MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

EIGHTH

ANNUAL CATALOGUE

OF THE

OFFICERS AND STUDENTS,

WITH

A STATEMENT OF THE COURSES OF INSTRUCTION.

1872-73.

BOSTON:
PRESS OF A. A. KINGMAN.
1872.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

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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 and the Mechanic Arts]. . . . . 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.

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.

CORPORATION

OF THE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

FOR THE YEAR 1872-73.

President,

JOHN D. RUNKLE.

Secretary,	**Treasurer,**
SAMUEL KNEELAND.	JOHN CUMMINGS.

Committee on the School of Industrial Science,

JOHN A. LOWELL, *Chairman.*	SAMUEL K. LOTHROP,
EDWARD ATKINSON,	JOHN D. PHILBRICK,
PHILLIPS BROOKS,	HENRY B. ROGERS,
J. ELLIOT CABOT,	WILLIAM B. ROGERS,
GEORGE B. EMERSON,	J. BAXTER UPHAM.

Committee on the Museum,

ERASTUS B. BIGELOW, *Chairman.*	FRED. W. LINCOLN,
THOMAS T. BOUVÉ,	JAMES L. LITTLE,
CHARLES H. DALTON,	M. D. ROSS,
OSEPH S. FAY,	STEPHEN P. RUGGLES,
RICHARD C. GREENLEAF,	SAMUEL D. WARREN.

Committee on the Society of Arts,

MARSHALL P. WILDER, *Chairman.*	HORACE McMURTRIE,
CHARLES L. FLINT,	E. R. MUDGE,
JAMES B. FRANCIS,	ALEXANDER H. RICE,
H. WELD FULLER,	EDWARD S. TOBEY,
J. C. HOADLEY,	GEORGE W. TUXBURY.

Committee on Finance,

JAMES M. BEEBE, *Chairman.*	WILLIAM ENDICOTT, JR.
J. INGERSOLL BOWDITCH,	JOHN M. FORBES,
J. WILEY EDMANDS,	NATHANIEL THAYER.

On the Part of the Commonwealth,

HIS EXCELLENCY, GOVERNOR WILLIAM B. WASHBURN.

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

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

OFFICERS OF INSTRUCTION.

President.

JOHN D. RUNKLE, PH.D., LL.D.

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

WILLIAM WATSON, PH.D.,
Professor of Mechanical Engineering.

JOHN B. HENCK, A.M.,
Hayward Professor of Civil and Topographical Engineering.

WILLIAM R. WARE, S.B.,
Professor of Architecture.

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

GEORGE A. OSBORNE, S.B.,
Professor of Mathematics, 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.,
Professor of Zoölogy and Physiology.

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

JAMES M. CRAFTS, S.B.,
Professor of Analytical and Organic Chemistry.

ROBERT H. RICHARDS, S.B.,
Professor of Mineralogy and Assaying, in charge of the Mining and Metallurgical Laboratories.

THOMAS STERRY HUNT, LL.D.,
Professor of Geology.

GEORGE H. HOWISON, A.M.,
Professor of Logic and the Philosophy of Science.

S. EDWARD WARREN, C.E.,
Professor of Descriptive Geometry, Stereotomy, and Drawing.

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

———— ———— ————

Professor of Modern Languages.

* The instruction in Botany is at present given by Prof. Ordway.

HENRY L. WHITING, U. S. Coast Survey,
Professor of Topography.

HENRY MITCHELL, A. M., U. S. Coast Survey,
Professor of Physical Hydrography.

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

LEWIS B. MONROE,
Professor of Vocal Culture and Elocution.

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

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

GAETANO LANZA, S.B., C.E.,
Assistant Professor of Mathematics and Mechanics.

ERNEST SCHUBERT,
Instructor in Free-Hand and Machine Drawing.

EUGENE LETANG,
Assistant in Architecture.

JOHN A. WHIPPLE,
Instructor in Photography.

WILLIAM E. HOYT, S.B,
Instructor in Civil Engineering and Drawin

JULES LÉVY,
Instructor in French, Spanish, and Italian.

E. C. F. KRAUSS,
Instructor in German.

CHARLES KASTNER,
Lowell Instructor in Practical Design.

EDWARD K. CLARK, S.B.,
Instructor in Mechanical Drawing.

RANDAL WHITTIER, S.B.,
Instructor in Mathematics.

JAMES M. HODGE, S.B.,
Instructor in General Chemistry and Qualitative Analysis.

CLARENCE S. WARD, S.B.,
Instructor in Quantitative Analysis.

HOBART MOORE,
Instructor in Military Tactics.

DARWIN C. FOGG, *Janitor.*

FACULTY.

JOHN D. RUNKLE, PH.D., LL.D., *President.*
WILLIAM WATSON, PH.D.
JOHN B. HENCK, A.M.
WILLIAM R. WARE, S.B.
WILLIAM P. ATKINSON, A.M.
GEORGE A. OSBORNE, S.B.
ALFRED P. ROCKWELL, A.M.
EDWARD C. PICKERING, S.B.
SAMUEL KNEELAND, A.M., M.D., *Secretary.*
JOHN M. ORDWAY, A.M.
JAMES M. CRAFTS, S.B.
ROBERT H. RICHARDS, S.B.
THOMAS STERRY HUNT, LL.D
GEORGE H. HOWISON, A.M.
S. EDWARD WARREN, C.E.
WILLIAM R. NICHOLS, S.B.
CHARLES R. CROSS, S.B.
GAETANO LANZA, S.B., C.E.
E. C. F. KRAUSS.
JULES LÉVY.

STUDENTS.

RESIDENT GRADUATES.

NAME.	RESIDENCE.	ROOM.
Dodge, William B.	Beverly	Beverly.
Forbes, Eli	Clinton	Clinton.
Hodge, James M.	Plymouth.	21 Dover St.
Ward, Clarence S.	Bridgewater	4 Boylston Pl.
Whittier, Randal	Boston	375 Columbus Ave.

REGULAR STUDENTS.

[The Roman numerals affixed indicate the professional courses.]

FOURTH YEAR.

NAME.	COURSE.	RESIDENCE.	ROOM.
Austin, Amory (*A.B., Harvard College*)	V.	Boston	11 Beacon St.
Beckwith, Daniel (*A.B., Brown University*)	II.	Providence, R. I.	25 Pemberton Sq.
Blodgett, George W.	II.	Boston	83 Chambers St.
Brotherton, William E.	V.	Cincinnati, O.	213 W. Springfield St.
Cabot, Lincoln	II.	Brookline	Brookline.
Fabens, Sam'l A., Jr.	II.	Marblehead	Marblehead.
Felton, Sam'l M., Jr.	II.	Thurlow, Pa.	506 Tremont St.
Fisher, Frederick L.	II.	Medway	Medway.
Gardner, James B.	I.	Boston	3 Centre St.

NAME.	COURSE.	RESIDENCE.	ROOM.
Greenleaf, Edward H.	IV.	Boston	34 Chambers St.
Guild, Frederic, Jr.	VI.	Boston	1038 Shawmut Ave.
Hardy, George R.	II.	Malden	38 Merchants' Build'g.
Harris, William D.	II.	Boston	189 Warren Ave.
Hodges, Osgood (*A.B., Harvard College*)	II.	Salem	Salem.
Howes, Clar. L. (*A.B., Amherst College*)	II.	Hanover	Hanover.
Jewett, William P.	II.	Cape Elizabeth, Me.	Dorchester.
Kimball, William A.	I.	Boston	21 Somerset St.
Lucas, Silas T.	II.	Syracuse, N. Y.	18 Ferdinand St.
May, William C.	V.	Dorchester	Dorchester.
Morse, Frank B.	II.	Boston	13 Worcester Sq.
Parsons, Charles O.	III.	Shirley	18 Ferdinand St.
Phillipps, George	III.	Marshfield	15 Milford St.
Phillips, Henry A.	IV.	Chicago, Ill.	189 Warren Ave.
Porter, Theodore C.	II.	Duxbury	57 Warren Ave.
Ripley, Henry L.	II.	Kingston	Kingston.
Shailer, Robert A.	II.	Boston	2051 Washington St.
Stafford, Charles E.	III.	Boston	47 Blue Hill Ave.
Stone, James E.	II.	Charlestown	Charlestown.
Straw, Frank P.	II.	Hyde Park	Hyde Park.
Tinkham, S. Everett	II.	Taunton	Malden.
Very, Frank W.	V.	Salem	Salem.
Wells, Webster	II.	Boston	36 Edinboro' St.
Williams, Francis H.	V.	Boston	15 Arlington St.
Wood, Louis F.	V.	Wellesley	Lake Crossing.
Woodbury, Chas. J. H.	II.	Lynn	Lynn.

THIRD YEAR.

Arnott, James L.	II.	Thompsonville, Ct.	81 Essex St.
Austin, Charles D.	II.	Boston	380 Columbus Ave.
Baldwin, Loammi F.	II.	Pomfret, Ct.	Peabody.
Barrows, Herbert	II.	Reading	Reading.
Barrus, George H.	I.	Reading	Reading.
Bee, Albert W.	I.	San Francisco, Cal.	26 Milford St.
Blunt, William T.	II.	East Somerville	East Somerville.
Bouvé, Walter L.	II.	Boston	40 Newbury St.
Burrison, Henry K.	II.	Boston	156 Saratoga St.

NAME.	COURSE.	RESIDENCE.	ROOM.
Doane, George E.	II.	Middleboro'	Middleboro'.
Dowse, William B.	IV.	Boston	350 Columbus Ave.
Emerson, Joseph S.	II.	Hawaiian Is.	77 Dartmouth St.
Hamilton, Edward R.	II.	Dedham	Dedham.
Holbrook, Elliot	II.	East Abington	East Abington.
Hongma, Aechirau	II.	Fukuoka, Japan	114 Chandler St.
Howard, Charles P.	II.	Hartford, Conn.	16 Chester Sq.
Jackson, Frank H.	III.	Brighton	Brighton.
Means, Walter K.	II.	Boston	92 Chauncy St.
Myrick, Willis H.	I.	Dublin, N. H.	775 Tremont St.
Perkins, Herbert B.	II.	Ware	Watertown.
Pond, Frank H.	I.	Woonsocket, R. I.	77 Dartmouth St.
Russ, Willis R.	II.	Boston	11 Franklin Pl.
Shaw, Edward S.	II.	Cambridge	Cambridge.
Silsbee, Francis H.	I.	Salem	Salem.
Stevens, Harold W.	II.	Toledo, O.	Cambridgeport.
Sweetser, Arthur W.	II.	Cliftondale	Cliftondale.
Tappan, Roger	II.	Boston	10 Pembroke St.
Tucker, Benjamin R.	VI.	New Bedford	59 Temple St.
Ware, Robert C.	VI.	Marblehead	Marblehead.
Wilder, Stephen H.	VI.	Cincinnati, O.	189 Warren Ave.

SECOND YEAR.

Aspinwall, Thomas, Jr.		Brookline	Brookline.
Bakewell, Thomas H.		Pittsburg, Pa.	607 Tremont St.
Bowditch, Frederic C.		Brookline	Brookline.
Boyden, Amos J.		Foxboro'	Foxboro'.
Breed, Joshua B. F.		Louisville, Ky.	Lynn.
Browne, Edward C.		Salem	Salem.
Burnet, Moses De Witt		Syracuse, N. Y.	298 Columbus Ave.
Church, Christopher A., Jr.		New Bedford	8 Allston St.
Cunningham, Caleb L.		Milton	Milton.
Dabney, Herbert		Fayal, Azores	34 Lambert St.
Dabney, William H., Jr.		Teneriffe	411 Beacon St.
Dodge, Frank S.		Beverly	Beverly.
Dorr, Edgar S.		Boston	1 Foster St.
Edes, William C.		Bolton	372 Dudley St.
Farr, S. Millard		Brooklyn, N. Y.	6 Tyler St.

NAME.	RESIDENCE.	ROOM.
Faulkner, Lothrop H.	Plymouth	108 Appleton St.
Frye, Charles R.	Salem	Salem.
Frye, George B.	Boston	13 Washington Pl.
Gammans, Elbert H.	Newton Centre	Newton Centre.
Goodale, Charles W.	Hudson	Hudson.
Hammatt, Edward A. W.	Belmont	Belmont.
Han y, Edward A.	Barnstable	28 Milford St.
Head, James H.	Brookline	Brookline.
Hibbard, Thomas	West Roxbury	West Roxbury.
Hildabolt, John A.	Germantown, O.	40 Montgomery St.
Huntington, William F.	Springfield	28 Milford St.
Jaqueth, Alfred J.	Liverpool, N. Y.	375 Columbus Ave.
King, Frank T.	Buffalo, N. Y.	98 Pembroke St.
Kinnicutt, Leonard P.	Worcester	94 Chestnut St.
Knowles, J. Frank	New Bedford	6 Allston St.
Lewis, Wilfred	Philadelphia, Pa.	53 Temple St.
Lincoln, Edwin H.	Brookline	Brookline.
Little, Arthur	Boston	2 Commonwealth Ave.
Mason, William A.	N. Cambridge	N. Cambridge.
May, Frank A.	Boston	277 Warren St.
Mixter, Samuel J.	Boston	219 Beacon St.
Mudge, Henry N.	Holliston	Holliston.
Munroe, William R.	Lexington	Lexington.
Okie, Fredrick E.	Linwood, Pa.	506 Tremont St.
Oxnard, Benjamin A.	Jamaica Plain	Jamaica Plain.
Parks, Charles F.	Waltham	Waltham.
Peck, Louis W.	Providence, R. I.	21 Gray St.
Phipps, David W.	Boston	31 Leverett St.
Plimpton, Thomas D.	Walpole.	Walpole.
Powell, John H.	Newport, R. I.	6 Park Square.
Prentiss, William A.	Holyoke	117 Chandler St.
Robinson, Thomas W.	Chicago, Ill.	213 W. Springfield St.
Robinson, William P.	Boston	7 Sheafe St.
Sargent, Frank T.	Malden	Malden.
Sargent, Welland F.	Sedgwick, Me.	9 Oliver Place.
Shockley, William H.	New Bedford	108 Appleton St.
Simonds, Harry	Lexington	Lexington.
Stanwood, James B.	Cincinnati, O.	Arlington.
Stimpson, Oliver D.	Boston	45 Chestnut St.
Taylor, Jacob M.	Brighton	Brighton.

NAME.	RESIDENCE.	ROOM.
Temple, Arthur W.	Reading	Reading.
Tenney, Frank P.	Manchester	Manchester.
Webster, William R.	Philadelphia, Pa.	506 Tremont St.
Willard, William P.	Boston	8 Oak St.

FIRST YEAR.

