

FOURTH  
ANNUAL CATALOGUE

OF THE

OFFICERS AND STUDENTS

AND

PROGRAMME OF THE COURSE OF INSTRUCTION

OF THE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

1868-69.

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BOSTON:  
PRESS OF A. A. KINGMAN.  
1868.

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*Extract from an Act of the General Court of Massachusetts, approved April 10, 1861,  
to incorporate the Massachusetts Institute of Technology.*

"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 science in connection with arts, agriculture, manufactures, and commerce."

*Chapter 183, Acts and Resolves of 1861.*

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The Institute shares the benefits of the Act of Congress of July 2d, 1862, giving Public Lands to the States in aid of instruction in Agriculture and the Mechanic Arts. Under an Act of the General Court of Massachusetts, approved April 27, 1863, the Institute receives from the State "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. . . . Said Institute of Technology, in addition to the objects set forth in its Act of Incorporation [as above quoted], shall provide for instruction in military tactics."

*Chapter 186, Acts and Resolves of 1863.*

GOVERNMENT  
OF THE  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY.  
FOR THE YEAR 1868-69.

President,

WILLIAM B. ROGERS.

Vice-Presidents,

JOHN A. LOWELL,  
JACOB BIGELOW,

Secretary,

SAMUEL KNEELAND.

Committee on Instruction,

WILLIAM B. ROGERS,  
JOHN D. PHILBRICK,  
HENRY B. ROGERS,  
GEORGE W. TUXBURY,  
JAMES B. FRANCIS,  
NATHANIEL THAYER,  
THOMAS SHERWIN,  
EDWARD ATKINSON,  
SAMUEL K. LOTHROP,  
GEORGE T. BIGELOW.

Committee on Publication,

JOHN D. RUNKLE,  
CHARLES L. FLINT,  
GEORGE B. EMERSON,  
J. C. HOADLEY,  
ALEXANDER H. RICE.

MARSHALL P. WILDER,  
MORRILL WYMAN.

Treasurer,

WILLIAM ENDICOTT, JR.

Committee on Museum,

ERASTUS B. BIGELOW,  
FREDERIC W. LINCOLN, JR.,  
STEPHEN P. RUGGLES,  
RICHARD C. GREENLEAF,  
JAMES L. LITTLE,  
JOSEPH S. FAY,  
M. DENMAN ROSS,  
CHARLES H. DALTON,  
JOHN CUMMINGS, JR.

Committee on Finance,

JAMES M. BEEBE,  
EDWARD S. TOBEY,  
J. WILEY EDMANDS,  
J. INGERSOLL BOWDITCH,  
JOHN M. FORBES.

BENJAMIN F. EDMANDS, *Chairman of Committee on Machinery.*

JOHN M. ORDWAY, *Chairman of Committee on Chemical Products and Processes.*

WARREN SAWYER, *Chairman of Committee on Manufactures of Wood, Leather, etc.*

H. WELD FULLER, *Chairman of Committee on Household Economy.*

EDWARD S. PHILBRICK, *Chairman of Committee on Tools and Instruments.*

On the Part of the Commonwealth,

HIS EXCELLENCY, GOVERNOR ALEXANDER H. BULLOCK.

HON. REUBEN A. CHAPMAN, *Chief Justice of the Supreme Court.*

HON. JOSEPH WHITE, *Secretary of the Board of Education.*

During the temporary absence of the President the duties of the office are performed by Professor Runkle.

## OFFICERS OF INSTRUCTION.

---

### President,

WILLIAM B. ROGERS, LL.D.

- JOHN D. RUNKLE, A.M. . . . . *President pro tempore, and Walker Professor of Mathematics and Mechanics.*  
WILLIAM B. ROGERS, LL.D. . . . . *Professor of Geology.*  
FRANK H. STORER, S.B. . . . . *Professor of General and Industrial Chemistry.*  
CHARLES W. ELIOT, A.M. . . . . *Professor of Analytical Chemistry and Metallurgy.*  
CYRUS M. WARREN, S.B. . . . . *Professor of Organic Chemistry.*  
WILLIAM P. ATKINSON, A.M. . . . . *Professor of the English Language and Literature.*  
FERDINAND BÔCHER . . . . . *Professor of Modern Languages.*  
JOHN B. HENCK, A.M. . . . . *Hayward Professor of Civil and Topographical Engineering.*  
WILLIAM WATSON, PH.D. . . . . *Professor of Descriptive Geometry and Mechanical Engineering.*  
WILLIAM R. WARE, S.B. . . . . *Professor of Architecture.*  
GEORGE A. OSBORNE, S.B. . . . . *Professor of Astronomy and Navigation.*  
ALFRED P. ROCKWELL, A.M. . . . . *Professor of Mining Engineering.*  
EDWARD C. PICKERING, S.B. . . . . *Thayer Professor of Physics.*  
SAMUEL KNEELAND, A.M., M.D. . . . . *Instructor in Zoology and Physiology.*  
E. C. F. KRAUSS . . . . . *Instructor in Modern Languages.*  
JOHN TROWBRIDGE, S.B. . . . . *Superintendent of Drawing and Instructor in Physics.*  
ERNEST SCHUBERT . . . . . *Instructor in Free Hand and Machine Drawing.*  
ALBERT F. HALL . . . . . *Instructor in Mechanical and Plan Drawing.*  
ROBERT H. RICHARDS . . . . . *Assistant in General Chemistry.*  
HOBART MOORE . . . . . *Instructor in Military Tactics.*
- 
- GEORGE A. OSBORNE . . . . . *Secretary of the Faculty. (Address, Mass. Institute of Technology, Boston.)*

The instruction in History and Political Economy is at present given by Professor Atkinson.

# STUDENTS.

## FIRST YEAR.

[The numbers affixed to some of the names indicate that the students thus designated are taking partial courses in the years corresponding to the numbers.]

NAME.	RESIDENCE.	ROOM.
Adams, Joseph S. 1 . . .	Framingham . . .	Framingham.
Allen, Calvin F. . . .	Boston . . . .	56 Vernon St.
Atkinson, Frank P. . . .	Cambridge . . . .	Cambridge.
Barney, Edward E. . . .	Dayton, O. . . .	12 Dartmouth St.
Bateman, Charles H. . . .	Boston . . . .	13 Fountain St.
Beck, Charles B. 1, 4 . . .	Boston . . . .	23 Beacon St.
Brewster, Benjamin E. . . .	Boston . . . .	Warren St.
Brown, Frank N. . . .	Newton Centre . . .	Newton Centre.
Browne, Walter H. . . .	Boston . . . .	1680 Tremont St.
Carpenter, Charles S. . . .	Cincinnati, O. . . .	Waltham.
Carpenter, Edwin J. . . .	Cincinnati, O. . . .	Waltham.
Chapman, James R. . . .	Beverly . . . .	Beverly.
Coffin, Frederick W. . . .	Watertown . . . .	Watertown.
Crosby, Arthur M. . . .	Jamaica Plain . . . .	Jamaica Plain.
Crowell, Edwin D. . . .	East Dennis . . . .	7 Edinboro' St.
Dean, Benjamin W. . . .	South Boston . . . .	Broadway.
Devereux, Arthur M. . . .	Castine, Me. . . .	Waverly.
Dewson, Edward 1 . . . .	Dorchester . . . .	Dorchester.
Dodge, De Forrest B. . . .	North Abington . . .	North Abington.
Dodge, William B. . . .	Beverly . . . .	Beverly.
Dunn, George B. 1, 2 . . .	Ashland, Me. . . .	72 Trenton St.
Emmert, Frederick A. . . .	Salem . . . .	Salem.
Emmons, Arthur B. . . .	Boston . . . .	8 Mt. Vernon Pl.
Fabens, Samuel A., Jr. . . .	Marblehead . . . .	Marblehead.
Fallon, John H. . . .	Lawrence . . . .	Lawrence.
Farley, Arthur C. . . .	Boston . . . .	41 Allen St.
Foley, John B. . . .	Boston . . . .	Edgewood St.

