory to the Faculty.

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, departments. 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 professional courses. All regular students conclude Algebra, and also study Solid Geometry, and Plane and Spherical Trigonometry. Students in most of the courses receive instruction in Analytic Geometry, and in the Differential and Integral Calculus. A course in Differential Equations is given in the course in Physics.

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 Stereotomy is given by means of lectures and drawing exercises, illustrating a variety of problems in Stone Cutting, and in Engineering and Architectural construction.

The Instruction in Drawing. Instruction is given to all regular students in the principles of Geometrical and Mechanical 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 special 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 admissions, page 58) is continued through one year, and German through two years, for all regular students. In certain departments there is an advanced course in each. Instruction is also given in the elements of Italian and Spanish.

The Instruction in English. In this department, all regular students receive a course of instruction, extending throughout one year, in Rhetoric and Criticism, in the elements of Deductive and Inductive Logic, and in the History of English Literature. This is accompanied by practice in composition, and in the critical reading of English texts, so far as time allows. Additional instruction in these subjects is given in connection with the General Courses.

The Instruction in History and Political Science. All regular students receive instruction in the history of recent

times, followed by a course in general European History, and a course in English and American Constitutional History. A course in Political Economy is given to all regular students. Students in the General Courses receive more extended instruction in Political Economy and in American and European Political History.

The Instruction in Chemistry. In General Chemistry, all regular students attend a course of lectures on Inorganic Chemistry, illustrated by experiment, and perform actual experimental work in the laboratory for 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. The elements of Theoretical Chemistry are also taught; and, in connection with the lectures, the student has practice in the solution of stochiometrical and other chemical problems. 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. Both lectures and laboratory work are required of all candidates for a degree.

A course of lectures and recitations is given on the principles of Chemical Philosophy, 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 the matter of thermochemistry.

The instruction in Analytical Chemistry extends through two or more years. In the analytical laboratory, the system of instruction in classes is not employed. Each student is given a desk in the laboratory, which is open to him at all times, and receives personal instruction. The rate of progress depends upon the personal ability and application of the student, and upon the amount of time spent in the work. Each student has a course of analytical work especially assigned. This will include analyses, qualitative and quanti-

tative, involving such a variety of methods and processes as will tend to qualify the student to undertake any chemical analysis, yet so selected as to afford a preparation for any special branch of chemistry which he may have in view. A special laboratory has been fitted for volumetric analysis. Here, students are taught to graduate and calibrate with accuracy the various instruments used, and to work with that attention to detail necessary to impart accuracy to these rapid methods of analysis. Full development is given this department, in view of the increasing importance of volumetric methods.

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 a course of lectures upon methods of analysis and manipulation ; and a course of lectures and exercises involving the preparation of abstracts, and the critical comparison of the special methods of analysis appearing in the various chemical journals is given.

Industrial Chemistry is taught by a course of lectures, and by work in the laboratory of industrial chemistry. The laboratory work includes the preparation of salts, acids, and other chemicals from the raw material; the refining of gross products ; the preparation of pure chemicals ; experiments in dyeing, printing, bleaching and scouring; the extraction of fixed and volatile oils ; the production of dyes, colors, paints, and glazes ; tanning ; glass making ; fermentation ; distillation ; destructive distillation. It is intended to prepare the student for the practical investigation of questions connected with the chemical arts, and to familiarize him with the use of steam and fire. Facilities will be provided, as far as possible, for regular or special students who wish to carry out special lines of investigation having reference to their future work in life.

The instruction in Organic Chemistry consists of lectures and laboratory work. The theories of organic chemistry are

discussed, and the practical applications of these theories described. The work in the laboratory consists of ultimate analysis, preparation of organic products, and original research. Ample opportunities are afforded for the prosecution of investigations in organic chemistry.

The Kidder Laboratories of Chemistry afford accommodations for four hundred and fifty students. They are fitted with all the necessary appliances for instruction in general, analytical, and organic chemistry, and offer good facilities for the prosecution of research. In the reading room is a valuable chemical library, containing files of the more important chemical periodicals.

The Instruction in Physics. This instruction begins by 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 constantly 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, Heat, Acoustics, 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 in a series of lectures accompanied by practical exercises in the photographic laboratory. Instruction will also be 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 will be opened during the coming year, and the

course in general Electrical Measurements will be very considerably extended.

As many of the students taking the course in Physics intend to make teaching their profession, a special course called Advanced Physics is arranged with this object in view, in which each student in turn prepares a particular subject, giving the result of his own or other researches, and presents it in the form of a scientific memoir or lecture.

The Rogers Laboratory of Physics. At the close of the lectures in Physics, all regular students enter this laboratory, and receive training in the use of various instruments for physical measurement, and verify many of the fundamental laws of nature. The experiments are so chosen that some of them — for instance, those with the microscope, spectroscope, and apparatus for electrical measurements — have a direct technical value; others are intended to establish certain principles in the mind, to cultivate manual skill in handling minute or delicate objects, or to exercise the reasoning faculties, and show the application of mathematics to concrete problems. Thus the course has a value beyond the immediate aim of the experiments in the direction of general culture, teaching the student to derive conclusions from observed facts, and showing him various methods of experimental research. A portion of the students carry on advanced work of a more technical nature. Original investigation is stimulated 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 accessible to the students.

The Instruction in Electrical Engineering. In this subject, instruction will be given in the theory of electricity. Also an extended course of lectures will be 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 will be given by lectures and laboratory exercises upon the processes of photometry, especially as applied to the measurement of electric lights. Advanced instruction in electric measurements, including work with dynamo-electric machinery; and a course in electrical testing of telegraph lines will also be provided.

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, Hydraulics, Thermodynamics, 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 a testing machine of fifty thousand pounds capacity, capable of determining the elasticity and tensile strength of specimens not more than thirty inches long, and also 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. The classes are divided into small sections when making tests with the machine. All the experiments are so chosen as to make the student better acquainted with the resisting properties of materials; and those on transverse strength and stiffness

are also serving to determine certain constants for use in construction, which have not heretofore been determined from tests on full-sized pieces.

The Instruction in the Mechanic Arts. 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, and some manual skill in the use of tools. These laboratories are now located in the new building on Garrison Street, and are equipped as follows: —

The Carpenter, Wood-Turning, and Pattern Making department contains 40 carpenter's benches, 2 circular-saw benches, a swing saw, 2 jig saws, a buzz planer, a boring machine, 36 wood lathes, a large pattern-maker's lathe, and 36 pattern-maker's benches. The Foundry will contain a cupola furnace for melting iron, 2 brass furnaces, and 32 moulder's benches. The Smith's Shop contains 32 forges, 7 blacksmith's vises, and 2 blacksmith's hand-drills. The Machine Shop contains 22 engine lathes and 15 hand-lathes of recent approved patterns, a machine drill, 2 planers, a shaping machine, a universal milling machine, and 32 vise-benches arranged for instruction in vise-work.

The Instruction in Civil Engineering is given by means of lectures and recitations, and by practice in the field and in the drawing room. The use of the various instruments employed in surveying is taught mainly by actual work in the field. The student is thus made familiar in a practical way with the several operations involved in Railroad, Hydraulic, and Sanitary Engineering. The work in the drawing-room consists in representing upon paper the surveys made in the field, and in making both working drawings and finished plans from direct measurement of actual engineering struct-

ures, a large number of which are found in the immediate neighborhood of the Institute.

The course in Civil Engineering embraces roads, railroads, bridges, rivers, harbors, canals, water power, water supply, sewerage, drainage, and irrigation. The subject of 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 actual problems occurring in practice. The instruction in Hydraulic Engineering embraces the subjects of hydrology, rivers and canals, water supply, and water power. A thorough study is made of the fundamental principles of hydraulics and hydrostatics, and the application of these principles to practice is shown by numerous examples. A special examination is made of the sources and supply of water, of its flow in both natural and artificial channels, and of the collecting, storing, filtering, raising, and distributing of water for domestic purposes, with illustrations of the different systems employed and the practical details for carrying out such work. Particular attention is also given to the control and improvement of rivers, to the construction of locks, dams, and canals, and to the utilization of water as a motive power. The subject of Sanitary Engineering embraces the study in detail of the house, with its apparatus, the disposal of sewage by cesspools or by local distribution for isolated buildings, the collection and removal of sewage in the larger towns, sanitary drainage for cities, and drainage and irrigation for agricultural purposes. Coast and harbor work includes the design and construction of docks, wharves, sea-walls, jetties and breakwaters, the formation of bars and the maintenance of channels, and the building and illumination of light-houses.

The work in Engineering Construction consists of a complete series of lessons on bridges and roofs, foundations and masonry, piers, abutments, arches and retaining walls, with

ample illustrations of the different methods of determining the strength and stability of such works. Parallel with the above, and as a part of the same course, runs an extended examination of wood, iron, steel, brick, stone, mortar and cement, and a study of the practical details by means of which these materials are applied to use. The student is taken to the quarry, the foundry, the rolling mill, the stone-cutting sheds, the shops for bridge-building, and to numerous works in process of construction, and is shown the origin of the different materials he is to use, and the method of applying them in actual structures. Following the above comes a study of various engineering works, especial care being taken to call attention to defective methods and to faulty construction, and to impress upon the student the importance of thorough and exact knowledge as the basis of sound engineering.

The study of Specifications and Contracts includes the various methods of obtaining the quantities and estimating the cost of engineering structures, the study in detail of a variety of actual specifications, the preparation of working drawings, and other operations preliminary to carrying out any work of construction. Under the head of Practice in Designing, the student selects some piece of work, and proceeds as if he were about to build it, studying it generally and in detail, drawing on his previous theoretical studies, and also, on any illustrations he can get from actual works, making all necessary computations and drawings, laying the work out on the ground, if the subject admits of it, and concluding with a thesis, which is placed on file as evidence that he has satisfactorily completed his studies.

The object throughout the above course is not only to make the student familiar with the general principles of engineering, but also with the practical details through which alone those principles can be made of use. The several subjects are in every case presented by the threefold method of lectures, reference to books, and examination of actual works; and the whole course is so arranged as to lead the student gradually from the methods of the school to those

of the practical engineer. By the kindness of many active members of the profession, and of the managers of the various railroads leading out of Boston, the classes are enabled to inspect a great variety of engineering structures, and are thus made to see the exact connection between the work of the school and the real engineering practice of the day.

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 running machinery and manufacturing processes in addition to those which can be seen at the Institute itself.

Instruction is given in the principles of mechanism, in the construction of gear teeth, in the slide valve and link motions; and also, by means of certain courses specially prepared for the purpose, the students are familiarized, as far as possible, with the mechanism of the shop and of the mill machinery to be found in the market at the present time. This is followed by the study of thermodynamics, of steam and heat engines, of steam boilers, and of other subjects connected with steam, such as the indicator, cylinder condensation, pressure on the crank, steam heating, etc.

Lectures are given on the rate of flow of water and on water motors, on the construction and equipment of mills and of machine shops, and on other subjects connected with machinery and with steam. Besides this, a course in design is given under the supervision of the instructors in the department. Some of the designs are readily solved by calculation, and are almost in the form of problems; while others, such as the design of a boiler, or of some more or less elaborate machine, require a considerable amount of study, of calculation, of drawing, and sometimes of research. All, however, require the student to apply the principles he has learned in his previous work in this or in other departments of the school, and to search for all the evidence that he can

find upon each of the practical cases thus brought to his attention.

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 expected that at no distant time this laboratory will be in a position to undertake the investigation, in an experimental way, at the hands of the students under suitable direction, of many 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.

The students of mechanical engineering also receive instruction in carpentry, wood turning, foundry work, forging, chipping, filing, and in machine tool work in the Mechanical Laboratories in the new building on Garrison Street.

The Laboratory of Mechanical Engineering. This laboratory is situated in the basement of the Rogers Building, and will contain the following as a portion of its equipment: an eighty-horse-power Porter-Allen engine in constant use for driving a fan for the heating and ventilation of the new building; a sixteen-horse power Harris-Corliss engine provided with a condenser, and other apparatus, rendering it suitable for a variety of steam experiments, and to be used either with a friction brake or to supply power; a calorimeter; a vacuum pump; machinery for testing the transmission of power by belting; transmission dynamometers; a mule; a drawing frame; and apparatus for hydraulic experiments. There are also available for work, in connection with this department, five steam boilers; a forty-horse power engine, used for running the lathes, planers, etc., in the mechanical laboratories; and a number of looms.

It is expected during the present school year to make one or more tests of the evaporative power of a boiler; tests of the effects of different cut-off, compression, back-pressure, speed, etc., of engines under constant and variable loads; calorimetric tests; tests of the transmission of power by belting; measurements of the rate of flow of water; and such others as there may be opportunity for.

The department has recently been the recipient of the following very valuable gifts: —

A set of models showing different arrangements of belting, from Mr. Nathaniel Hill.

A set of drop forgings, from Messrs. Billings and Spencer.

A set of spindles and rings, from Messrs. George Draper & Sons.

Shaft-hanger models, from the Woonsocket Machine Co.

A triple valve, from the Westinghouse Air-Brake Co.

A wood rim pulley, from Mr. W. W. Carey.

A swivel vise, from Messrs. Reed, Gleason, and Reed.

Working drawings, from the Pacific Mills and the Fitchburg Steam Engine Company.

A sectioned pulsometer, from Mr. S. B. Everett.

A mule, from the Mason Machine Company.

A fly-frame, a speeder, a ring frame, and a hank clock, from the Lowell Machine Shop.

A set of gearing models, from Messrs. Pratt and Whitney.

A set of parts of steam pumps and an entire pump, from the Blake Pump Company.

A steam pump, from the Worthington Pump Co.

A steam pump, from the Deane Steam Pump Co.

An inspirator, from the Hancock Inspirator Co.

A Mack injector, from the National Tube Works.

A recording steam gauge, from the American Steam Appliance Co.

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. These lectures are illustrated by drawings, and by a set of models from Freiberg, Saxony, which show in detail the methods of working underground, by underhand and overhand stoping, the timbering and walling of shafts and levels, the arrangement of pumps, man engines, ladder ways, hoisting ways, the sinking of shafts, 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.

The professors in this department hope to give each student of mining and metallurgy at least one opportunity during his course of study to join a party organized for visiting some of the more interesting mining regions.

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 Mining and Metallurgical Laboratories. These laboratories furnish to students in Mining and Metallurgy the means for studying experimentally the various processes of ore-dressing and smelting. Ores of different kinds may be here subjected, on a small scale, to the same modes of treatment as have been adopted at the best mining and metallurgical establishments.

The mining laboratory is supplied with two suites of milling apparatus: —

I. A five-stamp battery, a set of amalgamating plates, a mercury saver, a circular buddle for concentrating tailings, an Atwood's amalgamator, and an amalgamating pan.

II. A Blake crusher, crushing rolls with automatic sizing screens, a Richards separator, a spitzkasten, four automatic machine jigs, an elevator, an Evans table or rotary buddle, a settling tank, and a centrifugal pump, which throws the water from the settling tank back to the feed tank, the same water being thus used over and over again, to avoid loss in

slimes. This laboratory also contains the following auxiliary apparatus: a steam engine and boiler, an edge-stone mill, a Bogardus mill, a dynamo machine for electro-deposition, a Root blower, and a Sturtevant blower.

The Metallurgical Laboratory contains a blast furnace, a copper refining furnace, a roasting furnace, a furnace for cupellation, furnaces for fusion, crucible and muffle assay furnaces, a blacksmith's forge, a melting kettle, and an eliquation furnace.

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 the amount of power, water, chemicals, fuel, and labor expended, wherever practicable, and thus learns approximately the effectiveness and economy of the method adopted. Each student is assisted in working his ore by his classmates, who have an opportunity in this way to run the machines and furnaces.

The Institute is from time to time receiving ores of gold, silver, lead, copper, antimony, zinc, iron, etc., from various localities. These ores are worked, and reports sent to those who contribute them; and it is expected that, by the co-operation of those who wish to have examinations made, the laboratory will continue to receive the necessary amount and variety of ores.

The Instruction in Geology and Physical Geography. The instruction in these branches has been so arranged that the topics to be taught may be presented in the order of their logical succession, namely:—

I. Physical Geography, including Dynamical Geology. It is the aim of the lessons on these topics to lead the student

to a scientific knowledge of the principal features of the earth's surface, their characteristics, classification, geographical relations, and the changes which they have experienced within the historic period. Frosts, glaciers, rains, streams, tides, volcanoes, earthquakes, plants, animals, etc., are considered as geological agencies, and also in their bearing upon navigation, the construction and maintenance of roads, and various works of improvement.

II. Structural Geology, including a systematic course in Lithology. Oral instruction and laboratory work are combined in this course, the aim being to place in the hands of each student a specimen of each type to be considered. 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. This instruction is supplemented by frequent excursions to localities of geological interest in the vicinity of Boston. The instruction in Chemical Geology and the history of crystalline formations comprises 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, also a general sketch of the chemical forces which co-operated with physical agencies in the formation of the earth.

III. Historical Geology. In this branch the outlines of the physical history of the earth are taught, and special attention is given to American geological history. The geological positions of ores and other economic products, and the modes of their occurreuce, are taught in connection with the geological formations in which they are found. The instruction is made as practical as its limits will admit. A collection of specimens and a series of pictorial representations are employed in the illustration of this branch. During the summer vacations, excursions of a few weeks are often made to regions where the fossiliferous formations are well developed.

The instruction in Meteorology and Industrial Geography provides for an advanced course of study. It includes the

outlines and industrial applications of meteorological science, also the influences of geographical positions, physical features, climates, etc., upon the resources of countries, and upon the character and prosperity of nations.

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 accessible to students at all times. 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 in Eastern Massachusetts.

The Instruction in Natural History. This is given by professors of the Institute, with the aid of the collections and library of the Boston Society of Natural History, which, by an agreement between the Society and the Institute, are freely open to the students of the latter. The collections are specially arranged for purposes of instruction and the library is rich in works on Natural History, including all the important periodicals.

Besides the collections and library just mentioned, laboratories are provided within the Institute for the pursuit of certain topics; *e.g.*, the laboratories of geology and mineralogy, and the biological laboratory.

The Instruction in Biology. Biology is taught by lectures, recitations, and especially by actual work in the biological laboratory now established upon the ground floor of the Rogers Building. At the outset, the students of Natural History and those who are preparing for the professional study of Medicine pass from the study of not-

living matter, as pursued in Physics and Chemistry, to the study of living matter, its properties and peculiarities, and the dissection and minute study of certain typical forms. Neither Zoölogy nor Botany as such is studied at the start, but attention is fixed rather upon general, though fundamental, facts. A microscope and other instruments essential to accurate individual observation will be assigned to each student, who will also have his own work-table. After the instruction in General Biology has been given as outlined above, some emphasis is laid upon classification, by a brief study of Zoölogy and Botany as special topics. After this point is reached, further specialization is permitted; but, in any case, considerable time is to be given to Zoölogy, Palæontology, Animal Physiology, and Botany. To this purpose, the Biological Laboratory is specially adapted, particularly as concerns Animal Physiology, which will be taught experimentally in the laboratory. Instruments for this purpose will be provided, and opportunities for research in the biological sciences will be supplied. In the later portions of the instruction, stress will be laid on either Zoölogy or Botany, physiological or morphological; and advanced work will be expected, with the preparation of a satisfactory thesis. A special working library for ready reference will be found in the laboratory itself.

The Instruction in Zoology and Palæontology, including the history of ancient animal life and the study of the distinctive and characteristic fossils of the different formations, is given as a necessary foundation for the further study of Geology. The aim of the course is to give the student a practical acquaintance with the structure of the characteristic families and orders of living and extinct animals, and by a judicious selection of examples, to familiarize him to some extent with the forms which characterize different periods.

The handling and drawing of specimens by the student are essential features of the method of instruction. The lectures of the instructor are devoted largely to explanatory demonstrations of the specimens which the students are at the same time drawing.

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 not only of young men who purpose to pursue a comprehensive course of architectural study, but of those who are looking only for such an elementary training as shall qualify them for positions as draughtsman.

The more strictly professional work begins with the study of the Five Orders and their applications, and of Greek and Roman Architectural History. At the same time, 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 historical studies are continued by taking up the mediæval period, from the fall of the Roman Empire to the fall of Constantinople, and the modern period, including that of the Renaissance.

The students are constantly practised in original design. Each set of drawings is examined and criticised before the classes. Instruction is also given in sketching, in black and white and water-color; and an evening class is held during the winter for drawing from the life, to which all students in the department are admitted who have reached sufficient proficiency in drawing from the cast.

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 the following additions have been made, mostly by gifts: A considerable collection of photographs, lithographs, and drawings presented to the Institute by French, English, and American architects, taken from their own works, including sets of actual working drawings, with details and specifications. A complete series of drawings, mostly presented by the late Ernst

Benzon, Esq., of London, formerly a merchant of Boston, illustrating the course of architectural instruction in the Ecole des Beaux-Arts in Paris,— *Esquisses-Esquisses, Projets Rendus, Projets d'Ordre, Projets de Construction, Grand Prix de Rome, Envoi de Rome.* Besides these, a very large number of 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 nearly four hundred well selected volumes; and the principal technical periodicals, both American and foreign, are regularly taken. 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 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 drill examination are held at the 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 an examination satisfactory to the department, in both theoretical and practical tactics and drill.

The large drill-hall includes a gymnasium, used by all classes in the Institute.

Libraries. The Institute possesses a good and increasing general library of reference for use by the students; and each department of instruction has, in its own reading-room or laboratory, its separate working library of reference. These departmental libraries, which are of the greatest value to students, are intended to 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 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 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 430,300 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.

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.

Excursions. In aid of the practical studies of the school, and as a means of familiarizing students with the actual details of work, they are required, in term time, to make visits of inspection to machine-shops, engines, mills, furnaces, and chemical works, and to important buildings and engineering constructions within convenient reach.

In the vacations, more extended excursions are made for the survey of mines and geological features, and for the study of metallurgical works and noted specimens of engineering.

Parties of students have in this way visited mines, furnaces, and engineering works in Nova Scotia, Vermont, New York, New Hampshire, Massachusetts, Rhode Island, Pennsylvania, Colorado, Utah, Missouri, and the Lake Superior copper and iron regions.

In June, 1883, a party of mining and chemical students, with two of the professors, made an excursion to the mining regions of Virginia and West Virginia, during which they visited an antique bloomery forge in Shady Valley, Tenn., the Cranberry Iron Mine in North Carolina, the salt works and gypsum quarries at Saltville, the Ivanhoe Furnace and ore beds, the Wythe lead and zinc mines, lead furnaces and shot works, the Bertha Zinc Smelting Works, the Natural Bridge, the "Rainbow," and iron ore beds at Iron Gap, the Low Moor Iron Mines and Furnaces, the Quinnimont iron furnace, coal mine, and coking ovens, the coal mines at Blacksburg, the black band deposits near Charleston, the Kanawha Salt and Bromine Works, the movable dams of Kanawha River, and the Luray Cavern.

Occasional Lectures. In addition to the instruction given by the permanent corps of teachers in the school, single lectures or courses of lectures on special lines of scientific or practical work will be given from time to time by eminent gentlemen in active business or professional life.

REQUIREMENTS FOR ADMISSION.

Times 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 will begin at 9 a.m. on the first Tuesday after September 17, and will continue two days (see Calendar, page 72). Attendance on both days of either examination is required.

Applicants for advanced standing must pass the entrance examinations, as before given, and present themselves for further examination at 9 a.m. on the Thursday following the second entrance examination (see Calendar, page 72).

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 at all such examinations held at other times than those above specified.

TO THE REGULAR COURSES.

First Year. To be admitted as a regular student in the first year class, the applicant must have attained the age of sixteen years, and must pass a satisfactory examination in Arithmetic, Algebra, Plane Geometry, French, English Grammar and Composition, 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; and square root. A satisfactory

* The year 1884 is necessarily an exception; and the examination will begin on Thursday, May 29, as stated in the calendar, page 72.

treatment of these subjects may be found in either Seaver and Walton's Arithmetic, Wentworth and Hill's Arithmetic, or Greenleaf's Complete Arithmetic.

2. *Algebra.* Elementary operations; factoring; greatest common divisor and least common multiple; fractions; equations of the first degree, including those containing two or more unknown quantities; involution and evolution of monomials and of polynomials; radicals and theory of exponents; imaginary expressions; inequalities; equations of the second degree, including those containing two or more unknown quantities; ratio and proportion; Binomial Theorem with positive integral exponents; arithmetical progression and geometrical progression. A satisfactory treatment of these topics may be found in either of the following text-books: Wells' University Algebra, Wentworth's Complete Algebra, or Todhunter's Algebra for Beginners.

3. *Plane Geometry.* As much as is contained in the first five books of Chauvenet's, or of Wentworth's, Geometry.