Allen, Charles F.	Cincinnati, O.	Cambridgeport.
Atkinson, Richard S.	West Roxbury	West Roxbury.
Atwood, William P.	Lowell	Lowell.
Austin, William D.	Dorchester	Dorchester.
Baker, Eugene B.	Auburndale	Auburndale.
Baldwin, George J.	New York, N. Y.	350 Columbus Ave.
Barrows, Walter B.	Reading	Reading.
Beal, B. Leighton	Boston	Hotel Dartmouth.
Blodgett, Aaron D.	Boston	83 Chambers St.
Boutelle, Clarence M.	Chester, Minn.	57 Tremont St.
Bradford, Charles O.	New Albany, Ind.	7 Columbus Sq.
Brazer, Ralph F.	Lowell	Lowell.
Brown, Frank	Marblehead	Marblehead.
Browne, Edward A.	Amesbury	Amesbury.
Buck, Waldo E.	Woburn	Woburn.
Cabot, William R.	Brookline	Brookline.
Carney, William W.	Leavenworth, Kan.	98 Pembroke St.
Carr, E. Frederick	Quincy	Quincy.
Chapman, George H., 3d.	Winchester	Winchester.
Churchill, Charles E.	Milton	Milton.
Coburn, Arthur B.	Charlestown	Charlestown.
Codd, William F.	Nantucket	349 Columbus Ave.
Colcord, J. Marshall	Boston	240 Shawmut Ave.
Copeland, Frederick K.	Fairhaven, Vt.	Cambridge.
Correa, John B.	Boston	65 Bainbridge St.
Cushing, Caleb, Jr.	Newburyport	Newburyport.
Cushing, Wm. Forbes	Cambridge	Cambridge.
Davis, Lorenzo M.	New Bedford	125 Zeigler St.
Davis, Willis E.	San Francisco, Cal.	Boston Highlands.
Dennett, Clarence L.	Beverly	Beverly.
Draper, George A.	Hopedale	Hopedale.
Duncklee, Albert C.	Cambridge	Cambridge.
DuPont, William	Wilmington, Del.	16 Louisburg Sq.

NAME.	RESIDENCE.	ROOM.
Ellis, William F.	Ashland	Ashland.
Estes, J. Irving	East Abington	East Abington.
Evans, Joseph S.	Cincinnati, O.	5 St. James Ave.
Fairbank, Warren H.	Harvard	Harvard.
Fairbanks, Warren E,	Bellingham	Bellingham.
Farwell, Clifford A.	Waltham	Waltham.
Faulkner, John A.	Billerica	Billerica.
Fletcher, Charles R.	Chelsea	Chelsea.
Flint, George L.	North Reading	North Reading.
Fox, Charles L.	Portland, Me.	Brookline.
Freeman, John R.	Lawrence	Lawrence.
Galloupe, Francis E.	Lynn	Lynn.
Gay, Martin	Staten Island, N. Y.	8 Berkeley St.
Giles, Jabez E.	Rockport	Rockport.
Gould, Robert H.	East Cambridge	East Cambridge.
Gowing, E. Harley	Reading	Reading.
Greeley, Frederick	Chicago, Ill.	78 Pinckney St.
Hackett, Wallace	Portsmouth, N. H.	30 Chestnut St.
Hapgood, Everett E.	Hudson	Hudson.
Harlow, William R.	Lowell	Lowell.
Hatch, J. Howard	West Medford	West Medford.
Hayward, J. Lyman	Lowell	Lowell.
Henck, John B., Jr.	Brookline	Brookline.
Heustis, Charles H.	Hyde Park	Hyde Park.
Hicks, Charles A.	Needham	Needham.
Higgins, Delazon P.	Carmel, N. Y.	527 Columbus Ave.
Hills, Edgar R.	Brookline	Brookline.
Hodgdon, Frank W.	Arlington	Arlington.
Hollingsworth, Sumner	South Braintree	South Braintree.
Holman, Silas W.	Framingham	Newton.
Hopps, Arthur D.	Lamoille, Ill.	Newton Centre.
Hume, Charles W.	Eastport, Me.	10 Millmont St.
Hunt, Alfred E.	Hyde Park	Hyde Park.
James, Samuel, Jr.	Cambridgeport	Cambridgeport.
Jaques, William W.	Newbury	Dorchester.
Kendall, Henry H.	Newton	Newton.
Kilham, Alfred C.	Beverly	Beverly.
Knowles, Allen H.	Yarmouth Port	25 Cambridge St.
Lavery, George L.	Boston	653 Broadway.
Leach, Henry L., Jr.	Boston	1 Rollins St.
Learned, Francis M.	Allston	Allston.

NAME.	RESIDENCE.	ROOM.
Leland, Joseph D.	Boston	21 St. James Ave.
Lewis, Theodore J.	Philadelphia, Pa.	53 Temple St.
Low, Albert H.	Chelsea	Chelsea.
Main, Charles T.	Marblehead	Marblehead.
Martin, Edward E.	Lynn	Lynn.
Mills, Arthur L.	Everett	Everett.
Morrell, William H.	Chicago, Ill.	1087 Washington St.
Morton, George A.	Springfield	26 Upton St.
Partridge, Edward J.	Boston	1332 Shawmut Ave.
Partridge, Francis C.	Boston	1332 Shawmut Ave.
Patch, Charles H.	Wakefield	Wakefield.
Pierce, Robert E.	Charlestown	Charlestown.
Piper, Edward E.	Hyde Park	Hyde Park.
Plimpton, Arthur L.	Boston	7 Hawthorn St.
Pond, Wallace R.	Rutland, Vt.	11 Oxford St.
Pratt, Jonathan W.	Bridgewater	Bridgewater.
Pritchard, Charles F.	Marblehead	Marblehead.
Reed, Frank	Charlestown	Charlestown.
Sampson, Edward N.	Boston	26 Saratoga St.
Sawyer, Charles A.	Chicago, Ill.	18 Thornton St.
Schwarz, Theodore E.	Boston	157 Charles St.
Shillaber, Charles P.	Brighton	Brighton.
Staniford, Daniel, Jr.	Boston	76 Highland St.
Steele, Arthur	Stoneham	Stoneham.
Susman, Julius H.	Boston	42 Upton St.
Taber, James C. S.	New Bedford	Brookline.
Thurlow, William C.	Newburyport	Newburyport.
Towne, William F.	Boston	409 Columbus Ave.
Townsend, Walter D.	Boston	10 Brimmer St.
Tyler, James D.	Boston	5 Suffolk Place.
Waite, Charles N.	Lowell	West Newton.
Waite, Edwin E.	New Bedford	125 Zeigler St.
Waitt, Henry M.	Nantucket	349 Columbus Ave.
Watriss, A. Whiting	Cambridgeport	Cambridgeport.
West, George	Salem	Salem.
Whiting, George A.	Charlestown	Charlestown.
Wilde, George A.	Melrose	Melrose.
Willard, John F.	Chicago, Ill.	17 Appleton St.
Wilson, Joseph M.	Charlestown	Charlestown.
Wood, Henry B.	Woburn	Woburn.
Wrinkle, Thomas D. P.	North Lee	255 Harrison Ave.

STUDENTS NOT CANDIDATES FOR A DEGREE.

[Students who are taking studies in different years are placed under the highest year, and the other years are indicated by the Arabic figures affixed. The Roman numerals show that a student is taking parts of the corresponding Regular Course.]

FOURTH YEAR.

NAME.	COURSE.	RESIDENCE.	ROOM.
Adams, Joseph S.	V.	Framingham	Framingham.
Barker, Joseph H.	II.	Cincinnati, O.	506 Tremont St.
Bicknell, Fred. H. 2	IV.	Somerville	Somerville.
Blaisdell, Hiram W.	II.	Concord	Concord.
Borden, Philip D., Jr.	II.	Fall River	114 Chandler St.
Briggs, John L.	IV.	Springfield	519 Columbus Ave.
Brooks, Charles B. 3	VI.	Boston	130 Boylston St.
Craig, Henry S. 3	II.	Bradford	Bradford.
Harris, Ernest A.	II.	Appleton, Wis.	189 Warren Ave.
Hayes, Edmund 2, 3	II.	Farmington, Me.	235 Northampton St.
Johnston, Albert W.	II.	Charlestown	Charlestown.
Leman, William T.	V.	Chelsea	Chelsea.
Lodge, Henry E. 3	II.	Boston	1227 Washington St.
Macomber, John K. (*S.B., Iowa Ag. College*), 3	VI.	Ames, Io.	9 James St.
Merrick, William (*A.B., Harvard College*)	IV.	Springfield	519 Columbus Ave.
Rotch, Arthur (*A.B., Harvard College*) 2	IV.	Boston	3 Commonwealth Ave
Swallow, Ellen H. (*A.B., Vassar College*), 3	V.	Worcester	523 Columbus Ave.
Ware, William R. (*A.B., Harvard College*) 2	IV.	Milton	Milton.
Whitman, Charles B.	III.	Boston	12 Atlantic St.

THIRD YEAR.

Adams, Charles F. 1, 2	V.	E. Brookfield	564 Broadway.
Barnard, Ed. H. 1, 2	IV.	Belmont	Belmont.
Brown, Samuel J. 1	IV.	Cincinnati, O.	E. Cambridge.
Bruce, Charles T.	IV.	Newburyport	Newburyport.

NAME.	COURSE.	RESIDENCE.	ROOM.
Colt, Samuel P.	IV.	Bristol, R. I.	17 Beacon St.
Cunningham, C. G.	III.	Readville	Readville.
Curtis, Edgar C.	IV.	Boston	17 Charles St.
Dandridge, Alex. S., Jr.	II.	Cincinnati, O.	373 Columbus Ave.
Dodd, Arthur H. [2]	IV.	Boston	137 Boylston St.
Elliot, George B.	IV.	Keene, N. H.	249 Tremont St.
Ferry, George B. [2]	IV.	Springfield	420 Columbus Ave.
Flanders, Sherman L.	II.	Goffstown, N. H.	3 Ash Pl.
Foster, William	V.	Brookline	Brookline.
Gardner, Newman W. [2]	IV.	Springfield	420 Columbus Ave.
Gaylord, George B. [2]	II.	S. Hadley Falls	235 Northampton St.
Gibson, Louis H. [1, 2]	IV.	Indianapolis, Ind.	Cambridge.
Haberstroh, Charles E.	II.	Boston	28 Sherman St.
Haynes, Gideon F. [2]	V.	Weston	Weston.
Hubbard, Ervin S. [1 2]	IV.	Holden	Newton.
Lee, Francis W. [2]	V.	Boston	254 Beacon St.
Lewis, G. Wilton [1, 2]	IV.	Fredonia, N. Y.	8 Berkeley St.
Lodge, Francis G.	V.	Boston	1227 Washington St.
Magee, Frank A.	I.	Chelsea	Chelsea.
Mitchell, Louis A. [2]	V.	Philadelphia, Pa.	607 Tremont St.
Paine, Walter J.	IV.	Fall River	29 Hanson St.
Perry, Oliver H., Jr.	V.	Andover	Andover.
Pratt, William L. [2]	IV.	W. Newton	Newton.
Read, Charles F. [2]	IV.	Boston	24 Dartmouth St.
Sampson, Thomas H.	I.	Charlestown	Charlestown.
Simpson, Charles A. [2]	V.	Saxonville	Newtonville.
Skinner, Francis [2]	IV.	Newton	81 Marlborough St.
Smith, Spencer E. [1, 2]	IV.	Poultney, Vt.	44 Hudson St.
Smith, Thomas W.	VI.	Boston	8 Sharon St.
Sullivan, Louis H. [2]	IV.	Wakefield	Wakefield.
Teulon, James A. [1, 2]	IV.	Newton	Newton.

SECOND YEAR.

Abbot, Samuel L., Jr.		Boston	90 Mt. Vernon St.
Barret, Alexander H. [1]		Louisville, Ky.	16 Edinboro' St.
Bates, Walter C. [1]		Boston	21 Union Park St.
Bowers, George		Chelmsford	24 Derne St.
Cabot, John [1]		Lawrence	Lawrence.

NAME.	RESIDENCE.	ROOM.
Conover, Frank 1	Dayton, O.	32 Appleton St.
Cushing, Richmond H.	St. John, N. B.	40 Montgomery St.
Dabney, Frank	Fayal, Azores	34 Lambert St.
Dunn, George F.	Dover	Dover.
Dustan, Robert J.	Milton	Milton.
Eddy, George H., Jr.	Fall River.	67 Appleton St.
Follansbee, Willard F.	Winchester	Winchester.
Garlick, Anson K.	Youngstown, O.	40 Montgomery St.
Hambly, John B.	Portsmouth, R. I.	340 Tremont St.
Marion, William C.	Burlington	Burlington.
Morey, Charles A. 1	Lake City, Minn.	Somerville.
Nickerson, William E.	E. Somerville	E. Somerville.
Norton, Lewis M. 1	Natick	Natick.
Palmer, Frederick M.	Boston	426 Broadway.
Reynolds, Edward G.	Concord	Concord.
Rich, Charles L. 1	Morrisville, Vt.	E. Somerville.
Roby, Luther A.	Nashua, N. H.	Nashua, N. H.
Sherlock, John C. 1	Cincinnati, O.	298 Columbus Ave.
Smith, Morrill A.	Boston	15 St. James Ave.
Smith, Robert B. 1	Charlestown	45 Warren St.
Stickney, Charles D.	Fall River	291 Columbus Ave.
Stoddard, George H.	Plymouth	237 W. Canton St.
Stowe, Horace E.	Hudson	Hudson.
Warren, Henry L. J.	Boston	16 Marlborough St.
Whitney, Charles E.	Harvard	78 Myrtle St.

FIRST YEAR.

Allen, Robert H.	Walpole	Walpole.
Avery, George C.	Louisville, Ky.	32 Appleton St.
Caldwell, Eliot L.	Fitchburg	9 Hanson St.
Davis, Edward W.	Boston	9 E. Newton St.
Goodrich, Charles H.	Chicago, Ill.	69 Essex St.
Hubbard, Charles W.	Boston	2 Louisburg Sq.
Kinsey, Oliver	Cincinnati, O.	5 St. James Ave.
Lord, John O.	Minnesota City, Minn.	25 Vernon St.
Norcross, Edward M.	Grantville	Grantville.
Slade, Abbott E.	Fall River	67 Appleton St.
Sloane, John D.	Haverhill, N. H.	Jamaica Plain.
Tufts, Charles F.	Somerville	Somerville.

STUDENTS IN PRACTICAL DESIGN.

NAME.	RESIDENCE.	ROOM.
Barnard, Anne W.	Lynn	Lynn.
Grant, Augusta	Boston	Boston.
Hinckley, Howard G.	Boston.	14 Rutland St.
Hudson, Annie M.	E. Cambridge	E. Cambridge.
Hudson, E. Frances	E. Cambridge	E. Cambridge.
Jefferson, Mary I.	Melrose	Melrose.
Johnson, Emma L.	Boston	27 Somerset St.
Johnston, Alexander S.	Charlestown	Charlestown.
Lynde, Melissa	Melrose	Melrose.
Mabille, Henry P.	Roslindale	Roslindale.
Mendum, Elizabeth M.	Melrose	Melrose.
Morse, Henry W.	Charlestown	Charlestown.
Pennock, Salmon C.	Somerville	Somerville.
Ricker, M. Elizabeth	Dorchester	Dorchester.
Sherburne, Edith M.	Boston	1272 Washington St.
Williams, Edward	Boston	S. Boston.

SUMMARY.

Resident Graduates,	5
Regular Students, fourth year,	35
" " third "	30
" " second "	59
" " first "	115
Students not candidates for a degree, fourth year	19
" " " " third "	35
" " " " second "	30
" " " " first "	12
" in Practical Design.	16
Total,	356

CALENDAR.

School-year began	Monday, Oct. 7, 1872.
School-year ends	Saturday, May 31, 1873.
The next School-year will begin . . .	Monday, Oct. 6, 1873.
First Entrance Examinations . .	Monday, June 2, 1873, and Tuesday, June 3, 1873.
Second Entrance Examinations . .	Wednesday, Oct. 1, 1873, and Thursday, Oct. 2, 1873.
Examinations for advanced standing, . . .	Friday, Oct. 3, 1873.

COURSES OF INSTRUCTION.