NAME.	RESIDENCE.	ROOM.
Foster, William . . . .	Brookline . . . .	Brookline.
Fowle, John A., Jr. . . .	Brooklyn, N. Y. . . .	Cambridge.
Francis, Joseph S. . . .	Lowell . . . .	Lowell.
Haley, James W. 1 . . . .	Salmon Falls, N.H. . . .	Chelsea.
Hanford, Clarence C. 1 . . . .	Somerville . . . .	Somerville.
Harkness, Frank . . . .	Cincinnati, O. . . .	Waltham.
Heath, Nathaniel . . . .	Salem . . . .	Salem.
Hodge, James M. . . .	Plymouth. . . .	6 Goodnow Park.
Howard, William L. 1 . . . .	Canton . . . .	Canton.
Hunking, Arthur W. 1 . . . .	Haverhill . . . .	Haverhill.
Hunt, Charles H. . . .	Boston . . . .	15 Ash St.
Knapp, J. Austin . . . .	Hanover . . . .	Hanover.
Leman, William T. . . .	Chelsea . . . .	Chelsea.
Lewis, David S. 1 . . . .	Rochester . . . .	42 Oak St.
Locke, Edward C. . . .	Watertown . . . .	Watertown.
Lothrop, Eben W., Jr. . . .	Chelsea . . . .	Chelsea.
Mansfield, Albert K. . . .	Lowell . . . .	Lowell.
Minor, William A. . . .	New Britain, Ct. . . .	Needham.
Minot, Charles S. 1 . . . .	Jamaica Plain . . . .	Jamaica Plain.
Morse, Frank B. . . .	Boston . . . .	13 Worcester Sq.
Patch, Maurice B. . . .	Lowell . . . .	Lowell.
Perry, Stewart L. 1 . . . .	South Malden . . . .	South Malden.
Peters, Edward G. 1 . . . .	Boston . . . .	137 Beacon St.
Phillipps, George . . . .	Marshfield . . . .	28 E. Brookline St.
Pond, Joseph A. 1 . . . .	Allston . . . .	Allston.
Porter, Theodore C. . . .	Duxbury . . . .	Duxbury.
Putnam, Nathan B. . . .	Salem . . . .	Salem.
Ruiz, Enrique 1 . . . .	Peru, S. A. . . .	Concord.
Sawyer, Arthur W. 1 . . . .	Boston . . . .	31 Commonwealth Av.
Sparrow, William E., Jr. . . .	Mattapoisett . . . .	44 Cambridge St.
Spinning, Frank . . . .	Dayton, O. . . .	4 River St.
Stafford, Frederick H. . . .	Boston . . . .	2 Tilden Pl.
Stearns, William H. . . .	Malden . . . .	Malden.
Steele, Charles L. 1 . . . .	Boston . . . .	68 Warren St.
Stewart, Edgar . . . .	Charlestown . . . .	Charlestown.
Stone, James E. . . .	Charlestown . . . .	Charlestown.
Thatcher, Harry L. 1, 2 . . . .	Middleboro' . . . .	114 Harrison Av.
Thayer, Edmund G. . . .	Baltimore, Md. . . .	South Braintree.
Thompson, Edwin D. 1, 2 . . . .	Hopkinton . . . .	Hopkinton.
Townsend, Edward E. 1 . . . .	South Canton . . . .	South Canton.
Tuxbury, George A. . . .	Haverhill . . . .	12 Berkeley St.
Upton, Edgar W. . . .	Peabody . . . .	Peabody.
Wales, William Q. . . .	Dorchester . . . .	Dorchester.

NAME.	RESIDENCE.	ROOM.
Ward Clarence S. . . . .	Newtonville . . . . .	Newtonville.
Wheildon, Frederick W. . . . .	Concord . . . . .	Concord.
Whitney, Alfred B. . . . .	Boston . . . . .	61 Beach St.
Williams, Francis H. . . . .	Boston . . . . .	15 Arlington St.
Wright, John E. . . . .	Prairie du Sac, Wis. . . . .	83 Carver St.
Wyman, George D. 1 . . . . .	Woburn . . . . .	48 Porter St.

## SECOND YEAR.

NAME.	RESIDENCE.	ROOM.
Allis, Edward P., Jr. 1, 2 . . . . .	Milwaukee, Wis. . . . .	62 Pinckney St.
Baker, George . . . . .	Marshfield . . . . .	118 Harrison Av.
Beal, Foster E. L. . . . .	Fitchburg . . . . .	South Boston.
Binney, Henry P. 2 . . . . .	Boston . . . . .	Walnut Av.
Bishop, Nathaniel H. . . . .	Tuckerton, N. Y. . . . .	176 W. Brookline St.
Bush, J. S. Foster 2 . . . . .	Boston . . . . .	3 Lambert St.
Childs, Frank C. . . . .	East Lexington . . . . .	East Lexington.
Clark, Augustus 2 . . . . .	Beverly . . . . .	Beverly.
Cutler, Henry M. . . . .	San José, Cal. . . . .	34 Worcester Sq.
Danforth, Charles F. . . . .	Chelsea . . . . .	Chelsea.
Dean, Ralph 2 . . . . .	South Boston . . . . .	185 K St.
Drake, Harlow B. 2 . . . . .	Waltham . . . . .	Waltham.
Faunce, Elmer . . . . .	Kingston . . . . .	Kingston.
Fay, Harrie F. . . . .	Chelsea . . . . .	Chelsea.
Foote, Edward H. . . . .	North Somerville . . . . .	North Somerville.
Forbes, Edmund C. . . . .	Clinton . . . . .	31 Hollis St.
Gay, Frederick T. 1, 2 . . . . .	North Chelmsford . . . . .	North Chelmsford.
Gowen, Charles S. . . . .	Clinton . . . . .	Melrose.
Greenough, Malcolm S. 2 (A. B., Harvard College). . . . .	Boston . . . . .	56 Temple St.
Herrick, J. Amory 2, 3 . . . . .	Chelsea . . . . .	Chelsea.
Johnson, Walter L. 1, 2 . . . . .	Holliston . . . . .	Holliston.
Judkins, Charles A. . . . .	Winchester . . . . .	6 Berkeley St.
Levanseler, Frank E. 2 . . . . .	Boston . . . . .	34 Worcester Sq.
Lincoln, George R. . . . .	Philadelphia, Pa. . . . .	Hingham.
Lothrop, William U. . . . .	East Boston . . . . .	163 Webster St.
Pike, William A. . . . .	Dorchester . . . . .	Dorchester.
Pratt, George H. . . . .	Salem . . . . .	Salem.
Reed, John . . . . .	Boston . . . . .	1 Oak Pl.
Rollins, Edward W. . . . .	Concord, N. H. . . . .	6 Berkeley St.
Scott, Joseph R. . . . .	Jamaica Plain . . . . .	Jamaica Pl.
Shedd, James A. 2 . . . . .	East Boston . . . . .	58 Princeton St.
Smith, Herbert M. 2 . . . . .	Grafton . . . . .	10 Davis St.



NAME.	RESIDENCE.	ROOM.
Smith, Walter W. 2 . . .	Dayton, O. . . . .	4 River St.
Stearns, William C. 2 . . .	Lexington . . . . .	Lexington.
Stone, Charles F. . . . .	Waltham . . . . .	Waltham.
Trowbridge, Almarin, Jr. .	Charlestown . . . . .	Charlestown.
Warren, Charles B. 1, 2 . .	Waltham . . . . .	Waltham.
Weeks Isaiah S. P. . . . .	West Barnstable . . . .	1167 Washington St.
Whittier, Randal . . . . .	Boston . . . . .	87 Waltham St.

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T H I R D   Y E A R .