4. *French.* Elements of grammar and some practice in translation. Part one of Otto's Grammar, with fifty or sixty pages of easy reading, represents, in general, the required amount.

5. *English.* The elements of English grammar as they are to be found in Prof. Whitney's "Essentials of English Grammar," or an equivalent; the principal rules respecting correctness of style as they are to be found in Campbell's "Philosophy of Rhetoric," Book II., or Whately's "Principles of Rhetoric," Book III., or in any reputable modern school Rhetoric; such a knowledge of the history of English literature as may be obtained from Brooke's "Primer of English Literature," together with evidence that the candidate has really read, and is more or less familiar with some of the classical English writers in prose and verse.

6. *History.* So much knowledge of recent history as may be obtained from Mackenzie's "Nineteenth Century," or an equivalent.

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

Certificates of clear admission to colleges or technical schools of recognized standing and with requirements equivalent to those of this School will be accepted in place of the entrance examinations.

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, as 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 or that preparatory to the study of Medicine will find it advantageous to acquire also the elements of Greek.

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 (seventeen, eighteen, and nineteen years respectively), must in general pass satisfactorily the examination for admission to the first year class, and examinations on all of the subjects given in the earlier years of the course which he desires to enter. See pages 57 to 59, and pages 18 to 32. Applicants for advanced standing in the course preparatory to the study of Medicine will not for the present be received.

Graduates of colleges who find it possible to enter upon most of the studies of the third year will be afforded opportunity to make up those studies of the earlier years in which they are not prepared; they will, in general, be accredited 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 pages 18 to 32, and to the schedule of topics on pages 61 to 71.

TO SPECIAL COURSES.

To be admitted as a student in any one or more selected subjects in any of the regular courses, except that in Architecture (see page 33), *i.e.*, to partial or special courses, the applicant must have attained the age of at least sixteen 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 in the following eleven pages, 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 acquired 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 are received only into the full two years' special course given at page 33, and applicants for this course must pass the regular entrance examination to the first year class (page 57). In addition to this, the student may, however, with the consent of the Faculty, elect such other studies as he may desire.

SCHEDULE OF TOPICS.

The following eight 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," "Non-professional Studies," etc. In the first column of the tables 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 taking this subject, optional for those in parentheses; in the sixth and seventh, the number and term 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 28; that for 28 is 29; those for 29 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 29, which has already been followed through. So that to take up the course 32 in Applied Mechanics the applicant must be prepared to pass or must have passed in 26, 27, 28, 29, 30, 31, 126, and in 1, 2, and 3. The sufficient reason for this is that in Course 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" (35 to 56), 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 pages 57 to 59.

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

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.	Osborne, Wells, French, Porter.	All reg. students.	1	1	8	5	(1) (2)
27	Solid Geometry, ...	Rec.	Osborne, Wells, French, Porter.	All reg. students.	1	1	7	5	(3)
28	Analytical Geometry, . . .	Lect., Rec.	Runkle, Wells.	I. II. III.A. IV. V.A. (VII.) VIII. IX.A.	2	1	15	3	(29)
29	Trigonometry (Plane and Spherical), ...	Rec.	Runkle, Wells, French.	All reg. students.	1	2	15	5	(26) (27)
30	Differential Calculus, . . .	Lect., Rec.	Osborne.	I. II. III.A. IV. V.A. (VII.) VIII. (IX.A.)	2	2	15	3	(28)
31	Integral Calculus, ...	Lect., Rec.	Runkle.	I. II. III.A. IV. VIII. (IX.A.)	3	1	7	3	(30)
32	Applied Mechanics (Statics and Stresses in Frames), .	Lect., Rec.	Peabody.	I. II. III.A. IV. VIII. (IX.A.)	3	1	8	3	(31) (126)
33	Applied Mechanics (Strength of Materials, Kinematics and Dynamics), ...	Lect., Rec.	Peabody.	I. II. III.A. IV. VIII. (IX.A.)	3	2	15	3	(32)
34	Applied Mechanics (Strength of Materials, Hydraulics, Dynamics, and Thermodynamics), ...	Lect., Rec., Lab.	Lanza.	I. II. III.A. IV. VIII. (IX.A.)	4	1	15	3	(33)
35	Applied Mechanics (Strength of Materials, Hydraulics, Dynamics, and Thermodynamics,)	Lect., Rec., Lab.	Lanza.	I. II. VIII.	4	2	15	3	(34)
36	Advanced Mathematics, . .	Lect., Rec.	Osborne.	VIII.	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.	Burrison.	All reg. students.	1	1, 2	30	6	
52	Descriptive Geometry,	Rec., Draw.	Burrison.	I. II. IV. VIII.	2	1	15	2	(1) (27) (51)

NON-PROFESSIONAL STUDIES.

76	Rhetoric and English Composition,	Lect., Rec.	Wheelock.	All reg. students.	1	1	15	2	(5) (6)
77	Modern History and English Literature,	Lect., Rec.	Wheelock.	All reg. students.	1	2	15	2	
78	Modern History and English Literature,	Lect., Rec., Writing.	Atkinson.	All reg. students.	2	1, 2	30	2	
79	English History and Literature (collateral reading and study),	Reading.	Atkinson.	IX.	2	1, 2	30	1	
80	Constitutional History,	Rec., Writing, Reading.	Atkinson.	All reg. students.	3	1	15	2	
81	Constitutional History of the U.S.,	Lect., Rec.	Atkinson.	IX.	4	1	15	2	
82	English History and Literature (special studies),	Reading.	Atkinson.	IX.	4	1	15	2	
83	Elements of Political Economy,	Lect.	The President.	IX.	2	2	15	1	
84	Political Economy,	Lect., Rec.	The President.	All reg. students.	3	2	15	2	
85	International Law,	Lect., Rec.	The President.	IX.	3	2	15	2	
86	Special Studies in Finance,	Rec.	The President.	IX.	4	1	15	2	

NON-PROFESSIONAL STUDIES.

	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation Required.
87	French (grammar and translation),	Lect., Rec.	Luquiens.	All reg. students.	1	1 2	30	3	(4)
88	Advanced French,	Lect., Rec.	Luquiens.	IX.	3	1 2	30	3	(87)
89	Advanced French,	Lect., Rec.	Luquiens.	IV.	4	1 2	30	3	(87)
90	German (elementary),	Lect., Rec.	Otis.	All reg. students.	2	1 2	30	3	
91	German (grammar and translation),	Lect., Rec.	Otis.	All reg. students.	3	1 2	30	3	(90)
92	German (advanced),	Lect., Rec.	Otis.	IX.	4	1 2	30	3	(91)
93	Italian or Spanish,	Lect., Rec.	Otis or Luquiens.	IX.	4	1 2	30	2	

CHEMISTRY.

101	General Chemistry,	Lect., Lab.	Nichols, Norton.	All reg. students.	1	1 2	30	6	(1) (2)
102	Chemical Analysis,	Lect., Lab.	Wing.	III. V. VI. VII. VIII.A. IX.B.C. III.B. V. VI. (IX.A.)	2	1 2	30		(101)
103	Chemical Philosophy,	Lect., Rec.	Nichols.	IX.B. VII.B. VIII.A.	2 3	1	15	3	(101)
104	Chemical Analysis,	Lab.	Wing.	III. V. VI.	3	1 2	30		(102)
105	Chemical Analysis,	Lab.	Wing.	VII. VIII.A.	3	1	15		(102)
106	Special Methods,	Rec.	Wing.	III.B. V.	3	1	15	2	(87) (90) (102)
107	Industrial Chemistry,	Lect.	Ordway.	III.B. V. VI.	3	2	15	3	(101)
108	Chemical Analysis,	Lab.	Wing.	III. V. VI. VIII.A.	4	1	15		(104)
109	Chemical Analysis,	Lab.	Wing.	III. V.	4	2	15		(108)

CHEMISTRY.

	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation Required.
110	Organic Chemistry, . . .	Lect.	Norton.	V. IX.B.	4	1 2	30	2	(103) (90) (104)
111	Organic Chemistry, . . .	Lab.	Norton.	V.A.	4	1 2	30	12	(110)
112	Industrial Chemistry, . . .	Lab.	Ordway.	V.C. IX.B.	4	1	15	12	(101)
113	Physiological Chemistry, . .	Lect., Rec.	Sedgwick.	VII.	4	1	15	3	(101) (260)

PHYSICS.

126	Physics, ...	Lect.	Cross.	All reg. students.	2	1 2	30	3	(29)
127	Descriptive Astronomy, . .	Lect.	Pickering.	I. V.B.C. VI. VII. VIII. IX.	2	1	6	3	(27)
128	General Physics (in connection with 126), ...	Rec.	Pickering.	VIII.B.	2	1	15	2	(29)
129	Physical Laboratory,	Lab.	Pickering, Woodbridge.	VIII.A.	2	1 2			(126)
130	General Physics, ...	Lect., Rec.	Cross, Pickering, Woodbridge.	VIII.B.	2	2	15	1	(128)
131	Physical Laboratory, . . .	Lab.	Pickering, Woodbridge.	VIII.B.	2	2	15	3	(126)*
132	Physics, ...	Lect., Lab.	Holman, Pickering, Woodbridge.	All reg. students.	3	1 2	30	2	(126)
133	Physical Laboratory, . . .	Lab.	Cross, Holman, Pickering, Woodbridge.	VIII.A.	3				
134	Physical Laboratory, . . .	Lab.	Cross, Holman, Pickering, Woodbridge.	VIII.B.	3	1 2	15 15	2 6	(126) (130) (131)

* The student must also be qualified to enter VIII.B., 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.
135	General Physics (electricity and allied subjects),	Readings.	Cross, Holman, Pickering.	VIII.B.	3	1 2	30	3	(128) (132) (87) (31)
136	General Physics (optics or acoustics),	Readings.	Cross.	VIII.A.	3	1 2	30	3	(132) (87) (28)
137	Advanced Physics (memoirs, etc.),	Readings.	Cross, Holman.	VIII.	3	2	15	1	(132) (87)
138	History of Physical Science,	Readings.	Cross.	VIII.	3	2	15	1	(87) (90) (126)
139	Physics,	Lab.	Cross, Holman, Pickering.	III.B. V. VI. VIII.	4	1	15		(132)
140	History of Physical Science,	Readings.	Cross.	VIII.	4	1	15	3	(87) (90) (126)
141	General Physics,	Readings.	Cross, Holman, Pickering.	VIII.A.	4	1 2	30	3	(87) (31) (132) (90)
142	Acoustics,	Lect.	Cross.	IV. VIII.B.					(126)
143	Physical Labor't'y (ac'stics),	Lab.	Cross, Woodb'dge.	VII.B.					(132) (142)

CIVIL ENGINEERING.

151	Surveying,	Lect., Rec., F'ld, Draw.	Burton.	I. III. IX.C.	2	1 2	30	4	(29) (51)
152	Stereotomy,	Draw.	Burton.	I.	2	2	15	4	(52)
153	Elements of Topography,	Draw.	Burton.	I.	2	2	15	4	(29) (51)
154	Railroad Engineering,	Lect., Rec., F'ld, Draw.	Vose.	I.	3	1 2	30	3	(151) (153)
155	Advanced Topography,	Draw.	Burton.	I.	3	1 2	30	4	(151) (153)

CIVIL ENGINEERING.

	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation Required.
156	Principles of Construction, .	Lect., Rec., Draw.	Swain.	I.	4	1 2	30	3	(33)
157	Engineering Practice, . . .	Lect., Rec., F'ld, Draw.	Vose.	I.	4	1 2	30	3	(154) (155)
158	Hydraulic Engineering, . .	Lect., Rec., Draw.	Swain.	I.	4	1 2	30	3	(33)
159	Higher Surveying, ...	Field, Draw.	Burton.	I.	2	1 2	30	2	(154) (155)

MECHANICAL ENGINEERING.

176	Mechanism (must take also 52), ...	Lect., Rec., Draw.	Fisher, Schwamb, Stephens.	II.	2	1	15	4	(29 (51)
177	Mechanism, ...	Lect., Rec., Draw.	Schwamb, Fisher, Stephens.	II.	2	2	15	7	(176)
178	Mechanical Engineering (must take also 31, 32, and 132), ...	Lect., Rec.	Lanza, Schwamb.	II.	3	1	15	4	(30) (177)
179	Mechanical Engineering (must take also 33 and 132), ...	Lect., Rec., Draw., Lab.	Lanza, Schwamb.	II.	3	2	15	11	(178)
180	Mechanical Engineering (must take also 34), .	Lect., Rec.	Lanza, Fisher, Peabody.	II.	4	1 2	30	6	(179)
181	Designing, ...	Draw.	Fisher, Peabody.	II.	4	1	15	8	(179)
182	Mechanical Engineering,	Lab.	Lanza, Fisher, Peabody.	II.	4	1 2	30	4	(179)

MINING ENGINEERING.

	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor.	Taken by	Year.	Term.	No. of Weeks.	Hours per Week.	Preparation Required.
201	Mineralogy (including Blowpipe Analysis and Crystallography), ...	Lect., Lab.	Crosby.	III. V. VI. VII. IX.B.C.	2	2	15	6	(3) (101)
202	Mining Engineering, . . .	Lect.	Richards.	III.	3	1 2	30	3	(126) (201)
203	Assaying by Fire, ...	Lab.	Richards, Clark.	III. V. VI.	3	1	5	6	(1) (201)
204	Metallurgy, ...	Lect.	Ordway.	I.	4	1	10	3	(101)
205	Metallurgy, ...	Lect.	Ordway.	II. III. V. VI. IX.C.	4	1	15	3	(101)
206	Mining and Metallurgy, . .	Lab.	Richards, Clark.	III. V.B. VI.	4	1	15	3	(104) (203)
207	Mining and Metallurgy, . .	Lab.	Richards, Clark.	III. VI.	4	2	15	12	(206)
208	Metallurgy and Ore Dressing, ...	Lect.	Ordway.	III. VI.	4	2	15	2	(126) (201) (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.	Clark.	IV.	2	1 2	30	1	
227	Orders, ...	Lect., Draw.	Ely.	IV.	2	1	12	8	
228	Materials of Architecture, .	Lect.	Clark.	IV.	2	1	15	2	
229	Common Construction, . .	Lect.	Clark.	IV.	2	2	15	1	
230	Shades, Shadows, and Perspective, ...	Lect., Draw.	Clark. Ely.	IV.	2	2	7	2	
231	Working Drawings, . . .	Draw.	Clark.	IV.	3	1	15	1	
232	Iron Construction, ...	Lect.	Clark.	IV.	3	2	15	1	
233	Fine Art, ...	Lect.	Rotch. Treadwell.	IV.	3 4	1	15	1	
234	Sketching, ...	Draw.	Turner.	IV.	3 4	1 2	30	2	
235	Specifications and Contracts,	Lect.	Clark.	IV.	4	1 2	30	1	
236	Problems in Construction,	Lect., Draw.	Clark.	IV.	4	1 2	30	1	
237	Building Materials, ...	Lect.	Ordway.	I. II. III. IV. VI.	4	2	15	2	(101)
238	Schools, Theatres, Churches, Hospitals, etc., ...	Lect.	Clark.	IV.	4	2	15	1	
239	Planning, ...	Draw.	Clark.	IV.	4	2	15	1	
240	Designing, ...	Draw.	Létang.	IV.		1 2	30	12	
241	Elementary Mechanism, . .	Lect.	Ely.	IV. (Sp.)	1	1 2	30	3	

NATURAL SCIENCES.

	Subject.	Lect., Rec., Lab., Draw., or Field.	Professor or Instructor	Taken by	Year.	Term.	No. of Weeks.	Hours Per Week.	Preparation Required.
251	Physical Geography, . . .	Lect.	Niles.	All reg. students.	2	2	15	3	(7)
252	Botany, ...	Lect., Lab.	Sedgwick.	III.B. IV.V.B.C.VI. VII. VIII. IX.B.C.	2	2	15	2	
253	General Biology, ...	Lect., Rec., Lab.	Sedgwick.	VII.	2	1 2	30	7	
254	Zoölogy and Palæontology, .	Lect., Lab.	Hyatt.	III.B. VI. VII. IX.C.	2	2	15	2	
255	Zoölogy and Palæontology, .	Lect., Lab.	Hyatt.	III.B. VI. VII. IX.C.	3	1	15	2	(254)
256	Geology (Elements of Lithology and Structural Geology), ...	Lect., Lab.	Crosby.	I. IV.	3	1	15	2	(101) (251)
257	Geology (Lithological, Structural, and Chemical), . .	Lect., Lab.	Crosby.	III. V.B.C. VI. VII. IX.B.C.	3	1	15	3	(201) (251)
258	Historical Geology, . . .	Lect.	Niles.	I. III. V.B.C. VI. VII. IX.C.	3	2	15	3	(250) or (257)
259	Cryptogamic Botany, . . .	Lect., Lab.	Sedgwick.	VII.	3	1	15	2	(252)
260	Biology, ...	Lect., Lab.	Sedgwick.	V. VI. VII. VIII. IX.B.C.	3	1	15	2	(101) (252)
261	Animal Physiology, . . .	Rec.	Sedgwick.	VI. VII. IX.P.C.	3	2	15	2	(260)
262	Anatomical Laboratory, . .	Lab.	Hyatt, Sedgwick.	VII.	3	2	15	12	(252) (254)
263	Drawing with Microscope, .	Draw.	Sedgwick.	VII. IX.C.	4	1	15	2	(260)
264	Drawing, ...	Draw.		VI. VII.					

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

CALENDAR FOR 1883–84.

School year began,	Monday, Sept. 24, 1883.
Second term will begin,	Tuesday, Jan. 29, 1884.
Degrees conferred,	Tuesday, May 27, 1884.
First Entrance Examinations,	Thursday, May 29, 1884, and Friday, May 30, 1884.
Second Entrance Examinations,	Tuesday, Sept. 23, 1884, and Wednesday, Sept. 24, 1884.
Examinations for Advanced Standing,	Thursday, Sept. 25, 1884.
School year of 1884–85 will begin,	Monday, Sept. 29, 1884.

CALENDAR FOR 1884–85.

School year will begin,	Monday, Sept. 29, 1884.
Second term will begin,	Tuesday, Feb. 3, 1885.
Degrees conferred,	Tuesday, June 2, 1885.
First Entrance Examinations,	Thursday, June 4, 1885, and Friday, June 5, 1885.
Second Entrance Examinations,	Tuesday, Sept. 22, 1885, and Wednesday, Sept. 23, 1885.
Examinations for Advanced Standing,	Thursday, Sept. 24, 1885.
School year of 1885–86 will begin,	Monday, Sept. 28, 1885.

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 conditioned students will be held on the Thursday and following days after the September entrance examinations, and at the time of the semi-annual and 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 March 1 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 drop 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 Registrar an attendance paper, blank forms for which will be supplied. This paper should contain, in the case of a regular student, the course to be pursued; in the case of a special student, a statement of every subject which he desires to take during the term, and the years (1st, 2d, 3d, or 4th) in which these subjects are given. 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 insure prompt placing of the names upon the class lists, and to give opportunity for the immediate determination of qualifications. After the first week of the term, no changes can be made in the attendance papers except by special vote of the Faculty.

Petitions. Special matters in regard to courses of study, etc., may be brought before the Faculty for action by suitable petitions presented through the Secretary.

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 sureties, one of whom must be a citizen of Massachusetts, as security for the payment of all bills of the Massachusetts Institute of Technology; or he may deposit with the Bursar two hundred dollars in money or in United States bonds for the same purpose; or he may deposit fifty dollars as security, and pay his tuition fees in advance as follows: five-eighths on or before October 10, and three-eighths on or before February 10. No officer of instruction or student of the Institute will be received as a surety.

Fees. The fee for regular students is $200 per year, $125 at the beginning and $75 at the middle (first Tuesday in February) of the school-year. 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, who, for more than thirty years, was the distinguished Master of the English

High School in the city of Boston. Mr. Sherwin was also an active and influential member of the Corporation of the Institute. The pupil, to receive the privilege of this scholarship, is to be a graduate of the English High School of Boston, and is to be selected by the Faculty of the Institute in concurrence with the Head Master of the High School for the time being.

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.

Applications for any of these scholarships should be made to the Faculty. No student will be recommended for a scholarship who has not been in the Institute at least one year, and shown himself an earnest and faithful student.

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.

SCHOOL OF INDUSTRIAL SCIENCE.

REGISTER OF STUDENTS.

GRADUATE STUDENTS.

NAME.	HOME.	RESIDENCE.
Abbott, Paul W., B.S. Sheffield Scientific School.	*Whitinsville*,	68 Chandler St.
Bardwell, Fred L., B.S. University of Minnesota.	*Minneapolis, Minn.*	114 Chandler St.
Benton, Edward R., Ph.D. Harvard University.	*Newton Centre*,	Newton Centre.
Bean, Harry P., A.B. Maine State College.	*Franklin*,	Franklin.
Carr, W. Frank, B.S. Mass. Agricultural College.	*Clinton*,	94 Waltham St.
Day, Sarah L., A.B. Vassar College.	*Roxbury*,	9 Day St.
Foss, Fred. E., A.B. Bates College.	*Lewiston, Me.*	So. Boston.
Goodnough, Benj. F., A.B. Harvard University.	*Brookline*,	Brookline.
Gunnison, Sarah P., A.B. Vassar College.	*Gloucester*,	16 E. Chester Pk.
Hayes, Hammond V., A.B. Harvard University.	*Cambridge*,	86 Mt. Vernon St.
Hutchings, James H., S.B. Mass. Institute of Technology.	*Boston*,	68 Carver St.
Jones, Mary E., A.B. Vassar College.	*Boston*,	10 James St.
Lyle, David A., U.S.A. U. S. Military Acad.	*Roxbury*,	Norfolk House.
Mahon, William L'E., Ph.B. University of Michigan.	*Boston*,	223 W. Canton St.
Morse, Philip S., A.B. Harvard University.	*Boston*,	33 Marlboro' St.
Perkins, Charles B., A.B. Harvard University.	*Boston*,	2 Walnut St.
Phillips, Henry A., S.B. Mass. Institute of Technology.	*Boston*,	353 Marlboro' St.
Pierce, Richard H., A.B. Yale College.	*Brighton*,	Brighton.
Reber, Louis E., M.S. Penn. State College.	*State College, Pa.*	369 Col'mb's Ave.
Weston, John F., C.S. U.S.A. U.S. Artillery School.	*Boston*,	159 High St.

REGULAR STUDENTS.

FOURTH YEAR.

NAME.	COURSE.	HOME.	RESIDENCE.
Appleton, Charles B.	II.	*Boston,*	39 Worcester St.
Baldwin, H. Furlong	II.	*Waterbury, Md.*	142 Boylston St.
Bartlett, T. Harris	III. B.	*Portsmouth, N.H.*	Milton.
Boardman, Henry A.	V. C.	*Melrose,*	Melrose.
Bothfeld, Charles C.	I.	*Newton,*	Newton.
Brown, Alice I.	V. A.	*Roxbury,*	16 Holborn St.
Carr, W. Frank, B.S.	I.	*Clinton,*	94 Waltham St.
Carven, Christopher J.	I.	*So. Boston,*	125 Broadway.
Chase, Roscoe L.	V. A.	*Lowell,*	Lowell.
Doane, Alfred O.	III. B.	*Newtonville,*	Newtonville.
Fitch, Alfred L.	II.	*Chicago, Ill.*	94 Waltham St.
French, George L. R.	I.	*East Boston,*	203 Lexington St.
Gill, Augustus H.	V. A.	*Canton,*	Canton.
Heywood, George H.	III. B.	*Gardner,*	142 Boylston St.
Holder, James G.	V. A.	*Lynn,*	Lynn.
Knapp, George F.	V. B.	*Cambridge,*	Cambridge.
Puffer, William L.	III. B.	*West Newton,*	W. Newton.
Purinton, Arthur J.	II.	*Boston,*	88 W. Newton St.
Rich, William J.	III. A.	*Pembroke, Me.*	21 Central Sq.
Richards, Franklin B.	III. B.	*Somerville,*	Somerville.
Robinson, Theodore W.	III. B	*Wareham,*	190 W. Sp'gf'd St.
Rotch, A. Lawrence	II.	*Boston,*	3 Com'nw'th Ave.
Ryder, Josiah P.	V. C.	*East Boston,*	25 Saratoga St.
Stantial, Amy M.	V. A.	*Melrose,*	Melrose.
Sturgis, Elliot T.	III. A.	*Boston,*	307 Beacon St.
Tyler, Harry W.	V. A.	*Ipswich,*	Ipswich.
Ward, Nahum	V. C.	*Roxbury,*	Mt. Seaver Ave.
Whitney, William M.	II.	*Winchendon,*	142 Boylston St.
Williams, Francis C., Jr.	I.	*Roxbury,*	Roxbury.