The Massachusetts Institute of Technology provides a series 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. These studies and exercises are 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 Mechanical, Civil, and Mining Engineer, Chemist, Architect, Teacher of Science, and Naturalist. Seven Regular Courses, each extending through four years, have been established as follows: —

I. A Course in Mechanical Engineering.
II. " " " Civil and Topographical Engineering.
III. " " " Geology and Mining Engineering.
IV. " " " Building and Architecture.
V. " " " Chemistry.
VI. " " " Science and Literature.
VII. " " " Natural History.

These courses are identical throughout the first year and half of the second year. For the remainder of the second year the first four courses differ somewhat from the rest. In the third and fourth years the courses differ widely, but certain general studies are common to them all. The student is thus allowed a year and a half, and in some respects two years, before deciding finally upon a profession.

The course in Science and Literature, and the course in Natural History, differ from the others in having a less distinctly professional character. The former offers a sound education,

based on 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 course in Natural History affords an appropriate general training for those whose ulterior object is the special pursuit of Geology, Mineralogy, Botany, Zoology, Medicine, Pharmacy, or Rural Economy.

In all the courses it is intended to secure to every student a liberal mental development and general culture, as well as the more strictly technical education which may be his chief object.

For proficiency in any one of these courses the degree of S.B., Bachelor of Science, is conferred.

Advanced courses of study have recently been established, and the degree of Doctor of Science authorized by a vote of the Corporation.

The Institute also provides annually several courses of instruction, scientific and literary, open to both sexes. At present these courses are free, being supported by the Trustee of the Lowell Institute. Fuller details are given on page 59.

REGULAR COURSES.

FIRST YEAR.

[The Courses in this year are all alike.]

Mathematics. Algebra, after quadratic equations and including logarithms. Plane Trigonometry.

Physics. Mechanics of solids, liquids, and gases.

Chemistry. Experimental study of General Inorganic Chemistry.

English. Rhetoric and Composition. Modern History and Literature.

Logic. Rudiments of Formal Logic. Structure of the Sentence.

French. Grammar and Translation.

German. Grammar and Translation.

Descriptive Geometry and Geometrical Drawing. Plane Problems. Drawing Instruments and Operations. Elementary Projections. Elementary Perspective.

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

Physiology and Hygiene. Lectures.

SECOND YEAR.

[The Courses in this year are alike, with the exception noted below.]

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. By lines only. By Compass. By Transit. Application of rectangular coördinates. Field-work. Plotting surveys. Levelling.

Physics. Sound. Light. Heat. Magnetism. Electricity.

Chemistry. Qualitative Analysis. Organic Chemistry.

Physical Geography. Physical and Industrial Geography.

English. English Philology. Composition. Modern History and Literature.

French. Grammar and Translation.

German. Grammar and Translation.

Descriptive Geometry and Geometrical Drawing. General Problems of Descriptive Geometry in perpendicular and oblique projection.

Topographical Drawing. Elementary Practice in Pen and Colored Topography. Plans.

Free-hand Drawing. Machinery. Ornamentation. Landscape.

After the semi-annual examination, those who take the courses in Chemistry, Science and Literature, and Natural History, will be allowed to take, instead of Surveying and the mathematics of the second term, approved equivalents selected from the following subjects: —

Botany. Systematic and Structural.

English. English Philology. English Literature and History of the 18th Century. Critical reading of English writers. Composition.
Chemistry. Organic Chemistry. Chemical Philosophy.
Physical Geography. Physical and Industrial Geography.

THIRD YEAR.

I. COURSE IN MECHANICAL ENGINEERING.

Machinery. Cinematics. Principles of Mechanism. Measurement of the Dynamic Effect of Machines. Regulating Apparatus, as Brakes, Fly-Wheels, Governors, etc. Friction and Rigidity. Materials, Construction, and Strength of Machinery. Action of Cutting Tools.
Mathematics. Differential and Integral Calculus. Analytic Mechanics.
Applied Mechanics. Dynamics of Solids. Hydrostatics and Hydrodynamics.
Stereotomy. Shades and Shadows. Perspective. Machine Construction and Drawing. Elements of Mechanism. Whole Machines.
Metallurgy. Metallurgical Processes, Constructions, and Implements.

Zoology. Outlines of Zoology.
Physics. Laboratory Practice.
Geology. Descriptive and Theoretical.
English. Composition. History of English Literature.
Constitutional History. England and the United States.
French. (Italian or Spanish, one or both, may be substituted.)
Logic. Systematic treatment of Formal Logic.
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.
Topography. As practised by the U. S. Coast Survey.
Mathematics. Differential and Integral Calculus. Analytic Mechanics.

Applied Mechanics. Stress. Stability, Strength, and Stiffness.
Spherical Astronomy. Higher Geodesy. Latitude and Longitude.
Stereotomy. Shades and Shadows. Perspective. Machine Construction and Drawing. Drawings of Wood, Stone, and Iron Structures.
Topographical Drawing. Maps of Railway, Topographical, and Hydrographical Surveys.

Zoology. Outlines of Zoology.
Physics. Laboratory Practice.
Geology. Descriptive and Theoretical.
English. Composition. History of English Literature.
Constitutional History. England and the United States.
French. (Italian or Spanish, one or both, may be substituted.)
Logic. Systematic treatment of Formal Logic.
German.

III. COURSE IN MINING ENGINEERING.

Mining. Ore-deposits. Prospecting. Boring.
Engineering. Survey and Construction of Roads and Railways. Measurement of Earth-work and Masonry. Hydraulics. Drainage. Field-practice.
Mineralogy. Descriptive and Determinative. Crystallography. Use of the Blowpipe.
Assaying. Wet and Dry Ways.
Chemistry. Laboratory Practice in Quantitative Analysis.
Metallurgy. Metallurgical Processes, Constructions, and Implements.
Palæontology.
Mathematics. Differential and Integral Calculus. Analytic Mechanics.
Applied Mechanics. Stress. Stability, Strength, and Stiffness.
Stereotomy. Shades and Shadows. Machine Construction and Drawing.
Topographical Drawing. Maps and Sections of Mines.

Zoology. Outlines of Zoology.
Physics. Laboratory Practice.
Geology. Descriptive and Theoretical.
English. Composition. History of English Literature.
Constitutional History. England and the United States.

French. (Spanish or Italian, one or both, may be substituted.)
Logic. Systematic treatment of Formal Logic.
German.

IV. 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.
Stereotomy. Shades and Shadows. Perspective. Elements of Machine Construction and Drawing.

Zoology. Outlines of Zoology.
Physics. Laboratory Practice.
Geology. Descriptive and Theoretical.
English. Composition. History of English Literature.
Constitutional History. England and the United States.
Logic. Systematic treatment of Formal Logic.
French. (Spanish or Italian, one or both, may be substituted.)
German.

V. COURSE IN CHEMISTRY.

Industrial Chemistry. Study of Chemical Manufactures. Glass Pottery, Acids, Gas, etc. The Arts of Dyeing, Calico-Printing, Tanning, etc.
Chemistry. Laboratory Practice in Quantitative Analysis.
Metallurgy. Metallurgical Processes, Constructions, and Implements.
Assaying. Wet and Dry Ways.
Mineralogy. Descriptive and Determinative. Crystallography. Use of the Blowpipe.
Botany. Vegetable Physiology. Classification.
Stereotomy. Shades and Shadows. Perspective. Elements of Machine Construction and Drawing.

Zoology. Outlines of Zoology.
Physics. Laboratory Practice.
Geology. Descriptive and Theoretical.
English. Composition. History of English Literature.
Constitutional History. England and the United States.
Logic. Systematic treatment of Formal Logic.
French. (Spanish or Italian, one or both, may be substituted.)
German.

VI. COURSE IN SCIENCE AND LITERATURE.

History. Guizot—Histoire Générale de la Civilisation en Europe.
Stereotomy. Shades and Shadows. Perspective.
Zoology. Outlines of Zoology.
Physics. Laboratory Practice.
Geology. Descriptive and Theoretical.
English. Critical Reading of English Writers. Earlier English Literature. Composition.
Constitutional History. England and the United States.
Logic. Systematic treatment of Formal Logic.
French. Advanced Study. (Spanish or Italian may be substituted.)
German. Advanced Study.

The foregoing studies are required, and of the following the student must select at least two : —

Mathematics. Differential and Integral Calculus. Analytic Mechanics.
Mineralogy. Descriptive and Determinative Crystallography. Use of the Blowpipe.
Chemistry. Laboratory Practice in Quantitative Analysis.
Botany. Vegetable Physiology. Classification.
Physics. Physical Research.
Architecture. Architectural Design.
Engineering Courses. Subjects at the option of the student.

VII. COURSE IN NATURAL HISTORY.

Geology. Descriptive and Theoretical.
Botany. Vegetable Physiology. Classification.
Mineralogy. Descriptive and Determinative. Use of the Blowpipe

Chemistry. Laboratory Practice in Quantitative Analysis.
Microscopy. Practical Exercises on Organic Structures.
Drawing. Free-Hand, of Animal and Vegetable Structures.

Zoology. Outlines of Zoology.
Physics. Laboratory Practice.
English. Composition. History of English Literature.
Constitutional History. England and the United States.
French. (Spanish or Italian, one or both, may be substituted.)
Logic. Systematic treatment of Formal Logic.
German.

FOURTH YEAR.

I. COURSE IN MECHANICAL ENGINEERING.

Engineering. Resistance of the Materials used in Construction. Estimation of the Strength of Structures of Wood, Stone, and Iron. Foundations, Beams, Girders, Columns, Roofs, etc.
Thermodynamics. Mechanical theory of Heat.
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, Cements.
Stereotomy. Stone Cutting.
Geometrical Drawing. Drawing of subjects assigned by the Department.
Physics. Practical experiments in Weighing and Measuring, Strength of Materials, Heat, and Steam.

English. Composition. English Literature.
Philosophy of Science. Theory of Induction. Classification of the Mathematical Sciences. Theory of the Calculus.
Political Economy.
Elements of Business Law.
German.
French.
Italian. } (Voluntary.)
Spanish.

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.

Physical Hydrography. As practised by the U. S. Coast Survey.

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

Building Materials. Woods, Stones, Bricks, Mortars, Cements.

Physics. Practical Experiments in Weighing and Measuring, Strength of Materials, Flow of Liquids and Gases.

Stereotomy. Stone Cutting. Carpentry.

Geometrical and Topographical Drawing. Drawing of subjects assigned by the Department.

English. Composition. English Literature.

Philosophy of Science. Theory of Induction. Classification of the Mathematical Sciences. Theory of the Calculus.

Political Economy.

Elements of Business Law.

German.

French.
Italian.
Spanish.
} (Voluntary.)

III. COURSE IN MINING ENGINEERING.

Mining. Sinking Shafts,—Timbering, Walling, and Tubbing. Driving Levels. Methods of Mining. Ventilation. Winding Machinery. Ladders and Man-Engines. Underground Transportation. Pumps. Dressing and Concentration of Ores. Laboratory practice in Ore-dressing.

Economic Geology. Detailed description of American Ore-deposits and Mines.

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

Engineering. Resistance of the Materials used in Construction Estimation of the Strength of Structures of Wood, Stone, and Iron. Foundations, Beams, Girders, Columns, Roofs, etc.

Chemistry. Quantitative Analysis. Laboratory Practice.

Geology. American Geology, lithological, stratigraphical, and palæontological.

Metallurgy. Lectures and Laboratory Practice in Ore Dressing and Smelting.

Chemical Geology. Origin of Rocks, Vein-stones, Ore-deposits, Coal, Petroleum, Salt, etc.

Physics. Practical Experiments in Weighing and Measuring, Strength of Materials, Microscopy, Spectroscopy.

Building Materials. Stones, Bricks, Mortars, Cements.

Stereotomy. Stone Cutting. Carpentry.

Geometrical and Topographical Drawing. Geological Maps and Sections. Plans and Sections of Mines. Mining Machinery and Implements.

English. Composition. English Literature.

Philosophy of Science. Theory of Induction. Classification of the Mathematical Sciences. Theory of the Calculus.

Political Economy.

Elements of Business Law

German.

French.
Italian.
Spanish.
(Voluntary.)

IV. 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.

Stereotomy. Stone Cutting. Carpentry.

Physics. Practical Experiments in the Strength of Materials, Photometry, Ventilation, Warming, Acoustics.

Building Materials. Woods, Stones, Bricks, Mortars, Cements.

English. Composition. English Literature.
Philosophy of Science. Theory of Induction. Classification of the Mathematical Sciences. Theory of the Calculus.
Political Economy.
Elements of Business Law.
German.
French.
Italian. } (Voluntary.)
Spanish.

V. COURSE IN CHEMISTRY.

Chemistry. Quantitative Analysis. Organic Analysis. Gas Analysis. Preparation of Chemical Products. Special Researches.
Physics. Use of the Microscope, Spectroscope, Saccharimeter. Photometry. Electrical Measurements.
Geology. American Geology, lithological, stratigraphical, and palæontological.
Building Materials. Stones, Bricks, Mortars, Cements.
Drawing. Apparatus used in the Arts.
Botany. Vegetable Physiology. Economic Botany.

English. Composition. English Literature.
Philosophy of Science. Theory of Induction. Classification of the Mathematical Sciences. Theory of the Calculus.
Political Economy.
Elements of Business Law.
German.
French.
Italian. } (Voluntary.)
Spanish.

VI. COURSE IN SCIENCE AND LITERATURE.

Physics. Special Researches.
Geology. American Geology, lithological, stratigraphical, and palæontological.
Botany. Vegetable Physiology. Economic Botany.
Drawing. Subjects determined by each student's choice of studies.

English. Critical Reading of English Writers. Earlier English Literature. Composition.

Philosophy of Science. Theory of Induction. Classification of the Mathematical Sciences. Theory of the Calculus.

Political Economy.

Elements of Business Law.

French. Advanced Study.

German. Advanced Study.

Italian. } (Voluntary.)
Spanish. }

The foregoing studies are required, and of the following the student must select at least two : —

Chemistry. Quantitative Analysis. Organic Analysis.

Zoology. Comparative Anatomy. Any special Department of Zoology at the option of the student. Laboratory Practice.

Engineering Courses. Subjects at the option of the student.

Thermodynamics. Mechanical theory of Heat.

VII. COURSE IN NATURAL HISTORY.

Zoology. Comparative Anatomy. Any Special Department of Zoology at the option of the Student. Laboratory Practice.

Geology. American Geology, lithological, stratigraphical, and palæontological.

Physics. Use of the Microscope, Spectroscope, Saccharimeter.

Botany. Vegetable Physiology. Economic Botany.

Chemistry. Quantitative Analysis. Organic Analysis. Toxicology.

English. Composition. English Literature.

Philosophy of Science. Theory of Induction. Classification of the Mathematical Sciences. Theory of the Calculus.

Political Economy.

Elements of Business Law.

German.

French.
Italian. } (Voluntary.)
Spanish.

ADVANCED COURSES.

These courses have been established by a recent vote of the Corporation, and are intended to afford to Bachelors of Science of this Institute, and others of equal attainments, the means of continuing their studies. For proficiency in these courses the degree of S. D., or Doctor of Science, has been authorized.

The particular course of study which a student wishes to pursue must be submitted in writing, and must meet the approval of the Faculty. The methods of instruction, whether by lectures, or projects, or practice in the field or in the laboratories, will be those best adapted to each case. Frequent examinations will be held to test the progress of the student; but in voluntary subjects no examination will be required.

The minimum term of residence of candidates for a 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.

A candidate for a degree will be required to present at least one printed thesis on some subject embraced in his course.