NAME.	RESIDENCE.	ROOM.
Amory, Frederick 3 . . . .	Brookline . . . . .	Brookline.
Bannard, William N. . . . .	Kingsboro', N. Y. . . . .	Cambridgeport.
Brewster, William W. . . . .	Plymouth . . . . .	Plymouth.
Brooks, Frederick 2, 3 (A. B., <i>Harvard College</i> ) . . . . .	Boston . . . . .	45 Hancock St.
Burton, Hazen J., Jr. 3 . . .	Boston . . . . .	4 Berkeley St.
Byrne, Joseph W. 3 . . . . .	Boston . . . . .	2 Osborne Pl.
Cabot, Samuel, Jr. . . . .	Boston . . . . .	11 Park Sq.
Cary, S. Mathews . . . . .	Houlton, Me. . . . .	7 Concord Sq.
Clark, Edward K. . . . .	Bangor, Me. . . . .	151 W. Canton St.
Clark, Walter 3 . . . . .	Tarrytown, N. Y. . . . .	Jamaica Plain.
Colman, Henry 3 . . . . .	Nahant . . . . .	Nahant.
Cross, Charles R. . . . .	Newburyport . . . . .	60 Pleasant St.
Curtis, Russell H. . . . .	Jamaica Plain . . . . .	Jamaica Plain.
Dickinson, William C. . . . .	Waltham . . . . .	Waltham.
Earle, Stephen C. 3 . . . . .	Worcester . . . . .	Worcester.
Footman, Frederick N. 3 . . .	G't Falls, N. H. . . . .	Cambridge.
Fuller, Frank L. . . . .	Grantville . . . . .	Grantville.
Hardy, George R. . . . .	Malden Centre . . . . .	Malden Centre.
Henry, William T. . . . .	Fall River . . . . .	127 Harrison Av.
Herreshoff, Nathaniel G. 3 .	Bristol, R. I. . . . .	20 Boylston St.
Hinman, Charles W. . . . .	W. Concord, Vt. . . . .	41 Anderson St.
Howe, Frank M. 3 . . . . .	Arlington . . . . .	Arlington.
Lamb, Charles D. 3 (A. B., <i>Harvard College</i> ) . . . . .	Boston . . . . .	13 Somerset St.
Lewis, William W. 1, 3 . . . .	Boston . . . . .	206 Warren Av.
Mason, Sampson D. . . . .	Concord . . . . .	Concord.
Orvis, Christel 3 . . . . .	Jamaica Plain . . . . .	Jamaica Plain.
Page, Frederick R. . . . .	Boston . . . . .	67 Revere St.
Preble, Henry C. 3 . . . . .	Charlestown . . . . .	Charlestown.

NAME.	RESIDENCE.	ROOM.
Renouf, Edward 3 . . . .	Keene, N. H. . . . .	643 Tremont St.
Ritchie, John 3 . . . .	Brookline . . . . .	Brookline.
Sprague, Charles H. 3 . . .	Malden . . . . .	Malden.
Thayer, George F. P. . . .	Boston . . . . .	170 Dorchester St.
Tilden, George T. 3 . . . .	Boston . . . . .	345 Shawmut Av.
Tillinghast, Theodore F. .	New Bedford . . . . .	127 Harrison Av.
Turner, Edmund K. . . . .	Marblehead . . . . .	Marblehead.
Wells, Frank 3 . . . . .	Quincy, Ill. . . . .	14 Orange St.
Whittlesey, Walter 3 . . . .	Chelsea . . . . .	Chelsea.
Willbur, Charles A. . . . .	Watertown . . . . .	Watertown.
Willard, Daniel W. . . . .	Jamaica Plain . . . . .	Jamaica Plain.
Woollett, William M. 2, 3 .	Albany, N. Y. . . . .	Auburndale.
Wrinkle, Laurence F. J. . .	Lee . . . . .	Roxbury.

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FOURTH YEAR.

NAME.	RESIDENCE.	ROOM.
Avery, Charles E. 3, 4 . . . .	Boston . . . . .	43 Chester Park.
Baker, William H. . . . .	Fitchburg . . . . .	62 Shawmut Av.
Bowditch, Ernest W. 4 . . . .	Brookline . . . . .	Brookline.
Carson, Howard A. . . . .	North Oxford . . . . .	169 Charles St.
Edmands, J. Rayner . . . . .	Boston . . . . .	57 W. Cedar St.
Gelett, William 4 . . . . .	Boston . . . . .	60 Pleasant St.
Harman, Henry A. 4 . . . . .	Boston . . . . .	68 W. Cedar St.
Merrill, N. Fred. 2, 3, 4 . . . .	Cambridgeport . . . . .	Cambridgeport.
Nichols, William R. . . . .	Boston . . . . .	Walnut Av.
Pearson, Arthur H. 1, 4 . . . .	Haverhill . . . . .	Haverhill.
Pearson, Frank P. 1, 4 . . . .	Haverhill . . . . .	Haverhill.
Saltmarsh, Ernest O. 4 . . . .	Knoxville, Tenn. . . . .	494 Tremont St.
Tebbetts, Eugene L. . . . .	Lisbon, Me. . . . .	60 Pleasant St.
Thorndike, George F. 4 . . . .	Boston . . . . .	29 Edinboro' St.
Whitaker, Channing . . . . .	Boston . . . . .	12 Berkeley St.
Wiley, Walter T. 4 . . . . .	Boston . . . . .	68 Mt. Vernon St.

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SUMMARY.

Students of the first year, . . . . .	76
“ “ second year, . . . . .	39
“ “ third “ . . . . .	41
“ “ fourth “ . . . . .	16
Total, . . . . .	172

## GRADUATES IN 1868.

NAME.	RESIDENCE.	IN THE DEPARTMENT OF
Albert F. Hall . . . .	Charlestown . . . .	Mechanical Engineering.
Frank R. Firth . . . .	Boston . . . . .	Civ. and Top. Engineering.
William E. Hoyt . . . .	Portsmouth, N. H. . . .	" " "
Walter H. Sears . . . .	Plymouth . . . . .	" " "
Charles A. Smith . . . .	Newburyport . . . . .	" " "
Joseph Stone . . . . .	Charlestown . . . . .	" " "
Ellery C. Appleton . . . .	Boston . . . . .	Geol. and Min. Engineering.
Nelson W. Conant . . . .	Louisville, Ky. . . . .	" "
Charles C. Gilman . . . .	Chelsea . . . . .	" "
Robert H. Richards . . . .	Boston . . . . .	" "
Bryant P. Tilden . . . .	Boston . . . . .	" "
James P. Tolman . . . .	Boston . . . . .	" "
Eli Forbes . . . . .	Clinton . . . . .	Science and Literature.

## D A T E S .

School-year began . . . . .	Monday, Oct. 5, 1868.
School-year ends . . . . .	Saturday, June 5, 1869.
The next School-year will begin . . . . .	Monday, Oct. 4, 1869.
Examinations for admission to the first year's class, . . . . .	{ Monday, June 7, 1869. Thursday, Sept. 30, 1869.
Examinations for advanced standing, . . . . .	{ Tuesday, June 8, 1869. Friday, Oct. 1, 1869.

## I N D E X .

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SCHOOL  
OF THE  
INSTITUTE OF TECHNOLOGY.

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The Massachusetts Institute of Technology provides a four years' course of scientific and literary studies and practical exercises, embracing pure and applied mathematics, the physical and natural sciences with their applications, drawing, the English language, mental and political science, French, and German. The course is so selected and arranged as to offer a liberal and practical education in preparation for active pursuits, as well as a thorough training for the professions of the Civil and Mechanical Engineer, Chemist, Metallurgist, Engineer of Mines, Architect, and Teacher of Science. All the studies and exercises of the first and second years are pursued by the whole school. At the beginning of the third year, each student selects one of the following special courses of study:—

1. A COURSE IN MECHANICAL ENGINEERING.
2. “ “ “ CIVIL AND TOPOGRAPHICAL ENGINEERING.
3. “ “ “ CHEMISTRY.
4. “ “ “ GEOLOGY AND MINING.
5. “ “ “ BUILDING AND ARCHITECTURE.
6. “ “ “ SCIENCE AND LITERATURE.