THIRD YEAR.

Abbott, Paul W., S.B.	VIII. B.	*Whitinsville,*	68 Chandler St.
Allen, Anson W.	V. A.	*Walpole,*	Walpole.
Allen, Charles R.	V. C.	*New Bedford,*	232 W. Canton St.
Baker, David	III. A.	*Auburndale,*	Auburndale.
Benton, Edward R., Ph.D.	IV.	*Newton Centre,*	Newton Centre.
Cochran, Heywood	II.	*Louisville, Ky.*	Cambridge.

NAME.	COURSE.	HOME.	RESIDENCE.
Dewson, Edward H., Jr.	II.	*Quincy,*	Quincy.
Fox, Frederick, Jr.	V. C.	*Portland, Me.*	620 Tremont St.
Fry, Thomas W.	II.	*Chicago, Ill.*	55 W. Cedar St.
Goodrich, Robert R.	III. A.	*So. Boston,*	801 Broadway.
Harrington, Walter K.	I.	*Newport, R.I.*	118 Chandler St.
Hayes, Hammond V., A.B.	VIII. B.	*Cambridge,*	86 Mt. Vernon St.
Homer, Eleazer B.	IV.	*Belmont,*	Belmont.
Jones, Mary E., A.B.	VII.	*Boston,*	10 James St.
Lord, Frank H.	II.	*East Somerville,*	E. Somerville.
Lyon, Tracy	II.	*Oswego, N.Y.*	198 Beacon St.
MacRae, Hugh	III. B.	*Wilmington, N.C.*	27 St. James Ave.
Mahon, William L'E., Ph.B.	II.	*Boston,*	223 W. Canton St.
Martin, Henry	V. A.	*Lowell,*	Lowell.
McKim, Alex R.	I.	*Jamaica Plain,*	Jamaica Plain.
Merrill, Allyne L.	II.	*Cambridge,*	Cambridge.
Merrill, Eben G.	I.	*Chelsea,*	Chelsea.
Morss, Everett	III. A.B.	*Boston,*	323 Marlboro' St.
Newell, Frederick H.	III. A.	*Bradford, Pa.*	Brookline.
Nute, Joseph E.	I.	*Boston,*	335 Columbus Av.
O'Grady, Marcella I.	IX. C.	*Boston,*	82 Conant St.
Pickernell, Frank A.	VIII. B.	*So. Boston,*	551 E. Fifth St.
Pierce, Richard H., A.B.	VIII. B.	*Brighton,*	Brighton.
Pratt, Herbert G.	VIII. B.	*W. Newton,*	W. Newton.
Randall, Newbert M.	III. A.	*East Boston,*	23 London St.
Richards, Charles R.	II.	*Boston,*	36 Lambert St.
Robinson, C. Stanley	III. A.	*Boston,*	88 Pinckney St.
Spring, Charles F.	I.	*Boston,*	40 Harrison Ave.
Stantial, Otis T.	III. A.	*Melrose,*	Melrose.
Talbot, Harry P.	V. C.	*Holliston,*	Holliston.
Vanier, George P.	III. A.	*Boston,*	3 Pelham St.
Worthington, Erastus, Jr.	I.	*Dedham,*	Dedham.

SECOND YEAR.

Aborn, George P.	II.	*Wakefield,*	Wakefield.
Anthony, Arthur C.	III. A.	*Boston,*	285 Marlboro' St.
Bartlett, Dana P.	II.	*Boston,*	24 Milford St.
Bartlett, Sidney R.	III. B.	*Newton,*	Newton.
Batcheller, Birney C.	II.	*Wallingford, Vt.*	85 Dartmouth St.
Brainerd, William L.	IV.	*Hyde Park, Ill.*	Upham's Corner.
Burgess, John K.	II.	*Dedham,*	Dedham.
Burlingham, Charles L.	III. B.	*Chicago, Ill.*	535 Columbus Av.
Chadbourn, William H.	III. A.	*Wilmington, N.C.*	335 Columbus Av.
Chase, Arthur T.	VIII. B.	*Haverhill,*	Haverhill.
Clifford, Harry E. H.	VIII. B.	*So. Boston,*	801 Broadway.

NAME.	COURSE.	HOME.	RESIDENCE.
Cobb, Louis R.	I.	*Chicago, Ill.*	Cambridgeport.
Crane, Frank H.	VIII. B.	*Stoughton,*	Stoughton.
Cutter, Louis F.	I.	*Winchester,*	Winchester.
Doe, Charles C.	IV.	*Boston,*	224 C'mwe'lth Av.
Doolittle, Orrin S.	V. B.	*Wallingford, Conn.*	19 St. James Av.
Draper, Nelson C.	VIII. B.	*Canton,*	Canton.
Duff, James C.	V. B.	*Charlestown,*	14 Sheafe St.
Ellis, Warren H.	V. B.	*Waukegan, Ill.*	63 Appleton St.
Farmer, George W.	II.	*Rutland, Vt.*	63 Appleton St.
Foss, Edward S.	V. B.	*Malden,*	Malden.
Foster, Theodore R.	II.	*Charlestown,*	26 Union St.
Frink, William P.	VIII. B.	*Greenland, N.H.*	104 Dartmo'th St.
Garfield, Alex. S.	II.	*Lexington,*	Lexington.
Higgins, Edward E.	VIII. B.	*Chelsea,*	Chelsea.
Howard, John G.	IV.	*Chelmsford,*	116 Appleton St.
Ingalls, Walter R.	III. A.	*Lynn,*	Lynn.
Jordan, William F.	I.	*Auburn, Me.*	31 Milford St.
Kenney, C. Belle	V. C.	*E. Boston,*	111 Saratoga St.
Leach, Albert E.	II.	*Newtonville,*	Newtonville.
Lewis, Fred	VIII. B.	*Haverhill,*	Haverhill.
Locke, Frank L.	I.	*Boston,*	7 Eaton St.
Low, Wilson H.	V. B.	*Brookline,*	Brookline.
Lynde, James P.	III. A.	*Athol,*	164 W. Canton St.
Merriam, Harry B.	I.	*Fort Scott, Kan.*	35 Dwight St.
Merriam, Henry P.	VIII. B.	*Lawrence,*	Lawrence.
Miller, Edward F.	II.	*Cambridge,*	Cambridge.
Mumford, Edgar H.	II.	*Dorchester,*	Alban St.
Pierce, Edward L., Jr.	II.	*Milton,*	Milton.
Putnam, Frederick W.	III. A.	*Waterville, N.Y.*	109 Appleton St.
Richardson, Charles F.	II.	*Brooklyn, N.Y.*	66 Beacon St.
Robbins, Arthur G.	I.	*Carlisle,*	Watertown.
Seavey, John F.	II.	*Boston,*	27 Polk St.
Shove, Edward	II.	*Fall River,*	369 Columbus Av.
Simpson, James E.	III. A.	*Lawrence,*	Lawrence.
Stebbins, Theodore	VIII. B.	*Onawa, Ia.*	109 Appleton St.
Steele, George F.	VIII. B.	*E. Somerville,*	E. Somerville.
Stickney, Samuel C.	I.	*St. Paul, Minn.*	335 Columbus Av.
Stoughton, Augustus B.	II.	*Philadelphia, Pa.*	7 Charles St.
Thacher, Lawrence M.	I.	*Yarmouth,*	147 Warren Av.
Torrey, J. Carleton	I.	*Rockland,*	Rockland.
Tucker, H. Judson	VIII. B.	*Sandwich,*	36 Yarmouth St.
Turnbull, Charles D.	II.	*Boston,*	111 Beacon St.
Van Alstine, David	II.	*Louisville, Ky.*	Lexington.
Wilder, C. Morris	VIII. B.	*Cincinnati, O.*	134 Boylston St.

NAME.		HOME.	RESIDENCE.
Wilson, Elwood J.	III. A.	*Jamaica Plain,*	Jamaica Plain.
Winsor, Paul	VIII. B.	*Winchester,*	Winchester.
Wood, Charles	I.	*Edinburgh, Scot.*	369 Columbus Av.
Woodbury, Charles H.	II.	*Lynn,*	Lynn.
Worcester, Vernor F.	II.	*Chelsea,*	Chelsea.
Young, Fred R.	III. A.	*Brookline,*	Brookline.

FIRST YEAR.

Adams, John W.	*St. Paul, Minn.*	335 Columbus Ave.
Armington, George A.	*Weymouth,*	Weymouth.
Ballantyne, James R.	*Tilton, N.H.*	Newton.
Banes, Warner J.	*Philadelphia, Pa.*	286 Beacon St.
Barbour, Fred F.	*Cambridgeport,*	Cambridgeport.
Barron, Frank O.	*Quechee, Vt.*	350 Columbus Ave.
Barton, Charles A.	*Waltham,*	Waltham.
Bean, Frank A.	*S. Natick,*	S. Natick.
Billings, George L.	*Milford, N.H.*	5 Copeland St.
Bliss, William S.	*Carson, Nev.*	1507 Washington St.
Bowles, Robert L.	*Brookline,*	Brookline.
Bowles, Stephen W., Jr.	*Springfield,*	81 Dartmouth St.
Brace, Walter C.	*Leavenworth, Kan.*	29 Dartmouth St.
Brainerd, Henry B.	*Montreal, P.Q.*	627 Tremont St.
Brainerd, Thomas D.	*Montreal, P.Q.*	627 Tremont St.
Brett, Franklin	*Brookline,*	Brookline.
Bruce, Thomas K.	*Winchester,*	Winchester.
Bryant, Henry F.	*Bryantville,*	Bryantville.
Bryant, Percy	*Melrose,*	Melrose.
Burgess, Frank G.	*Boston,*	175 Warren Ave.
Cameron, Julian A.	*Westford,*	134 Boylston St.
Carleton, Elbridge S.	*Rochdale,*	2 Ashburton Place.
Carney, Frank D.	*Thomaston, Me.*	2 Sunderland St.
Carpenter, Frank F.	*Portland, Me.*	147 Warren Ave.
Carter, N. P. Ames	*Chicopee Falls,*	5 St. James Ave.
Caughey, Edward G.	*Allegheny City, Pa.*	45 Concord Sq.
Childs, Edward L.	*Lee,*	10 Boylston Place.
Cobb, Morton E.	*Newton,*	Newton.
Coburn, Howard L.	*Patten, Me.*	Hyde Park.
Cole, Winthrop	*Newton,*	Newton.
Conant, Henry J.	*Watertown,*	Watertown.
Cooley, Maurice W.	*Little Britain, N.Y.*	76 Pinckney St.
Coombs, Stephen E.	*Brunswick, Me.*	Brookline.
Couch, John H.	*Concord, N.H.*	58 Chandler St.
Curtis, Ralph E.	*Newburyport,*	Newburyport.
Curtiss, George F.	*New Britain, Conn.*	58 Chandler St.

NAME.	HOME.	RESIDENCE.
Cushing, Albert L.	*Jamaica Plain,*	Chestnut Ave.
Davenport, George W.	*Fall River,*	10 St. Charles St.
Dorrance, Amos P.	*Norwich, Conn.*	19 St. James Ave.
Douglas, William B.	*Middletown, Conn.*	165 W. Canton St.
Draper, George O.	*Milford,*	304 Columbus Ave.
Edgett, Horace P.	*Beverly,*	Beverly.
Eliot, George	*Chicopee,*	44 Brimmer St.
Eliot, Jesse L. R.	*Cambridgeport,*	Cambridgeport.
Emery, Herbert Q.	*Roxbury,*	3 Fremont Place.
Farwell, Lyman	*St. Paul, Minn.*	42 Worcester St.
Fox, John M.	*Portland, Me.*	620 Tremont St.
Freeman, J. Eugene	*So. Boston,*	395 Fourth St.
Fuller Josiah F., Jr.	*West Newton,*	West Newton.
Gay, Joseph B.	*Boston,*	4 Ashburton Pl.
Gerrish, Willard P.	*Roxbury,*	2 Hartwell St.
Gleason, Walter H.	*Boston,*	24 Bowdoin St.
Goss, Edward O.	*Waterbury, Conn.*	44 Bowdoin St.
Greeley, James T.	*Nashua, N.H.*	Nashua, N.H.
Gulliver, Frederic P.	*Norwich, Conn.*	19 St. James Ave.
Harris, William L.	*Marblehead,*	Marblehead.
Hathaway, Savory C., Jr.	*New Bedford,*	16 Circuit St.
Heath, Edward W.	*Waterville, Me.*	29 Dartmouth St.
Henchman, Russel B., Jr.	*Hyde Park,*	Hyde Park.
Hildreth, William O.	*Gardiner, Me.*	65 Dorchester St.
Hill, Henry F.	*Augusta, Me.*	606 E. Seventh St.
Hillyer, William	*Washington, D.C.*	289 Columbus Ave.
Hobart, James C.	*Cincinnati, O.*	Boston Highlands.
Holmes, Charles L.	*Waterbury, Conn.*	48 Chandler St.
Holt, Henry W.	*Wakefield, Va.*	30 Yarmouth St.
Howes, Herbert M.	*Somerville,*	Somerville.
Hunt, Jarvis	*Weathersfield, Vt.*	91 Boylston St.
Hussey, Oren S.	*Nashua, N.H.*	165 W. Canton St.
Kemble, Richard L.	*New York, N.Y.*	118 Boylston St.
Kendall, Charles B.	*Manchester, N.H.*	3 Columbus Sq.
Kilburn, J. Frederick	*Rutland, Vt.*	129 W. Newton St.
Kimball, Harry W.	*Bath, Me.*	116 W. Newton St.
Kirkham, Guy	*Springfield,*	81 Dartmouth St.
Kreps, John E.	*Allegheny, Pa.*	165 W. Canton St.
Lane, Benjamin C.	*Boston,*	623 Tremont St.
La Trobe, Gamble	*Baltimore, Md.*	Brookline.
Livermore, William D.	*Charlestown,*	45 Soley St.
Loud, Joseph P.	*Boston,*	135 Mt. Vernon St.
Manning, George L.	*Boston,*	775 Tremont St.
Merrill, Frank A.	*Exeter, N.H.*	Newton.

NAME.	HOME.	RESIDENCE.
Miller, Douglas G.	*New York, N.Y.*	626 Tremont St.
Moody, Walter S.	*Chelsea,*	Chelsea.
Mossman, Philip	*Beverly,*	Beverly.
Mulliken, Samuel P.	*Newburyport,*	Newburyport.
Nichols, Frank C.	*New London, Conn.*	385 Columbus Ave.
Nickels, Arthur R.	*Cherryfield, Me.*	48 Chandler St.
Norris, George L.	*Melrose,*	Melrose.
Northey, Herbert W.	*Salem,*	Salem.
Olzendam, Louis H.	*Manchester, N.H.*	3 Columbus Sq.
Parks, Granville H.	*N. Woburn,*	N. Woburn.
Pearson, Edwin R.	*Portsmouth, N.H.*	14 Temple St.
Peters, Charles Q.	*Atlanta, Ga.*	315 Beacon St.
Pike, Clayton W.	*Fryeburg, Me.*	24 Appleton St.
Potter, Carroll	*Ft. Assinaboine, M.T.*	22 Yarmouth St.
Pratt, Charles E.	*Kansas City, Mo.*	83 Waverly St.
Richardson, Herbert A.	*Boston,*	1818 Washington St.
Robinson, Miner	*W. Newton,*	W. Newton.
Ruffin, Roulhac	*Old Church, Va.*	371 Columbus Ave.
Saunders, George F.	*Lawrence,*	Lawrence.
Schwarz, Franz H.	*Boston,*	157 Charles St.
Sears, Henry D.	*Dubuque, Ia.*	5 Moseley Ave.
Sears, Willard T.	*Plymouth,*	Hyde Park.
Sever, George F.	*Cambridge,*	Cambridge.
Shepard, Frank E.	*Dorchester,*	Ashland St.
Shepard, Horace B.	*Marblehead,*	Marblehead.
Shortall, John L.	*Chicago, Ill.*	27 St. James Ave.
Smith, Charles P.	*Cambridge,*	Cambridge.
Smith, Harry E.	*Marshalltown, Ia.*	Jamaica Plain.
Snow, Loum, Jr.	*New Bedford,*	46 Chestnut St.
Solomon, Frank L.	*Somerville,*	Somerville.
Souther, Henry, Jr.	*So. Boston,*	546 Broadway.
Spaulding, Hollon C.	*E. Boston,*	9 Princeton St.
Sprague, T. W.	*Fitchburg,*	312 Columbus Ave.
Stanwood, James H.	*Portland, Me.*	298 Columbus Ave.
Stearns, John W.	*Waltham,*	Waltham.
Steele, Henry M.	*Baltimore, Md.*	309 Columbus Ave.
Stevens, Charles W.	*Cambridge,*	Cambridge.
Stewart, Norman Q.	*Everett,*	Everett.
Stoddard, Henry F.	*Plymouth,*	Plymouth.
Sturges, Solomon	*Chicago, Ill.*	27 St. James Ave.
Sylvester, George E.	*Danversport,*	Danversport.
Taintor, Giles	*Keene, N.H.*	41 Union Park.
Thomas, Edward G.	*Hingham Centre,*	92 W. Newton St.
Thomas, Fred A.	*Woonsocket, R.I.*	25 Holyoke St.

NAME.	HOME.	RESIDENCE.
Thomas, William R.	*Roxbury*,	16 Circuit St.
Thompson, Frederick	*Washington, D.C.*	289 Columbus Ave.
Thompson, Walter S.	*Roxbury*,	33 Rockland St.
Thorp, Frank H.	*Bloomington, Ill.*	285 Columbus Ave.
Totman, Harry F.	*Fairfield, Me.*	29 Dartmouth St.
Tripp, Frank F.	*Roxbury*,	27 Forest Ave.
Twombly, Alexander H.	*Charlestown*,	39 High St.
Underhill, Charles D.	*Chelsea*,	Chelsea.
Very, Nathaniel T.	*Salem*,	Salem.
Voorhies, Hugh E.	*Keokuk, Ia.*	Hyde Park.
Vose, Ralph	*Hyde Park*,	Hyde Park.
Wall, William L.	*Boston*,	381 Northampton St.
Whitmore, Walter G.	*Plymouth*,	16 Ferdinand St.
Whitney, Granger	*Beverly*,	Beverly.
Whitney, Joseph T.	*Leominster*,	Leominster.
Wilcox, Herbert A.	*Somerville*,	Somerville.
Wilde, Henry E.	*Waltham*,	Waltham.
Williams, Arthur S.	*Boston*,	15 Arlington St.
Wood, H. Clifford	*New York, N.Y.*	Braintree.
Woodbury, Merton G.	*Melrose*,	Melrose.
Young, Royal B.	*Boston*,	5 Rollins St.

SPECIAL STUDENTS.*

NAME.	HOME.	RESIDENCE.
Abbott, John C., Jr. Arch.	*Brookline*,	66 Mt. Vernon St.
Adams, Henry S. Math., Chem., Draw., Mil.	*Burlington*,	Cummingsville.
Ames, Frank M. Germ., Met., Assay., Chem	*Boston*,	447 Shawmut Av.
Anderson, Robert E. Chem., Draw., Math., Mil.	*Wellesley*,	Wellesley.

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

Arch.	Architecture.	Draw.	Drawing.	Met. Lab.	Metallurgical Laboratory.
Assay.	Assaying.	Desc. Geom.	Descriptive Geometry.	Mil.	Military Drill.
Ast.	Descriptive Astronomy.	Eng.	English.	Min.	Mineralogy.
Biol.	Biology.	Fr.	French.	Min. Eng	Mining Engineering.
Bot.	Botany.	Geol.	Geology.	Phys.	Physics.
Build. M.	Building Materials.	Germ.	German.	Shop.	Shopwork.
Chem.	Chemistry.	Math.	Mathematics.	Span.	Spanish.
Civ. Eng.	Civil Engineering.	Mech.	Mechanics.	Ster.	Stereotomy.
		Mech. Eng.	Mechanical Engineering.	Surv.	Surveying.
		Met.	Metallurgy.	Zoöl.	Zoölogy.

NAME.	HOME.	RESIDENCE.
Atkinson, J. Spencer Arch.	*Baltimore, Md.*	381 Columbus Av.
Attwill, William H. Math., Chem., Eng., Germ.	*Lynn,*	Lynn.
Bacon, Francis E., Jr. Fr., Eng., Shop, Germ., Mil.	*Boston,*	276 Beacon St.
Baker, Charles V. B. Arch., Math.	*Troy, N.Y.*	120 Boylston St.
Baker, Moses E. Arch., Germ.	*Dedham,*	Dedham.
Baldwin, Jessie Chem.	*Winchester,*	Winchester.
Bardwell, Fred L., B.S. Chem., Met., Phys., Biol.	*Minneapolis, Minn.*	114 Chandler St.
Barr, Harry P. Math., Phys., Mech. Eng., Eng., Germ., Desc. Geom., Shop.	*Washington, D.C.*	25 Holyoke St.
Bartlett, Charles H. Civ. Eng., Phys., Math., Mech., Geol., Eng.	*Milford, N.H.*	Cambridgeport.
Bates, James H. S. Mech. Eng., Shop, Math., Phys., Germ., Eng.	*Cincinnati, O.*	24 Appleton St.
Bean, Harry P., A.B. Chem., Assay.	*Franklin,*	Franklin.
Bennett, Henry D. Civ. Eng., Mech., Draw., Met.	*Brookline,*	Brookline.
Bhat, Keshav M. Shop, Mil.	*Poona, India,*	
Blake, William B. Civ. Eng., Math., Ast., Phys., Germ., Eng., Desc. Geom.	*Newburyport,*	27 St. James Av.
Blunt, Matthew M. Mech. Eng., Desc. Geom., Shop, Math., Phys., Germ.	*E. Somerville,*	E. Somerville.
Bodwell, Joseph F. Civ. Eng., Math., Desc. Geom., Phys., Germ., Eng., Ast.	*Hallowell, Me.*	142 Boylston St.
Bowditch, Nathaniel I. Chem., Eng., Draw., Mil.	*Framingham,*	29 Com'nw'th Av.
Borden, Richard P. Mech. Eng., Shop, Math., Phys., Germ., Desc. Geom.	*Fall River,*	369 Columbus Av.
Brown, Arthur H. Phys., Math., Germ., Mech. Eng.	*Lynn,*	Lynn.
Brown, Charles A. Eng., Arch., Draw.	*Portland, Me.*	Com'nw'th Hotel.
Bullard, Frederic F. Chem., Germ., Mil.	*Boston,*	Hotel Edinburgh.
Bunce, Walter H. Chem., Min. Lab., Met., Mech.	*Hartford, Conn.*	142 Boylston St.
Burr, Lewis A. Chem.	*Scituate,*	Scituate.
Bush, Robert W. Chem., Eng., Mil.	*West Newton,*	West Newton.
Cabot, Charles M. Math., Chem., Draw., Mil.	*Brookline,*	Brookline.

NAME.	HOME.	RESIDENCE.
Cady, Walter C. Math , Chem., Eng., Draw., Mil.	*New London, Conn.*	385 Columbus Av.
Callahan, William K. Mech., Mech. Eng., Met.	*Dayton, O.*	138 Boylston St.
Chadbourne, Albert H. Germ., Phys., Ast., Eng., Math., Biol., Geol., Chem.	*Boston,*	5 St. James Ave.
Chase, William C. Shop.	*Lowell,*	Lowell.
Church, William L. Math., Phys., Germ., Desc. Geom., Eng., Shop, Mech. Eng.	*Boston,*	43 Concord Sq.
Coburn, Daniel L. Germ., Chem., Assay.	*Tyngsboro',*	Tyngsboro'.
Codman, Henry S. Shop, Draw.	*Brookline,*	Brookline.
Codman, Ogden, Jr. Arch.	*Lincoln,*	96 Charles St.
Coffin, Horace P. Draw., Math., Germ.	*Nantucket,*	614 Tremont St.
Cole, Otto B. Phys.	*Boston,*	55 Chester Park.
Cone, Albert P. Civ. Eng., Germ., Geol., Eng.	*Wellsboro', Pa.*	M'lrose H'ghl'ds.
Conro, Emma O. Germ., Phys., Biol., Chem., Zoöl.	*Keeseville, N.Y.*	12 Cordis St.
Cornell, James L. Chem., Assay.	*Brooklyn, N.Y.*	Somerville.
Corns, Archer C. Math., Eng., Draw., Chem., Mil.	*Massillon, O.*	11 Union Park.
Crafts, William Math., Chem., Draw., Eng.	*Charleston, S.C.*	167 Beacon St.
Crosby, Freeman M. Math., Chem., Eng., Draw., Mil.	*Brewster,*	Melrose.
Cumnock, Victor I. Math., Chem., Eng., Draw., Mil.	*Lowell,*	Lowell.
Currier, William M. Math., Chem., Draw., Germ., Eng.	*Lynn,*	Lynn.
Davenport, James F., Jr. Math., Phys., Germ., Eng., Mech. Eng., Desc. Geom., Shop.	*Fall River,*	58 Chandler St.
Day, Sarah L., A.B. Chem., Geol.	*Roxbury,*	9 Day St.
Dearborn, Samuel S. Mech. Eng., Math., Mech.	*Boston,*	Harrison Sq.
DeCoster, Robert S. Arch.	*New York, N.Y.*	243 W. Canton St.
Doane, Arthur H. Civ. Eng., Germ., Phys., Eng., Geol.	*Middleboro',*	147 Warren Ave.
Dodge, Louis L. Desc. Geom., Mech. Eng., Math., Eng., Phys., Germ., Shop.	*Beverly,*	Beverly.
Duker, Henry P. Arch., Germ., Math.	*Baltimore, Md.*	Hotel Berkeley.