The usual final examinations for a degree will be held, and these, with all previous examinations and the thesis, will be the tests of the student's proficiency.

CONDITIONS OF ADMISSION.

Regular Courses. To be admitted as a regular student of the first year's class, applicants must have attained the age of sixteen years, and must pass a satisfactory examination in arithmetic, algebra through equations of the second degree, plane and solid geometry, French grammar to regular verbs,[1] English grammar and composition, and geography. In general, the training given at the best High Schools, Academies, and Classical Schools, will be a suitable preparation for this School.

To be admitted as a regular student of the second year's class, applicants 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 applicants for admission into the classes of the succeeding years.

Graduates of Colleges will, in general, be presumed to have the requisite attainments for entering the third year as regular students, and may do so on satisfying the department which they purpose to enter that they are prepared to pursue their studies to advantage. Such students, if deficient in any of the scientific studies of the first two years, will have opportunities for making them up without extra charge, and will be required to pass an examination in them before entering upon the studies of the fourth year. Should they be already proficient in any of the general studies of the third and fourth years, they will be excused, if they wish, from attendance on the exercises in these subjects.

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. Those who intend to take the course in Natural History will find it advantageous also to acquire the elements of Greek.

[1] The first nineteen lessons in Otto's Grammar, or the first twenty lessons in Fasquelle's Grammar, or the first fifty-seven pages in Magill's Grammar, contain all that is required in French in 1873. In 1874, and subsequently, applicants will be examined in all that part of the grammar that precedes Syntax, and in translating *Corinne*, or some equivalent book.

Persons not candidates for a degree will be allowed to enter special divisions of either of the courses,—as, for example, the classes of mathematics, chemistry, physics, drawing, engineering, metallurgy, architecture, natural history, etc., — on giving satisfactory evidence to the Faculty that they are prepared to pursue with advantage the studies selected. They must be present for examination at the times stated below, and will be required to pass the entrance examination prescribed for regular students, except when the studies selected do not require a knowledge of certain of the subjects covered by that examination, such as mathematics, French, etc. In this case the examination will be modified accordingly.

An examination for admission to the first year's class will begin at 9 A. M., on the first Monday in June, and continue two days. A second examination will begin at 9 A. M., on the Wednesday preceding the first Monday in October, and continue two days. Attendance on both days of either examination is required. Applicants for advanced standing must present themselves at either the first or second entrance examination, as given above, and if they pass this examination, must present themselves for further examination at 9 A. M., on the Friday preceding the first Monday in October. College graduates will also apply at the time last mentioned. Applications for admission at other times than the above will be received only when sickness or some other equally good cause has prevented attendance on the days prescribed. Copies of recent examination papers and further information in regard to the requirements for admission may be obtained by application to the Secretary of the Institute.

Advanced Courses. Bachelors of Science of the Institute may enter on these courses without examination. Bachelors of Arts, Science, or Philosophy of any other Institution may enter, on giving satisfactory evidence, by examination or otherwise, that they are qualified to pursue the course selected. Any person may enter who, by examination, is found qualified to take the degree of Bachelor of Science in the Institute.

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 upon.

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. Such students must appear for re-examination at 9 A. M., on the Friday preceding the first Monday in October.

The Instruction in Chemistry. In the chemical laboratories provision is made for teaching General Chemistry, Qualitative Analysis, Quantitative Analysis, Assaying, Determinative Min-

eralogy, the Use of the Blowpipe, Metallurgy, and Industrial Chemistry. The department occupies five laboratories, a chemical lecture-room, and a recitation-room, besides rooms for apparatus, balances, and storage.

In the first year, instruction is given in General Chemistry by exercises which combine a recitation and an illustrated lecture, and by weekly lessons 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 by oral and written examinations. Instruction is also given, during the first term of the year, in the elements of Organic Chemistry. In the second term, students who intend to pursue the regular courses in Chemistry, Natural History, and Science and Literature, study the principles of Chemical Philosophy, and have practice in solving chemical problems.

In the third and fourth years, the principal subjects of study are Quantitative Analysis, Organic Chemistry, Gas Analysis, the Preparation of Chemical Products, Assaying, Mineralogy, the Use of the Blowpipe, Metallurgy, and Industrial Chemistry. In the third year, a series of lectures is given upon new methods in Quantitative Analysis, and a course of study in Volumetric Analysis is pursued with the use of a German text-book. The fourth year's chemical work in the lecture room is devoted to a thorough study of Organic Chemistry. Competent students are encouraged to undertake special researches, and are assisted in bringing them to useful results.

The Instruction in Physics. During the first two years the whole subject is discussed in a series of lectures, which are attended by all the regular students. 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 first part of the course is devoted to Mechanics of solids, liquids, and gases, and is designed both to prepare the student for an extended study of General Physics, and to serve as an introduction to Analytical and Applied Mechanics.

The Institute possesses an extensive and constantly increasing collection of physical apparatus. The lectures are also illustrated by a large number of photographs on glass, which are projected upon a screen by means of the calcium light.

The Physical Laboratory. In the third year, the students enter the physical laboratory, and learn to use the different instruments, and to perform a variety of experiments. Special attention is paid to the testing of physical laws, by comparing the observed and computed results.

In the fourth year, they carry on systematic investigations in particular branches of physics, or pursue such portions of the following subjects as have a direct bearing on their professional studies :—

Strength of Materials. Flexure of beams and girders; breaking weight; laws of elasticity.

Weighing and Measuring. Comparison of scales; calibrating tubes; use of dividing engine; making standards of weight and volume.

Laws of Gases and Vapors. Mariotte's law; expansion by heat; pressure of steam at different temperatures.

Flow of Liquids and Gases. Coefficients of efflux; weirs; effusion and transpiration of gases; velocity of air and water currents; flow under different pressures.

Microscopy. Methods of viewing various objects; magnifying powers; focal lengths; polariscope; micrometers; mounting objects dry and in balsam; making cells; cutting and grinding sections; injecting tissues.

Spectroscopy. Application to chemical analysis; electric spectra of metals and gases; constructing normal maps of

the solar spectrum; measurement of indices of refraction and wave-lengths.

Photometry. Candle power of gas; comparison of burners; ratio of light to consumption.

Electrical Measurements. Measurement of quantity, electro-motive force, and resistance; testing electro-magnets; comparison of different batteries; application to submarine telegraphy; detection of faults in the cable.

Teachers of physics, and others properly qualified, may enter the laboratory, and take the whole or any part of the above subjects.

The Instruction in Rhetoric and History. Lectures are given on the history of the English Language and of English Literature. Systematic practical exercises in English Composition will be required of all regular students, as an essential part of their training. Practice in writing English will be continued throughout the four years, in the preparation of abstracts of the lectures or of the collateral reading prescribed, of translations from the French or German manuals used in the instruction in history, and of original papers or essays to be read to the class.

In the second year, a course of lectures is given on Modern History, in connection with the reading of a manual in French accompanied by written abstracts and translations. In the third year, a similar course is continued, in connection with the French text of Guizot's "Histoire Générale de la Civilisation en Europe," or of some similar work in German. The main object of these courses is to teach the student how to read history for himself, and to give materials and opportunity for practice in written composition.

In the third and fourth years, instruction is given in English and American Constitutional History, and in the text of the Constitution of the United States.

To students in the department of Science and Literature opportunity is afforded for a more detailed study of English by

the critical reading of annotated texts of standard English authors.

The Instruction in Descriptive Geometry, Stereotomy, and Drawing. Descriptive Geometry is taught as the Geometry of Form and Position in Space, treated by the method of projections, and has associated with it, for convenience, both Elementary and Higher Plane Problems.

Stereotomy is taught as the cutting of forms, either material or immaterial, to suit prescribed conditions. It thus embraces shades and shadows, perspective, structure drawing, machine drawing, stone cutting, and carpentry.

Drawing is taught under three heads: geometrical drawing, embracing all the drawing associated with the foregoing subjects, and done with instruments; topographical drawing, including the construction of maps of hydrographical and railway surveys, in either pen or colored topography; and free-hand drawing, which is conducted with reference to the wants of the scientific professions, rather than as a training for artistic pursuits, and consists partly of progressive exercises in the drawing of geometrical forms by hand, as a preparation for making sketches and measurements of bridges, machines, etc., partly of lettering and ornament in their relations to finished drawings and to architectural decoration, and partly of sketching from nature, as useful in sketching topography.

The first year's work is confined to elementary drawing, and is intended to be complete in itself, and to serve not only as a foundation for the succeeding work of the school, but to afford the necessary instruction for special students in drawing who are preparing to become draughtsmen or artisans. It embraces elementary plane problems; use of drawing instruments and materials; elementary projections (common and isometrical) of forms, shadows, and simple structures; elementary perspective; and elementary free-hand drawing, including lettering.

In the succeeding years, are given the higher general problems in descriptive geometry, shades and shadows, and perspec-

tive, with more advanced free-hand practice; also the drawing peculiar to the professional work of the school, embracing structure drawing, machine drawing, stone-cutting, carpentry, and the execution of finished maps of surveys.

The instruction is given in part by the professor personally, and in part by assistants, acting under his direction, and to each of whom is assigned a specific portion of the work. Text-books are also used, and short familiar lectures are given, with free use of models and the blackboard. The student is required to be prepared on regularly assigned lessons, either for interrogation at his table or for demonstrations on the blackboard. Every student has a separate table assigned to him, which he may occupy for either drawing or study when not engaged in other exercises.

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. These projects, given in connection with the lectures and complementary to them, are of three kinds. The projects of the first kind, namely, those in applied Cinematics, are numerical and graphical problems, having for their object the representation of the motion, and the determination of the form adapted to each piece of mechanism. They include the construction of cams, eccentrics, link work, and all kinds of gearing. Projects of the second kind are exercises in the construction of parts of machines such as axles, cranks, valves, pistons, and finally of complete machines, from numerical data. Projects of the third kind are not given until the students have been made acquainted with the doctrine of the strength of materials, so as to be able to find the dimensions of pieces to resist flexure, shearing, torsion, etc. They consist of original designs for machines, involving the determination of the strength, dimensions, and proper proportions of the several parts by calculation.

These projects comprise: — The plans, elevations, and sections of the machines; the working drawings of the details; and a memoir containing the description and theory of the machines, the estimation of the resistances, the calculation of the strength and proper proportions of the parts, and the reasons for the particular dispositions adopted. Much value is attached to these last exercises, and the whole of the previous work is made tributary to them.

The Instruction in Civil 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, 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 Instruction on pages 24 and 29, 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. An *Observatory*, erected upon the Institute building, from which a large number of U. S. Coast Survey stations are visible, is used in the instruction in triangulation and geodesy. Observations are also made for the determination of the meridian, and of latitude and longitude.

The Instruction in Topography is mainly given in the field by means of the Plane-Table, as perfected and used in the United States Coast Survey. The maps are completed in the drawing rooms, where instruction is given in the conventional modes of shading and topographical illustration.

The Instruction in Physical Hydrography is begun by practice in water surveys. After the student has become familiar with the data and the means of obtaining them, applications are made to the construction of breakwaters, docks, wharves, and other harbor improvements, as well as to the dyking and reclaiming of lands, to the location and construction of canals, and to the rectification of rivers.

The Instruction in Mineralogy. Determinative Mineralogy is taught by the study of crystalline forms, and the physical properties of minerals, and by the use of the blowpipe; and Descriptive Mineralogy by the actual handling of specimens.

The Instruction in Geology and certain related subjects is given as follows:—

In the third year, is given a course of thirty lectures on Descriptive and Theoretical Geology, embracing the classification of the Sciences; Scope of Geological Studies; Nature of Rocks, or Lithology; Stratigraphy; Succession of Formations; Zoological History; Geological Dynamics; Chemical and Physical Forces; Aqueous and Igneous Agencies; Currents; Sedimentation; Elevation and Subsidence; Geographical Distribution of Formations; Nature and Origin of Mountains; Volcanic Action.

In the fourth year, are given:—a course of thirty lectures on American Geology, comprising Geological History; Geology of North America, considered lithologically, stratigraphically, and palæontologically; Comparative Geognosy:— a course of fifteen lectures on Practical Lithology, comprising the mineralogical composition of Rocks; Building-stones, their cohesion, porosity, etc.; Granites, Marbles, Limestones, Sandstones, Slates; Limes, Cements, and Mortars; Ornamental Stones and Gems:—and a course of fifteen lectures on Chemical Geology, or the chemical history of the globe; comprising the Origin of Rocks, both stratified and unstratified; the History of Veinstones and Ore-deposits; the Formation of Coal and Petro-

leum; the Chemistry of Salt-deposits and of Mineral Waters; the Seat and Origin of Volcanic and Earthquake phenomena.

The Instruction in Mining and Economic Geology is given in two courses, to students of the third and fourth years.

The first is a course of seventy lectures on Mining. The student is made acquainted with the general character of the various deposits of the useful minerals, and with the theory and practice of mining operations, comprised under the general term Exploitation, such as "prospecting," boring, the sinking of shafts, the driving of levels, different methods of working, hoisting, pumping, ventilation, etc.; with a study of the machinery and appliances connected with them. Ore-dressing, or the mechanical separation of ores from their gangues, is discussed somewhat at length, and the machines described by means of which this concentration is most economically effected. The practical course of ore-dressing and smelting in the Mining and Metallurgical Laboratories, affords the student opportunities for acquiring a familiar knowledge of the treatment of ores, such as can be got, under ordinary circumstances, only at the best mines.

The second is a course of twenty lectures on Economic Geology, mainly devoted to a detailed description of the coal and ore-deposits of North America, especially such as are most extensively worked.

Students are expected to spend a portion of their vacations in some one of the principal mining-districts in the study of the local peculiarities of the ore-deposits, and the details of actual working, and to submit a full report upon the same, with drawings. Those who intend to become metallurgists, may take smelting-works instead. Through the kindness of several proprietors, certain mines in different regions have been made accessible to students, for the purpose of systematic study.

The valuable scientific library and the large geological collection of the late Prof. Henry D. Rogers of the University of Glasgow, presented to the Institute by Mrs. Rogers, are acces-

sible to the students in Geology and Mining. This collection is made up chiefly of fossils and rock specimens from American localities, and is especially rich in coal-plant fossils. Accompanying this collection are a large number of diagrams and maps of great value for the lecture room. The collection of ores and vein-stones is already large and varied, and is constantly receiving additions from the various mining regions.

A typical set of models of mining machinery, chiefly from Freiberg, Saxony, is used in the course of instruction. They are designed mainly to illustrate the principles of the various processes of mining and ore-dressing, but combine also the latest improvements in machines. They show, in detail, the methods of working under ground by underhand and overhand stoping, the timbering and walling of shafts and levels, the arrangements of pumps, man-engines, ladder-ways, hoisting-ways, the sinking of shafts, etc. The machines for ventilation, as well as those for ore-dressing, are working models, with all their parts made proportional. The latter illustrate all the stages of the concentration of ores. It is proposed, as opportunity offers, to add to this collection other similar models.

The Instruction in Palæontology is given to students of the third and fourth years.

Palæontology, including the history of ancient animal life, and the study of the distinctive and characteristic fossils of the different formations, is taught 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 genera which characterize various formations.