These courses differ widely, but certain general studies are common to them all. It is intended to secure to every student, whatever his special course of study, a liberal mental development and general culture, as well as the more strictly technical education which may be his chief object. The Course in Sci-

ence and Literature differs from the others in not having so distinctly a professional character. It offers a sound education founded upon the sciences and modern literature, and furnishes, with its wide range of elective studies, a suitable preparation for any of the departments of active life or for teaching science.

The Institute also provides courses of evening instruction in the main branches of knowledge above referred to, for persons of either sex who, being unable to study during the day, desire to avail themselves of systematic evening lessons or lectures.

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### CONDITIONS OF ADMISSION.

To be admitted to the first year's class the student must have attained the age of sixteen years, and must pass a satisfactory examination in arithmetic, so much of algebra as precedes equations of the second degree, plane geometry, English grammar, and geography. In general, the training given at the best High Schools, Academies, and Classical Schools, will be a suitable preparation for the studies of this School.

In order to enter the second year's class, the student must be at least seventeen years of age, and must pass a satisfactory examination upon the first year's studies, besides passing the examination for admission to the first year's class; and a like rule applies to the case of students seeking admission into the classes of the succeeding years.

A knowledge of the Latin language is not required for admission; but the study of Latin is strongly recommended to young men who propose to enter this School.

Examinations for admission to the first year's class will be held on Monday, June 7, 1869, and on Thursday, Sept. 30, 1869, beginning at 9 A. M., precisely. The candidates will assemble at the Institute Building, Boylston Street, Boston.

The examinations for advanced standing will take place on Tuesday, June 8, 1869, and on Friday, Oct. 1, 1869, beginning at 9 A.M. Applicants for admission are earnestly advised to present themselves at the regular examinations; but under special circumstances, they may present themselves at other times.

To make the opportunities of instruction as widely accessible as possible, students will be allowed to enter special divisions of either of the courses,—as, for example, the classes of mathematics, of engineering, of chemistry, of physics, or of mining and metallurgy,—on giving satisfactory evidence that they are prepared to pursue such special studies with advantage.

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## COURSE OF INSTRUCTION.

### FIRST YEAR.

*Mathematics.* Algebra, beginning with quadratic equations and including logarithms. Solid Geometry. Mensuration. Plane Trigonometry. Applications of Trigonometry to Navigation.

*Elementary Mechanics.* Forces. Mechanical Powers. Motion. Mechanics of Liquids and Gases.

*Chemistry.* Experimental study of General Inorganic Chemistry.

*English.* Composition. History and Structure of the Language.

*German.* Grammar and Translation.

*Descriptive Geometry.* Problems of position relative to the Point, the Right Line, and the Plane.

*Mechanical Drawing.* Use of instruments, water-colors, and India ink. Graphical construction of problems in Geometry, Trigonometry, and Descriptive Geometry.

*Free-hand Drawing.* With chalk and crayons. Machinery. Ornamentation.

## SECOND YEAR.

*Mathematics.* Spherical Trigonometry. Analytic Geometry of two and three dimensions. First Principles of the Differential and Integral Calculus.

*Descriptive Astronomy.* The Earth. The Sun. Time. Gravitation. The Moon. Planets. Comets. Nebulæ. Constellations.

*Surveying.* Field-work. Plotting surveys. Computing areas. Plans.

*Physics.* Sound. Heat. Light.

*Chemistry.* Qualitative Analysis. Organic Chemistry.

*English.* Composition. Reading. History of the Language.

*French.* Grammar and Translation.

*German.*

*Descriptive Geometry.* Projections. Perspective. Shades and Shadows.

*Mechanical Drawing.* Geometric, Perspective, and Isometric Drawing.

*Free-hand Drawing.* Machinery. Ornamentation. Landscape.

## THIRD YEAR.

## I. COURSE IN MECHANICAL ENGINEERING.

*Mechanism.* The Principles of Machinery.

*Mathematics.* Differential and Integral Calculus. Analytic Mechanics.

*Applied Mechanics.* Strength of Materials. Friction and Rigidity.

Cinematics. Dynamics of Solids. Hydrostatics and Hydrodynamics. Thermodynamics. Useful Effect of Machines.

*Descriptive Geometry.* Applications to Masonry, Carpentry, and Machinery.

*Drawing.* Machinery.

*Physics.* Optics. Magnetism. Electricity.

*Geology.* Physiographic Geology. Lithology. Outline of Geological History. Dynamical Geology.

*English.* Logic. Rhetoric. History of English Literature.

*Constitutional History.* England and the United States.

*French.* (Spanish may be substituted.)

*German.*

## II. COURSE IN CIVIL AND TOPOGRAPHICAL ENGINEERING.

*Engineering.* Survey, Location, and Construction of Roads, Railways, and Canals. Measurement and Computation of Earth-work and Masonry. Supply and Distribution of Water. Drainage. Hydrographical Surveying. River and Harbor Improvements. Field-Practice.

*Mathematics.* Differential and Integral Calculus. Analytic Mechanics.

*Applied Mechanics.* Stress. Stability, Strength, and Stiffness.

*Spherical Astronomy.* Higher Geodesy. Latitude and Longitude.

*Descriptive Geometry.* Applications to Masonry and Carpentry.

*Drawing.* Plans, Profiles, Elevations, Sections, etc.

*Physics.* Optics. Magnetism. Electricity.

*Geology.* Physiographic Geology. Lithology. Outline of Geological History. Dynamical Geology.

*English.* Logic. Rhetoric. History of English Literature.

*Constitutional History.* England and the United States.

(Spanish may be substituted.)

*German.*

## III. COURSE IN CHEMISTRY.

*Industrial Chemistry.* Study of Chemical Manufactures. Glass, Pottery, Soda-ash, Acids, Soap, Gas, etc. The Arts of Dyeing, Calico-Printing, Tanning, Brewing, Distilling, etc.

*Metallurgy.* Metallurgical Processes, Constructions, and Implements.

*Assaying.* Wet and Dry Ways.

*Descriptive and Determinative Mineralogy.* Use of the Blowpipe.

The foregoing studies are elective. Each student must select one or more of them. The following studies are required:—

*Quantitative Chemical Analysis.* Laboratory Practice.

*Drawing.* Chemical or Metallurgical Apparatus. Plans of Works.

*Physics.* Optics. Magnetism. Electricity.

*Geology.* Physiographic Geology. Lithology. Outline of Geological History. Dynamical Geology.

*English.* Logic. Rhetoric. History of English Literature.

*Constitutional History.* England and the United States.

*French.* (Spanish may be substituted.)

*German.*



## IV. COURSE IN MINING ENGINEERING.

*Engineering.* Survey and Construction of Roads and Railways.  
Measurement of Earth-work and Masonry. Hydraulics. Drainage. Field-practice.

*Descriptive and Determinative Mineralogy.* Use of the Blowpipe.

*Assaying.* Wet and Dry Ways.

*Quantitative Chemical Analysis.* Laboratory Practice.

*Metallurgy.* Metallurgical Processes, Constructions, and Implements.  
Furnaces, Crucibles, Blowing Machines, Fuels, and Fluxes.

*Mathematics.* Differential and Integral Calculus. Analytic Mechanics.

*Applied Mechanics.* Stress. Stability, Strength, and Stiffness.

*Drawing.* Sections and Maps. Mines. Metallurgical Apparatus.

*Physics.* Optics. Magnetism. Electricity.

*Geology.* Physiographic Geology. Lithology. Outline of Geological History. Dynamical Geology.

*English.* Logic. Rhetoric. History of English Literature.

*Constitutional History.* England and the United States.

*French.* (Spanish may be substituted.)

*German.*

## V. COURSE IN BUILDING AND ARCHITECTURE.

*Architectural Design.* The Elements of Design. The Principles of Composition. Exercises. The Study of Executed Works.

*Construction.* Building Materials and Processes. The Study of Works in Progress.

*Drawing.* Plans, Elevations, Sections, and Details. Ornament. Sketching from Buildings.

*Mathematics.* Differential and Integral Calculus. Analytic Mechanics.

*Applied Mechanics.* Stress. Stability, Strength, and Stiffness.

*Descriptive Geometry.* Applications to Masonry and Carpentry.