NAME.	HOME.	RESIDENCE.
du Pont, Alfred I. Shop, Min , Germ., Chem.	*Wilmington, Del.*	118 Boylston St.
Eaton, George H. Math., Chem., Draw., Germ., Shop.	*No. Middleboro'*,	Com'nw'lth H't'l.
Eaton, Charles W. Civ. Eng., Germ., Eng., Geol.	*Haverhill*,	Haverhill.
Eddy, William H. Eng., Phys., Math., Desc. Geom., Mech. Eng., Shop.	*Fall River*,	58 Chandler St.
Elzner, Alfred O. Arch., Desc. Geom.	*Cincinnati, O.*	34 Buck'gham St.
Erwin, H. Clayton Chem., Draw., Mil.	*Elkhart, Ind.*	30 Yarmouth St.
Fletcher, P. Russel Ast., Civ. Eng., Math., Desc. Geom., Phys., Germ., Eng., Chem.	*Middlebury, Vt.*	350 Columbus Av.
Fogg, Arthur G. Civ. Eng., Math., Phys., Ast., Desc. Geom., Germ., Eng.	*Norwood*,	Norwood.
Foss, Fred. E., A.B. Surv., Draw., Desc. Geom.	*Lewiston, Me.*	So. Boston.
Fox, Thomas A. Arch., Math.	*Dorchester*,	Dorchester.
Frost, Henry G. Germ., Eng., Geol., Min., Assay., Zoöl., Chem.	*Boston*,	664 Tremont St.
Gay, Edward H. Phys., Germ., Math., Eng., Mech. Eng., Shop, Draw.	*Marlboro'*,	33 St. James Ave.
Getchell, Alice M. Min., Ast., Phys., Bot., Phys. Geog.	*Brookline*,	Brookline.
Goodnough, Benj. F., A.B. Surv., Math.	*Brookline*,	Brookline.
Greeley, Morris L. Mech. Eng., Shop, Math., Mech., Phys., Eng., Germ.	*Chicago, Ill.*	55 W. Cedar St.
Green, Lonsdale Arch.	*College Hill, O.*	34 Buck'gham St.
Greene, Joseph T. Arch.	*Dorchester*,	Washington St.
Greene, S. Cuyler Mech. Eng., Math., Mech., Desc. Geom., Shop.	*Dorchester*,	Pleasant St.
Griffin, Percy Arch., Germ.	*Orange, N.J.*	11 Upton St.
Guild, Chas. F. M. Math., Chem., Draw., Eng., Mil.	*Charlestown*,	31½ Mt. Vernon St.
Gunnison, Sarah P., A.B. Chem., Chem. Phil.	*Gloucester*,	16 E. Chester Pk.
Hadaway, Will S. Math., Chem., Draw., Eng., Germ.	*Plymouth*,	16 Ferdinand St.
Haines, Frank M. Chem., Min. Lab., Met., Germ.	*Boston*,	Townsend St.
Harding, John P. Arch.	*Longmeadow*,	Rockland.
Haskell, Edward A. Math., Chem., Fr., Draw., Germ.	*E. Boston*,	223 Saratoga St.

NAME.	HOME.	RESIDENCE.
Hathaway, D. Lewis Mech. Eng., Math., Phys., Eng., Germ., Desc. Geom., Shop.	*Rochester*,	Charlestown.
Holden, Sarah E. Chem., Phys.	*Cleveland, O.*	17 St. James Ave.
Hopkins, William J. Phys., Math., Mech., Shop, Draw., Mech. Eng.	*New Bedford*,	232 W.Canton St.
Houghton, Neidhard H. Chem., Biol.	*Boston*,	1512Wash'gt'nSt.
Hovey, James B. Chem., Chem. Phil., Biol.	*Lowell*,	Lowell.
Hutchinson, Frank A. Math., Shop, Germ.	*Lowell*,	Lowell.
Hutchings, James H., S.B. Phys., Mech. Eng., Germ., Shop.	*Boston*,	68 Carver St.
Ilsley, Samuel M. Arch., Mech., Fr., Germ.	*Milwaukee, Wis.*	128 Marlboro' St.
Jones, Theodore Phys., Chem., Eng., Fr.	*Brookline*,	Brookline.
Kellogg, Lansing O. Phys., Mech. Eng., Eng., Germ., Shop.	*San Francisco, Cal.*	198 Beacon St.
Kellogg, Thomas M. Arch., Math.	*Laurel, Md.*	14 Worcester Sq.
Kendall, Frederick A. Arch.	*Jamaica Plain*,	Jamaica Plain.
Kimball, Clarence L. Math., Arch., Desc. Geom., Phys., Germ., Eng.	*Lowell*,	Lowell.
Knox, George A. Math., Chem., Eng., Germ.	*Lynn*,	Lynn.
Lavalle, John W. Arch., Math.	*Boston*,	24 Marlboro' St.
Lawrence, John M. Mech. Eng., Shop, Math., Phys., Desc. Geom., Draw.	*St. John, N.B.*	80 Berkeley St.
Lawrence, Warrington G. Arch., Math.	*Baltimore, Md.*	12 Worcester Sq.
Lee, John C. Chem., Math.	*Roxbury*,	145 Cedar St.
Litchfield, Isaac W. Math., Phys., Germ., Eng., Mech. Eng.	*Warwick, N.Y.*	36 Union Pk.
Little, Arthur D. Chem., Assay., Germ., Biol.	*Portland, Me.*	36 Union Pk.
Lloyd, James D., Jr. Ast., Chem., Phys., Germ., Eng.	*Sandwich*,	35 Dwight St.
Loewenthal, Joseph B. Chem., Eng., Fr., Draw., Mil.	*Chicago, Ill.*	467 Columbus Av.
Lovering, Edward Chem.	*Taunton*,	Taunton.
Lyle, David A., U.S.A. Chem., Met., Min. Lab.	*Boston*,	Norfolk House.
Lufkin, Elgood C. Math., Mech. Eng., Phys., Desc. Geom., Germ., Eng., Shop.	*Titusville, Pa.*	73 Chandler St.

NAME.	HOME.	RESIDENCE.
Mackintosh, Fred Chem., Shop.	*Boston,*	Norfolk House.
Maher, Edward F. Arch.	*Canton, Md.*	381 Columbus Av.
Morrison, Gilbert W. Math., Chem., Eng., Draw.	*Exeter, N.H.*	Exeter, N.H.
Morse, Philip S., A.B. Chem., Phys., Zoöl.	*Boston,*	33 Marlboro' St.
Murdock, Herbert T. Chem., Draw., Shop., Mil.	*Uxbridge,*	385 Columbus Av.
Neave, Joseph S. Math., Phys., Mech. Eng., Eng., Desc. Geom., Shop.	*Cincinnati, O.*	370 Columbus Av.
Neumann, Fernando Chem., Phys. Geog., Min. Lab.	*Parimaribo, S.A.*	1 Bulfinch Pl.
Noyes, Arthur A. Chem., Phys., Germ., Eng., Min., Chem. Phil.	*Newburyport,*	Newburyport.
Nutter, Oscar E. Math., Chem., Eng., Draw., Mil.	*Great Falls, N.H.*	355 Dudley St.
Nye, George H. Civ. Eng., Math., Mech., Phys.	*New Bedford,*	New Bedford.
Osgood, Frank O. Eng., Math., Chem., Mil.	*Waltham,*	Waltham.
Osgood, William H. Chem., Assay., Met., Germ., Geol.	*Peabody,*	Peabody.
Page, Frank H. Eng., Phys., Math., Desc. Geom., Mech. Eng., Shop.	*Chicopee Falls,*	1308 W'sh'gt'n St.
Paine, Robert T., 4th Chem., Shop, Draw., Mil.	*Waltham,*	6 Joy St.
Park, Dean W. Min. Lab., Chem., Met.	*Newton,*	Newton.
Park, Walter L. Arch.	*Taunton,*	Taunton.
Parsons, Sidney A. Civ. Eng., Math., Mech., Germ., Eng.	*Gloucester,*	Gloucester.
Peirce, Charles C. Eng., Chem., Math., Draw.	*Newport, R.I.*	236 W. Canton St.
Perkins, Charles B., A.B. Arch.	*Boston,*	2 Walnut St.
Phillips, Henry A., S.B. Civ. Eng.	*Boston,*	353 Marlboro' St.
Plaisted, Arthur I. Math., Phys., Germ., Shop, Eng.	*E. Somerville,*	E. Somerville.
Powell, William D. Arch.	*Rochester, N.Y.*	142 Boylston St.
Prescott, Howard B. S. Math., Phys., Germ., Arch., Desc. Geom., Eng.	*Arlington,*	Arlington.
Proctor, Charles A. Math., Chem., Eng., Draw., Mil.	*Peabody,*	Peabody.
Randall, Thomas H. Arch.	*Annapolis, Md.*	31 Mt. Vernon St.

NAME.	HOME.	RESIDENCE.
Rawson, Edward L. Mech. Eng., Phys., Math., Shop, Desc. Geom., Germ.	*Boston*,	62 W. Cedar St.
Reber, Louis E., M.S. Math., Mech., Shop, Mech. Eng.	*State College, Pa.*	223 W. Canton St.
Reynolds, George F. Draw., Mech. Eng., Phys., Germ., Math., Desc. Geom., Eng.	*Evanston, Ill.*	149 W. Newt'n St.
Reynolds, Blake Shop., Draw.	*Chicago, Ill.*	351 Columbus Av.
Rice, David Math., Phys.	*Boston*,	272 Seaver St.
Richardson, Robert E. Math., Mech. Eng., Phys., Desc. Geom., Shop.	*Concord*,	Concord.
Ricker, George A. Civ. Eng., Math., Phys., Germ., Desc. Geom., Eng	*Buffalo, N.Y.*	88 Pinckney St.
Robertson, Nathaniel G. Phys., Min., Chem., Germ., Eng., Math., Mech., Geol.	*Providence, R.I.*	153 Worcester St.
Robinson, C. Snelling Chem., Met., Phys., Min. Lab.	*Wareham*,	190 W. Spr'gf'd St.
Ruffin, C. Stanley Phys., Math., Mech., Eng., Germ., Mech. Eng.	*Boston*,	170 Cambri'ge St.
Russell, L. Kimball Draw., Chem., Chem. Phil., Min., Ast., Phys., Germ., Eng.	*Arlington*,	Arlington.
Safford, Leandro T. Math., Fr., Chem., Draw., Shop.	*Boston*,	308 Columbus Av.
Sands, Frank E. Phys., Germ., Biol., Eng., Span.	*Cambridge*,	Cambridge.
Schmidt, Richard E. Arch., Math.	*Chicago, Ill.*	467 Columbus Av.
Shepard, William E. Math., Phys., Germ., Desc. Geom., Mech., Eng., Shop.	*Hartford, Conn.*	61 Clarendon St.
Shipman, Pelham W. Phys., Ast., Chem., Germ., Eng., Draw., Fr.	*Astoria, L.I.*	5 Berwick P'k.
Smith, Irwin Z. Phys., Chem., Eng., Surv.	*St. Louis, Mo.*	7 W. Cedar St.
Smith, James M., Jr. Chem., Germ., Min., Ast., Eng., Math.	*Boston*,	10 Greenwich Pk.
Smith, J. Waldo Phys., Civ. Eng., Math., Eng., Germ.	*Lincoln*,	Lincoln.
Sparhawk, N. Arthur Math., Chem., Draw.	*Boston*,	1766 W'sh'gt'n St.
Sprague, Arthur C. Arch.	*Wollaston*,	Wollaston.
Stebbins, Alfred, Jr. Chem.	*Roslindale*,	Roslindale.
Steele, Herbert B. Math., Chem., Draw.	*E. Somerville*,	E. Somerville.
Stuart, Frederic M. Civ. Eng., Mech., Met., Phys.	*Newton Centre*,	Newton Centre.
Tappan, David H. Chem., Eng., Shop, Draw.	*Bakersville, N.C.*	Brookline.

NAME.	HOME.	RESIDENCE.
Taylor, William M. Math., Phys., Mech. Eng., Germ., Eng.	*Indianapolis, Ind.*	112 Dartmo'th St.
Tilton, Osmon B. Phys., Mech. Eng., Draw., Shop.	*Nashua, N.H.*	418 Columbus Av.
Todd, Frederick C. Math., Chem., Eng., Draw., Mil.	*Milltown, N.B.*	45 W. Newton St.
Tucker, Greenleaf R. Germ., Biol., Assay., Chem.	*Boston,*	City Hospital.
Tuttle, Edward O. Chem., Math., Bot., Min., Eng., Germ.	*Holyoke,*	61 Dartmouth St.
Varney, William W. Mech. Eng., Math., Shop, Phys., Desc. Geom., Chem., Draw.	*Norfolk, Va.*	14 Yarmouth St.
Wakefield, F. Manton Math., Chem., Eng., Fr., Draw., Arch.	*St. Paul, Minn.*	147 Warren Ave.
Walker, Stoughton Fr., Draw., Chem., Biol.	*Boston,*	237 Beacon St.
Weeks, Harry W. Chem., Draw., Germ., Shop, Mil.	*Framingham,*	Framingham.
Weston, John F., C.S.U.S.A. Chem., Chem. Phil., Biol	*Boston,*	159 High St.
Wetherbee, Frank E. Civ. Eng., Math., Germ., Desc. Geom., Ast., Eng.	*Ellsworth,*	Cambridgeport.
White, Joseph F. Chem., Math., Draw., Germ., Eng.	*Brookline,*	Brookline.
White, Oscar B. Math., Eng., Draw., Chem., Shop.	*St. John, N.B.*	46 Cortes St.
Whitney, Samuel A., Jr. Math., Chem., Shop.	*Glassboro', N.J.*	19 Temple St.
Williams, Alfred B. Arch.	*Taunton,*	Taunton.
Williams, Sidney Germ., Geol., Phys., Draw., Eng., Math.	*Boston,*	15 Arlington St.
Windom, William D. Arch., Math., Mech.	*Boston,*	2 Providence St.

SUMMARY: SCHOOL OF INDUSTRIAL SCIENCE.

GRADUATE STUDENTS,	20
REGULAR STUDENTS, 4th year,	29
" " 3d "	37
" " 2d "	61
" " 1st "	145
SPECIAL STUDENTS,	171
	463
Deduct names counted twice,	20
Total,	443

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 1883–84 are on the following subjects: —

1. Elements of the Calculus. A course of twelve lectures by Professor John D. Runkle, on Mondays and Fridays, at 7.30 p.m., beginning November 9.

2. Elementary Lithology. A course of twelve lectures by Assistant Professor Wm. O. Crosby, on Mondays and Thursdays, at 7.30 p.m., beginning November 12.

3. General Biology. A course of twelve lectures by Assistant Professor Wm. T. Sedgwick, on Tuesdays and Thursdays, at 7.30 p.m., beginning December 4.

4. The XVIII. Century (Lectures and Readings). A course of twelve lectures *in French* by Assistant Professor Jules Luquiens, on Tuesdays and Fridays, at 7.30 p.m., beginning December 7.

5. Studies in Middle High German. A course of twelve lectures by Professor Charles P. Otis, on Mondays and Thursdays, at 7.30 p.m., beginning December 31.

6.–7. Thermometry, Calorimetry, and Thermochemistry. A course of twenty lectures on Physics and Chemical Philosophy, by Professor W. R. Nichols and Assistant Professor S. W. Holman, on Mondays and Wednesdays, at 7.30 p.m., beginning January 28.

8. Spherical Trigonometry with Applications. A course of twelve lectures by Assistant Professor Webster Wells, on Tuesdays and Fridays, at 7.30 p.m., beginning February 5.

SCHOOL OF MECHANIC ARTS.

For the benefit of those who are unable, for want of time or means, to go through one of the regular courses of the School of Industrial Science, and yet desire a good preparation for industrial pursuits, a subordinate School of Mechanic Arts has been established by the Corporation of the Institute, in which special prominence is given to hand work in connection with high-school studies, affording an opportunity to such students as have completed the ordinary grammar-school course to continue the elementary scientific and literary studies, together with mechanical drawing, while receiving instruction in the use of the typical hand and machine tools for working iron and wood.

The general plan of the school is similar to that of the Imperial Technical School of Moscow, the Royal Mechanic Art School of Komotau in Bohemia, the Ecole Municipale d'Apprentis of Paris, or that of the Ambachtsschoole of the principal cities of Holland, but has been specially adapted to the somewhat different conditions existing in our own country. The object is not to fit the pupil for a particular trade, but to develop the bodily and mental powers in harmony with each other, and with reference to the actual wants of life. The hand work is done without regard to pecuniary profit, but is calculated to give the student good judgment, self-reliance, and executive power. Its exact and systematic method affords the direct advantage of training the hand and eye for accurate and efficient service with the greatest economy of time, and the instruction in the use of tools and materials has also proved a valuable aid in intellectual development.

The school has proved so successful that it has outgrown its former limited accommodations, and during the past

summer has been removed to a new building of the Institute on Garrison Street, a short distance from the Rogers Building. The facilities for instruction have been greatly increased; and the new mechanical laboratories, in which the instruction in the mechanic arts is given, have a thorough equipment (see page 42).

The instruction in the mechanic arts given to each regular student at present embraces: —

I. Carpentry and Joinery; II. Wood-turning; III. Pattern-making; IV. Foundry Work; V. Iron Forging; VI. Vise Work; VII. Machine Tool Work.

The regular course also includes two years of study. Special students will be received for shorter times or for particular parts of the course.

The present regular course is as follows: —

REGULAR COURSE.

FIRST YEAR.

FIRST TERM.	SECOND TERM.
Shop Work,— Carpentry.	Shop Work,— Wood-turning, Pattern-making, Foundry Work.
Algebra begun.	Algebra.
Geometry begun.	Plane Geometry.
English Composition.	English Composition.
Mechanical and Free-hand Drawing.	Mechanical and Free-hand Drawing.

SECOND YEAR.

FIRST TERM.	SECOND TERM.
Shop Work,— Forging.	Shop Work,— Vise Work, Machine Tool Work.
Algebra completed.	Geometry.
Elementary Physics.	Physics.
English Composition.	English Composition.
Mechanical Drawing.	Mechanical Drawing.
French.	French.

As there are many who desire a year of study and work additional to the regular course, to become better fitted either for the superintendence of labor or for giving instruc-

tion to others, it is expected that, when the new arrangements are completed, the increased facilities will render such a course possible.

REQUIREMENTS FOR ADMISSION.

Applicants for the regular course must be at least fifteen years of age, and must pass a satisfactory examination, at the time and place of the examinations for the School of Industrial Science, in Arithmetic, Geography, and English Composition. For shop work only, or for mechanical drawing, no examination is required.

REGULATIONS OF THE SCHOOL.

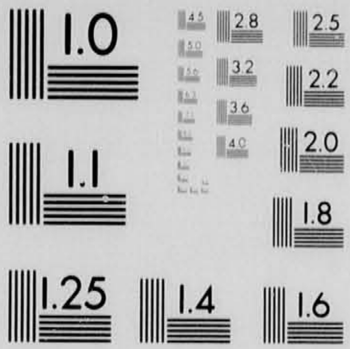
School-year. The beginning and ending of the school-year and the days of examinations are the same as in the School of Industrial Science. (See Calendar, page 72.)

Attendance. Students are expected to be prompt in their attendance on all the exercises of their course, and no excuse will be granted except by special vote of the Officers of Instruction. The daily exercises of the school begin at 9 a.m. and end at 4.15 p.m., with an intermission from 12 until 1.15 p.m., except on Saturdays, when the exercises are closed at noon.

Fees. The tuition fee is one hundred and fifty dollars a year, payable one hundred dollars at the beginning of the year, and fifty dollars at the commencement of the second term (February). Special students taking fewer studies than those of the regular course will be charged less.

No extra charge is made for materials or for the proper use of tools, except in case of special students who pursue more than one branch of shop work at a time. All unnecessary damage to tools or furniture must be paid for.

Each student provides his own drawing instruments. The cost of books and stationery will not exceed fifteen dollars a year.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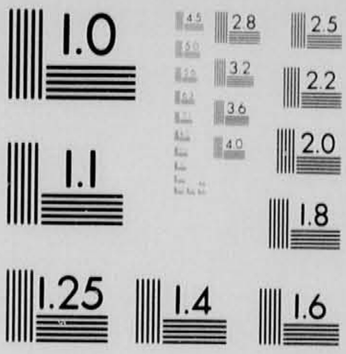
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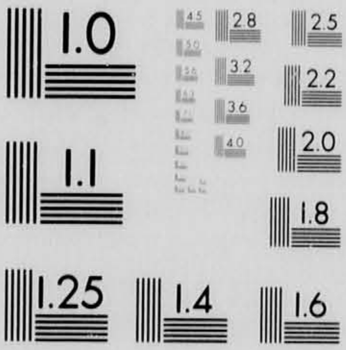
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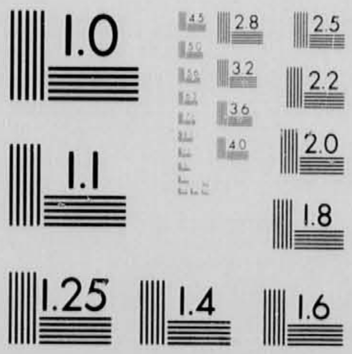
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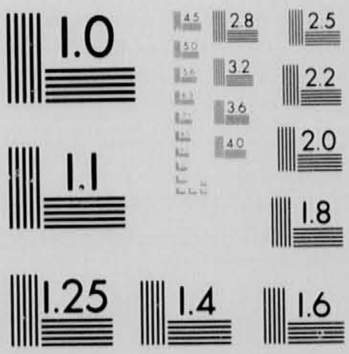
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Bond. The regulations concerning the bond are the same as in the School of Industrial Science. (See page 74.)

Examinations. Examinations are held at the close of each term, and a report of the progress of each student is made to his parent or guardian.

Each regular student will be entitled to a certificate of proficiency on the satisfactory completion of the course.

Scholarships of the Massachusetts Charitable Mechanics' Association. The two scholarships founded by this Association are awarded on competitive examination to sons of present or past members of the Association.

OFFICERS OF INSTRUCTION.

FRANCIS A. WALKER, LL.D., *President.*

PETER SCHWAMB, S.B., *Director of the Workshops.*

JULES LUQUIENS, PH.D., *Instructor in French.*

CLARENCE W. FEARING, A.M., *Instructor in English and Mathematics.*

CHARLES L. ADAMS, *Instructor in Drawing.*

WILLIAM H. PICKERING, S.B., *Instructor in Physics.*

GEORGE SMITH, *Instructor in Wood-working.*

ARTHUR W. SANBORN, *Instructor in Iron Work.*

CHARLES H. STEPHENSON, *Instructor in Machine Tool Work.*

WILLIAM R. MAXWELL, *Assistant in Wood-working.*

——— ———, *Instructor in Foundry Work.*

Special instruction is also given by members of the Faculty of the School of Industrial Science.

SCHOOL OF MECHANIC ARTS.

REGISTER OF STUDENTS.

SECOND YEAR.