The handling and drawing of specimens by the students is an essential feature 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 Mining and Metallurgical Laboratories. These Laboratories are intended to furnish to the student in Mining and Metallurgy the means for studying experimentally the various processes of ore-dressing and smelting, and ores of different kinds may be here subjected to the same modes of treatment as have been adopted at the best mining and metallurgical establishments. The mining laboratory contains a fifteen-horse-power engine, a five-stamp battery of the form in use in Colorado and on the Pacific coast, an amalgamating pan, settler, and concentrator of the kind used in the Washoe process in California and Nevada, for the treatment of silver and gold ores, a Blake crusher, a Whelpley and Storer pulverizer, a Rittinger automatic shaking-table, a hand-jigger, a Freiberg shaking-table and a Sturtevant pressure-blower. The metallurgical laboratory contains blast and reverberatory smelting furnaces, a roasting furnace, a furnace for cupellation, furnaces for fusion, and crucible and muffle assay furnaces.

The experimental work of the laboratory is carried on by the students under the immediate supervision of an instructor. A sufficiently large quantity of ore is assigned to each student, who first examines it for its component minerals, 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, and thus learns approximately the effectiveness and economy of the method adopted.

The Institute is from time to time receiving ores of gold, silver, lead, copper, antimony, zinc, iron, etc., from various localities on this continent. These ores are worked, and reports sent to those who contributed them; and it is hoped that by such coöperation the laboratory will continue to receive the necessary amount and variety of ores.

The Instruction in Machinery and Motors, given to the students in mechanical, civil, and mining engineering, includes the measurement of force and power, the estimation of the resistances in machines, and the construction of hydraulic machines and motors; the description of each machine illustrated by diagrams and models, the theory of its action and the calculation of its efficiency; the properties of steam and gas; combustion and fuel; the principles of thermodynamics; the arrangement and efficiency of boilers, furnaces, and fire-grates; steam, air, and gas engines; and the recent improvements in binary engines and steam turbines.

Models, etc., relating to the Engineering Courses. The collections under this head consist of models in wood, in metal, and in plaster, besides lithographs, photographs, and manuscript drawings, chiefly selected from the best collections of France, Germany and Switzerland, and, in some instances, made expressly for the school. They are arranged for convenience in the following groups. Some of these groups contain one or two hundred models, others only a few typical ones; it is, however, proposed to add from time to time such as may be required for the purposes of instruction.

Descriptive Geometry and its Applications. A set of models in relief, illustrating the various problems of Descriptive Geometry, arranged upon sets of planes at right angles to each other, and containing the corresponding graphical solutions; a set of models illustrating linear perspective, and the theory and practice of shades, shadows, and reflections; plaster models showing the intersections of cylinders, cones, and surfaces of revolution with each other, the penetrations made in each surface, and the common solid; models of brass and silk threads to illustrate the course on developable and warped surfaces.

Masonry and Stone Cutting. Models representing groined and cloistered arches, domes, staircases, etc., with detached

voussoirs; models of right and oblique bridges, with their approaches and other accessory works.

Carpentry. Models of joints and mouldings; models of wooden and iron roof trusses, including a model illustrating Polonceau's system of iron roofs, centres for bridges, girders, etc.

Iron Bridges. A set of models illustrating the most recent constructions in iron bridges, beautifully executed by Bock, of Dresden.

Experimental Mechanics. Casts of Saint Venant's models, showing the changes of forms which bodies of various shapes undergo, when subjected to forces causing flexure and torsion; a full sized model of the liquid vein observed and measured by Poncelet and Lesbros, in their hydraulic experiments. These models are duplicates of those made for the *Conservatoire des Arts et Métiers*, at Paris.

Graphical Representation. Model representing the mean temperature of a place for the twenty-four hours of each day of the twelve months of the year; topographical models, showing contour lines, with accompanying topographical drawings.

Mechanism. Models showing the different methods of laying out teeth of wheels in the various cases of racks, outside and inside gearing, etc.; bevel and skew bevel wheels; an instrument for laying out teeth devised by Schröder; models of pulleys and wrapping connectors, belts, and chains; models of parallel motions, including Watt's parallelogram, applied to land and marine engines; Seward's parallel motion, fitted to the engines of the Gorgon, etc.; models of non-circular, and screw wheels; endless screws; wheels in trains; epicyclic trains; Ferguson's paradox; equation clock; system of Lahire, etc.; models of cams; of silent feed motions; regulating apparatus, for stopping, reversing, or modifying the motions of machines — these include governors, friction cones and clutches, reversing gear, Oldham's coupling, etc.

Resistance of Materials. A set of models illustrating the

best forms of beams for resisting flexure, torsion, and compression under various conditions of stress; to which is added an apparatus for testing the deflections caused by loads applied in any manner to test their strength or stiffness.

Construction of Machines. These consist of a number of highly finished models of the parts of machines, such as screws, chains, hooks, riveting, axles, plumber blocks, steps and supports for shafts, wheels, pulleys, cranks, eccentrics, cross-heads, connecting rods, working beams, valves, pistons, etc.

Lifting Engines. These consist of the following working models:—Crab engine; Fairbairn's plate iron dock crane; hydraulic press.

Hydraulic Motors. A model of the water pressure engine at Alt Mordgrube, in Freiberg, Saxony, with the pumps and apparatus for draining mines; a model of Poncelet's water wheel; Fourneyron's turbine; Jonval's turbine; also Swain's and Leffel's inward flow turbines.

Steam Engines. Boilers and fire grates; steam cylinders, pistons, valves, etc.; slide valves and the mechanism showing the distribution of the steam; variable cut-off valves; Stephenson link motion; models of steam engines of various forms.

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. 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 Civil 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. It is calculated to meet the wants not only of young men who propose to pursue a comprehensive course of architectural study, but of those who are looking only for such elementary training as shall qualify them for positions as draughtsmen.

The recent establishment of Advanced Courses of study in the School renders possible a more systematic arrangement of this work than previous catalogues have exhibited.

The Regular Course will henceforward be confined to the subjects of Architectural History and Design, with so much of Construction as the Departments of Engineering afford. Though the degree of Bachelor of Science is given in Architecture to all students at the conclusion of their fourth year, who have passed the prescribed examinations, and have executed in a satisfactory manner the drawings and designs required, the training of such students cannot be such as to entitle them to call themselves Architects. It is, however, complete in itself, and not only includes the scientific basis of professional work, giving all that an architect need know of Mathematics, Chemistry, Physics, Geology, and Engineering, but gives also as much of more strictly technical knowledge and artistic skill as can properly be attempted in a school of science. It puts such students in a position to pursue their further studies, either in offices or in this Department, and ultimately to enter upon the practice of their profession, to the best advantage.

The Advanced Course is designed to have a less distinctly scientific character, the studies and exercises being rather those of a school of art than those of a school of science. It will consist mainly of a series of advanced problems in the composition and design of various classes of buildings, involving the artistic treatment of different materials and of different methods of construction, and the study of ornament and details. The study of the various arts employed in building will also be taken up in connection with specifications and working drawings, subjects which, though belonging strictly to office work, require a more systematic treatment than students in offices can generally give them. To such a course it is not practicable to assign any definite limits of time, but certain standards of proficiency will be fixed upon, and suitable honors awarded to such students as may attain them.

Professional draughtsmen who may wish to avail themselves of this instruction in the intervals of other engagements, may join the school for short periods of time, taking part in whatever problems, or other work, the class may have in hand.

The Boston Society of Architects "wishing to do its part in the work of professional education," has established, by consent of the Corporation of the Institute, two prizes, of the value of fifty dollars each, one for the best work in the class of design, and one for the best work in the class of construction, during the year.

The prize in design was last year awarded to Mr. Samuel Dacre Bush, of Brookline. The prize in construction was awarded to Mr. William Rotch Ware, of Milton.

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 various periods of art. It includes a large and valuable 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, mostly by gift: —

A considerable collection of photographs and lithographs of great interest, presented to the Institute by French, English, and American architects, taken from their own works, together

with sets of actual working drawings, with details and specifications.

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

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

The publications of the Royal Institute of British Architects, and of the Architectural Institute of Scotland, and the miscellaneous papers of the Architectural Publication Society, have been presented by the authorities of these institutions.

A considerable library is in course of formation, and all the collections have been largely added to during the past year.

The Instruction in Natural History. This will be given 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. These collections rank among the first in the country for extent and value, and in many departments are unsurpassed; the library is rich in works on Natural Science, many of them finely illustrated, and embraces the leading American and European journals and periodicals on Natural History. It is believed that the facilities thus afforded to the students of the Institute are ample for the most thorough instruction in Zoology, Palæontology, and other branches of Natural Science. This instruction will be given by the Professors of the Institute in the lecture room of the Natural History Society, whose building is upon the same square.

The Instruction in Military 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. During the first two years all students are required to attend twice a week an exercise in military tactics, unless specially excused. For these exercises they are 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 one of the professors; but excuses of general application can be granted by the Faculty only.

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 familiarizing students with the actual details of work, they are required to make visits of inspection to machine-shops, engines, mills, mines, furnaces, and chemical works, and to important buildings and engineering constructions within convenient reach.

Recent excursions have been made to the Norway Iron and Steel Works, Downer's Petroleum Refinery, and the Boston Gas Works, in Boston; Union Sugar Refinery in Charlestown; Revere Copper Co.'s Rolling Mills and the Kingsley Iron Works at Canton; Webster's Tannery and the India Rubber Works, in Malden; the Pacific Mills in Lawrence; Nashua Manufacturing Co.'s Cotton Mills and the Nashua Iron Co.'s Forging and Steel Tire Rolling Works at Nashua, N. H.; also to the Works of the Phœnixville Iron and Bridge Co. at Phœnixville, Pa., of the Keystone Bridge Co. at Pittsburgh, Pa., and of the Louisville Bridge Co. at Louisville, Ky.; to the Bessemer Steel Works at Harrisburg, Pa.; to the Baldwin Locomotive Works at Philadelphia, Pa., and the Shops of the Reading Railroad Co., at Reading, Pa.; to the Bridges at Albany, N. Y., Pittsburgh, Pa., Cincinnati, O., Louisville, Ky., St. Louis, Mo., and Quincy, Ill.

THE SOCIETY OF ARTS.

One of the primary objects of the founders of the Institute of Technology, as shown by the extract from the charter given on page 4, was the establishment of a Society of Arts. This Society was organized in 1861, and now numbers about 350 members. It holds regular meetings at its rooms in the Institute Building, on the second and fourth Thursdays of each month from November to May inclusive. At these meetings are presented communications on various subjects of applied science, with the exhibition of machines and apparatus illustrating important inventions in the mechanic and useful arts. Students of the School may be present at these meetings, by permission of the Secretary of the Institute.

THE BOSTON PUBLIC LIBRARY.

The professors and students of the Institute are allowed the full use of this extensive 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 200,000 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.

SCHOLARSHIPS.

THE THOMAS SHERWIN SCHOLARSHIP.

This 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 of the City of Boston. Mr. Sherwin was also an active and influential member of the Corporation of the Institute. The pupil to receive the benefit of this Scholarship "is to be a graduate of tne English High School in the city of Boston."

ADVANCED SCHOLARSHIPS.

Five advanced scholarships, of $150 each, have been established, and will be awarded to such applicants as are recommended by the Faculty.

DIPLOMAS AND CERTIFICATES.

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.

The degrees or diplomas corresponding to the seven Regular Courses of the School are as follows: —

I. A Degree in Mechanical Engineering.
II. " " " Civil and Topographical Engineering.
III. " " " Geology and Mining Engineering.
IV. " " " Building and Architecture.
V. " " " Chemistry.
VI. " " " Science and Literature.
VII. " " " Natural History.

To be entitled to either of these degrees, the student must pass a satisfactory examination in all the prescribed studies and exercises of his course in the third and fourth years, and in all the studies of the previous years in which he has not already passed a satisfactory examination. He must, moreover, prepare a dissertation on some subject included in the 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.

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

The title of the degree in these courses is S. B., or Bachelor of Science, in ————————.

The degree of S. D., or Doctor of Science, for proficiency in Advanced Courses of study, has recently been authorized by the Corporation.

Besides the degrees or diplomas of the Regular Courses and of the Advanced Courses, certificates of attainment in special subjects are given to such students as on examination are found to have the required proficiency in them.

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 are 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 joins the School.

Fees. The fee for regular students is $200 per year, payable by students who have given bonds, $125 at the beginning, and $75 at the middle (first Monday in February) of the School-year. For one-half, or any less fraction of the School-year, the fee is $125. Students not candidates for a degree 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 student.

Attendance. Regular students are expected to attend all the exercises of their several courses. Students not candidates for a degree are expected to attend all the exercises in the subjects they have selected. A weekly return of absences and tardinesses is 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. Students are, in general, expected to devote themselves to the work of the School between the hours of 9 A. M., and 5 P. M. (4 1-2 P. M., in winter), except during the interval for dinner. There are no exercises on Saturday afternoon, and the building is 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. They are required to avoid all running, loud talking, whistling, or other noise in the halls and passages 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.

Residence and Expenses. As the exercises of the School begin at nine o'clock in the morning, and end at half past four or 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; and the cost of books, drawing instruments, and paper is from twenty-five to thirty dollars a year.

FREE COURSES OF INSTRUCTION.

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

This department of the School 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, drawing, chemistry, geology, natural history, physiology, English, French, German, history, navigation and nautical astronomy, architecture, and engineering.

The subjects, and the extent of the several courses, will be made known 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.

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.

The courses for 1872–73 are on the following subjects: —

Chemical and Physical Geology. Eighteen lectures on Monday and Friday evenings, at 7½ o'clock, beginning November 29, by Prof. T. Sterry Hunt.

Experimental Mechanics. Eighteen lectures on Monday and Wednesday evenings, at 7½ o'clock, beginning December 16, by Prof. Cross.

Modern History. Ten lectures on Wednesday evenings, at 7½ o'clock, beginning November 13, by Prof. Atkinson.

Logic, with especial reference to its connection with English Analysis. Ten lectures on Wednesday evenings, at 7½ o'clock, beginning when Prof. Atkinson's course ends, by Prof. Howison.

Laws of Life and Health. Ten lectures on Tuesday and Friday evenings, at 7½ o'clock, beginning November 12, by Prof. Kneeland.

Systematized French Pronunciation, French Conjugation, Idiomatic French. Eighteen lectures on Monday and Thursday evenings, at 7½ o'clock, beginning November 11, by Instructor Lévy.

Translation of Lessing's Nathan der Weise, with a Philological and Critical Commentary. Eighteen lectures on Monday and Thursday evenings, at 7½ o'clock, beginning when Mr. Lévy's course ends, by Instructor Krauss.

Elements of Descriptive Geometry. Eighteen lectures on Monday and Wednesday evenings, at 7½ o'clock, beginning November 11, by Prof. Lanza.

Machine Drawing. Eighteen lessons, of two hours each, on Tuesday and Friday evenings, at 7 o'clock, beginning November 12, by Instructor Schubert. The courses in Descriptive Geometry and Drawing will supplement each other.

The Trustee of the Lowell Institute has also made provision for a course of free instruction in Practical Design for Manufactures, open to pupils of both sexes. Students are received at the beginning of the school year in October, to whom is taught the art of making patterns for Prints, Delaines, Silks, Paper-Hangings, Carpets, Oil-Cloths, etc.

The Course embraces: — 1. Original Design, or Composition of Patterns; 2. Secondary Design, or Variation of Pat-

terns; 3. The Making of Working Drawings; 4. Technical Manipulations.

The class is arranged in four divisions, corresponding to these four kinds of work. The student, on joining the class after passing the prescribed examination, enters the first division, and is advanced to the second, and to the third, and so on to the practice of original design, as rapidly as his proficiency permits. The more advanced students have the assistance of the lower divisions in the drawing out of their designs.

Instruction is given personally to each student over his work, with occasional general exercises. Students supply their own instruments and materials.

