

UNIVERSITY  
OF ILLINOIS.

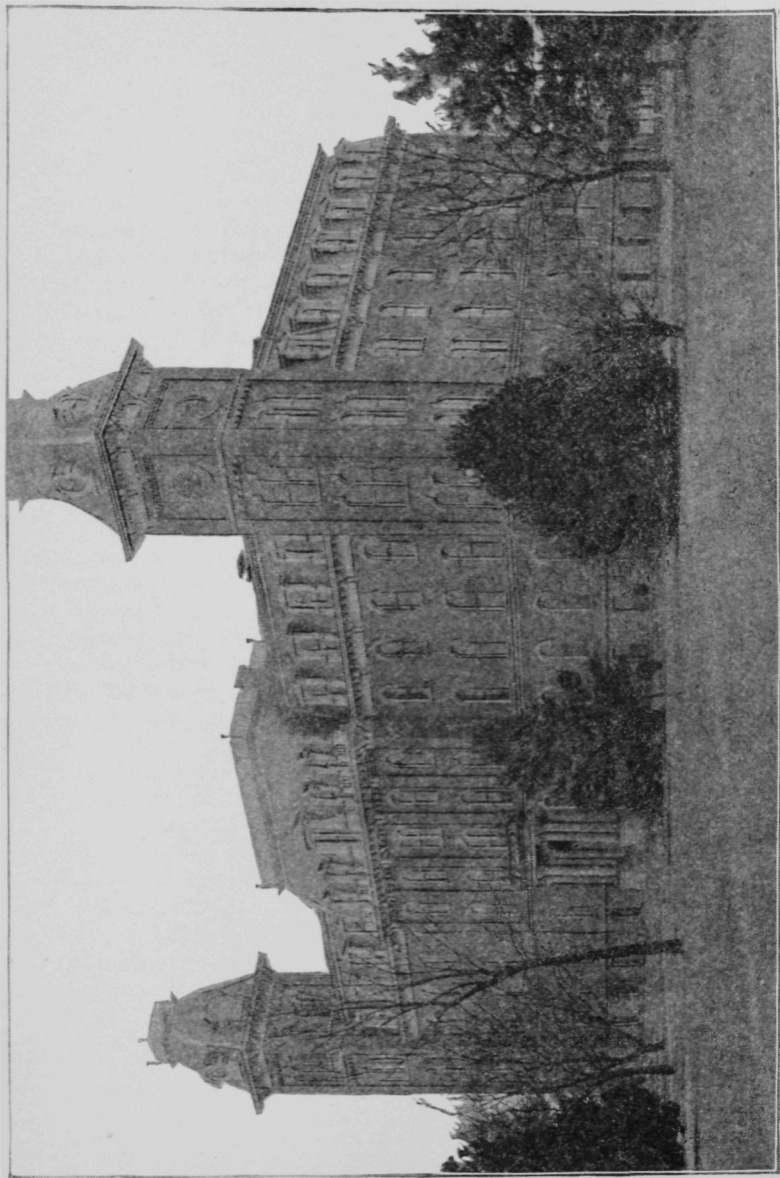
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1889-90.

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MAIN BUILDING

LEARNING AND LABOR.

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CATALOGUE AND CIRCULAR

OF THE

UNIVERSITY OF ILLINOIS,

URBANA, CHAMPAIGN COUNTY, ILL.

(POST OFFICE, CHAMPAIGN, ILL.)

1889-90.

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CHICAGO:  
HORNSTEIN BROS., PRINTERS.  
1890.

"The leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislature of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."—*Act of Congress 1862, section 4.*

"All pupils attending the said University shall be taught, and shall study, such branches of learning as are related to agriculture and the mechanic arts, and as are adapted to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life, without excluding other scientific and classical studies, and including, for all male students, military tactics."—*Act of the Legislature of Illinois, 1873, section 6.*

"The Illinois Industrial University, located at Urbana, in Champaign county, shall, after the passage of this act, be known as the University of Illinois, and under that name and title shall have, possess, be seized of and exercise all rights, privileges, franchises and estates which have hitherto belonged to, or may hereafter inure to the said Illinois Industrial University."—*Act of the Legislature of Illinois, 1885, section 1.*

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UNDER LAW OF JUNE 16, 1887.

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### *TERM EXPIRES 1891.*

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OLIVER A. HARKER, CARBONDALE.

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EMORY COBB.  
CHARLES BENNETT.

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JAMES D. CRAWFORD, LIBRARIAN.

“The end of all education should be the development of a TRUE MANHOOD, or the natural, proportionate, and healthful culture and growth of all the powers and faculties of the human being—physical, mental, moral, and social; and any system which attempts the exclusive or even inordinate culture of any one class of these faculties will fail of its end—it will make mushrooms and monks, rather than manhood and men.”—JONATHAN B. TURNER 1853.