NAME.		HOME.	RESIDENCE.
Agassiz, Max	Sp.	*Cambridge,*	Cambridge.
Brown, George A.	Sp.	*Milford, Me.*	80 Waltham St.
Chapman, Winthrop M.	Sp.	*Needham,*	Needham.
Crosby, Herbert H.		*Natick.*	Natick.
Damon, John H.	Sp.	*Plymouth,*	Plymouth.
Dearborn, William L.		*Boston,*	Harrison Sq.
Edwards, Harry O.		*Montreal, P.Q.*	137 W. Chester Pk.
Golden, Michael		*Lawrence,*	Lawrence.
Guest, David P.	Sp.	*Washington, D.C.*	Charlestown,
Hassett, Edward J.		*Lowell,*	Lowell,
Heath, Charles A.		*Brookline,*	Brookline.
Holmes, Joseph E.	Sp.	*Cambridgeport,*	Cambridgeport.
Kennedy, Charles S. L.	Sp.	*N. Easton,*	N. Easton.
Martin, Horace B.		*Chelsea,*	Chelsea.
Nichols, Elijah B.	Sp.	*Dedham,*	Dedham.
Phillips, Arthur B.	Sp.	*S. Abington,*	S. Abington.
Quinn, John F.	Sp.	*S. Newmarket, N.H.*	S. Newmarket, N.H.
Townsend, Arthur F.		*Boston,*	10 Brimmer St.
Trufant, Walter E.		*Abington,*	137 W. Chester Pk.

FIRST YEAR.

Andrews, Charles H.	Sp.	*N. Easton,*	N. Easton.
Chapman, Blanchard	Sp.	*Pittston, Pa.*	
Davis, Walter C.		*Abington,*	Abington.
Dawson, William F.		*Jamaica Plain,*	Jamaica Plain.
Drake, Charles A.	Sp.	*Easton,*	Easton.
Frost, Albert W.	Sp.	*Providence, R.I.*	Providence, R.I.
Gustin, Harry E.		*Boston,*	140 W. N'wt'n St.
Hall, Fred A.		*Weston,*	Weston.
Harrington, E. M.		*Reading,*	Reading.
Hayward, William W.	Sp.	*Easton,*	Easton.
Howard, Henry		*Longwood,*	Longwood.
Johnson, Fred J.	Sp.	*Saco, Me.*	25 Holyoke St.
Leach, Edward F. S.	Sp.	*Manchester,*	Manchester.
Littlefield, Willie S.		*Melrose,*	Melrose.

NAME.		HOME.	RESIDENCE.
Lull, Richard S.		*Charlestown*,	Navy Yard.
Markoe, George B.		*Boston*,	61 Warren Ave.
Marques, João F.	Sp.	*Brazil*,	352 Columbus Av.
Mears, Henry A.		*Neponset*,	Neponset.
Morgan, William R.		*Everett*,	Everett.
Orrok, George A.		*Boston*,	Olney St.
Porter, Fred	Sp.	*N. Easton*,	N. Easton.
Power, Roy W.		*Pittsfield*,	Winchester.
Richardson, Joseph L.		*Abington*,	Abington.
Ricketson, Oliver G.		*Pittsburg, Pa.*	286 Beacon St.
Sears, William B.		*Brookline*,	Brookline.
Seaverns, John A.		*Jamaica Plain*,	Jamaica Plain.
Shepardson, Harold S.	Sp.	*Shelburne Falls*,	26 Grenville Pl.
Snowdon, Edward W.	Sp.	*Cincinnati, O.*	349 Columbus Av.
Thompson, Andrew, Jr.		*Boston*,	8 Moon St.
Tower, Herbert		*Cambridgeport*,	Cambridgeport.
Tuttle, Edward L.	Sp.	*Winsted, Conn.*	Chelsea.
Wesson, Reginald H.	Sp.	*Brookline*,	Brookline.
Weston, Herbert M.	Sp.	*Boston*,	43 St. James St.
Wilcox, Henry A.	Sp.	*Northboro'*,	Newtonville.
Winne, Ernest	Sp.	*Boston*,	35 Hammond St.
Winning, Herbert W.		*Somerville*,	Somerville.
Wright, Lincoln		*Lowell*,	Lowell.

SUMMARY: SCHOOL OF MECHANIC ARTS.

REGULAR STUDENTS, 2d year,	9
" " 1st "	21
SPECIAL " 2d "	10
" " 1st "	16
Total,	56

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 new 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. John Scott, 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 free-hand 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. 29, 1884. The number of students in the school, including those to be admitted, will be limited to sixty. Examinations for applicants for admission will be held on Sept. 23, 1884. 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 the 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.

A list of those who have received the certificate of this school and of their occupations is given at page 127.

STUDENTS.

NAME.	HOME.	RESIDENCE.
Barton, Carrie	*Jamaica Plain,*	Jamaica Plain.
Beal, Morton F.	*Wellesley Hills,*	Wellesley Hills.
Brainard, Ida A.	*Hyde Park,*	Hyde Park.
Carter, Willis S.	*N. Woburn,*	N. Woburn.
Childs, Rosalie	*Dorchester,*	Mt. Bowdoin.
Coburn, Clarence S.	*Charlestown,*	12 Monument Sq.
Codman, Henry S.	*Brookline,*	Brookline.
Cushing, John P.	*Boston,*	Beacon St.
Cushing, Mary E.	*Lowell,*	Lowell.
Drew, Sarah A.	*Cambridgeport,*	Cambridgeport.
Fisher, Susan R.	*Chelsea,*	Chelsea.
Flagg, Lewis G.	*Hanover, N.H.*	22 Ashburton Pl.
Folger, Charles E.	*New Bedford,*	New Bedford.
Folsom, Fred N.	*Salisbury Point,*	102 Boylston St.
Gage, Nellie F.	*Charlestown,*	9 Park St.
Goering, Edwin R.	*Boston,*	16 Beethoven St.
Guild, Marguerite	*Cambridge,*	Cambridge.
Hall, Alice H.	*West Medford,*	West Medford.
Harvey, Agnes	*Boston,*	2462 Washington St.
Hoyt, Mabel M.	*Chelsea,*	Chelsea.
Irish, George O.	*New Bedford,*	New Bedford.
Knowles, Florence M.	*Boston,*	81 Bower St.
Lovering, Ella M.	*Boston,*	192 K St.
McCaffery, F. H.	*Westerly, R.I.*	Westerly, R.I.
Macomber, Sarah N.	*Boston,*	86 Munroe St.
Martin, Frank H.	*Providence, R.I.*	Lynn.
Moulton, David P.	*Chelsea,*	Chelsea.
Mossman, Fidie E.	*Beverly,*	Beverly.
Nawn, George H.	*Boston,*	2 Quincy St.
Noyes, Fred W.	*Melrose,*	Melrose.
Packard, Fred C.	*Jamaica Plain,*	Jamaica Plain.
Paige, Bessie L.	*Lowell,*	Lowell.
Pattee, Stephen B.	*Revere,*	Revere.
Pope, William F.	*Leominster,*	Leominster.
Rawlings, U. S. G.	*Boston,*	3114 Washington St.
Reynolds, Henry R.	*Dorchester,*	Dorchester.
Rice, Maud W.	*Cambridge,*	Cambridge.
Richardson, Fred H.	*Lowell,*	Lowell.

NAME.	HOME.	RESIDENCE.
Ricker, Everett W.	*Jamaica Plain*,	Jamaica Plain.
Roberts, Henry M.	*Hyde Park*,	Hyde Park.
Robinson, Alex. C.	*Roxbury*,	777 Parker St.
Shove, Edward	*Fall River*,	369 Columbus Ave.
Simmons, Elizabeth J.	*Boston*,	383 Fourth St.
Smith, James F.	*Jamaica Plain*,	Jamaica Plain.
Spear, Frank O.	*Jamaica Plain*,	Jamaica Plain.
Springer, Fred A.	*Marlboro'*,	Marlboro'.
Stratton, Charles G.	*Worcester*,	Worcester.
Studley, Edward F.	*Chelsea*,	Chelsea.
Swain, William C.	*Dover, N.H.*	350 Columbus Ave.
Tew, George A. D.	*Worcester*,	Worcester.
Thacher, Ellen H.	*Boston*,	46 Clifford St.
Tilly, William	*Hyde Park*,	Hyde Park.
Underwood, Walter A.	*Dorchester*,	Dorchester.
Underwood, Western	*Boston*,	643 Tremont St.
Ward, Abba L.	*Charlestown*,	40 Soley St.
Webster, Mary K.	*Manchester, N.H.*	68 Warrenton St.
Weston, Lillian M.	*Lowell*,	Lowell.
Whipple, Lillian W.	*Salem*,	Salem.
White, Mary A.	*Chelsea*,	Chelsea.
Wilson, John H.	*Jamaica Plain*,	Jamaica Plain.
Wright, Mary C.	*Sar't'ga Sp'gs, N.Y.*	62 Clarendon St.
Young, Haldimand P.	*Dover, N.H.*	533 Columbus Ave.

TOTAL, 62

THE SOCIETY OF ARTS.

This Society was the first organized of the three distinct component parts, of which, as set forth in the act of incorporation, it was originally intended that the Institute should consist. Its first meeting was held on April 8, 1862; and meetings are now regularly held in the Institute building on the second and fourth Thursdays of each month, from October to May inclusive.

The objects of the Society are to awaken and maintain an active interest in the practical sciences, and to aid generally in their advancement and development in connection with arts, agriculture, manufactures, and commerce. All who have valuable knowledge of this kind, which they are willing to contribute, are invited to attend its meetings, and become members. Persons having valuable inventions or discoveries which they wish to explain will find a suitable occasion in the Society's meetings; and while the Society will never indorse, by vote or diploma, or other official recognition, any invention, discovery, theory, or machine, it will give every facility to those who wish to discuss the principles and intentions of their own machines or inventions, and will endeavor at its meetings, or through properly constituted committees, to show how far any communications made to it are likely to prove of real service to the community.

Abstracts of the proceedings of the Society are printed in one or more of the Boston daily papers, and are also published in an annual report.

Candidates for Associate Membership must be recommended by not less than two members, whose signatures shall be affixed to a written or printed form to that effect. Each nomination is referred to the Executive Committee,

and when reported upon favorably by it, and read by the Secretary, may be acted upon at the same meeting.

Associate Members pay an admission fee of five dollars before being entitled to the privileges of membership, and an annual assessment of five dollars on the first of October of each year.

An Associate Member who shall have paid at any one time the sum of fifty dollars, or annual assessments for twenty years, shall become a member for life, and be thereafter exempt from annual assessments.

Students of the Institute may be present at the meetings by permission of the Secretary of the Faculty.

Among the papers that have been read before the Society during the past year may be mentioned the following : Deep-Sea Soundings, by Commander J. R. Bartlett ; The High-speed Steam Engine, by Mr. Charles T. Porter ; Electric Signal Clock, by Mr. George W. Blodgett ; Japanese Magic Mirrors, by Prof. T. C. Mendenhall ; Faure Electric Storage Battery, by Mr. J. M. Pendleton ; Attitude of Animals in Motion, by Mr. E. Muybridge ; Fine Rulings on Glass and Metals, by Prof. W. A. Rogers ; The Fabrics and Industries of the Phillippine Islands, by Dr. Samuel Kneeland ; The Distribution of Solar Energy, by Prof. S. P. Langley ; The Cummer Steam Engine, by Mr. H. A. Hill ; The Crystallization of Iron and Steel, by Mr. A. F. Hill ; Driven Wells, by Mr. J. C. Hoadley ; The Thomson-Houston System of Electric Lighting, by Prof. Elihu Thomson ; and various others, including a number by Professors and Instructors in the Institute. During the present year, a number of equally interesting papers, covering a wide range of scientific and practical topics, will be presented, of which the following have already been given : Japanese Pottery, by Prof. Edward S. Morse, of Salem ; The Evolution and Breeds of Domestic Animals, as illustrated in Swine, by Prof. Wm. H. Brewer, of New Haven ; The Chemistry of Cotton, by Dr. C. W. Dabney, State Chemist of North Carolina ; Coverings for Steam Pipes, by Prof. J. M. Ordway ; Glass and Glass-making, by Mr. Thomas Gaffield, of Boston, and others.

OFFICERS OF THE SOCIETY FOR 1883-84.

President.

FRANCIS A. WALKER, LL.D.

Executive Committee.

JACOB A. DRESSER, *Chairman.*

HOWARD A. CARSON. C. J. H. WOODBURY.

WALDO O. ROSS.

Secretary.

GEORGE F. SWAIN.

LIST OF MEMBERS.

Life Members.

Allen, Stephen M. . Boston.
Amory, William . . "
Atkinson, Edward . "
Atkinson, William P. "

Baker, William E. . "
Batchelder, J. M. . . Cambridge.
Bond, Geo. W. . . Boston.
Bouvé, T. T. . . . "
Bowditch, J. I. . . . "
Bowditch, Wm. I. . Brookline.
Brimmer, Martin . . Boston.
Browne, C. Allen . . "
Bullard, W. S. . . . "

Cabot, Dr. Samuel . "
Cummings, John . . Woburn.
Cummings, Nathaniel Boston.

Dalton, Chas. H. . . "
Davenport, Henry . "
Delano, J. C. . . New Bedford.
Dupee, James A. . . Boston.

Endicott, Wm., Jr. . "

Farmer, Moses G. . Salem.
Fay, Joseph S. . . . Boston.
Fay, Mrs. Sarah S. . "
Flint, C. L. . . . . "
Forbes, John M. . . "
Forbes, Robert B. . "
Foster, John . . . "
Francis, James B. . Lowell.

Gaffield, Thomas . . Boston.
Gardner, John L. . . "
Gookin, Samuel H. . Lexington.
Greenleaf, R. C. . . Boston.
Grover, Wm. O. . . "

Hemenway, Mrs. M. . "
Henck, J. B. . . . . "
Hoadley, J. C. . . . "
Holmes, Dr. O. W. . "
Homans, Dr. C. D. . "

Johnson, Samuel . . "

Kidder, Henry P. . . "
Kneeland, Dr. Samuel New York.

Lawrence, Amos A. . Boston.
Lee, Henry . . . . "
Lincoln, F. W. . . . "
Little, James L. . . "
Lothrop, Rev. S. K. . "
Lowell, John . . . Newton.

Matthews, Nathan . Boston.
May, J. J. . . . . "

Ordway, John M. . . "

Peabody, O. W. . . "
Philbrick, E. S. . . "
Philbrick, J. D. . . Danvers.
Pickering, E. C. . . Cambridge.
Pratt, Miss . . . . Boston.
Preston, Jonathan . "

Rice, Alex H. . . . "
Richardson, George C. "
Rogers, Henry B. . Boston.
Ross, M. Denman . Jamaica Pl.
Ross, Waldo O. . . "
Runkle, John D. . . Brookline.

Sayles, Henry . . . Boston.
Sullivan, R. . . . . "

Tobey, Edward S. . "

Wales, Geo. W. . . "
Wales, T. B. . . . "
Wales, Miss . . . "
Ware, Wm. R. . . . New York.
Warren, Cyrus M. . Brookline.
Whitaker, Channing . Lowell.
Wilder, M. P. . . . Boston.
Williams, H. W. . . "
Winthrop, R. C. . . "
Wolcott, J. H. . . . "

Associate Members.

Adams, Joseph H. . Boston.
Allen, W. S. . . . New Bedf'd.
Amory, Thos. C. . . Boston.
Appleton, Thos. G. . "
Atwood, Nath'l E. Provincetown.

Baker, C. M. . . . Boston.
Beal, James H. . . . "
Bender, Richard W. . "
Bernstein, A. . . . "
Billings, Geo. H. . . So. Boston.
Blodgett, A. D. . Boston.
Blodgett, G. W. . . "
Brown, E. W. . . . "
Brown, G. W. . . . "
Bunce, F. M. . . . Charlestw'n.
Burton, A. E. . . . Boston.

Carpenter, Geo. O. . "
Carruth, Charles . . "
Carson, H. A. . . . "
Chandler, S. C., Jr. . "
Clapp, Wm. W. . . "
Clark, T. M. . . . . "
Clark, John M. . . . "
Clark, John S. . . . "
Coffin, F. S. . . . . "
Cross, Chas. R. . . "

Davis, Barnabas . . "
Deblois, S. G. . . . "
Dewson, F. A. . . . Newtonville.
Dix, John H. . . . Boston.
Doane, Thomas . . Charlest'wn.
Dresser, Jacob A. . . Boston.

Eastman, Ambrose . "

Felton, S. M., Jr. . . "
Fisher, C. H. . . . "
Flint, E. A. . . . . "
Fuller, H. Weld . . "

Gibbens, Joseph M. . "
Guild, Curtis . . . "
Guild, Henry . . . "
Guild, Henry . . . "

Hammett, W. A. . . "
Hammond, Geo. W. . "
Hartford, R. Frank . Newburyp't.
Hathaway, John G. . Boston.
Haven, Franklin . . "
Henck, John B., Jr. . "
Hewins, Edmund H. . "
Hill, Hamilton A. . . "
Hollerith, Herman . Washingt'n.
Hollingsworth, S. . . S. Braintree.
Holman, Silas W. . . Boston.
Howe, H. M. . . . "
Hubbard, Chas. T. . "
Hyde, Geo. B. . . . "

Hyde, Henry D. . . Boston.
Jenks, Lewis E. . . "
Kastner, Chas. . . . "
Kehew, John . . . "
Kendall, J. H. . . Cambridgep't.
Kendall, Edward . "
Ladd, W. H. . . . Boston.
Lanza, Gaetano . . . "
Lewis, Chas. W. . . "
Little, James L., Jr. . Brookline.
Little, John M. . . . Boston.
Low, J. G. . . . . Chelsea.
Lowe, N. M. . . . Boston.
Lowell, A. L. . . . "
Lowell, Percival . . "
Lodge, H. Ellerton . "
Lyman, Theodore . . "
Marble, Geo. R. . . "
Markoe, G. F. H. . . "
May, F. W. G. . . . "
McClure, Chas. . . "
McPherson, W. J. . "
Mixter, S. J. . . . . "
Moore, Alex. . . . So. Boston.
Morris, Chas. W. . . Boston.
Mower, Geo. A. . . "
Nichols, Wm. R. . . Roxbury.
Niles, Wm. H. . . . Cambridge.
Norton, Jacob . . . Boston.
Norton, L. M. . . . Natick.
Osborne, Geo. A. . . Boston.
Parsons, Wm. . . . "
Paul, J. F. . . . . "
Peabody, C. H. . . "
Peabody, W. B. O. . "
Pickering, H. W. . . "
Pickering, Wm. H. . "
Plumer, Avery . . . "
Pope, Edward E. . . "
Prang, Louis . . . "
Van Praag, Judah . . "
Purinton, James . . "
Richards, R. H. . . Jamaica Pl.
Ritchie, E. S. . . . Brookline.
Robbins, James M. . Milton.
Roberts, Geo. L. . . Boston.
Robinson, J. R. . . Boston.
Ruggles, John . . . "
Richardson, Charles . "
Ruddick, H. . . . . "
Russell, Robert S. . "
Salisbury, D. Waldo . "
Sawyer, Edward . . Newton.
Sawyer, Joseph . . Boston.
Sawyer, Jacob H. . . "
Sawyer, Timothy T. Charlestown.
Schofield, W. J. . . Boston.
Schwamb, Peter . . "
Sears, Philip H. . . "
Sedgwick, W. T. . . "
Shaw, Henry S. . . "
Sherwin, Thos. . . Jamaica Pl.
Shimmin, Chas. F. . Boston.
Shurtleff, A. M. . . "
Sill, A. N. . . . . "
Sinclair, Alex. D. . . "
Smith, Chauncy . . Cambridge.
Sprague, Chas. J. . . Boston.
Stantial, F. G. . . . Melrose.
Stanwood, Henry P. . Boston.
Stevens, Benj. F. . . "
Sturgis, John H. . . Brookline.
Swain, Geo. F. . . . Boston.
Taber, C. A. . . . Lynn.
Thompson, Wm. H. . Boston.
Tolman, Jas. P. . . W. Newton.
Tufts, John W. . . Boston.
Tuttle, Joseph H. . . "
Vose, George L. . . "
Walker, Francis A. . "
Ware, Chas. E. . . "
Warren, Joseph H. . "
Warren, Sam'l D. . . "
Watson, R. S. . . . Milton.
Watson, Wm. . . . Boston.
Wellington, C. A. . . "
Weston, David M. . "
Whitman, Herbert T.
Whitmore, Wm. H. . "
Whiton, David . . . "
Whitwell, W. S. . . "
Williams, F. H. . . "
Wing, Chas. H. . . "
Woodbridge, S. H. . "
Woodbury, C. J. H. . Lynn.
Wyman, Morrill . . Cambridge.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

GRADUATES FROM THE

SCHOOL OF INDUSTRIAL SCIENCE.

The Roman numerals in the column marked "Course" denote the course in which the Graduate received the degree of S.B.

1868.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
ELLERY C. APPLETON, Allentown, Pa.	III.	Civil Engineer, Lehigh Coal and Navigation Co.
WHITNEY CONANT, 443 W. 73d St., New York.	III.	Civil Engineer.
* FRANK R. FIRTH,	I.	Died June 9, 1872.
ELI FORBES, Clinton, Mass.	Sci. and Lit.	Chemist at the Lancaster Mills.
CHARLES C. GILMAN, Marshalltown, Marshall Co., Ia.	III.	Chief Engineer, Iowa Improvement Co.
CHARLES E. GREENE, Ann Arbor, Mich.	I.	Prof. of Civil Engineering, University of Michigan.
ALBERT F. HALL, Boston, Mass.	II.	Draughtsman in the employ of the George F. Blake M'f'g Co.
WILLIAM E. HOYT, Rochester, N.Y.	I.	Chief Engineer of Rochester & Pittsburg R.R. Co.
ROBERT H. RICHARDS, Boston, Mass.	III.	Prof. of Mining Engineering, Mass. Institute of Technology.
WALTER H. SEARS, 35 Congress St., Boston.	I.	Chief Engineer, Winchester Water Works.
CHARLES A. SMITH, Box 998, Newburyport, Mass.	I.	Out of Health. Late, Professor at Washington Univ.
JOSEPH STONE, Lawrence, Mass.	I.	Supt. Worsted Dept., Pacific Mills.
BRYANT P. TILDEN, Junction, Carleton Co., Minn.	III.	Resident Engineer, N. P. R.R.
JAMES P. TOLMAN, West Newton.	III.	M'f'r of Cordage, 164 High St., Boston.

1869.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
WILLIAM H. BAKER, Las Vegas, New Mexico.	I.	Chief Engineer's office, A., T. & S. F. R.R.
HOWARD A. CARSON, 68 Devonshire St., Boston.	I.	Civil Engineer.
J. RAYNER EDMANDS, Cambridge, Mass.	II.	In charge of Time Service at the Observatory of Harvard University.
WM. RIPLEY NICHOLS, Boston, Mass.	V.	Professor of General Chemistry, Mass. Institute of Technology.
CHANNING WHITAKER, Box 524, Lowell, Mass.	II.	Mechanical Engineer.

1870.

*EDWARD K. CLARK,	II.	Died Sept. 10, 1878.
CHARLES R. CROSS, Boston, Mass.	Sci. and Lit.	Professor of Physics, Mass. Institute of Technology.
RUSSELL H. CURTIS, 154 Madison St., Chicago, Ill.	I.	Lawyer.
CHARLES W. HINMAN, 32 Hawley St., Boston, Mass.	III.	State Inspector of Gas.
SAMPSON D. MASON, Brainard, Minn.	I.	Principal Assistant Engineer, N. P. R.R.
N. FREDERICK MERRILL, Salem, Mass.	V.	Chemist.
THEODORE F. TILLINGHAST, Warren Street, Boston.	I.	In Business.
EDMUND K. TURNER, Boston, Mass.	I.	Assist't Superintendent and Chief Engineer, Fitchburg Railroad.
DANIEL W. WILLARD, 55 Broadway, New York City.	II.	Of the firm of Babb, Cook & Willard, Architects.
LAWRENCE F. J. WRINKLE, Virginia City, Nevada.	III.	Mining Engineer.

1871.