The class is under the personal direction of Mr. Charles Kastner, for fourteen years designer at the Pacific Mills, formerly Director of the Atelier Lebert in Paris, and nephew and pupil of M. Jean Baptiste Lebert, *Dessinateur*, of Mulhouse in Alsace.

Applicants for admission to the above Course are required to bring specimens of their work, exhibiting an acquaintance with Free-hand Drawing, and some familiarity with the use of mathematical instruments.

For circulars giving fuller information, address the Secretary of the Institute.

1872--73, First Half (Oct.—Feb.) of 1st and 2d Years.

	Year of Class	9 — 10	10 — 11	11 12	12 — 1	2.30 — 3.30	3.30 — 4.30
Monday	First	. I. II. Drawing . . III. IV. English .	. I. II. Mathematics. III. IV. Drawing	. . I. II. English . . III. IV. Mathematics	. . . . French	. . { II. III. Draw I. Chemical	i n g . . . . . Manipulation . . . .
	Second	. . . . English	. I. Desc. Geometry .	. II. Desc. Geometry .	. . . . Physics	. Physical Geog. .	. . . . French . . . .
Tuesday	First	. . . Drawing . . .	. . . Chemistry . . . . . I. English . . .	. . I. II. French . . . III. IV. English .	. . I. II. English . . . . III. IV. French .	. . . . . Draw	i n g . . . . .
	Second	. . . . German	. II. Mathematics . .	. . I. Mathematics . . . . II. Qualitative	Analysis	. . . . I. Qualitative . . . . . II. Draw	Analysis . . . . . i n g . . . . .
Wednes.	First	. . . . English	. I. II. Mathematics . . III. IV. French .	. . I. II. French . . III. IV. Mathematics	} Military Drill . . .	. . . . { I. II. Draw III. Chemical	i n g . . . . . Manipulation . . . .
	Second	. . . . German	. . . . English	Organic Chemistry		Draw	i n g .
Thursday	First	. I. II. Drawing . . III. IV. English .	. I. II. Chemistry . . III. IV. Mathematics	. . I. II. English . . . III. IV Chemistry .	. . . . Drawing . . .	. . . . { I. III. Draw II. Chemical	i n g . . . . . Manipulation . . . .
	Second	. . . . English	. I. Desc. Geometry .	II. Desc. Geometry	. . . . Physics	. . . . French	. . . . .
Friday	First	. . . Drawing . . .	. I. II. Mathematics. III. IV. Rud. Logic	I. II. Rud. of Logic . III. IV. French . .	. . I. II. French . . . III. IV. Drawing .	. . . . . Draw	i n g . . . . .
	Second	. . . French	. . I. Mathematics . .	. . . . I. Qualitative . II. Mathematics .	Analysis . . . . II. English . . .	. . . . . I. Draw . . . II. Qualitative	i n g . . . . . Analysis . . . . .
Sat'day	First	. . Mathematics . .	} I. Military Drill . .	. . . . .	. . . . .	. . . . .	5
	Second	. . . . German					

1872--73, Second Half (Feb.—June,) of 1st and 2d Years.

	Year of Class	9 — 10	10 — 11	11 — 12	12 — 1	2.30 — 4.30
Monday	First	. . . Drawing . . .	. I. II. Mathematics . . III. IV. French .	. . I. II. French . . III. IV. Mathematics	. . . . Physics	. . . . . I. Chemical Manipulation . . . . . II. Perspective . . III. Free Drawing .
	Second	. . . . French	. . . III. Botany . . .	. . . Astronomy . . .	. . I. II. Drawing . . III. Chemical Philos.	. . . . . I. II. Surveying . . . . III. Physical Geography . . . . .
Tuesday	First	. . . Perspective . . .	. . . Chemistry . . .	. . . I. English . . .	. . . II. English . . .	. . . I. French. . . . . II. French . . .
	Second	. . . . German	I. Math. . II. Draw. . . III. English . . .	. II. Mathematics . . I. III. Drawing .	. . . . Physics	. . . . . I. Chemical Analysis . . . . II. Drawing . . . . .
Wednes.	First	. I. II. Mathematics .	III. IV. Mathematics	. . . Drawing . . .	} Military Drill . . .	. . . I. French . . . . . II. French . . .
	Second	. . . . German	. . . . English	. . I. II. Drawing . . III. Chemical Philos.		. . . . . I. II. Surveying . . . . .
Thursday	First	I. II. Free Drawing . III. IV. English . .	I. II. Mathematics III. IV. Free Draw.	. . I. II English . . III. IV. Mathematics	. . Physiology . . .	. . 1. Perspective . . II. Free Drawing . . . . . III. Chemical Manipulation . . . .
	Second	. . . Drawing . . .	. III. Phys. Geog. .	. . . Astronomy . . .	. . . . Physics	. . . . . I. Drawing . . . . II. Chemical Analysis . . . . .
Friday	First	. I. II. Chemistry . . III. IV. German .	. I. II. German . III. IV. Chemistry	. . . . Physics	. . Physiology . . .	. . I. Free Drawing . . III. Perspective . . . . . II. Chemical Manipuiation . . . . .
	Second	. . . . French	I. Math. . II. Draw. . . III. English . .	I. Draw. . II. Math. III. Chemical Philos.	. . . . English	. . . . . I. II. Surveying . . . . III. Botany . . . . .
Saturday	First	. . Mathematics . .	} Military Drill.	. . . . .	. . . . .	1
	Second	. . . . German				

1872–73, First Half of Third Year.

	COURSES IN	9 — 10	10 — 11	11 — 12	12 — 1	2.30 — 4.30
MONDAY	Mechanical Engineering	Calculus or Mech.	Drawing	Natural History	Mech. Engineering	Machine Drawing
	Civil Engineering	do	do	do	Spherical Astron.	Plan Drawing
	Chemistry	Laboratory Prac.	Quant. Analysis	do	Laboratory Prac.	Blowpipe and Mineralogy
	Geology and Mining	Calculus or Mech.	do	do	Mining Engin'ring	do
	Building and Architecture	do	Drawing	do	Drawing	Architectural Design
	Science and Literature	do	Quant. Analysis	do	Physical Manip.	Drawing
TUESDAY	Mechanical Engineering	Calculus or Mech.	German	French	Drawing and Per-	Mechanism
	Civil Engineering	do	do	do	spective	Civil Engineering
	Chemistry	Laboratory Prac.	do	do	do	Laboratory Practice
	Geology and Mining	Calculus or Mech.	do	do	do	R. R. Curves — Hydr.
	Building and Architecture	do	do	do	do	Drawing
	Science and Literature	do	do	do	do	Laboratory Practice
WEDNESDAY	Mechanical Engineering	Natural History	Drawing	Formal Logic	Physical Manip.	Drawing
	Civil Engineering	do	Physical Manip.	do	Drawing	do
	Chemistry	do	Metallurgy	do	Physical Manip.	Laboratory Practice
	Geology and Mining	do	do	do	do	do
	Building and Architecture	do	Drawing	do	do	Architectural Practice
	Science and Literature	do	do	do	do	Laboratory Practice
THURSDAY	Mechanical Engineering	Calculus or Mech.	Formal Logic	Stereotomy	Mech. Engineering	Constructive Mechanism
	Civil Engineering	do	do	do	Spherical Astron.	Civil Engineering
	Chemistry	Laboratory Prac.	do	Blowpipe and Mineralogy		Laboratory Practice
	Geology and Mining	Calculus or Mech.	do	do		R. R. Curves — Hydr.
	Building and Architecture	do	do	Stereotomy	Drawing	Drawing
	Science and Literature	do	do	Physical Manipulation		do
FRIDAY	Mechanical Engineering	Calculus or Mech.	French	German	Mech. Engineering	Mechanism
	Civil Engineering	do	do	do	Physical Manip.	Civil Engineering
	Chemistry	Laboratory Prac.	do	do	Laboratory Prac.	Laboratory Practice
	Geology and Mining	Calculus or Mech.	do	do	Drawing	R. R. Curves — Hydr.
	Building and Architecture	do	do	do	do	Drawing
	Science and Literature	do	do	do	do	Laboratory or Physics
SATURDAY	Mechanical Engineering	English	Physical Manip.			
	Civil Engineering	do	Drawing			
	Chemistry	do	Physical Manip.			
	Geology and Mining	do	do			4
	Building and Architecture	do	do			
	Science and Literature	do	do			

1872–73, Second Half of Third Year.

	COURSES IN	9 — 10	10 — 11	11 — 12	12 — 1	2.30 — 4.30
MONDAY	Mechanical Engineering	Mechanics	Geology	Stereotomy	Mech. Engineering	Perspective
	Civil Engineering	do	do	do	Physical Manip.	do
	Chemistry	Drawing	do	Assaying		Laboratory Practice
	Geology and Mining	Mechanics	do	do		Perspective
	Building and Architecture	do	do	Stereotomy		Architectural Design
	Science and Literature	do	do	Physical Manipulation		Perspective
TUESDAY	Mechanical Engineering	Mechanics	French	German	Geology	Machinery and Mill-work
	Civil Engineering	do	do	do	do	Civil Engineering
	Chemistry	Drawing	do	do	do	Laboratory Practice
	Geology and Mining	Mechanics	do	do	do	Civil Engineering
	Building and Architecture	do	do	do	do	do
	Science and Literature	do	do	do	do	Laboratory Practice
WEDNESDAY	Mechanical Engineering	Drawing	Machine Drawing	History	Physical Manip.	Machine Drawing
	Civil Engineering	Physical Manip.	Drawing	do	Drawing	Structure Drawing
	Chemistry	Indust. Chemistry	Quant. Analysis	do	Physical Manip.	Laboratory Practice
	Geology and Mining	do	do	do	do	do
	Building and Architecture	Drawing	Drawing	do	do	Architectural Practice
	Science and Literature	Indust. Chemistry	Quant. Analysis	do	do	Laboratory Practice
THURSDAY	Mechanical Engineering	Mechanics	English (U.S.Const)	Stereotomy	Mech. Engineering	Constructive Mechanism
	Civil Engineering	do	do	do	Drawing	Civil Engineering
	Chemistry	Drawing	do	Assaying		Drawing
	Geology and Mining	Mechanics	do	do		Civil Engineering
	Building and Architecture	do	do	Stereotomy	Drawing	do
	Science and Literature	do	do	Physical Manipulation		Drawing
FRIDAY	Mechanical Engineering	Mechanics	French	Mech. Engineering	German	Machinery and Mill-work
	Civil Engineering	do	do	Drawing	do	Plan Drawing
	Chemistry	Drawing	do	do	do	Laboratory Practice
	Geology and Mining	Mechanics	do	do	do	Drawing
	Building and Architecture	do	do	do	do	do
	Science and Literature	do	do	do	do	Laboratory or Physics
SATURDAY	Mechanical Engineering	Physical Manip.				
	Civil Engineering	Civil Engineering				
	Chemistry	Physical Manip.				
	Geology and Mining	do				1
	Building and Architecture	do				
	Science and Literature	do				

1872--73, First Half of Fourth Year.

	COURSES IN	9—10	10—11	11—12	12—1	2.30—4.30
MONDAY	Mechanical Engineering	Mechanical Manipulation		Natural History	Stereotomy	Machine Drawing
	Civil Engineering	Civil Engineering		do	do	Drawing
	Chemistry	Drawing	Geology	do	Laboratory Prac.	Laboratory Practice
	Geology and Mining	do	Drawing	do	Mining Engin'riug	do
	Building and Architecture	do	do	do	Stereotomy	Architectural Design
	Science and Literature	do	do	do	Physical Research	do
TUESDAY	Mechanical Engineering	Inductive Logic	Mech. Engineering	Drawing	French	Mechanism
	Civil Engineering	do	Drawing	do	do	Drawing
	Chemistry	do	do	do	do	Organic Chemistry
	Geology and Mining	do	Engineering	do	do	Laboratory Practice
	Building and Architecture	do	do	do	do	Modelling
	Science and Literature	do	Drawing	do	do	Laboratory Practice
WED'SDAY	Mechanical Engineering	Natural History	Mechanical	Manipulation	English	Drawing
	Civil Engineering	do	Civil En	gineering	do	do
	Chemistry	do	Metallurgy	Drawing	do	Laboratory Practice
	Geology and Mining	do	do	Mining	do	do
	Building and Architecture	do	Drawing	Drawing	do	Architectural Practice
	Science and Literature	do	do	do	do	Laboratory Practice
THURSDAY	Mechanical Engineering	Political Economy	Mech. Engineering	Drawing	Drawing	Drawing
	Civil Engineering	do	Drawing	do	do	do
	Chemistry	do	do	Laboratory	Practice	Laboratory Practice
	Geology and Mining	do	Engineering	Lab. Practice.	Geology	do
	Building and Architecture	do	do	Stereotomy	Drawing	Drawing
	Science and Literature	do	Drawing	Phys. Research	Philosophy	Laboratory Practice
FRIDAY	Mechanical Engineering	Drawing	Mech. Engineering	French	German	Mechanism
	Civil Engineering	Civil En	gineering	do	do	Drawing
	Chemistry	Lab. Practice	Organic Chemistry	do	do	Laboratory Practice
	Geology and Mining	do	Engineering	do	do	do
	Building and Architecture	Drawing	do	do	do	Drawing
	Science and Literature	do	Drawing	do	do	do
SATURDAY	Mechanical Engineering	Drawing	German			
	Civil Engineering	do	do			
	Chemistry	do	do			
	Geology and Mining	Mining Engin'ring	do			3
	Building and Architecture	Drawing	do			
	Science and Literature	do	do			

1872--73, Second Half of Fourth Year.

	COURSES IN	9 — 10	10 — 11	11 — 12	12 — 1	2.30 — 4.30
MONDAY	Mechanical Engineering	Machine Drawing	Thermodynamics	Drawing		Machine Drawing
	Civil Engineering	Civil Engineering	Drawing	Weigh. and Meas.	Drawing	Drawing
	Chemistry	Lab. Practice	Organic Chemistry	Laboratory Practice		Laboratory Practice
	Geology and Mining	do.	do	Laboratory Practice	Geology	do
	Building and Architecture	Drawing	Drawing	Drawing		Architectural Design
	Science and Literature	do	Organic Chemistry	Physical Research		do
TUESDAY	Mechanical Engineering	English	Machinery, Motor	Drawing	Drawing	Mechanism
	Civil Engineering	do	do	do	do	Drawing
	Chemistry	do	Microscopy	Organic Chem.	do	Laboratory Practice
	Geology and Mining	do	Machinery, Motors	Weigh. and Meas.	do	do
	Building and Architecture	do	Strength Materials	Drawing	do	Modelling
	Science and Literature	do	Machinery, Motors	do	do	Laboratory Practice
WEDNESDAY	Mechanical Engineering	Drawing		Machine Drawing	Political Economy	Drawing
	Civil Engineering	Civil Engineering	Drawing	Weigh. and Meas.	do	do
	Chemistry	Indust. Chem.	do	Drawing	do	Laboratory Practice
	Geology and Mining	do	Weigh. and Meas.	Mining	do	do
	Building and Architecture	Drawing		Drawing	do	Architectural Practice
	Science and Literature	Quant. Analysis		do	do	Laboratory Practice
THURSDAY	Mechanical Engineering	Drawing	Machinery, Motor	Drawing	Physiology	Drawing
	Civil Engineering	do	do	do	do	do
	Chemistry	do	Drawing	Organic Chem.	do	Laboratory Practice
	Geology and Mining	do	Machinery, Motors	Geology	do	do
	Building and Architecture	do	Strength Materials	Drawing	do	Drawing
	Science and Literature	do	Machinery, Motors	Philosophy	do	Laboratory Practice
FRIDAY	Mechanical Engineering	Drawing	Thermodynamics	German	Physiology	Mechanism
	Civil Engineering	Civil Engineering	Drawing	do	do	Drawing
	Chemistry	Drawing	Microscopy	do	do	Laboratory Practice
	Geology and Mining	do	Mining	do	do	do
	Building and Architecture	do	do	do	do	Drawing
	Science and Literature	do	Drawing	do	do	do
SATURDAY	Mechanical Engineering	Drawing	German			
	Civil Engineering	do	do			
	Chemistry	do	do			
	Geology and Mining	Mining	do			1
	Building and Architecture	Drawing	do			
	Science and Literature	do	do			

LIST OF MEMBERS

OF THE

SOCIETY OF ARTS

OF THE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,

DECEMBER 1, 1872.