*Physics.* Optics. Magnetism. Electricity.

*Geology.* Physiographic Geology. Lithology. Outline of Geological History.

*English.* Logic. Rhetoric. History of English Literature.

*Constitutional History.* England and the United States.

*French.* (Spanish may be substituted.)

*German.*

## VI. COURSE IN SCIENCE AND LITERATURE.

*Mathematics.* Differential and Integral Calculus. Analytic Mechanics.  
*Chemistry.* Quantitative Analysis. Pure and Applied Chemistry.  
*Physics.* Physical manipulations.  
*Architectural Design.* The Elements of Design. The Principles of Composition. Exercises. The Study of Executed Works.

The foregoing studies are elective. Each student must select one or more of them. He may in addition choose any of the special subjects of the other Professional Courses, such as Descriptive Geometry, Engineering, Spherical Astronomy, Metallurgy, or Mineralogy. The following studies are required:—

*History.* Guizot—Histoire Générale de la Civilisation en Europe.

*Drawing.* Subjects determined by each student's choice of studies.

*Physics.* Optics. Magnetism. Electricity.

*Geology.* Physiographic Geology. Lithology. Outline of Geological History. Dynamical Geology.

*English.* Logic. Rhetoric. History of English Literature.

*Constitutional History.* England and the United States.

*French.* (Spanish may be substituted.)

*German.*

## FOURTH YEAR.

## I. COURSE IN MECHANICAL ENGINEERING.

*Machines.* Strength and Proportions of the Parts of a Machine. Hand Machinery,—Cranes, Derricks, Pumps, Turn-tables, etc.

*Motors.* Hydraulic Motors. Water-wheels. Water-Pressure Engines. Power and Strength of Boilers. Steam Engines,—Stationary, Locomotive, Marine. Air and Gas Engines.

*Building Materials.* Stones, Bricks, Mortars, and Cements.

*Descriptive Geometry.* Applications to Masonry, Carpentry, and Machinery. Modelling.

*Drawing.* Machines. Working Plans and Projects of Machinery, Mills, etc.

*Political Economy.*

*Natural History.* Zoölogy, Physiology.

*French.* (Italian may be substituted.)

*German.*

## II. COURSE IN CIVIL AND TOPOGRAPHICAL ENGINEERING.

*Engineering.* Structures of Wood,—Framing, Trusses, Girders, Arches, Roofs, Bridges. Structures of Stone,—Foundations, Retaining Walls, Arches, Bridges. Structures of Iron,—Foundations, Beams, Girders, Columns, Roofs, Bridges. Field-practice. *Machinery and Motors.* Hand Machinery. Water-wheels. Boilers. Steam-engines.

*Building Materials.* Stones, Bricks, Mortars, and Cements.

*Descriptive Geometry.* Applications to Masonry and Carpentry.

*Drawing.* Plans, Profiles, Elevations, Sections, etc.

*Political Economy.*

*Natural History.* Zoölogy and Physiology.

*French.* (Italian may be substituted.)

*German.*

## III. COURSE IN CHEMISTRY.

*Chemistry.* Pure and Applied. Quantitative Analysis. Preparation of Chemical Products. Special Researches.

*Building Materials.* Stones, Bricks, Mortars, and Cements.

*Drawing.* Apparatus. Machinery and Plans of Works.

*Political Economy.*

*Natural History.* Zoölogy and Physiology.

*French.* (Italian may be substituted.)

*German.*

## IV. COURSE IN MINING ENGINEERING.

*Mining.* The Useful Minerals. Modes of occurrence. Prospecting. Boring. Blasting. Sinking Shafts,—Timbering, Walling, and Tubbing. Driving Levels. Methods of Mining. Ventilation.

Lighting. Winding Machinery. Ladders and Man-Engines. Underground Transportation. Pumps. Dressing and Concentration of Ores,—Crushers, Stamps, Washers, Amalgamators, etc. Details of American Mining.

*Machinery and Motors.* Hand Machinery. Water-wheels. Boilers. Steam-engines.

*Engineering.* Structures of Wood, Stone, and Iron. Foundations. Walls, Arches, Domes, Beams, Trusses, Girders, Roofs.

*Chemistry.* Quantitative Analysis. Laboratory Practice.

*Geology.* Historical Geology. Paleontology. Detailed study of American Geology.

*Building Materials.* Stones, Bricks, Mortars, and Cements.

*Drawing.* Geological Maps and Sections. Plans and Sections of Mines, Quarries and other open Workings. Mining Machinery and Implements.

*Political Economy.*

*Natural History.* Zoölogy and Physiology.

*French.* (Italian may be substituted.)

*German.*

#### V. COURSE IN BUILDING AND ARCHITECTURE.

*Architectural Design.* Exercises in Composition. History of Architecture. The other Arts of Design.

*Professional Practice.* Specifications. Contracts. Estimating and Measuring. Superintendence.

*Drawing.* Architecture, Landscape, and the Human Figure. Lithography and Etching. Modelling. Drawing from Memory.

*Engineering.* Structures of Wood, Stone, and Iron. Foundations, Walls, Arches, Domes, Beams, Trusses, Girders, Roofs.

*Descriptive Geometry.* Applications to Masonry and Carpentry.

*Warming, Lighting, Ventilating, Acoustics.* Lectures.

*Building Materials.* Stones, Bricks, Mortars, and Cements.

*Political Economy.*

*Natural History.* Zoölogy and Physiology.

*French.* (Italian may be substituted.)

*German.*

## VI. COURSE IN SCIENCE AND LITERATURE.

*The Higher Mathematics.*

*Chemistry.* Special Researches.

*Physics.* Physical Research.

*Architectural Design.* Exercises in Composition. History of Architecture. The other Arts of Design.

The foregoing studies are elective. Each student must select one or more of them. He may in addition choose any of the special subjects of the other Professional Courses, such as Machinery and Motors, Descriptive Geometry, Engineering, Mining, or Geology. The following studies are required:—

*Mental Science.*

*Building Materials.* Stones, Bricks, Mortars, and Cements.

*Drawing.* Subjects determined by each student's choice of studies.

*Political Economy.*

*Natural History.* Zoölogy and Physiology.

*French.* (Italian may be substituted.)

*German.*

## MILITARY INSTRUCTION.

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 are required to attend a weekly exercise in military tactics, unless specially excused. For these exercises the School is organized as a battalion of two companies. Arms and equipments are lent to the School by the State. The matter of attendance at drill is under the control of the Secretary of the Faculty; but excuses of general application can only be granted by the Faculty.

## RESIDENCE OF STUDENTS.

Students may very conveniently live in the western and southern parts of Boston; but they may quite as well live in

either of the adjoining cities, or in the country on some of the many lines of steam and horse railways which converge upon Boston. The Institute Building is within five minutes' walk of the Boston and Albany, and the Boston and Providence railroads. Horse-cars pass the building. The exercises of the School do not begin until 9 A.M., and they end at 5 P.M.; so that parents are entirely at liberty to place their sons in homes a few miles from the city, if they prefer so to do.

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## 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. The progress of each student is tested by frequent oral examinations. 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 the oral examinations in connection with the ordinary exercises, written examinations are held from time to time, particularly in those departments in which the oral examination of the students is necessarily too infrequent to be exclusively relied on.

Near the close of the months of January and May, general examinations are held, — that of January embracing the subjects studied during the first half-year, that of May covering the studies of the whole year. Each examination on a distinct subject is marked on a scale of 100, and the marks of each student are reported to his parent or guardian. These returns are intended to enable the parent or guardian to judge of his

son's or ward's proficiency in each department of instruction. 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. A student who fails to pass the May examination in any subject will not be permitted to enter upon the studies of the following year without passing a new examination.

*The Instruction in Chemistry.* In the chemical laboratories provision is made for teaching General Chemistry, Qualitative Analysis, Quantitative Analysis, Assaying, Determinative Mineralogy, the Use of the Blowpipe, Metallurgy, and Industrial Chemistry. The Department occupies five ample laboratories, a chemical lecture-room, and a recitation-room, besides rooms for apparatus, balances, and storage.