FOSTER E. L. BEAL, Ames, Iowa.	I.	Prof. of Zoölogy and Comparative Anatomy, Agricultural College.
ADDISON CONNOR, Superior, Wis.	I.	Engineer on Northern Pacific R.R.
*HENRY M. CUTLER,	I.	Died May 16, 1877.
*ELMER FAUNCE,	III.	Died July 6, 1882.
EDW. H. FOOTE, 10 No. Market St., Boston, Mass.	I.	In Business.
FRANK L. FULLER, 7 Exchange Pl., Boston, Mass.	I.	Civil Engineer.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
HENRY M. HOWE, 75 State St., Boston, Mass.	III.	Consulting Metallurgist and Mining Engineer.
ALBERT H. HOWLAND, 12 West St., Boston, Mass.	I.	Civil Engineer.
G. RUSSELL LINCOLN, Box 65, Harrisburg, Pa.	III.	In Business.
WILLIAM A. PIKE, Minneapolis, Minn.	I.	Professor of Engineering, University of Minnesota.
GEORGE H. PRATT, So. Boston, Mass.	V.	Chemist at the Bayside Alkali Works.
EDWARD W. ROLLINS, Denver, Col.	III.	Broker.
WALTER W. SMITH, Dayton, Ohio.	II.	Builder of Steam Pumps and Hydraulic Machinery (Smith, Vaile & Co.).
CHARLES F. STONE, Waltham, Mass.	III.	Lawyer.
* ALMARIN TROWBRIDGE, Jr.,	II.	Died Dec. 5, 1878.
ISAIAH S. P. WEEKS, Missoula, Montana.	I.	Division Engineer, Takema Div., N. P. R.R.
RANDALL WHITTIER, Portland, Me.	V.	In Business.
	1872.	
C. FRANK ALLEN, Topeka, Kan.	I.	A., T. & S. F. R.R.
B. E. BREWSTER, Cheyenne, Wyoming Ter.	III.	Manager, War Bonnet Live Stock Co.
WILLIAM B. DODGE, Columbus, Ohio.	I.	Scale and Gas Inspector, P. C. & St. L. R.R., Steubenville, O.
FREDERIC A. EMMERTON, Joliet, Ill.	V.	Chemist at the Joliet Iron and Steel Co.'s Works.
JAMES A. HERRICK, Pittsburg, Penn.	V.	General Supt., Spang Steel and Iron Co.
JAMES M. HODGE, Greenup, Ky.	III.	Mining and Civil Engineer, Eastern Ky. R.R.
BRADFORD H. LOCKE, Central City, Col.	III.	Mining Engineer.
CHARLES S. MINOT, Harvard Medical School, Boston, Mass.	V.	Instructor in Histology and Embryology.
MAURICE B. PATCH, Houghton, Mich.	III.	Lake Superior Copper Smelting Co.
WALTER SHEPARD, Dorchester, Mass.	I.	Assistant Engineer, Boston & Albany R.R.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
RICHARD H. SOULE, 24 State St., New York, N.Y.	II.	Supt. of Motive Power, N. Y., W. S. & B. and N. Y., O. & W. R'ys.
CLARENCE S. WARD, 62 Sears Building, Boston, Mass.	III.	Lawyer.

1873.

AMORY AUSTIN, 82 Water St., Boston, Mass.	V.	Chemist.
GEORGE W. BLODGETT, 63 Kilby St., Boston, Mass.	I.	Manufacturing Electrician, and Electrician B. & A. R.R.
WILLIAM E. BROTHERTON, Cincinnati, Ohio.	V.	Second National Bank.
*SAMUEL A. FABENS, Jr.,	I.	Died March 14, 1875.
SAMUEL M. FELTON, Jr., Boston, Mass.	I.	General Manager, N.Y. & N.E. R.R.
FREDERICK L. FISHER, Medway, Mass.	I.	Insurance Agent and Broker, 35 Kilby St., Boston, and Medway, Mass.
FREDERICK GUILD, Jr., 94 Boylston St., Boston, Mass.	Sci. and Lit.	Whittier Machine Co., 1176 Tremont St.
WILLIAM D. HARRIS, 292 Nelson St., Ottawa, P.Q., Canada.	I.	Civil Engineer.
CLARENCE L. HOWES, Hanover, Mass.	I.	Physician.
*WILLIAM P. JEWETT, Colorado Springs, Col.	I.	Died Jan. 4, 1884.
WILLIAM A. KIMBALL, 371 Canal St., New York City.	II.	In Business.
*WILLIAM C. MAY,	V.	Died March 11, 1878.
FRANK B. MORSE, Murphy's, Cal.	I.	Supt., Oro Plata Mining and Milling Co.
CHARLES O. PARSONS, 77 State St., Boston, Mass.	III.	Mining Engineer.
HENRY A. PHILLIPS, Boston, Mass.	IV.	Student at Mass. Institute of Technology.
GEORGE PHILLIPS, Marshfield, Mass.	III.	Superintendent of an Antimony Mine.
ELLEN H. RICHARDS, Boston, Mass.	V.	Inst'r in Chemistry in the Mass. Institute of Technology.
HENRY L. RIPLEY, Care Horatio Adams, Box 2526, Boston, Mass.	I.	Lieut. U.S. Army, 24th Infantry.
ROBERT A. SHAILER, Milwaukee, Wis.	I.	Engineer, Bridges and Buildings, C., M. & St. P. R.R.
C. EDWARD STAFFORD, Steelton, Dauphin Co., Pa.	III.	Supt., Open Hearth Furnace, Steel Department, Penn. Steel Works.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
SAMUEL E. TINKHAM, 224 Federal St., Boston, Mass.	I.	Assistant Engineer, N. Y. & N. E. R.R.
FRANK W. VERY, Allegheny, Pa.	V.	Assistant Astronomer, Allegheny Observatory.
WEBSTER WELLS, Boston, Mass.	I.	Asst. Prof. of Mathematics, and Secretary, Mass. Inst. of Tech.
RANDALL WHITTIER,	I.	(See Record of Class of 1871.)
FRANCIS H. WILLIAMS, 100 Boylston St., Boston, Mass.	V.	Physician.
LOUIS F. WOOD, 56 Broad St., Boston, Mass.	V.	Chemical and Color Manufacturer.

1874.

HERBERT BARROWS, 290 Franklin St., Boston, Mass.	I.	Of the Chauncy Rubber Co.
GEORGE H. BARRUS, 81 Milk St., Boston, Mass.	II.	Consulting Steam Engineer.
WILLIAM T. BLUNT, 25 Euclid Ave., Cleveland, O.	I.	Of the firm of Eisenmann & Blunt, Architects and Engineers.
GEORGE E. DOANE, Middleboro', Mass.	I.	Of the firm of J. & G. E. Doane, Hardware.
WILLIAM B. DOWSE, 290 Franklin St., Boston, Mass.	IV.	Of the Chauncy Rubber Co.
JOSEPH S. EMERSON, Honolulu, Hawaiian Islands.	I.	Civil Engineer.
ELIOT HOLBROOK, Providence, R.I.	I.	Civil Engineer, 283 Westminster St.
AECHIRAU HONGMA, Tokio, Japan.	I.	Civil Engineer.
CHARLES P. HOWARD, Hartford, Conn.	I.	With J. L. Howard & Co., dealers in Railway and Car Builders' Supplies.
FRANK H. JACKSON, Maple Hill, Kan.	III.	Stock-raising.
* WILLIS H. MYRICK,	II.	Died Oct. 17, 1875.
HERBERT B. PERKINS, Appleton, Wis.	I.	Professor of Mathematics and Astronomy, Lawrence University.
FRANK H. POND, 709 Market St., St. Louis, Mo.	II.	Proprietor Pond Engineering Co.
EDWARD S. SHAW, Boston, Mass.	I.	Bridge and Consulting Engineer, B. & L. R.R.
FRANCIS H. SILSBEE, Lawrence, Mass.	II.	Mechanical Engineer, Pacific Mills.
* ARTHUR W. SWEETSER,	I.	Died April 10, 1878.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
* ROBERT C. WARE,	Sci. & Lit.	Died June 25, 1883.
STEPHEN H. WILDER, 65 W. 3d St., Cincinnati, Ohio.	Sci. & Lit.	Lawyer.

1875.

SAMUEL E. ALLEN, 65 Chauncy St., Boston.	I.	Agent for the Nashawanuck Manufacturing Co.
JAMES L. ARNOTT, 371 Canal St., New York, N.Y.	Sci. & Lit.	In Business.
AMOS J. BOYDEN, 413 Walnut St., Philadelphia, Penn.	IV.	Of the firm of Cabot, Chandler & Boyden, Architects.
MOSES D. BURNETT, Ocala, Marion Co., Fla.	III.	Of the firm of Robinson, Burnett & Co., Milling Business.
HENRY K. BURRISON, Boston, Mass.	I.	Instructor in Drawing in the Mass. Institute of Technology.
CHRISTOPHER P. CHURCH, Lewisburg, Greenbriar Co., W. Va.	I.	Sheep-farming.
FRANK S. DODGE, Cor. Ashland Ave. and Thirty-first St., Chicago, Ill.	I.	With Union Iron and Steel Company.
EDGAR S. DORR, Mt. Auburn, Mass.	I.	Employed in the Sewer Dept., Boston, Mass.
WILLIAM C. EDES, San Francisco, Cal.	I.	Assistant Engineer on the Southern Pacific Railroad.
CHAS. W. GOODALE, Charlestown, Pima Co., Arizona.	III.	Supt. of Boston and Arizona Smelting and Reduction Works.
EDWARD A. W. HAMMATT, 5 Pemberton Sq., Boston, Mass.	I.	Civil Engineer.
EDW. A. HANDY, Care Palmer, Sullivan & Co., City of Mexico, Mexico.	I.	Civil Engineer.
* JAMES H. HEAD,	II.	Died Aug. 18, 1875.
THOMAS HIBBARD, 8 Exchange Pl., Boston, Mass.	II.	Mechanical Engineer.
* WILLIAM F. HUNTINGTON,	I.	Died Aug. 7, 1877.
LEONARD P. KINNICUTT, Worcester, Mass.	V.	Assistant Professor of Chemistry at Worcester Free Institute.
JAMES A. KNAPP, Abington, Mass.	II.	Of the firm of J. B. Knapp & Son, Manufacturers Boots and Shoes.
WILFRED LEWIS, Philadelphia, Pa.	II.	Mechanical Engineer with Wm. Sellers & Co., Philadelphia, Pa.
SAMUEL J. MIXTER, 180 Marlboro' St., Boston, Mass.	VIII.	Assistant in Anatomy, Harvard Medical School.
BENJAMIN A. OXNARD, Brooklyn, N.Y.	III.	Superintendent of Fulton Sugar Refinery.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
THOMAS D. PLIMPTON, Hyde Park, Mass.	II.	Employed in the Manufacture of Woollen Goods.
WILLIAM A. PRENTISS, Holyoke, Mass.	Sci. and Lit.	Of the firm of Geo. W. Prentiss & Co., Manufacturers Iron Wire.
FRANCIS T. SARGENT, New York, N.Y.	II.	In Business.
WELLAND F. SARGENT, Pullman, Ill.	I.	In charge of Civil Engineering Dept., Pullman Palace Car Co., Kensington, Ill.
WILLIAM H. SHOCKLEY, Candalaria, Esmeralda Co., Nev.	III.	Supt. Mt. Diablo Mill and Mining Co.
JAMES B. STANWOOD, Mt. Auburn, Cincinnati, O.	II.	Head Draughtsman and Engineer with Lane & Bodley.
H. L. J. WARREN, Red Cliff, Eagle Co., Col.	III.	Mining Engineer, and Editor, Eagle River *Shaft*.
WILLIAM R. WEBSTER, Athens, Pa.	III.	Bridge Inspector for Kellogg & Maurice.

1876.

CHARLES F. ALLEN, Occidental Hotel, San Francisco, Cal.	III.	Mining Engineer and Metallurgist.
THOMAS ASPINWALL, Brookline, Mass.	I.	Civil Engineer, 7 Exchange Place, Boston.
WILLIAM P. ATWOOD, Lowell, Mass.	V.	Chemist at the Hamilton Print Works.
THOMAS W. BALDWIN, Bangor, Me.	I.	In Business.
WALTER B. BARROWS, Middletown, Conn.	VII.	Instructor in Botany and Assistant in Natural History, Wesleyan University.
AARON D. BLODGETT, 63 Kilby St., Boston, Mass.	II.	Electrician.
JOSHUA B. F. BREED, 1026 Fourth Ave., Louisville, Ky.	I.	Resident Engineer, Louisville, New Albany & St. Louis R.R.
HARRY T. BUTTOLPH, Buffalo, N.Y.	I.	Draughtsman, City Engineer's office.
WILLIAM O. CROSBY, Boston, Mass.	VII.	Assistant Professor of Mineralogy and Lithology in Mass. Institute of Technology.
FREDERICK K. COPELAND, Ottumwa, Ia.	I.	Supt. of the Ottumwa & Kirkville R.R.
WILLIS E. DAVIS, San Francisco, Cal.	Sci. and Lit.	Employed by Davis & Cowell, M'f'rs of Santa Cruz Lime.
* CLARENCE L. DENNETT,	II.	Died June 5, 1878.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
CHARLES R. FLETCHER, Boston, Mass.	V.	Lecturer on Chemistry in Boston Univ., and Mass. State Assayer.
JOHN R. FREEMAN, Lawrence, Mass.	I.	Principal Assistant Engineer, Essex Water Power Co.
FRANCIS E. GALLOUPE, 1 Park St., Lynn, Mass.	II.	Hinkley Locomotive Co.
* ROBERT H. GOULD,	VI.	Died Nov. 19, 1878.
JOHN B. HENCK, Jr., Boston, Mass.	VIII.	Electrician.
FRANK W. HODGDON, Arlington, Mass.	I.	Asst. Engineer with the Harbor and Land Commiss'ers of Mass.
SUMNER HOLLINGSWORTH, So. Braintree, Mass.	II.	Pres. of Hollingsworth & Whitney Paper Co., Boston.
SILAS W. HOLMAN, Boston, Mass.	VIII.	Asst. Professor of Physics, Mass. Institute of Technology.
ALFRED E. HUNT, 102 Fourth Ave., Pittsburg, Penn.	III.	Pittsburg Testing Laboratory.
WILLIAM W. JACQUES, 109 Court St., Boston, Mass.	VIII.	Electrician of the Am. Bell Telephone Co., and Instructor, Mass. Institute of Technology.
SAMUEL JAMES, Jr., Cooke City, Montana Ter.	III.	Supt., Republic Mining Co.
ALFRED C. KILHAM, Springfield, Mo.	II.	Employed in repair shops of St. Louis & San Francisco R.R.
THEODORE J. LEWIS, 2224 Greene St., Philadelphia, Pa.	II.	With the Standard Steel Works, 220 So. Fourth St.
ALBERT H. LOW, Argo, Col.	V.	Chemist, Boston & Colorado Smelting Co.
CHARLES T. MAIN, Lawrence, Mass.	II.	Engineer at the Pacific Mills.
ARTHUR L. MILLS, Everett, Mass.	I.	Civil Engineer (in California).
WILLIAM E. NICKERSON, 351 Broadway, N. Somerville, Mass.	V.	Chemist.
D. W. PHIPPS, 209 Washington St., Boston.	Phil.	Counsellor at Law.
CHARLES F. PRICHARD, Dedham, Mass.	II.	Superintendent of the Dedham and Hyde Park Gas Works.
HENRY RAEDER, Jr., Aurora, Ill.	I.	Asst. Engineer of C. B. & Q. R.R.
CHARLES L. RICH, E. Jaffrey, N.H.	I.	Book-keeper, Monadnock National Bank.
* T. W. ROBINSON,	III.	Died Nov. 3, 1880.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
CHARLES A. SAWYER, 1640 Indiana Ave., Chicago, Ill.	Sci. & Lit.	Attorney at Law, 110 Dearborn St., Chicago, Ill.
THEODORE E. SCHWARZ, Denver, Col.	III.	Mining Engineer.
JULIUS H. SUSMANN, 42 Upton St., Boston, Mass.	III.	In Business.
WALTER D. TOWNSEND, Yokohama, Japan.	III.	With the American Clock and Brass Co.
CHARLES N. WAITE, 23 Court St., Boston, Mass.	V.	Chemist, Avery Lactate Co.
HENRY M. WAITT, Minneapolis, Minn.	I.	Instructor in Civil Engineering, University of Minnesota.
* ROBERT C. WARE,	Phil.	Died June 25, 1883.
HENRY B. WOOD, 2828 Washington St., St. Louis, Mo.	I.	Assistant Engineer, U.S. Survey of the Miss. River.

1877.

JOHN ALDEN, Lawrence, Mass.	V.	Chemist at the Pacific Mills.
GEORGE BARTOL, Cleveland, Ohio.	III.	Employed at the Otis Iron and Steel Works.
CHARLES S. BACHELDER, San Francisco, Cal.	V.	Exchange Teller in the Pacific Bank.
J. WILLIAMS BEAL, Hanover P.O., So. Scituate, Mass.	IV.	Architectural Draughtsman.
WILLIAM H. BEECHING, Boston, Mass.	II.	In the Cork Business, 61 Blackstone St., Boston.
HENRY H. CARTER, 55 St. James St., Roxbury, Mass.	I.	Asst. Engineer, Improved Sewerage of Boston.
G. WALTER CAPEN, Canton, Mass.	IV.	Architect.
WILLIAM E. CHAMBERLIN, 6 Beacon St., Boston, Mass.	IV.	Architect.
* GEORGE R. CHAPMAN,	II.	Died Jan. 21, 1879.
LINUS FAUNCE, Norwood, Mass.	II.	With N. Y. & N. E. R.R. Co.
CHARLES H. FISHER, Ponkapoag P.O., Canton, Mass.	II.	Instructor in Mech. Engineering, Mass. Inst. of Tech.
* WILLIAM C. FLINT,	III.	Died June 14, 1881.
PIERCE P. FURBER, 322 Pine St., St. Louis, Mo.	IV.	In charge of office of Peabody & Stearns, Architects.
MARTIN GAY, W. New Brigh'n, Staten Isl., N.Y.	I.	Leveller in Department of Public Works of New York City.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
JOSEPH P. GRAY, Grand St., Lowell, Mass.	I.	Asst. Engineer in office of Proprietors of Locks and Canals on Merrimack River.
EDMUND GROVER, San Marcial, New Mexico.	I.	Asst. to the Engineer of Bridges and Buildings, A. T. & S. F. R.R.
RICHARD A. HALE, Lawrence, Mass.	I.	Asst. Engineer with the Essex Water Power Co.
JOHN E. HARDMAN, Box 396, Lowell, Mass.	III.	Mining Engineer and Metallurgist.
HENRY D. HIBBARD, Springfield, Ill.	III.	Supt. Boiler Plate Mill, Springfield Iron Co.
WALTER JENNEY, 56 G St., So. Boston, Mass.	III.	Chemist at Stephen Jenney & Co.'s Coal Oil Works.
JOSEPH KIRK, Box 174, Rondout, N.Y.	II.	Mech. Engineer for Wallkill Portland Cement Co.
GEORGE W. KITTREDGE, Zanesville, Ohio.	I.	Engineer, Maintenance of Way, Muskingum Valley Div., P. C. & St. L. R.R.
CHARLES F. LAWTON, New Bedford, Mass.	I.	Engineer Dept., A. & P. R.R., Arizona.
BENJAMIN C. MUDGE, 72 Summer St., Salem, Mass.	I.	With the Deane Steam Pump Co. of Holyoke.
CECIL H. PEABODY, Boston, Mass.	II.	Instructor in Applied Mechanics, Mass. Inst. of Tech.
ARTHUR L. PLIMPTON, 7 Hawthorn St., Roxbury, Mass.	I.	Asst. on Engineering Corps of Improved Sewerage of Boston.
HARRY C. SOUTHWORTH, Hancock, Houghton Co., Mich.	III.	Mining Engineer.
* CHARLES E. STEWART,	I.	Died Oct. 7, 1877.
THOMAS F. STIMPSON, Providence, R.I.	III.	With the Silver Spring Bleaching and Dyeing Co.
GEORGE F. SWAIN, Boston, Mass.	I.	Asst. Professor of Civil Engineering, Mass. Inst. of Tech.
FRANK E. WIGGIN, Cordoba, Argentine Republic.	I.	National Observatory.
FREDERICK W. WOOD, Steelton, Dauphin Co., Pa.	III.	Asst. Supt., Pennsylvania Steel Co.

1878.

WILLIAM B. ALLBRIGHT, Chicago, Ill.	V.	Chemist with N. K. Fairbank, 18th and Blackwell Sts., Chicago.
CHARLES M. BAKER, 117 Com'wealth Av., Boston, Mass.	IV.	With Baker & Morrill, 40 Equitable Building, Boston.
TAKUMA DAN, Osaka, Japan.	III.	Professor of Chemistry, Osaka University.
CHARLES S. EATON, 63 Hanover St., Boston.	IV.	In Business.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
ALFRED S. HIGGINS, 130 Court St., Boston, Mass.	IV.	With R. R. Higgins & Co.
JULIAN A. KEBLER, Chariton, Lucas Co., Iowa.	I.	Trackmaster on the Chicago, Burlington & Quincy R.R.
FRANK H. MORGAN, Springfield, Mass.	V.	Chemist, with Newell Bros. Manufacturing Co.
EVERELL J. NICHOLS, Burlington, Iowa.	I.	Engineer Corps, C. B. & Q. R.R.
FREDERICK H. PRENTISS, 28 State St., Boston, Mass.	II.	Mechanical Engineer.
JAMES RITCHIE, Wilson's Point, La.	I.	Asst. Engineer, Miss. River Improvement.
JAMES W. ROLLINS, Jr., 55 Broadway, New York, N.Y.	I.	With M. T. Seymour.
CHARLES D. SAWIN, 368 Main St., Charlestown, Mass.	Sci. and Lit.	House Physician, Boston City Hospital.
PETER SCHWAMB, Boston, Mass.	II.	Instructor in Mech. Engineering, Mass. Inst. of Tech.
FREDERIC P. SPALDING, 471 Middlesex St., Lowell, Mass.	I.	Employed in the City Engineer's office, Boston, Mass.
ISAAC M. STORY, Boston, Mass.	I.	Chief Engineer, Boston & Lowell R.R.
EDMUND TANEY, Washington, D.C.	I.	With the U.S. Coast and Geodetic Survey.
LINWOOD O. TOWNE, Rico, Col.	III.	Assayer, Grand View Mining and Smelting Co.
EMILE F. WILLIAMS, 230 Washington St., Boston, Mass.	I.	In Business.
JAMES G. WOOLWORTH, Providence, R.I.	V.	Chemist with Silver Spring Bleaching and Dyeing Co.

1879.

WALTER S. ALLEN, Boston, Mass.	V.	Instructor in Chemical Analysis, Mass. Institute of Technology.
SAMUEL T. BRALEY, Rutland, Vt.	II.	Draughtsman, Howe Scale Co.
JOHN W. CABOT, Johnstown, Penn.	III.	Asst. Supt., Bessemer Steel Dept., Cambria Iron Co.
HARRY H. CAMPBELL, Steelton, Dauphin Co., Penn.	III.	Asst. Supt., Basic Bessemer Dept., Penn. Steel Co.
FRED. S. COFFIN, Auburndale, Mass.	III.	With Stoddard, Lovering & Co., 10 Milk St., Boston, Mass.
W. OTIS DUNBAR, 223 S. Fourth St., Philadelphia, Pa.	II.	Signal Department, Penn. R.R.
GEO. W. FABENS, Burlington, Iowa.	I.	Employed on the Chicago, Burlington & Quincy R.R.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
CHARLES S. GOODING, 89 Court St., Boston, Mass.	II.	Mechanical Engineer & Draughtsman.
ERNEST G. HARTWELL, 68 Devonshire St., Boston, Mass.	IV.	With Hartwell & Richardson, Architects.
RAPHAEL M. HOSEA, Burlington, Iowa.	I.	On Engineer Corps of the Chicago, Burlington & Quincy R.R.
HORACE J. HOWE, Brainerd, Minn.	I.	Chief Engineer's office, N. P. R.R.
FRED. B. KNAPP, Cambridge, Mass.	I.	Supt. of Buildings and Instructor in Surveying and Drawing, Harvard University.
FRED. H. LANE, Chambersburg, Penn.	II.	Superintendent of the Chambersburg Woollen Mills.
FRED. R. LORING, 8 Greenwich Pk., Boston, Mass.	VII.	Studying in Germany.
WM. W. MACFARLANE, Philadelphia, Penn.	V.	Asst. Superintendent, Quaker City Dye Works.
ARTHUR H. METCALF, Pawtucket, R.I.	II.	General Manager, Campbell Machine Co.
EDWIN C. MILLER, 611 Washington St., Boston, Mass.	II.	With Henry F. Miller, Piano Manufacturer.
EDWARD H. OWEN, Jr., Lowell, Mass.	II.	Mill Engineer, Lowell Machine Shop.
WILLIAM H. PICKERING, Boston, Mass.	VIII.	Instructor in Physics, Mass. Institute of Technology.
GEORGE F. RIGGS, Memphis, Tenn.	I.	Asst. Engineer, K. C., S. & M. R.R.
FRANK G. STANTIAL, Melrose, Mass.	V.	In charge of Cochrane Chemical Co.'s Ammonia Works, E. Cambridge.
WM. S. STEARNS, Lockland, Ohio.	I.	Supt., Stearns & Foster Co.'s Cotton Factory.
ARTHUR M. WAITT, 37 Arch St., Boston, Mass.	II.	Mechanical Engineer, Eastern R.R.
	1880.	
GEORGE H. BARTON, Boston, Mass.	III.	Assistant in Geology, Mass. Institute of Technology.
CHAS. H. BROWN, Zacatecas, Mexico.	I.	Mexican National Construction Co.
EDWIN E. CHASE, Central City, Col.	I.	U.S. Deputy Surveyor.
FREDERICK W. CLARK, Boston, Mass.	III.	Instructor in the Mining and Metallurgical Laboratory, Mass. Institute of Technology.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
GEORGE W. HAMILTON, Squantum, Mass.	I.	Engineer Corps, Dept. of Improved Sewerage.
LORING R. MILLEN, New York, N.Y.	III.	Assayer.
WILLIAM T. MILLER, 611 Washington St., Boston, Mass.	Elective.	With Henry F. Miller, Piano Manufacturer.
* NATHANIEL C. SMALL,	V.	Died July 14, 1880.