HONORARY MEMBER.

* Prof. Daniel Treadwell, Cambridge, Mass.

LIFE MEMBERS.

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

Baker, William E. . "
*Bancroft, E. P. . "
Beebe, James M. . "
Bigelow, E. B. . . "
Bowditch, J. I. . . "
Bowditch, Mrs. J. I. "
Brimmer, Martin. . "
Browne, C. Allen . "
Bullard, W. S. . . "

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Cummings, John . . Woburn.

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Edmands, J. Wiley . "
*Eldredge, E. H. . "
Endicott, Wm., Jr. . "

Fay, Joseph S. . . "
Fay, Mrs. Sarah S. . "
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Forbes, Robert B. . "
Foster, John . . . "

Gaffield, Thomas . . "
*Gardner, G. A. . . "
Gardner, John L. . "
Gookin, Samuel H. . "
*Grant, Michael . . "
Greenleaf, R. C. . . "
Grover, Wm. O. . . "

Hemenway, Mrs. M. "
Hoadley, J. C. . . Lawrence.
*Huntington, Ralph . Boston.

Johnson, Samuel. . "

Kidder, H. P. . . "
Kuhn, Geo. H. . . "

Lawrence, James . "
Lee, Henry . . . "
Lee, John C. . . . "
* Lee, Thomas . . "
Little, James L. . . "

* Deceased.

Lowell, John A. . . Boston.
Lyman, Geo. W. . "

Matthews, Nathan . "
McGregor, James . "
Mudge, E. R. . . . "

Nichols, Lyman . . "
Norcross, Otis . . "

*Pierce, Carlos . . Canada.
Preston, Jonathan . Boston.
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Pratt Miss . . . . "

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Richardson, J. B. . "
Rogers, Henry B. . "
Rogers, William B. . "
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Ross, Waldo O. . . "
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Sayles Henry . . "
Sayles, Mrs. Willard "
*Sears David . . "
Shaw, Mary S. . . "
*Skinner, Francis . "
*Stetson, Joshua . "

Thayer, Nathaniel . "
Thorndike, John H. . "
Tobey, Edward S. . "
*Turner, J. M. . . "

Upton, George B. . "

Walcott, J. H. . . "
Wales, Geo. W. . . "
Wales, T. B. . . . "
Wales, Miss . . . "
*Whitney, Joseph . "

ASSOCIATE MEMBERS.

Adams, James . . Charlestown.
Allen, James T. . . W. Newton.
Ames, Isaac . . . Boston.
Amory, T. C. . . . "
Anderson, Luther W. Quincy.
Appleton, Thos. G. . Boston.
Atkinson, Chas. F. . Cambridge.
Atkinson, Wm. P. . "
Atwood, Nath'l E. . Provincet'n.
Austin, Edward . . Boston.

Bacon, John . . . "
Barber, Lyman L. . Charlestown.
Barnard, James M. . Boston.
Batchelder, John M. Cambridge.
Beal, James H. . . Boston.
Bender, Richard W. "
Bigelow, A. O. . . "
Bigelow, G. F. . . "
Bigelow, Geo. T. . "
Bigelow, Jacob . . "
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Bishop, Chas. J. . . "
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Bourne, William . . "
Bouvé, T. T. . . . "
Bowditch, Ernest W. Brookline.
Bowditch, Wm. I. . "
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Braman, G. T. W. . Boston.
Braman, Jarvis D. . "
Brown, Orren L. . "
Browne, Causten . . "
Buckingham, C. E. . "

Cabot, Edward C. . "
Cabot, Samuel . . "
Carpenter, Geo. O. . "
Carruth, Charles . "
Clapp, Otis F. . . "
Clapp, Wm. W. . . "
Clarke, E. H. . . "
Clinch, John M. . . "
Coffin, G. Winthrop . "
Copeland, R. M. . "
Crafts, N. Henry . "

Cummings, Nath'l . Boston.
Cumston, Charles M. "
Cushing, Thomas . "

Dana, Edward A. . "
Danforth, I. W. . . "
Danforth, James H. . "
Daniell, Moses G. . Roxbury.
Davenport, Henry . Boston.
Davies, Daniel . . "
Davis, Barnabas . . "
Davis, F. J. . . . Waltham.
Deane, Charles . . Cambridge.
Delano, Jos. C . . New Bedford.
Denny, Henry G. . Boston.
Derby, George . . "
Dewson, F. A. . . "
Dexter, George M. . "
Dix, John H. . . . "
Dixwell, J. J. . . . "
Doane, Thomas . . "
Dresser, Jacob A. . "
Dunklee, B. W. . . "

Eastman, Ambrose . "
Eddy, R. H. . . . "
Eliot, Chas. W. . . Cambridge.
Emerson, Geo. B. . Boston.
Endicott, Henry . . "

Farley, Noah W. . "
Farmer, Moses G. . "
Fitch, Jonas . . . "
Flint, Charles L. . "
Forbes, Franklin . Clinton.
Francis, James B. . Lowell.
Frothingham, Saml. . Boston.
Fuller, H. Weld . . "

Gerry, James H. . "
Gibbens, Joseph M. . "
Goddard, Benjamin "
Goddard, Nathaniel "
Goodman, William . "
Grandgent, L. H. . "
Gray, Horace . . . "
Guild, Chester, Jr. . "
Guild, Henry . . "

Hagar, D. B. . . . Salem.
Hale, Edward E. . Boston.
Hall, Andrew T. . "
Hall, Charles B. . . "
Hall, Thomas . . . Boston.
Hallem, William . . Waltham.
Hamblet, James . . Boston.
Hastings, Frank . . "
Haven, Franklin . . "
Hayes, A. A. . . . Longwood.
Hayes, S. Dana . . Boston.
Heard, John T. . . "
Henck, John B. . . Brookline.
Henshaw, John A. . Cambridge.
Herschel, Clemens . Boston.
Hewins, Edmund H. "
Higginson, J. A. . . "
Hill, Hamilton A. . "
Hilton, William . . "
Hitchcock, Thos. B. "
Holmes, Jabez S. . "
Holmes, O. W. . . "
Homans, C. D. . . "
Hooper, Samuel . . "
Houghton, Charles . "
Hovey, James . . Chelsea.
Hovey, J. F. . . . Boston.
Howe, S. G. . . . "
Hubbard, Charles T. "
Hunt, Ephraim . . Reading.
Hyde, George B. . Boston.
Hyde, Henry D. . "

Jackson, Francis H. "
Jackson, J. B. S. . "
Jackson, Patrick T. . "
Jasper, Gustavus A. . "
Jenks, Lewis E. . . "
Jewett, D. B. . . . "
Johnson, J. Q. A. . "
Joslin, Gilman . . "

Kehew, John . . . "
Kilburn, E. J. . . . "
Kneeland, Samuel . "

Langley, H. P. . . "
Lawrence, A. A. . "
Lee, Francis L. . . "
Lee, Thomas J. . . "
Leuchars, R. B. . . "
Lewis, Charles W. . Charlestown.
Lewis, Wm. K. . . Boston.
Lincoln, F. W. . . "
Little, James L., Jr. "
Little, John M. . . "
Loring, Frank W. . "

Lothrop, Sam'l K. . Boston.
Lowe, N. M. . . . "
Lowell, John . . . "
Lyman, Theodore . Brookline.
Lynch, Charles S. . Boston.

Marble, G. R. . . "
Markoe, G. F. H. . "
Marshall, H. N. . . "
Marshall, J. F. B. . "
Martin, A. C. . . . Cambridge.
Mason, Robert M. . Boston.
May, F. W. G. . . Dorchester.
May, John J. . . . "
McBurney, Charles . Boston.
McMurtrie, Horace . "
McPherson, W. J. . "
Merrill, N. F. . . . Cambridge.
Montgomery, Hugh . Boston.
Moore, Alex. . . . "
Morse, John T. . . "
Morse, Samuel T. . "
Munroe, William . "

Nash, Franklin . . "
Nichols, James R. . Haverhill.
Norton, Jacob . . Boston.

Ordway, John M. . W. Roxbury.

Page, Edward . . Boston.
Page, W. H. . . . "
Parsons, Wm. . . "
Paul, J. F. . . . . "
Payson, J. P. . . . Chelsea.
Peabody, O. W. . . Boston.
Peabody, W. B. O. . "
Perry, O. H. . . . "
Philbrick, Edward S. "
Philbrick, John D. . "
Pickering, E. C. . . "
Pickering, H. W. . "
Pierce, S. S. . . . "
Plumer, Avery . . "
Pope, Edward E. . "
Potts, J. Thorpe . . "
Prang, Louis . . . "
Pratt, George W. . "
Pratt, T. Willis . . "
Putnam, C. G. . . "
Putnam, J. P. . . "

Quincy, Edmund . Dedham.
Quincy, Josiah . . Boston.

Read, Wm. . . . Boston.
Reed, B. T. . . . "
Remington, W. H. . "
Revere, Joseph W. . "
Rice, Alexander H. . "
Richards, R. H. . . "
Ritchie, E. S. . . . Brookline.
Robbins, James M. . Milton.
Robbins, Royal E. . Boston.
Rotch, Benj. S. . . "
Ruggles, John . . "
Runkle, John D. . Brookline.
Russell, LeBaron . Boston.

Salisbury, D. Waldo "
Sawyer, Edward . Newton.
Sawyer, Timothy T. Charlestown.
Schubert, Ernest . Boston.
Scott, Isaac R. . . Waltham.
Sears, David . . . Boston.
Sears, George O. . "
Sears, Philip H. . . "
Shedd, J. Herbert . "
Sherwin, Thos. . . Dedham.
Shimmin, Chas. F. . Boston.
Shurtleff, A. M. . . "
Shurtleff, N. B. . . "
Sinclair, Alex. D. . "
Smith, Chauncy . . Cambridge.
Snow, S. T. . . . Boston.
Sonrel, Antoine . . "
Sprague, Chas. J. . "
Stearns, Jos. B. . . "
Stevens, Benj. F. . "
Stimpson, Fred. E. . "
Storer, Frank H. . "
Storer, H. R. . . . "
Storer, Jacob J. . . "
Strater, Herman, Jr. . "
Sturgis, John H. . "
Sullivan, Richard . "
Sweetser, Isaac . . "

Thompson, Newell A. "
Thompson, Wm. H. . "
Thornton, J. Wingate "
Trowbridge, John . Cambridge.
Tufts, Jonn W. . . Boston.
Tuxbury, Geo. W. . "

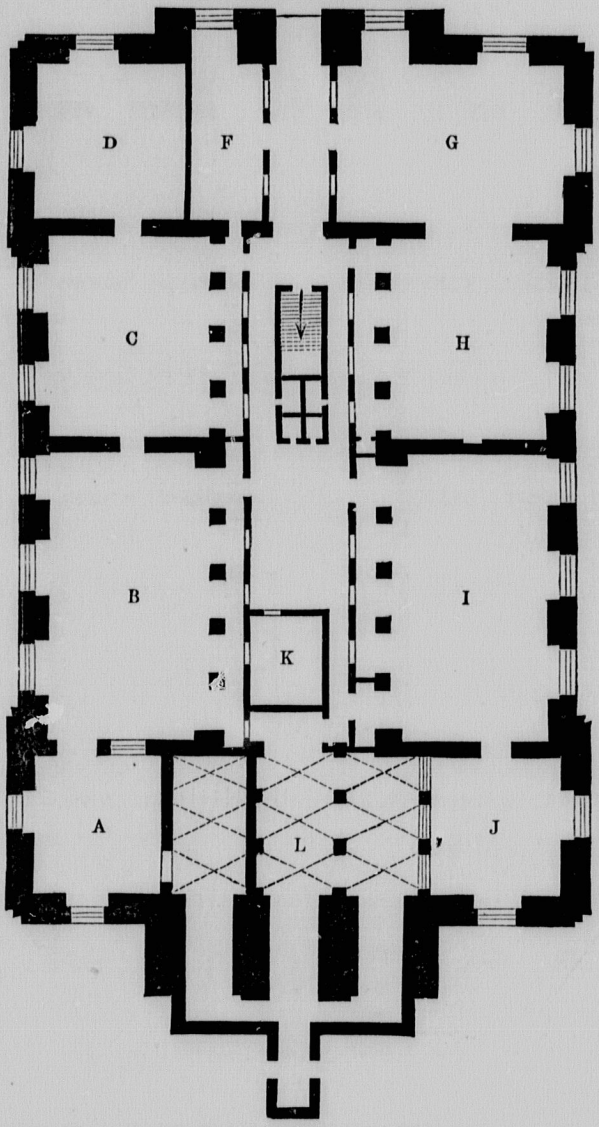
Upham, J. B. . . "
Urbino, S. R. . . . "

Van Brunt, Henry . "

Vila, Jos., Jr. . . . Boston.
Walling, Henry F. . "
Walworth, J. J. . . "
Ware, Chas. E. . . "
Ware, Wm. R. . . "
Warren, Cyrus M. . Brookline.
Warren, Geo. W. . Boston.
Warren, Joseph H. . "
Warren, Sam'l D. . "
Waters, C. H. . . . Clinton.
Waterston, R. C. . Boston.
Watson, R. S. . . Milton.
Watson, Wm. . . Boston.
Webster, A. . . . Waltham.
Weeden, Wm. N. . Boston.
Weld, Stephen M. . Boston.
Weston, David M. . "
Whipple, Edwin P. . "
Whitman, Herbert T. "
Whitmore, Wm. H. . "
Whiton, David . . "
Wickersham, Wm. . "
Wilder, Marshall P. Dorchester.
Williams, H. W. . . Boston.
Winthrop, Robert C. "
Wood, John F. . . "
Woodward, Frank L. "
Woolson, Moses . . "
Wright, John H. . . "
Wyman, Morrill . . Cambridge.