In the first year, instruction is given in Inorganic General Chemistry by a weekly exercise which combines a recitation and an illustrated lecture, and by a weekly lesson in the laboratory, where every student is provided with a desk and the necessary apparatus, and is required to perform, under the supervision of the professors, a large number of experiments selected to illustrate the laws of chemical action and the properties of all the important chemical elements. In the second year, a systematic course of instruction in Qualitative Analysis is given, by laboratory practice and oral and written examinations. Every student works in the laboratory twice a week during the greater part of the year. Towards the close of the year instruction is given in the Elements of Organic Chemistry. Manuals, specially prepared for the purpose, are used in aid of the laboratory instruction given to the classes of the first and second years.

In the third and fourth years the principal subjects of study are Quantitative Analysis, Assaying, Mineralogy, the Use of the Blowpipe, Metallurgy, and Industrial Chemistry. Competent students are encouraged to undertake special researches, and are assisted in bringing them to useful results.

*The Instruction in Physics.* The course of instruction in Physics, required of all students, extends through three years. The various branches of the subject are treated both mathematically and experimentally.

In addition to this course, students in the department of Science and Literature may choose as one of their elective studies in the third and fourth years a course of Physical Manipulation and Research. During the third year students who choose this elective course will be taught the use of the more important pieces of apparatus, and will be required to determine experimentally the density, specific heat, and other physical constants of various substances. In the fourth year original researches in Physics will be undertaken, or students will be required to verify the correctness of received hypotheses.

Through the liberality of a friend of the Institute, an extensive collection of acoustic apparatus has been purchased, including sets of organ pipes, tuning forks, resonators, a large Seebeck's sirene, phonautograph and other instruments used in performing the more recent experiments in sound. A large part of the physical apparatus of the Lowell Institute, particularly those portions relating to pneumatics and electricity, has also been lent to the School.

*The Instruction in Mechanical Drawing.* The use of mathematical instruments and of water-colors and India-ink, is taught during the first two years in connection with the study of Geometry, Trigonometry, Descriptive Geometry and Perspective. During the third and fourth years instruction is given under the supervision of the several professors in the making of the sketches and drawings used in their respective departments.

Every student has a separate drawing table assigned to him, which he may occupy either for drawing or study when not engaged in other exercises. The instruction in drawing is given at stated hours.

Besides an abundant collection of engraved and lithographed



copies, the students have the use of an excellent series of manuscript drawings, mostly French, and of models of machinery, carpentry, and engineering works.

*The Instruction in Free-Hand Drawing.* During the first two years, drawing upon the blackboard and with the pencil and crayons is taught according to the system of Mr. Hendrickx, in use in the public schools of Belgium, and lately adopted in the French normal schools. This method, which in Europe is applied chiefly to ornamentation, has been successfully extended in this School to working drawings of machinery and engineering works, as well as of architectural ornament and details. These exercises are thus made auxiliary to those in mechanical and architectural drawing. The style of work is simple, and the treatment of form somewhat conventional; but it enables the student to acquire, even in the short time devoted to it, a method of delineating objects which is of great efficiency and practical value, and it gives him a training both of the hand and eye, which forms an excellent introduction to more artistic study. The application of this method to isometric and perspective drawing, concludes this part of the course.

During the last two years, the students have further practice of the same sort in connection with the special projects upon which they are engaged, including drawing from models and making diagrams. The study of Landscape and the Human Figure is also taken up, and the processes of Lithography and Etching are explained and taught.

Besides lithographed examples, including the publications of Mr. Hendrickx and the best French and English copies for ornament, landscape, and the human figure, the Institute is in possession of a valuable collection of drawings, including a series illustrating the course of instruction adopted by the South Kensington schools of Art, a series illustrating the instruction in ornament and the human figure given to artisans in the municipal schools of Paris, some specimens of the drawings made from memory at the *Ecole Impériale et Spéciale du Des-*

*sin*, and a series of original drawings of the details of machinery made expressly for the use of the Institute. There have been provided also models of machinery, and plaster casts, including a number of casts of plants and animals taken from nature, such as are used in the English and French schools of drawing.

*The Instruction in Descriptive Geometry.* The course in Descriptive Geometry for the first two years embraces the subjects of orthographical, isometric, and spherical projections, perspective, and shades and shadows. During the third and fourth years it comprehends the practical problems which occur in the construction of stonework, carpentry, and machinery, such as the making of zinc and pasteboard patterns for arches, domes, and staircases, for the articulations of timber, and for the parts of machines.

The students have exercises in modelling in plaster during the last part of the course.

The instruction is illustrated throughout by sets of models in relief, partly from the establishment of Schröder at Darmstadt, and partly from that of the Frères Chrétiens at Paris.

*The Instruction in Mechanical Engineering.* Besides the ordinary lectures and recitations, there are in this department two distinct kinds of instruction; the first is that given in the drawing rooms in making sketches and finished drawings of machinery from models; the second is the practical instruction by projects, given in connection with, and complementary to, that of the lectures. These projects are exercises given in designing machinery from numerical data so expressed as to require the determination of the strength, dimensions, and proper proportions of the several parts by calculation. They begin with the elements of machines, such as cranks, teeth of wheels, cams, pistons, valves, etc., and are extended so as to include designs for complete machines and motors. As aids in the solution of these problems of construction, students have access to an excellent collection of models and manuscript drawings from the Polytechnic School at Carlsruhe.

*The Instruction in Civil and Topographical Engineering* is given by means of lectures and recitations, and by practice in the field and in the drawing rooms. The use of the various instruments for measuring lines and angles, and of the level and plane-table is taught mainly by actual work in the field; first, in ordinary surveying and levelling; then in laying out curves both circular and parabolic; and afterwards in the survey of a railway line, and in staking it out ready for construction. These surveys are plotted and represented on finished plans. The necessary computations of areas, earth-work, etc., are also made. In most of the remaining subjects peculiar to this department, as set down in the courses of the third and fourth years, Rankine's *Civil Engineering* is used as a text-book; and the aim is to enable the student, by means of suitable explanations, illustrations, and examples, to acquire a thorough working knowledge in these branches. The department has a good stock of excellent field instruments.

*The Instruction in Geology and Mining.* The examination of ores, veinstones, rocks, and fossils, the drawing of geological sections, mining machinery, and plans of mines, and the practical study of the various processes of mining and the details of geology, particularly of American geology, make up the characteristic work of this department. The general aim of the instruction is to give the student an exact knowledge of the subjects discussed, and to develop his judgment and powers of observation. Dana's *Geology* is used as a text-book. Those subjects for which no suitable manuals are accessible are discussed in lectures. During the vacations, students are expected to visit mines, and report upon them with drawings and explanatory memoirs.

The very valuable scientific library and the large and well-selected geological collection of the late Prof. Henry D. Rogers of the University of Glasgow, which have been presented to the Institute by Mrs. Rogers, are of special benefit to the students in Geology and Mining. This collection is made up chiefly of fossils and rock specimens from American localities.

Accompanying this collection are many diagrams and maps of great value for the lecture room.

As opportunity offers, it is proposed to add to the collections already made, models of mining machinery and ore specimens from the principal mining regions of the world.

*The Instruction in Architecture.* It is the object of this department to give to its students the instruction and discipline that cannot be obtained in architects' offices, rather than to cover the whole ground of architectural study. The course is, however, practical as well as theoretical, and, besides the scientific study of construction and materials, pursued in connection with the Department of Engineering, it comprises the study of building processes, and of professional practice and procedure, as well as that of composition and design, and of the history of the art.

In addition to the exercises which directly accompany and illustrate this instruction, a series of independent exercises in original design, consisting of problems in architecture and ornament, will be given out every month to any students who have time to give to them, and are sufficiently advanced in their studies to take part in them with profit. It is the object of these problems, by affording a large amount and variety of practice in architectural composition, to enable students to acquire practical skill in design. No student can become a candidate for the Diploma in Architecture, unless he has presented a proper number of such original designs of a suitable degree of merit.