1881.

IRA ABBOTT, Windsor Hotel, Montreal, P.Q.	I.	Vice-President and Asst. Engineer, Dominion Bridge Co.
JOHN H. ALLEN, Pueblo, Col.	III.	Assayer, Pueblo Smelting and Refining Co.
* JAMES S. ATKINSON, Hogansville, Ga.	II.	Died Dec., 1883.
AMOS BINNEY, A.B., Walpole, Mass.	V.	Chemist, Walpole Dye and Chemical Works.
DAVID S. BISSELL, Pittsburg, Penn.	III.	In the Iron Business.
FRANK H. BRIGGS, 78 High St., Boston, Mass.	IX.	With W. L. Montgomery, Broker in East India Goods.
FRANK E. CAME, Windsor Hotel, Montreal, P.Q.	I.	Asst. Engineer, Dominion Bridge Co.
FRANK D. CHASE, Rochester, N.Y.	III.	Superintendent, Municipal Gas Light Co.
BENJAMIN G. COLLINS, Edgartown, Mass.	II.	Quartermaster on Rio Janeiro Steamship.
HARRY H. CUTLER, 19 W. Cedar St., Boston, Mass.	II.	Mill Superintendent.
F. GRAEF DARLINGTON, Arch St., Allegheny City, Penn.	IX.	Engineer of Maintenance of Way, P. C. & St. L. Div., P. C. & St. L. R.R.
JOHN DUFF, Jr., Atlanta, Alturas Co., Idaho.	V. B.	Supt., Big Lode Mining Co.
MARIE O. GLOVER, A.M., 321 Gates Ave., Brooklyn, N.Y.	V.	Chemist with Dr. E. R. Squibb.
DAVID S. GODDARD, Steelton, Pa.	III.	In charge of Forge and Sp. Steel Dept., Penn. Steel Co.
WALTER J. KOEHLER, Pueblo, Col.	V. B.	Asst. Metallurgist, Pueblo Smelting and Refining Co.
EDWIN J. LEWIS, Jr., Adams St., Dorchester, Mass.	IV.	Draughtsman, Peabody & Stearns.
WM. B. LINDSAY, A.B., Crompton, R.I.	V.	Chemist, U.S. Dyeing Co.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
JAMES LUND, 27 Sever St., Charlestown, Mass.	V.	Asst. in Chemical Analysis, Mass. Institute of Technology.
GEORGE A. MOWER, West Newton, Mass.	II.	Expert Engineer, Crosby Steam Gage and Vapor Co.
WEBSTER NORRIS, Johnstown, Penn.	III.	Chemist, Cambria Iron Co.
EVELYN M. ORDWAY, Jamaica Plain, Mass.	V.	Asst. in Biology, Mass. Institute of Technology.
THEODORE PARKER, Creston, Ia.	I.	Engineer on Western Div., C. B. & Q. R.R.
NATHANIEL W. SHED, Nashua, N.H.	V.	Chemist with the Nashua Iron and Steel Co.
WILLIAM R. SNEAD, 1222 Chestnut St., Louisville, Ky.	IV.	Supt., Snead & Co.'s Architectural Iron Works.
HAROLD E. STEARNS, Wyoming, Ohio.	II.	Supt. of Machinery, Stearns & Foster, Cincinnati.
EDWARD R. WARREN, Gothic, Col.	VII.	Assayer.
CHARLES M. WILKES, 7 Ashburton Pl., Boston, Mass.	IV.	Asst. Engineer of Improved Sewerage of Boston.
ARTHUR WINSLOW, Hazleton, Pa.	III.	Asst. Geologist, 2d Geological Survey of Pa.

1882.

CLARA P. AMES, Harvard, Mass.	V.	Assistant in Bromfield School.
THOMAS B. CARSON, Iowa City, Ia.	II.	American Glucose Co.
EDWARD F. ELY, A.B., Boston, Mass.	IV.	Instructor in Architecture, Mass. Institute of Technology.
GEORGE FAUNCE, Jr., A.B., Mansfield Valley, Allegheny Co., Pa.	III.	Asst. Supt. of Pennsylvania Lead Co.'s Works.
HARRY A. FOSS, Jamaica Plain, Mass.	II.	Student of Law at Boston University.
CHARLES A. FRENCH, Boston, Mass.	III.	Asst. in Mathematics, Mass. Institute of Technology.
HOWARD V. FROST, Arlington, Mass.	V.	Asst. in General Chemistry, Mass. Institute of Technology.
EDWARD G. GARDINER, Baring Bros., London, Eng.	VII.	Student, Leipzig, Germany.
FRANCIS P. HALL, Columbia St., Dorchester, Mass.	V.	Travelling.
GEORGE L. HEINS, 49 Gilfillan's Block, St. Paul, Minn.	IV.	Architect.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
CHARLES D. JENKINS, 32 Hawley St., Boston, Mass.	V.	Asst. State Inspector of Gas.
JAMES W. JOHNSON, 35 Congress St., Boston, Mass.	I.	With Percy M. Blake, C.E.
JOHN F. LOW, Chelsea, Mass.	V.	Of the firm of J. G. & J. F. Low Art Tile Works.
HARRY G. MANNING, Box 244, Newton, Mass.	II.	Draughtsman, B. & A. R.R. Machine Shops.
GEORGE W. MANSFIELD, Greenville, N.J.	III.	Asst. Electrician, Daft Electric Light Co.
FRANK C. MORRISON, S. Framingham, Mass.	I.	Asst., Boston Water Works.
JAMES P. MUNROE, Boston, Mass.	III.	Registrar, Mass. Institute of Technology.
CARRIE L. RICE, Denver, Col.	V.	Asst. in the Denver High School.
WILLIAM T. RIPLEY, Rutland, Vt.	II.	With Ripley Brothers, Marble Dealers.
HENRY F. ROSS, Jamaica Plain, Mass.	III.	In Business.
JOHN H. ROSS, Jamaica Plain, Mass.	Elective.	In Business.
GRENVILLE T. SNELLING, New York, N.Y.	IV.	Supt. of Construction of Hospital Buildings, N. Brother Id.
WALTER B. SNOW, Watertown, Mass.	II.	With B. F. Sturtevant, Blowers and Engines, Jamaica Plain.
ANTHONY C. WHITE, Boston, Mass.	VIII.	Asst. Electrician, N. E. Weston Electric Light Co.

1883.

HERBERT T. BARDWELL, Holyoke, Mass.	I.	With Holyoke Water Power Co.
GEORGE H. BRYANT, Lowell, Mass.	II.	Office of Proprietors of Locks and Canals.
HARVEY S. CHASE, Manchester, N.H.	II.	Employed in the Manchester Mills.
FRANK E. DAVIS, 210 S. Water St., Chicago, Ill.	II.	Mechanical Engineer.
JOHN G. EPPENDORFF, Boston, Mass.	IV.	Asst. in Applied Mechanics, Mass. Institute of Technology.
GEORGE J. FORAN, 54 Oliver St., Boston, Mass.	II.	With Deane Steam Pump Co.
WILLIAM B. FULLER, Jamestown, D.T.	I.	Asst. Eng., Track, Bridges, and Buildings, N. P. R.R.

NAME AND ADDRESS.	COURSE.	OCCUPATION.
HORACE B. GALE, Boston, Mass.	II.	With N.E. Weston Electric Light Co.
GEORGE H. GUSTIN, Boston, Mass.	III.	With Vapor Fuel Co.
FREDERIC O. HARRIMAN, Jaltipan, Mex.	I.	Tehuantepec Inter-Ocean R.R.
JAMES H. HUTCHINGS, Boston, Mass.	II.	Student, Mass. Institute of Technology.
HARVEY M. MANSFIELD, Wakefield, Mass.	III.	Chemist, Common Sense Fertilizer Co., 42 Congress St., Boston.
ROBERT W. SCOTT, Philadelphia, Pa.	II.	With Southwark Foundery and Machine Co.
GEORGE A. SMITH, Arlington, Mass.	V.	With Tahanto M'f'g Co., Electro-platers, Boston.
FRANK TENNEY, Steelton, Dauphin Co., Pa.	III.	With Penn. Steel Co.
CHARLES H. TOMPKINS, Jr., Boise City, I.T.	III.	Asst. Eng., Survey of Canal for Irrigation.
GEORGE R. UNDERWOOD, Boston, Mass.	V.	Asst. in Chem. Analysis, Mass. Institute of Technology.
DAVID WESSON, Boston, Mass.	V.	Private Asst. to Prof. W. R. Nichols, Mass. Inst. of Technology.

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 1876,	42
1869,	5	1877,	32
1870,	10	1878,	19
1871,	17	1879,	23
1872,	12	1880,	8
1873,	26	1881,	28
1874,	18	1882,	24
1875,	30	1883,	18

Total,	326
Deduct names counted twice,	2
	324

GRADUATES FROM THE

SCHOOL OF MECHANIC ARTS.

1879.

WM. F. M. GOSS, Lafayette, Ind.	Instructor in the Mechanic Arts, Purdue University.
JAS. W. LAWRENCE, Fort Collins, Col.	Professor of Mechanics and Drawing in State Agricultural College.
GEO. A. SMITH, Arlington, Mass.	Graduate of School of Industrial Science, in the class of 1883. (See record of that class.)

1880.

M. PENNOCK BARNARD, Steelton, Dauphin Co., Pa.	Clerk in store of Penn. Steel Co.
ARTHUR W. SANBORN, Mass. Institute of Technology, Boston.	In charge of Iron Work in the School of Mechanic Arts.

1881.

PARKER C. CHOATE, Howells, Yavapai Co., Arizona Ter.	With Howell Smelting and Mining Co.
GEORGE A. COBURN, Hopkinton, Mass.	Worked with N.E.Weston Electric Light Co. till he injured his eyes. Not working at present.
JAS. F. DORSEY, 22 Commerce St., Hartford, Conn.	In Business.
WALTER E. FROST, Neponset, Mass.	In Business, 26 Federal St., Boston.
CHAS F. HOPKINS, 113 Liberty St., New York.	In a Brass Foundry.
HARRY M. POPE, Denver, Colorado.	Agent for Columbia Bicycles.
LYMAN SISE, Murphy's, Calaveras Co., Cal.	Milling.

1882.

SOLOMON F. CUSHMAN, Monson, Mass.	With his father, manufacturing Fancy Cassimeres.
ROBERT B. TWEEDY, Milwaukee, Wis.	On the Survey of the Wisconsin Central R.R.

1883.

HENRY H. DREW, 19 Jay St., Cambridgeport, Mass.	With J. L. Drew & Son, Gold and Silver Refiners, Boston.
JOHN W. HINKLEY, Cor. High and Irving Sts., Brookline, Mass.	Draughtsman at Boston Bridge Works.
WM. R. MAXWELL, Mass. Institute of Technology, Boston.	Assistant in Wood Work, School of Mechanic Arts.
RUDOLPH F. STAHL, 792 Tremont St., Boston.	In Business.

SUMMARY.

Class of 1879,	3
1880,	2
1881,	7
1882,	2
1883,	4
Total,	18

GRADUATES FROM THE

LOWELL SCHOOL OF PRACTICAL DESIGN.

Of the ladies reported without employment in the following list, eight have been married since graduation: they appear on the list with the names with which they received the certificate of the school.

1875.

Everett Anthes,	Manchester Print Co., Boston.
Annie W. Barnard,	At home. Florida.
James B. Folsom,	Hartford Carpet Co., Thompsonville, Ct.
H. J. Green,	Teacher of Drawing, South Boston.
Howard Hinckley,	Hamilton Woollen Co., N.Y.
Mary I. Jefferson,	Manchester Print Co., Boston.
Alexander Johnston,	Pacific Mills, Lawrence.
Elizabeth Mendum,	Manchester Print Co., Boston.
Henry Morse,	Artist.

1876.

Charles H. Cowdrey,	Hamilton Manuf'ring Co., Boston, Mass.
Edgar Eames,	Pacific Mills, Boston.
Silas R. Eaton,	Pacific Mills, Boston.
Carrol S. Faunce,	Pacific Mills, Boston.
Ernest R. Pierce,	Pacific Mills, Lawrence.
Minnie C. Ricker,	Hamilton Print Manufacturing Co.

1877.

Mary E. Frederick,	Oil Cloth Designer.
Caroline S. Greene,	Crayon Artist, Boston.
Samuel Hudson,	Pacific Mills, Lawrence.
Henry P. Mabille,	American Print Co., New York.
Salmon C. Pennock,	Artist, Flower Painting, Boston.
*William Schroeder,	Died June, 1880.
Kate T. Simonds,	At home. Philadelphia.
Annie D. Stimers,	At home. New York.
John H. Tarbell,	Donnell Manufacturing Co., New York.

1878.

Frank Hyde,	Merrimac Print Co., Boston.
Harriet A. Parker,	Roxbury Carpet Co., Roxbury.
Caroline L. Stafford,	At home. Boston.
Harry M. Symmes,	Merrimac Print Co., Boston.

Fannie W. Tewksbury,	Artist, Flower Painting, Newtonville.
Charles H. Underwood,	Pacific Mills, Lawrence.
Charles A. Washburne,	Amsterdam Carpet Co., Amsterdam, N.Y.
Reuben Winslow,	Merrimac Print Co., Boston.

1879.

George Albro,	Pacific Mills, New York, N.Y.
Elizabeth C. Bott,	At home. Boston.
Eva M. Close,	Forbes Lithograph Co., Boston.
Charles C. Cox,	Forbes Lithograph Co., Boston.
Abbott Grave,	Artist in Flowers, Boston.
Mindora Kennedy,	Artist in Wax Flowers, Boston.
John McMann,	Lowell Carpet Co., Boston.
Hermann W. Meierhardt,	In Business. Boston.
William V. O'Leary,	New England Glass Co., Cambridge.
William H. C. Pierce,	Lowell Carpet Co., Lowell.
Helen Smiley,	Teacher in Drawing, Waterville, Me.
Florence Starbuck,	Crayon Artist, Jamaica Plain.
Frank P. Woods,	Mystic Print Works, Medford.

1880.

Marie Therese Baker,	Oil Cloth Designer, Newton.
Lizzie F. Burnes,	Oriental Print Works, Boston.
Mary T. F. Cook,	Drawing, with Robinson Engraving Co.
Abraham Doolittle,	Designer, Ames Sword Co., Chicopee, Mass.
Clarence H. Lewis,	New England Glass Co., Cambridge.
Philip Little,	Artist in Water Color, Boston.
Frederic R. Tower,	Pacific Mills, New York.
Delphina Weston,	Asst. in Designing, Lowell School of Design.
Henry S. White,	Lancaster Mills, Clinton.

1881.

James B. Boardman,	Oriental Print Works, Boston.
Leila D. Collins,	At home.
Abbie A. French,	Teacher of Drawing.
Grace A. French,	Teacher of Drawing.
Ella C. Frost,	Lowell Carpet Co., Boston.
Gustave B. Kiander,	Lowell Carpet Co., Boston.
Clara Leeman,	Arlington Mills, Lawrence.
John T. McBarron,	Mystic Carpet Co., Boston.
Louisa M. Ordway,	At home. Jamaica Plain, Mass.
Andreas Sass,	Greenwich Print Works, N.Y.
Fidelia Sheldon,	At home.

Frank L. Tainter,	Lowell Carpet Co., Boston.
Albert F. Urban,	American Print Works, Boston,
Lucy W. Valentine,	Lowell Carpet Co., Boston.
Edward F. Whitmore,	Putnam Woollen Co., Putnam, Conn.

1882.

Winthrop E. Benner,	Lovering Cotton Mills, Taunton.
Mabel J. Boyd,	Mystic Carpet Mills, Medford.
Henry F. Bryant,	Forbes Lithographic Co.
Alex. B. Clough,	Merrimac Print Works.
Walter T. Dana,	Lowell Carpet Mills.
Emma F. Dowd,	Manchester Print Works.
Charles Gowing,	Pacific Mills.
Arthur A. Haserick,	Arlington Mills, Lawrence.
Arthur S. Leland,	Methuen Woollen Mills.
George D. Rice,	Marysville, California.
Ida C. Rogers,	Glasgow Gingham Mills, S. Hadley Falls.
John Scott,	Assistant in Weaving Department, Mass. Institute of Technology.
Lucius E. Shattuck,	Arnold Print Works.
Reuben Simmons,	Arnold Print Works.

1883.

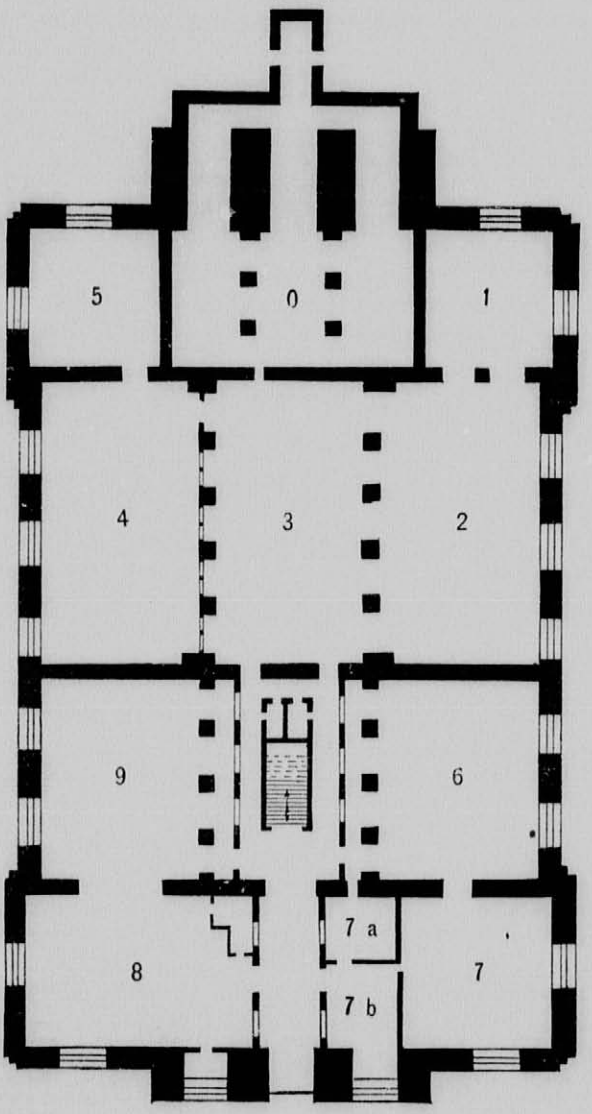
Thomas D. Aylward,	Embroidery. C. N. Carter, Boston.
George H. Baker,	Wall Paper. C. W. Robinson.
Edward D. Chandler,	Arnold Constable & Co., New York.
Solomon F. Cushman,	Monson Woollen Mills.
Fred W. Dillon,	Springfield Woollen Mills.
Eric Ericson,	Pacific Mills. Print Designer.
Edwin C. Foss,	Silk Designer. H. C. Davis, Boston.
Annie W. Hennig,	At home. Print Designer.
Walter H. Hersey,	
Herbert W. Munn,	Silk Designer. H. C. Davis, Boston.
Gertrude Rauch,	At home. Carpet Designer.
W. H. Weeks,	Embroidery Designer. Clapp, Boston.
Emily M. Whitten,	McDonald Glass Co.
Fred N. Williams,	Wall Paper Designer. Corse & Smith.
Carrie M. Winkley,	At home. Carpet Designer.

ROGERS BUILDING.

BASEMENT.

Boylston Street.

(SOUTH.)



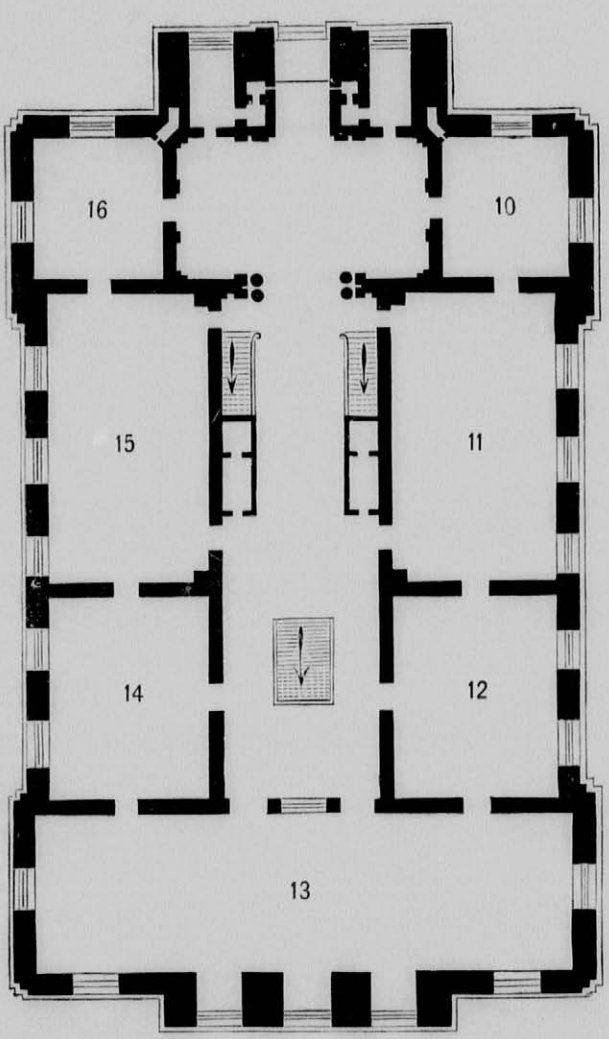
0. Boiler Room.
1. Mechanical Engineering Laboratory.
2. Mechanical Engineering Laboratory.
3. Mechanical Engineering Laboratory.
4. Laboratory of Applied Mechanics.
5. Laboratory of Applied Mechanics.
6. Assaying Room.
7. Mining Laboratory.
8. Mining Laboratory.
9. Metallurgical Laboratory.

ROGERS BUILDING.

FIRST STORY.

Boylston Street.

(SOUTH.)



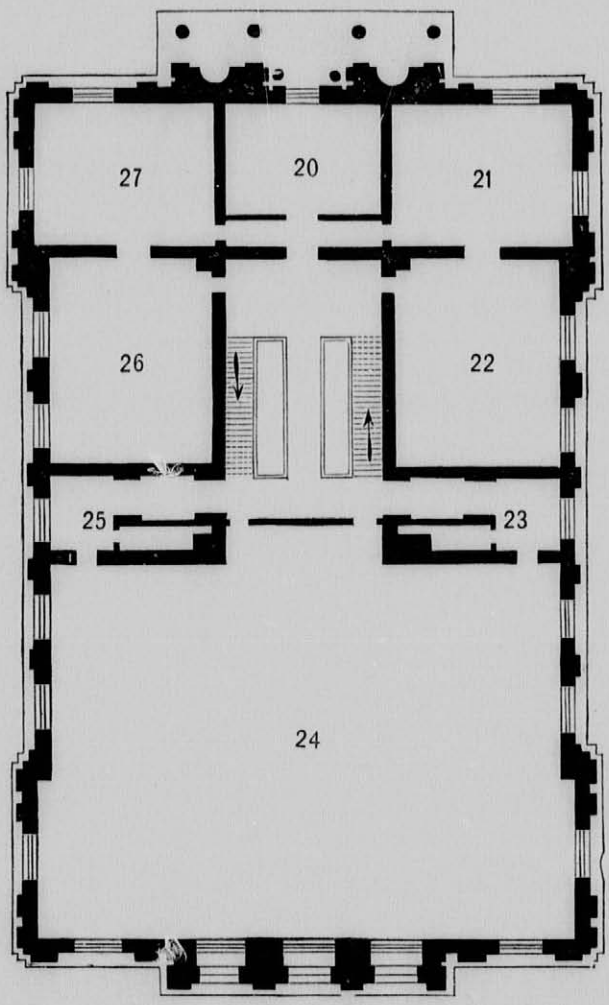
10. President's Office.
11. General Reading Room for Students.
12. Mineralogical Lecture Room.
13. Biological Laboratory.
14. Geological Lecture Room.
15. Society of Arts Room.
16. Secretary's and Bursar's Offices.