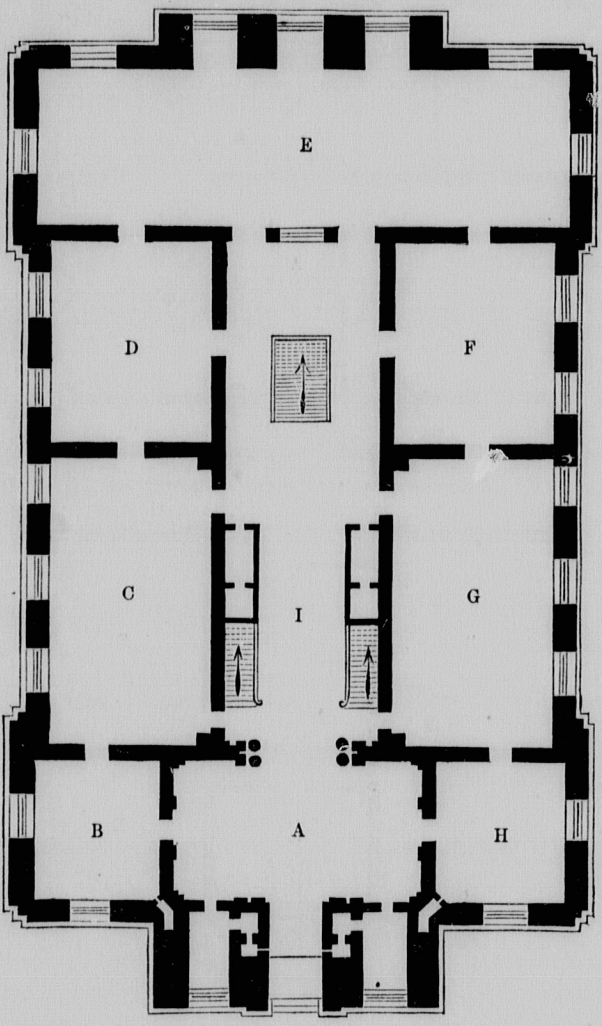
This view of the Institute Building is from a cut kindly furnished by Hon. Horace Capron, Commissioner of Agriculture, Washington, D.C.

BASEMENT FLOOR.



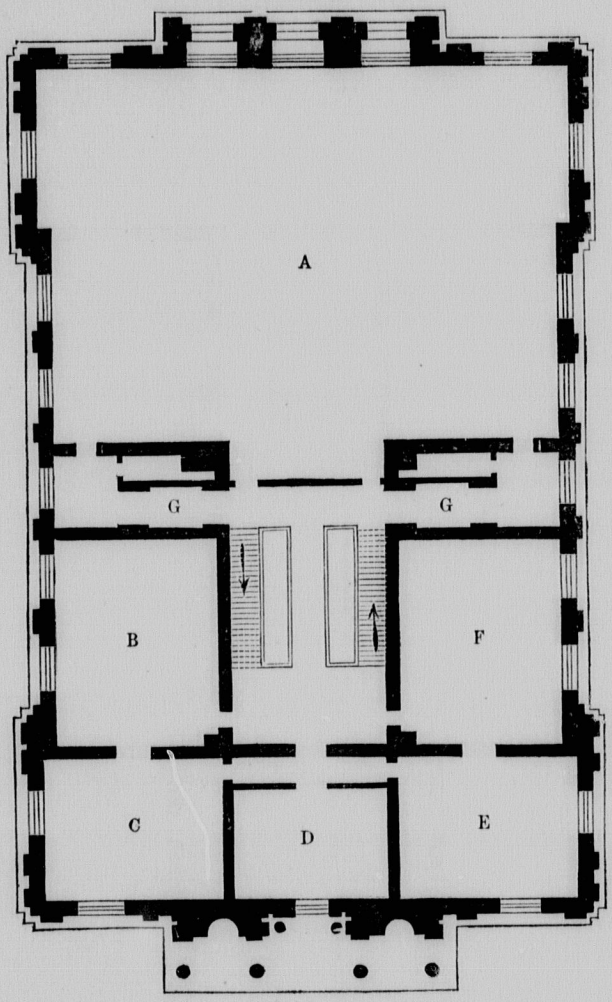
A. Professors' Chemical Laboratory, 25′ 0″ by 22′ 11″.
B. General and Qualitative Chemical Laboratory, 49′ 7″ by 34′ 0″
C. Quantitative Chemical Laboratory, 35′ 8″ by 34′ 0″.
D. Quantitative Chemical Laboratory, 26′ 4″ by 24′ 0″.
F. Professor Crafts's Private Laboratory, 34′ 0″ by 13′ 0″.
G. Mining Laboratory, 40′ 2″ by 27′ 10″.
H. Metallurgical Laboratory, 35′ 8″ by 24′ 0″.
I. Chemical Lecture Room, 49′ 7″ by 34′ 0″.
J. Mineralogical and Blowpipe Laboratory, 25′ 0″ by 22′ 11″.
K. Daily Chemical Supply Room, 14′ 6″ by 12′ 0″.
L. Engine and Boiler Room, 42′ 2″ by 25′ 0″.

FIRST STORY FLOOR.



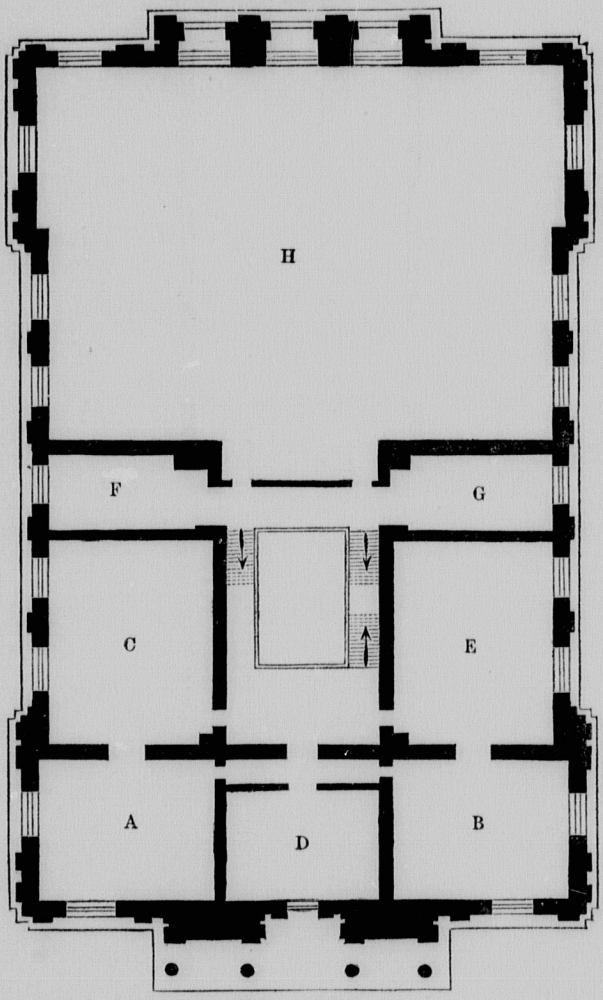
A. Entrance Hall, 42′ 2″ by 25′ 0″.
B. President's Office, 25′ 0″ by 22′ 11″.
C. Physical Lecture Room, 49′ 7″ by 28′ 3″.
D. Physical Laboratory and Apparatus Room, 35′ 8″ by 28′ 3″.
E. Physical Laboratory and Apparatus Room, 92′ 0″ by 27′ 10″.
F. Mining and Geological Lecture Room, 35′ 8″ by 28′ 3″.
G. Society of Arts Room, 49′ 7″ by 28′ 3″.
H. Secretary's Office, 25′ 0″ by 22′ 11″.
I. Stairway Hall, 87′ 3″ by 26′ 10″.

SECOND STORY FLOOR.



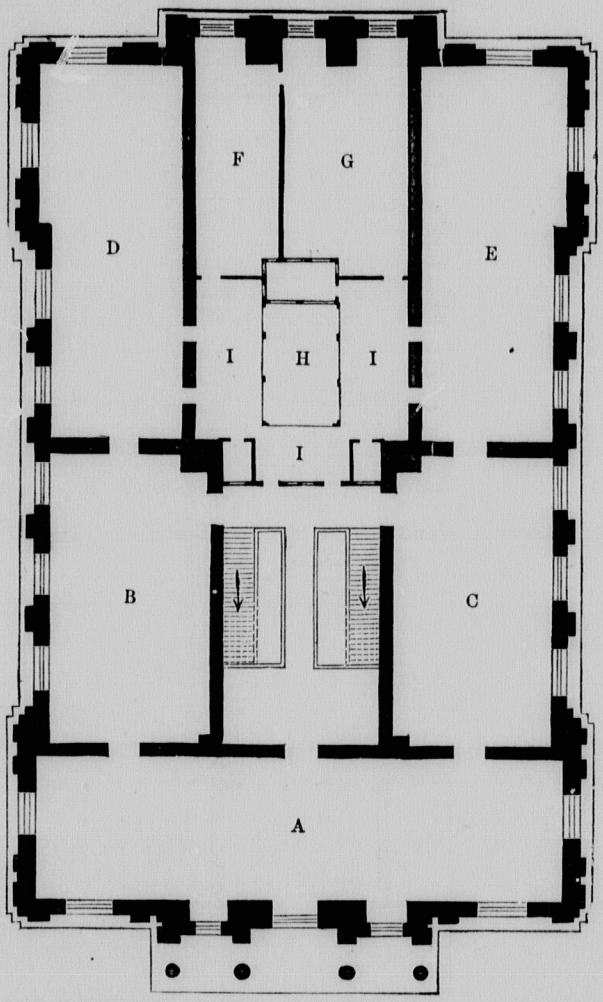
A. Huntington Hall, 92′ 0″ by 65′ 5″.
B. Mathematical Lecture Room, 34′ 9″ by 28′ 3″.
C. Civil Engineering Lecture Room, 32′ 2″ by 25′ 0″.
D. Modern Language Lecture Room, 26′ 2″ by 20′ 6″.
E. English Lecture Room, 32′ 2″ by 25′ 0″.
F. Mathematical and Astronomical Lecture Room, 34′ 9″ by 28′ 3″.
G. G. Passageways to Huntington Hall.

HALF STORY FLOOR.



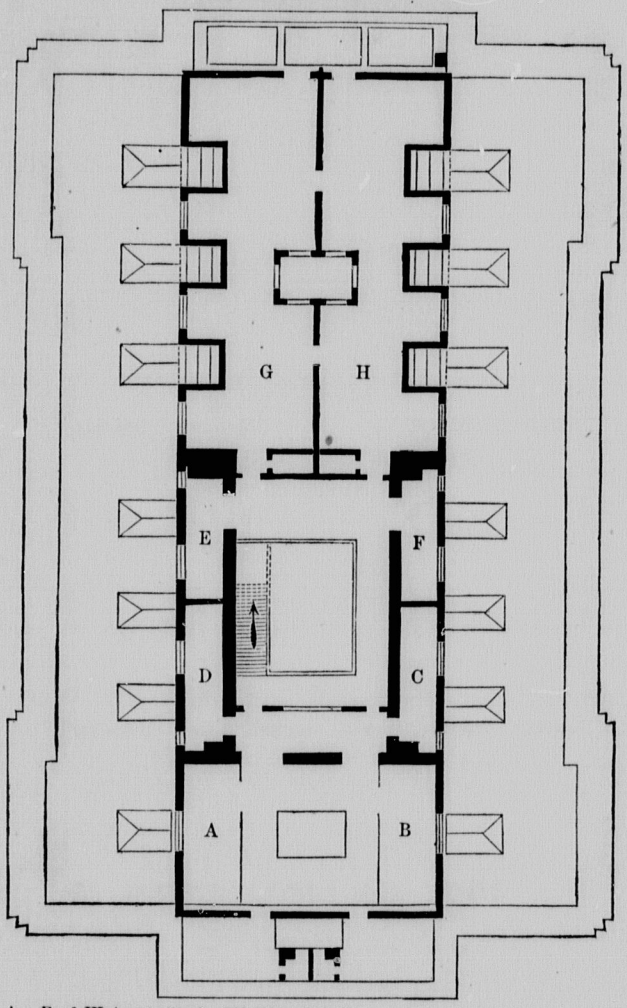
A. Architectural Museum, 32′ 2″ by 25′ 0″.
B. Architectural Library and Study Room, 32′ 2″ by 25′ 0″.
C. Architectural Museum, 34′ 9″ by 28′ 3″.
D. Natural History Lecture Room, 26′ 2″ by 20′ 6″.
E. Reading and Study Room, 34′ 9″ by 28′ 3″.
F. Prof. Atkinson's Study, 28′ 3″ by 14′ 2″.
G. Prof. Hunt's and Prof. Rockwell's Study, 28′ 3″ by 14′ 2″.
H. Huntington Hall.

THIRD STORY FLOOR.

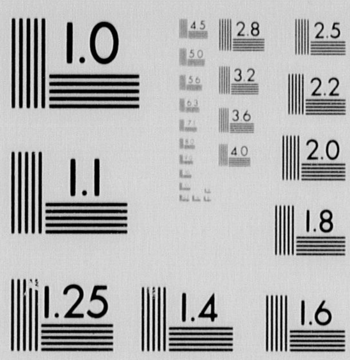


A. Second Year's Drawing Room, 92′ 0″ by 25′ 0″.
B. Third Year's Drawing Room, 49′ 7″ by 28′ 3″.
C. First Year's Drawing Room, 49′ 7″ by 28′ 3″.
D. Fourth Year's Drawing Room, 65′ 5″ by 26′ 0″.
E. First Year's Drawing Room, 65′ 5″ by 26′ 0″.
F. Mechanical Engineering Lecture Room, 37′ 0″ by 17′ 0″.
G. Mathematical and Descriptive Geometry Lecture Room, 37′ 0″ by 23′ 0″.
H. Model Room, 21′ 0″ by 13′ 0″.
I. I. I. Passageways.

FOURTH STORY FLOOR.



A. Prof. Watson's Study, 24′ 5″ by 11′ 6″.
B. Prof. Henck's Study, 24′ 5″ by 11′ 6″.
C. Prof. Osborne's Study, 24′ 9″ by 7′ 6″.
D. Prof. Richards's and Prof. Nichols's Study, 28′ 0″ by 7′ 6″.
E. Instructor Hoyt's Study, 21′ 6″ by 7′ 6″.
F. Prof. Ware's Study, 24′ 9″ by 7′ 6″.
G. Architects' Drawing Room, 65′ 5″ by 21′ 10″.
H. Drawing Room, Free-hand and Design, 65′ 5″ by 21′ 10″.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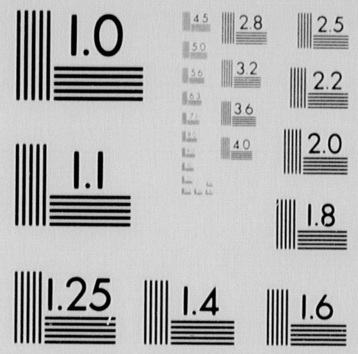
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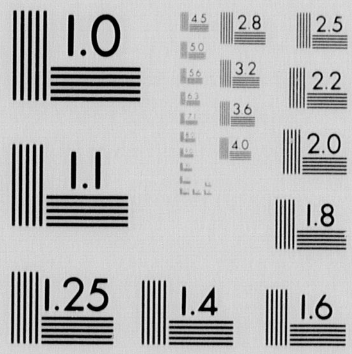
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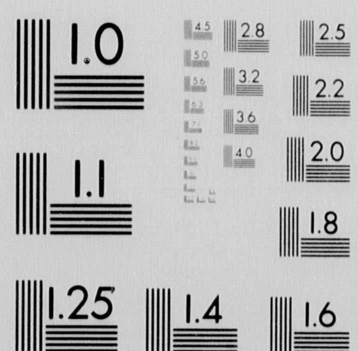
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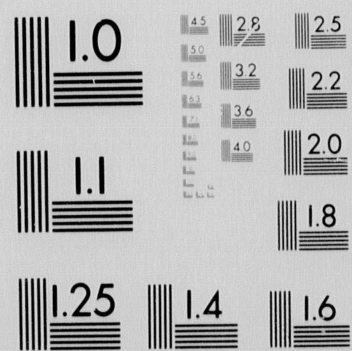
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