It is clear that the prescribed studies in the third and fourth years, leave but little time to the student for acquiring this skill and preparing these works. It is accordingly necessary for most students to take time for them after their other studies are finished, or before they are begun. But it is better for the majority of students to extend their studies over a greater length of time, and to devote their chief attention, throughout, to these exercises in original composition, to which, indeed, all the rest of their labor is properly subservient.

In the same way practising draughtsmen or assistants in architects' offices are able, by entering this Department as special students, to take up different subjects one by one, and finally to become candidates for the Diploma.

*The Architectural Museum.* A large number of photographs, prints, drawings, and casts, have been collected for this Department, by means of a special fund raised for the purpose. This collection includes a number of English and French water-colors, mostly of Architectural subjects, several lithographic publications issued by architectural students in England and on the continent, and photographs from the competition drawings for the Foreign Offices, the Law Courts, and the National Gallery in London, and others from French competitions for public buildings, and from the *Concours* of the *Ecole des Beaux-Arts*.

The collection of casts comprises both architectural details and specimens of carving and sculpture illustrating almost every period of art. It includes a unique collection of sculptures from the choir of Lincoln Cathedral, and contains also several models of temples and other buildings lent to the School by the Boston Athenæum.

To these collections the following additions have been made by gift:—

A considerable collection of photographs and lithographs of great interest presented to the Institute by French and English architects, taken from their own works and from their drawings, including photographs of the details of the New Opera House in Paris, presented by Mr. Charles Garnier.

A complete series of drawings, mostly presented by Ernst Benzou, 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, Projet d'ordre, Projet de Construction, Grand Prix de Rome, Envoi de Rome.*

Specimens of modern encaustic and other tiles presented by Messrs. Maw & Co., of Broseley, Salop, and photographs of

tile-work presented by Messrs. Minton, Hollins & Co., of Stoke-upon-Trent.

Specimens of modern English stained glass, partly purchased, and partly presented by the makers, with cartoons and drawings illustrating the processes of their manufacture.

Besides the publications of the Royal Institute of British Architects, the Architectural Institute of Scotland and the miscellaneous papers of the Architectural Publication Society, presented by the authorities of these institutions, the following valuable works have been added to these collections by the French Minister of Public Instruction, Mr. Duruy:—

Monographie de la Cathédrale de Chartres.

Statistique Monumentale de Paris.

Monographie de l'Eglise Notre Dame de Noyon.

Comptes de dépenses de la construction du château de Gaillon.

Histoire de l'architecture monastique.

*The Boston Public Library.* The professors and students of the Institute are allowed the full use of this noble library. Copies of the complete catalogues of the Library are kept at the Institute for convenience of reference, and the Library Building is near at hand. The Library now contains 144,000 volumes; and its reading-room is supplied with all the best scientific and technical periodical publications. New books of value are promptly bought, on proper application to the authorities of the Library. No college or school in the country has better facilities in these respects than those which the Trustees of the Boston Public Library have put at the disposal of the officers and students of the Institute of Technology.

*Excursions for the Inspection and Study of Machines, Processes of Manufacture, Buildings, Works of Engineering, Geological Sections, Quarries, and Mines.* In aid of the practical studies of the School, and as a means of initiating students into the actual details of the professions for which they are preparing, they are required from time to time, in the progress of the course, to make visits of inspection to machine-shops,

engines, mills, mines, furnaces, and chemical works, and to important buildings and engineering constructions which are within convenient reach.

With a like view they are expected to spend parts of their vacations in excursions for observation and practice.

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### DIPLOMAS AND CERTIFICATES.

As the diploma or certificate is intended to be, not only a reward to the student for his diligence and attainments, but an assurance to the public of his knowledge and skill in the particular department of science to which it relates, it will be conferred on such students only as give proof by examinations and other tests that they possess the prescribed qualifications; but all persons who fulfil this requirement shall be entitled to the testimonials of the Institute, without regard to the length of time they may have spent in the School.

The degrees or diplomas corresponding to the leading departments of the School are as follows:—

1. A DEGREE IN MECHANICAL ENGINEERING.
2. " " " CIVIL AND TOPOGRAPHICAL ENGINEERING.
3. " " " CHEMISTRY.
4. " " " GEOLOGY AND MINING ENGINEERING.
5. " " " BUILDING AND ARCHITECTURE.
6. " " " SCIENCE AND LITERATURE.

To be entitled to either of these degrees, the student must pass a satisfactory examination on the whole course of studies and exercises prescribed in his department, including the elementary and general, no less than the advanced and special subjects. He must, moreover, prepare a dissertation on some subject included in the course of study, an account of some research made by himself, an original report upon some ma-

chine, 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. He will be required, also, to have sufficient familiarity with French and German to be able to read without difficulty works in these languages, relating to science and the arts.

The examinations for degrees are held in the month of May, and are partly oral and partly in writing.

The form of the degree given by the Institute is "Graduate of the Massachusetts Institute of Technology in the Department of \_\_\_\_\_."

Beside the degrees or diplomas covering the complete courses of study above referred to, certificates of attainment in special subjects will be given to such students as on examination are found to have attained the required proficiency in them.

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## REGULATIONS OF THE SCHOOL.

*School-year.* The School-year begins on the first Monday in October, and ends on the Saturday preceding the first Monday in June. On legal holidays the exercises of the School will be suspended.

*Bond or Deposit.* Every student is required, on entering the School, either to give a bond for two hundred dollars to pay all charges accruing under the Regulations of the School; or to deposit, if he prefer so to do, the sum of two hundred dollars with the Secretary of the Institute, to be accounted for at the end of the School-year, or whenever the depositor leaves the School, in case he leaves it before the end of the year. This deposit must be renewed at the beginning of each



year. The bond must be executed by two bondsmen, satisfactory to the Secretary of the Institute, one of them being a citizen of Massachusetts; and it must be filed within ten days after the date at which the student joined the School.

*Fees.* The regular fees are,—for the first year's course, \$125; for the second, third and fourth, \$150 each,—payable by students who have given bonds, one-half at the beginning, and one-half at the middle (first Monday in February) of the School-year. For one-half, or any less fraction of the School-year, two-thirds of the above fees are charged. The fees for special students vary according to the length and number of the courses chosen, and cannot be specified, except for such special courses as may be annually advertised.

*Attendance.* Students are expected to attend all the exercises of the class to which they belong. Special students are expected to attend all the exercises of the course or courses of study which they have chosen. A weekly return of absences and tardinesses will be made by the Secretary of the Faculty to the parent or guardian of every student not of age. Tardiness consists in entering a lecture-room, drawing room, or laboratory, more than five minutes after the hour designated for the beginning of the exercise. All students, except special students, are expected to devote themselves to the work of the School between the hours of 9, A. M., and 5, P. M., except during the interval for dinner. There are no exercises on Saturday afternoon.

*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. They are specially required to avoid all running, loud talking, or other noise in the entries of the building. 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 good order of the School, if repeated after admonition, will be followed by the dismissal of the offender.

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### EVENING COURSES OF INSTRUCTION.

This department of the School is intended for the benefit of persons of either sex who are prevented from availing themselves of scientific instruction during the day, but are desirous of pursuing such studies in a systematic way, by the aid of afternoon or evening lessons and lectures. It will embrace a number of distinct courses, more or less varied from year to year by the omission or interchange of particular subjects, but including in their entire scope instruction in mathematics, physics, chemistry, geology, natural history, the English and other modern languages and literatures, navigation and nautical astronomy, architecture, and engineering.

The programme of subjects, and the extent of the several courses, will be made known early in October of each year.

As it is the object of this branch of the School to provide substantial teaching, rather than merely popular illustration of the subjects, it is expected that all persons attending these courses 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.

Except in the case of courses in which provision may be made for gratuitous instruction, a fee will be required, payable in advance.

THE TRUSTEE OF THE LOWELL INSTITUTE has established, under the supervision of the Institute of Technology, courses of instruction open to students of either sex, free of charge.