ROGERS BUILDING.

SECOND STORY.

Boylston Street.

(SOUTH.)



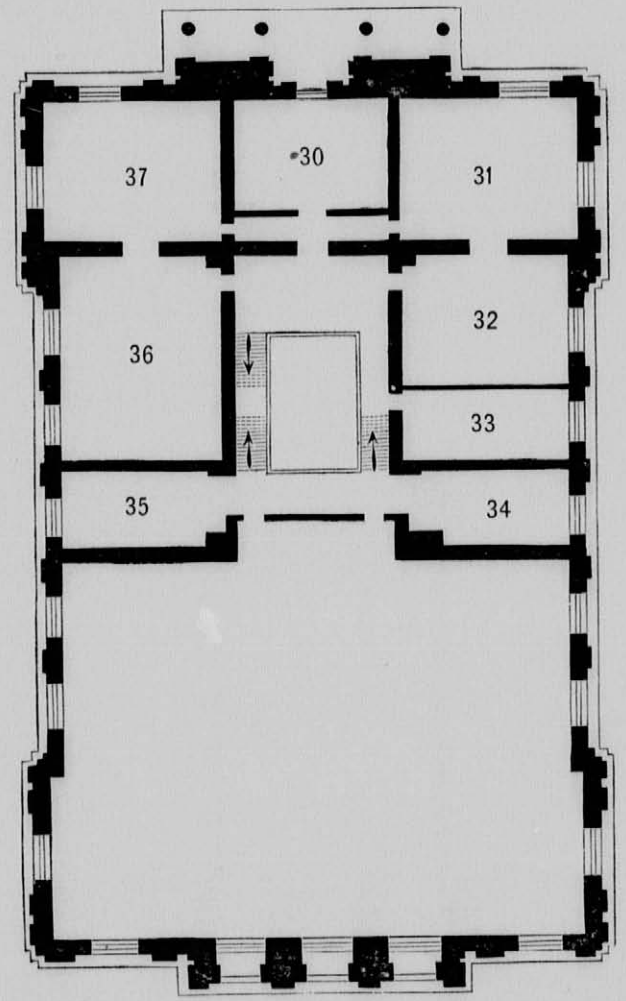
20. Mathematical Recitation Room.
21. Mathematical Recitation Room.
22. Mathematical Recitation Room.
23. Passageway to Huntington Hall.
24. Huntington Hall. Seating capacity, 836.
25. Passageway to Huntington Hall.
26. Mathematical Recitation Room.
27. Mathematical Recitation Room.

ROGERS BUILDING.

THIRD STORY.

Boylston Street.

(SOUTH.)



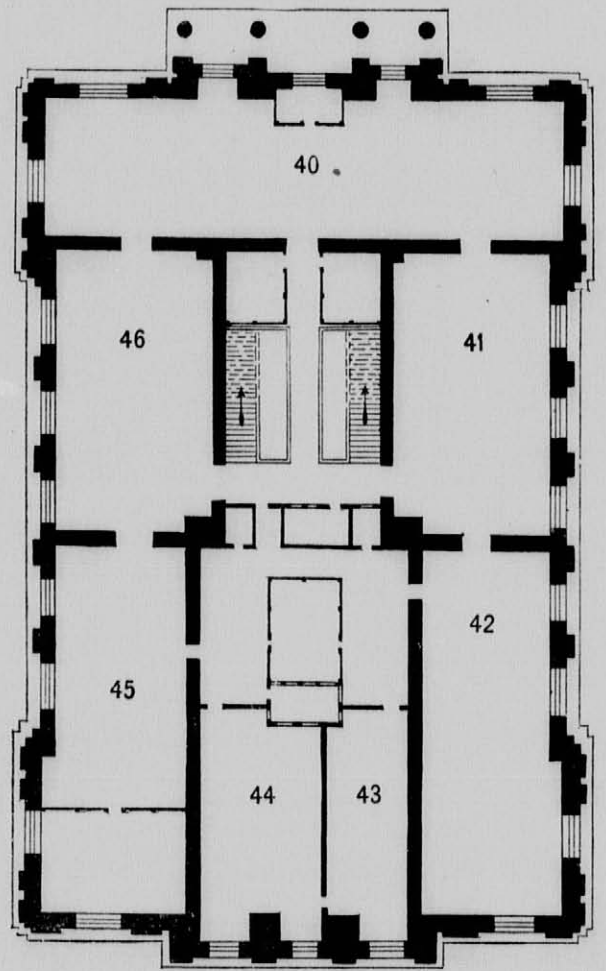
30. Unassigned.
31. Students' Reading Room.
32. Unassigned.
33. Private Study.
34. Private Study.
35. Ante-Room to Huntington Hall.
36. Mineralogical Laboratory.
37. Recitation Room.

ROGERS BUILDING.

FOURTH STORY.

Boylston Street.

(SOUTH.)



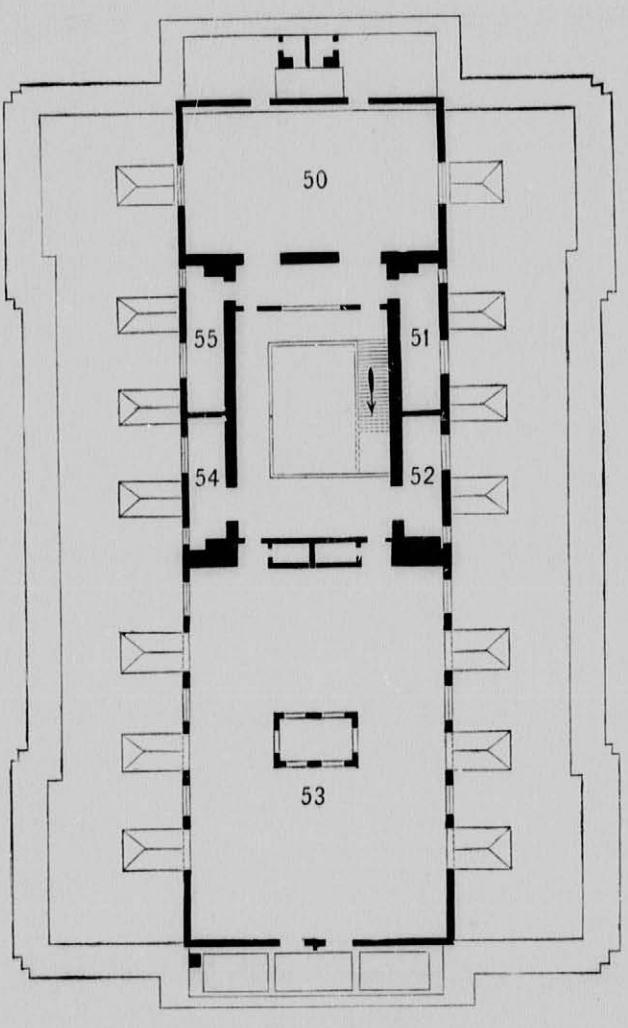
40. Civil Engineering Drawing Room.
41. Mechanical Engineering Drawing Room.
42. Mechanical Engineering Drawing Room.
43. Professor Lanza's Room.
44. Mechanical Engineering Recitation Room.
45. Civil Engineering Drawing Room.
46. Civil Engineering Recitation Room.

ROGERS BUILDING.

FIFTH STORY.

Boylston Street.

(SOUTH.)



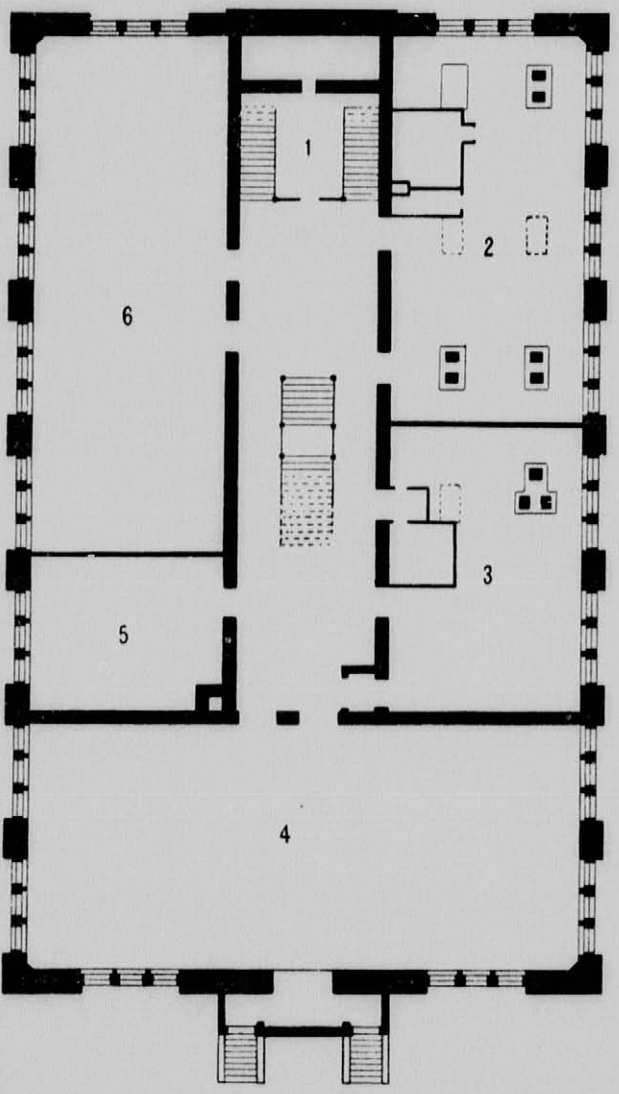
50. Reading Room for Students in Drawing.
51. Stationery Room.
52. Private Study.
53. First Year Drawing Room.
54. Wash Room.
55. Private Study.

NEW BUILDING.

BASEMENT.

Boylston Street.

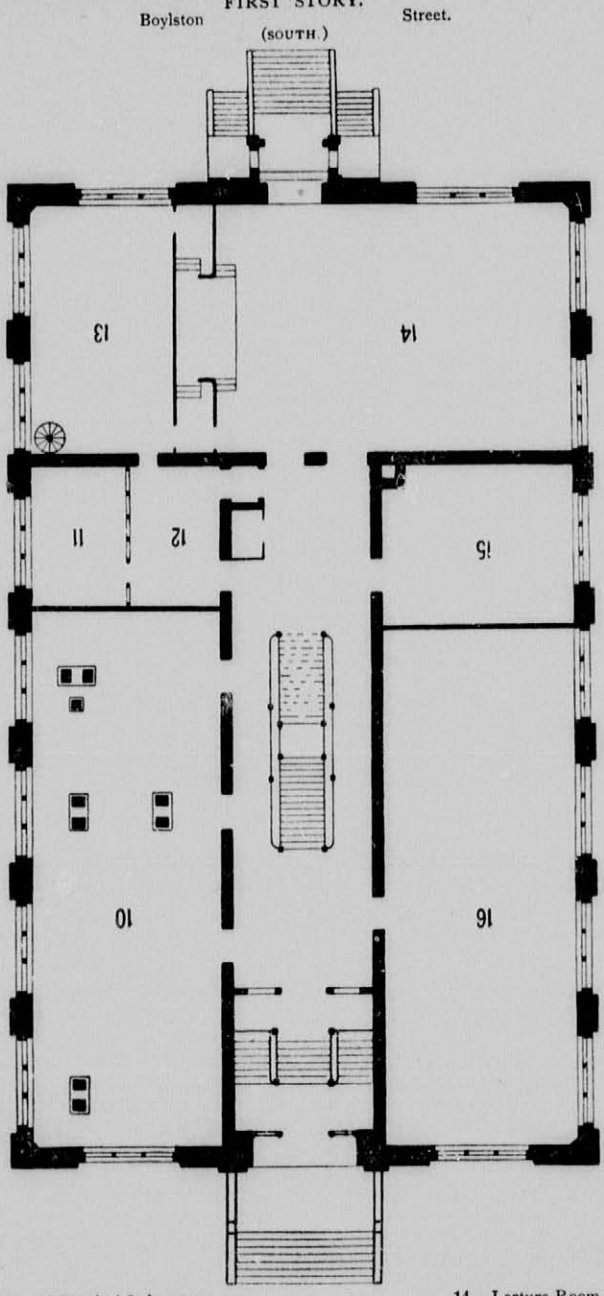
(SOUTH.)



1. Chemical Storage Room.
2. Photographic and Electrical Laboratory.
3. Chemical Storage Room.
4. Hall.
5. Ventilation and Heating.
6. Electrical Engineering Laboratory.

NEW BUILDING.

FIRST STORY.



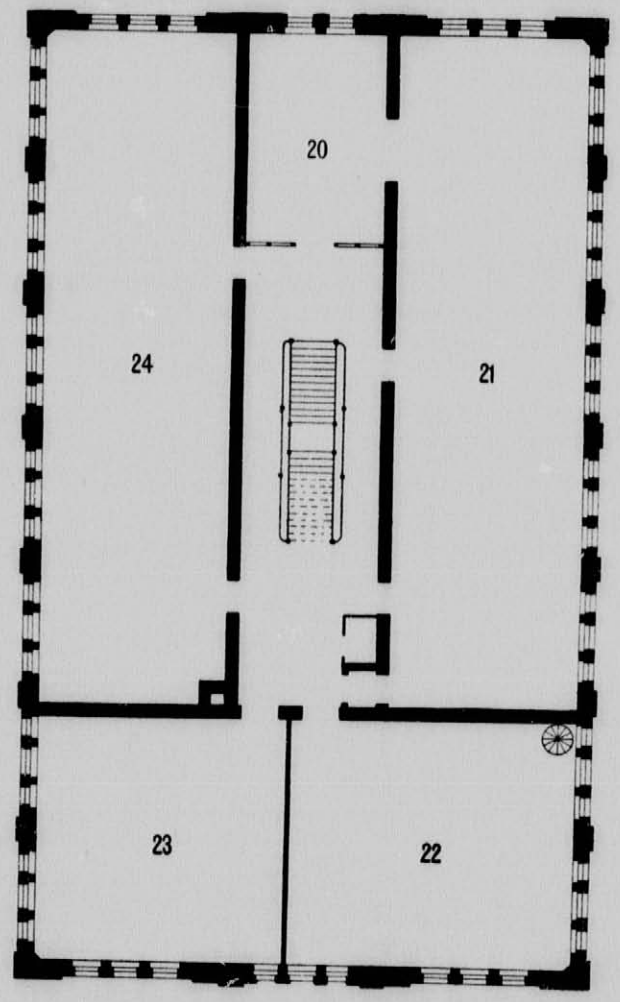
10. Advanced Physical Laboratory.
11. Small Physical Lecture Room.
12. Apparatus Room.
13. Private Study and Laboratory of Physics.
14. Lecture Room.
15. Physical Library.
16. Physical Laboratory.

NEW BUILDING.

SECOND STORY.

Boylston Street.

(SOUTH.)



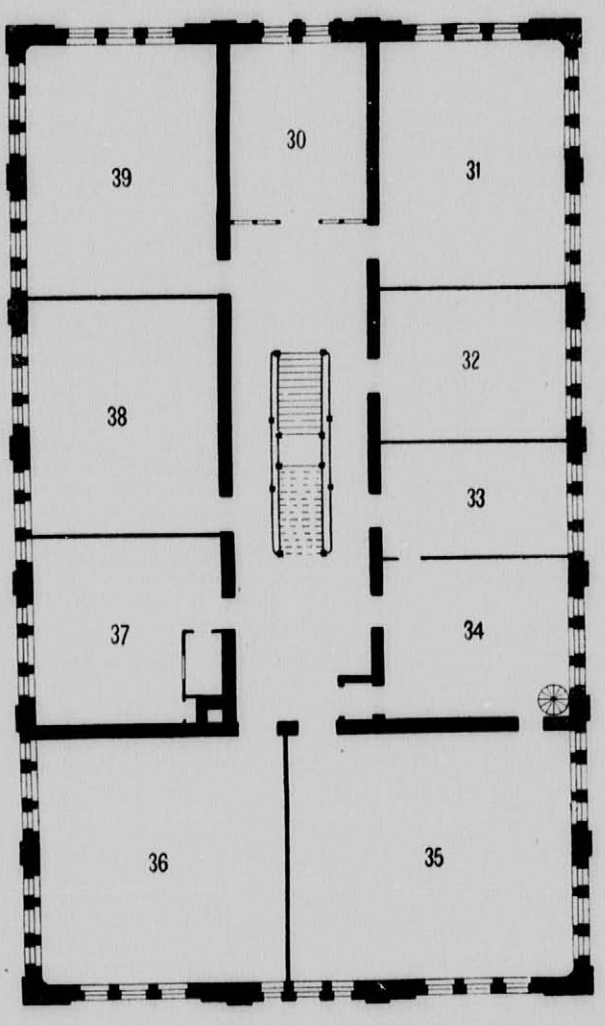
20. Architectural Library.
21. Architectural Drawing Room.
22. Physical Lecture Room.
23. Industrial Chemistry Lecture Room.
24. Industrial Museum.

NEW BUILDING.

THIRD STORY.

Boylston Street.

(SOUTH.)



30. Recitation Room.
31. English Lecture Room.
32. French Recitation Room.
33. Small Chemical Lecture Room.
34. Private Chemical Laboratory and Preparation Room.
35. Kidder Chemical Lecture Hall.
36. Unassigned.
37. Margaret Cheney Reading Room for Women
38. German Recitation Room.
39. Lecture Room.

NEW BUILDING.

FOURTH STORY.

Boylston Street.

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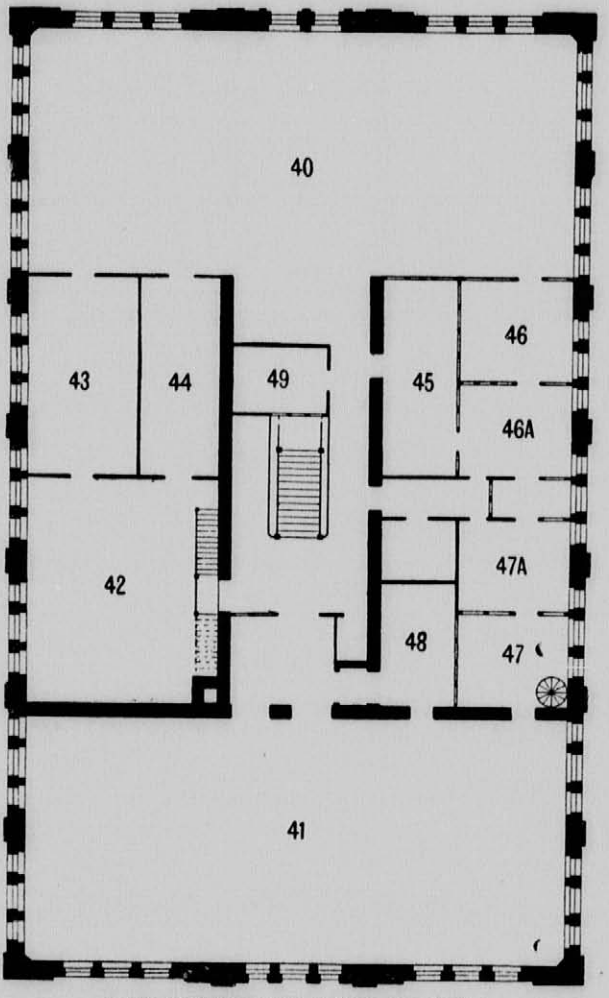
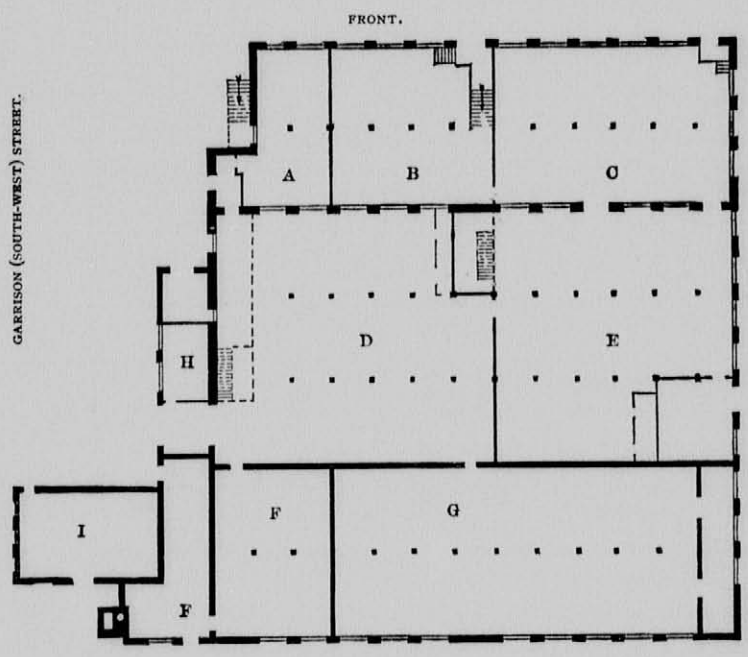


KIDDER CHEMICAL LABORATORIES.

40. Analytical Laboratory.
41. Laboratory of General Chemistry.
42. Organic Laboratory.
43. Chemical Library.
44. Balance Room.
45. Laboratory of Volumetric Analysis.
46. Private Laboratory of Assistants in Chemical Analysis.
46 A. Private Laboratory of Professor in Chemical Analysis.
47. Private Laboratory of Assistant in General Chemistry.
47 A. Private Laboratory of Professor in General Chemistry.
48. Apparatus Room.
49. Preparations Room.

MECHANICAL LABORATORY.

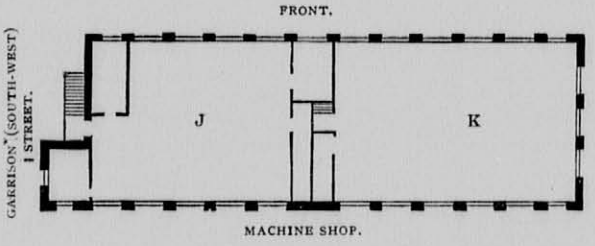
FIRST STORY FLOOR.



A. Weaving Room.
B. Recitation Room, School of Mechanic Arts.
C. Wood Working Lathe Room.
D. Iron Working Lathe Room.
E. Carpentry Shop.
F. Foundry.
G. Forge Shop.
H. Engine Room.
I. Boiler Room.

MECHANICAL LABORATORIES.

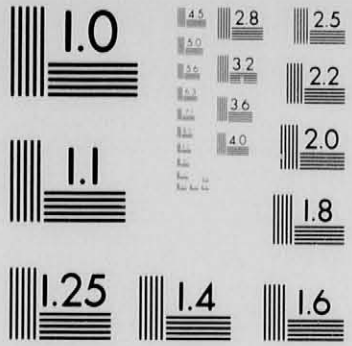
SECOND STORY.



SECOND STORY.

J. Drawing Room, Lowell School of Design.
K. Drawing Room, School of Mechanic Arts.

ALPHABETICAL INDEX.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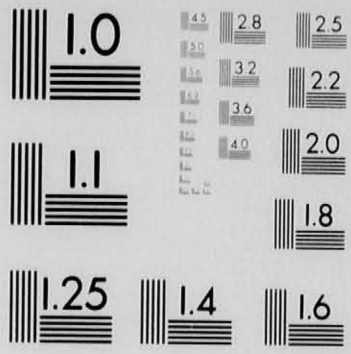
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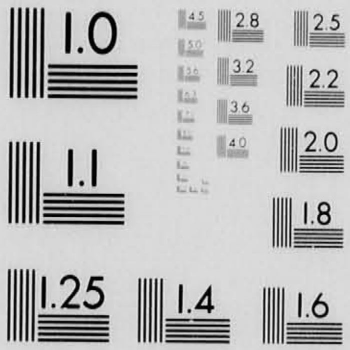
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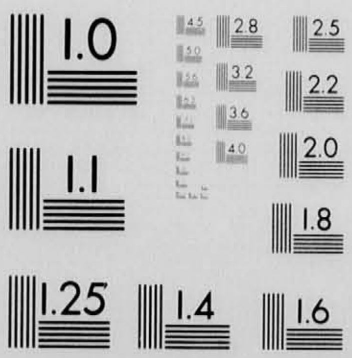
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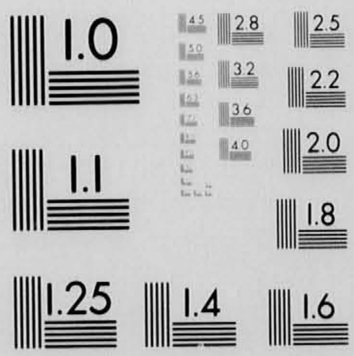
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