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, where the course is of a nature demanding preparation, stating the extent of their preliminary training.
3. The number of students in each class is necessarily limited. The selection will be made under the direction of the Faculty.
4. It is expected that all persons attending these courses will cheerfully comply with the regulations prescribed for the class or lecture-room.

The courses for 1868-69, attended by nearly five hundred persons, are as follows:—

- A course of thirty lessons in Qualitative Chemical Analysis, by Profs. Eliot and Storer, on Wednesdays and Saturdays, at 3, P.M., beginning November 18.
- A course of eighteen lectures on Mining and the Mineral Regions and Deposits of the United States, with methods of working, etc., by Prof. Rockwell, on Tuesdays and Fridays, at 7½, P.M., beginning January 5.
- A course of eighteen lessons in English History and Literature, by Prof. Atkinson, on Mondays and Thursdays, at 7½, P.M., beginning December 7.
- A course of eighteen lessons in Comparative Physiology and the Laws of Life, by Dr. Kneeland, on Tuesdays and Fridays, at 7½, P.M., beginning November 17.
- A course of eighteen lessons in French, by Prof. Bôcher, for those who have an elementary knowledge of the language, on Mondays and Thursdays, at 7½, P.M., beginning November 16.

1868-69 First Half (Oct.—Feb.) of 1st and 2d Years.

YEAR OF CLASS	9—10	10—11	11—12	12—1	3—4	4—5
MONDAY	First I Mathematics	II Mathematics	I German	II German	{ I Free Hand I Chemical Surveying	Drawing
	Second I Desc. Geometry	II Desc. Geometry	Free Hand Drawing	Physics		Manipulation
TUESDAY	First I English	II English	Physics		Mechanical	Drawing
	Second French	I Mathematics	II Mathematics	English	Chemical	Analysis
WEDNES.	First I Mathematics	II Mathematics	I German	II German	Free Hand	Drawing
	Second German	Mechanical	Drawing	Plan Drawing	Surveying	
THURSDAY	First I Mathematics	II Mathematics		Chemistry	{ I Free Hand II Chemical German	Drawing
	Second I Desc. Geometry	II Desc. Geometry	Plan Drawing	Physics		Manipulation
FRIDAY	First English	Physics	I German	II German	Mechanical	Drawing
	Second French	I Mathematics	II Mathematics	English	Chemical	Analysis
SAT'DAY	First Mathematics	} Military Drill				
	Second German					

## 1868--69, Second Half (Feb.--June.) of 1st and 2d Years.

YEAR OF CLASS	9 — 10	10 — 11	11 — 12	12 — 1	3 — 4	4 — 5
MONDAY	First I Mathematics Mechanical	II Mathematics Drawing	I German Astronomy	II German Physics	{ II Free-Hand I Chemical Surveying	Drawing Manipulation
TUESDAY	First I English French	II English I Mathematics	Physics II Mathematics	..... English	Mechanical Chemical Analysis	Drawing or Organ. Chemistry
WEDNESDAY	First I Mathematics German	II Mathematics	..... Free-Hand	..... Chemistry Drawing	Mechanical Surveying	Drawing
THURSDAY	First I Mathematics Plan	II Mathematics Drawing	I German Astronomy	II German Physics	{ I Free-Hand II Chemical Free-Hand	Drawing Manipulation Drawing
FRIDAY	First English French	Physics I Mathematics	..... Plan II Mathematics	Drawing English	Free-Hand Chemical Analysis	Drawing or Organ. Chemistry
SATURDAY	First Mathematics German	Military Drill	.....	.....	.....	.....



# 1868-69, Second Half of Third Year.

	COURSES IN	9—10	10—11	11—12	12—1	3—5
MONDAY	Mechanical Engineering. Civil Engineering. Chemistry. Geology and Mining. Building and Architecture. Science and Literature.	Mechanics do Indust. Chemistry Mechanics do do	Geology do do do do	Drawing do Laboratory Practice Drawing do Phys. Manipulation	Stereotomy do Laboratory Practice Stereotomy do	Machine Drawing Plan Drawing Laboratory Practice Assaying Architectural Design Drawing
TUESDAY	Mechanical Engineering. Civil Engineering. Chemistry. Geology and Mining. Building and Architecture. Science and Literature.	Mechanics do Drawing Mechanics do do	Machine Drawing Drawing do do do do	German do do do do do	Physics do do do do do	Mechanical Engineering. Civil Engineering Laboratory Practice Civil Engineering do do Laboratory Practice.
WEDNESDAY	Mechanical Engineering. Civil Engineering. Chemistry. Geology and Mining. Building and Architecture. Science and Literature.	Drawing do Quant. Analysis do Drawing Quant. Analysis	French do do do do do	History do do do do do	Geology do do do do do	Drawing do Laboratory Practice do do Architectural Practice. Laboratory Practice.
THURSDAY	Mechanical Engineering. Civil Engineering. Chemistry. Geology and Mining. Building and Architecture. Science and Literature.	Mechanics do Drawing Mechanics do do	English (U.S. Const) do do do do do	Drawing do Laboratory Practice Assaying Drawing Physical Manipulation	Drawing do Laboratory Practice do do do do	Drawing Civil Engineering Drawing Civil Engineering do do Drawing
FRIDAY	Mechanical Engineering. Civil Engineering. Chemistry. Geology and Mining. Building and Architecture. Science and Literature.	Mechanics do Drawing Mechanics do do	French do do do do do	German do do do do do	Physics do do do do do	Mechanical Engineering. Civil Engineering Laboratory Practice Civil Engineering do do Laboratory or Physics
SATURDAY	Mechanical Engineering. Civil Engineering. Chemistry. Geology and Mining. Building and Architecture. Science and Literature.	English do do do do do	Military Drill			

Students may join a Spanish Class Tuesdays and Fridays, 4—5 P. M.

# 1868-69, First Half of Fourth Year.

	COURSES IN					3—5
	9—10	10—11	11—12	12—1		
MONDAY	Mechanical Engineering Civil Engineering Chemistry Geology and Mining Building and Architecture Science and Literature	Mech. Engineering Drawing Laboratory Practice Drawing Physical Manipulation	Drawing Civil Engineering Drawing Engineering do Drawing	Drawing do Laboratory Practice do do	Drawing do Geology do do	Machine Drawing Drawing do Laboratory Practice Architectural Design do
TUESDAY	Mechanical Engineering Civil Engineering Chemistry Geology and Mining Building and Architecture Science and Literature	Mech. Engineering Drawing do Mining Drawing do	Drawing do do do do	German do do do do	Machinery and Motors Drawing Machinery, Motors Drawing Machinery, Motors	Drawing do Laboratory Practice do Modelling Laboratory Practice
WEDNESDAY	Mechanical Engineering Civil Engineering Chemistry Geology and Mining Building and Architecture Science and Literature	Drawing Civil Engineering Quant. Analysis Engineering do Quant. Analysis	French do do do do	Machine Drawing Drawing do do do	English (Political Economy) do do do do	Drawing do Laboratory Practice do do Architectural Practice Drawing
THURSDAY	Mechanical Engineering Civil Engineering Chemistry Geology and Mining Building and Architecture Science and Literature	Natural History do do do do	Stereotomy (Modelling) do Laboratory Practice Stereotomy (Modelling) Physical Manipulation	do do Laboratory Practice do do	Drawing do do do do	Drawing do do Laboratory Practice do Drawing Laboratory Practice
FRIDAY	Mechanical Engineering Civil Engineering Chemistry Geology and Mining Building and Architecture Science and Literature	Drawing Civil Engineering Drawing Engineering do Drawing	French do do do do	German do do do do	Machinery and Motors Drawing Machinery, Motors Drawing Machinery, Motors	Drawing do do Laboratory Practice do Drawing do do
SATURDAY	Mechanical Engineering Civil Engineering Chemistry Geology and Mining Building and Architecture Science and Literature	Mech. Engineering Drawing do Mining Drawing do	Military Drill			

Students in either of the courses may join an Italian class, on Wednesdays, from 11 to 12, A. M., and Fridays, from 3 to 4, P. M.