“Under the old system it was book in the morning, book in the afternoon, book in the evening—an unceasing round of studying what men have said *about* things. Under the better system of the various institutions for scientific and industrial education, the student passes frequently from study about things to study of the things themselves; in laboratory or work-shop, in draughting-room or museum, or in the field. Every science must now have its laboratory practice.”—ANDREW D. WHITE, 1873.



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Professor of Mathematics.

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Professor of Zoölogy and Entomology.

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JAMES H. BROWNLEE, M. A.,  
Professor of Rhetoric and Oratory.

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Professor of Geology.

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Professor of Veterinary Science.

NATHANIEL BUTLER, JR., M. A.,  
Professor of English Language and Literature.

ARTHUR T. WOODS,  
Professor of Mechanical Engineering.

CURTIS B. HOPPIN,  
FIRST LIEUT. 2ND CAVALRY, U. S. A.,  
Professor of Military Science and Tactics.

S. ROBERTSON WINCHELL, M. A.,  
Professor of Latin.

ARTHUR N. TALBOT, C. E.,  
Assistant Professor of Engineering and Mathematics.

ARTHUR W. PALMER, Sc. D.,  
Assistant Professor of Chemistry.

GEORGE W. PARKER,  
Instructor in Wood-work, and Foreman.

FANNY M. RYAN,  
Instructor in Modern Languages.

GEORGE W. MYERS, B. S.,  
Instructor in Mathematics.

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RUFUS ANDERSON, M. E.,  
Instructor in Iron-work, and Foreman.

CLARA MAUD KIMBALL,  
Teacher of Vocal and Instrumental Music.

SAMUEL W. STRATTON, B. S.,  
Assistant in Architecture.

HOWARD S. BRODE,  
Assistant in Zoölogy.

ETTA L. BEACH,  
Assistant in Drawing.

C. EUGENE BOGARDUS, B. S.,  
First Assistant in Chemistry.

HARRY S. GRINDLEY, B. S.,  
Second Assistant in Chemistry.

J. V. E. SCHAEFER, B. S.,  
Assistant in Machine Shop.

\*LINCOLN BUSH, B. S.,  
Instructor in Descriptive Geometry.

CLEAVES BENNETT,  
Assistant in Library.

---

A. B. BAKER,  
Janitor.

---

\*For Winter Term.

# STATE LABORATORY OF NATURAL HISTORY.

---

STEPHEN A. FORBES, PH. D.,  
DIRECTOR AND STATE ENTOMOLOGIST.

THOMAS J. BURRILL, PH. D.,  
Botanist.

CHARLES A. HART,  
Office Entomologist.

JOHN MARTEN,  
Field Entomologist.

FREDERICK W. MALLY, M. Sc.,  
Entomological Assistant.

MARY J. SNYDER,  
Stenographer.

# AGRICULTURAL EXPERIMENT STATION.

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\*ALBERT G. MANNS, PH. D.,  
Assistant Chemist.

†EDWARD H. FARRINGTON,  
Assistant Chemist.

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W. L. PILLSBURY, M. A.,  
Secretary.

\*Resigned, January 1, 1890.

†After January 1, 1890.



# LIST OF STUDENTS.

## RESIDENT GRADUATES.

NAME.	RESIDENCE.
Bennett, Cleaves	Mattoon.
Kinkead, David R.	Earlville.
Ross, Luther S., B.S.	Reno.
Sparks, Myrtle E., B.A.	Champaign.
Stewart, Ella M.	Champaign.
Williamson, Mary H., B.L.	Champaign.

## SENIOR CLASS.

### GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Barr, James	Mechanical Engineering & Mil.	Urbana.
Bawden, Samuel D.	Mechanical Engineering & Mil.	Champaign.
Beardsley, John	Literature and Science	Champaign.
*Beckwith, Frank	Civil Engineering & Military	Quincy.
Benson, Edward M.	Civil Engineering	Colfax.
Bowsher, Col'mb's A.	Civil Engineering	Barnett.
*Boyd, Willard A.	Mechanical Engineering	Lewistown.
*Bunton, Fred L.	Mechanical Engineering	Kewanee.
Camp, Norman H.	Natural History	Chanute, Kas.
Clark, Frank H.	Mechanical Engineering & Mil.	Urbana.
Clark, Thomas A.	Literature and Science	Champaign.
Clarkson, James F.	Civil Engineering & Military	Chicago.
Clinton, George P.	Natural History	Polo.
Cooke, Robert J.	Civil Engineering & Military	East Newbern.
Cornelison, Robt. W.	Chemistry	Washington.
Crabbs, Clarence L.	Civil Engineering & Military	Gibson City.
*Eidmann, Edw. C.	Civil Engineering	Mascoutah.
Fisher, Frank	Civil Engineering & Military	Indianola.
Gilliland, Wm. M.	Mechanical Engineering	Coatsburg.
Hanssen, G. Adolph	Architecture	Davenport, Ia.
Hazelton, Hugh	Mechanical Engineering & Mil.	Forest Glen.
Keene, Edward S.	Mechanical Engineering	Moline.
McCandless, H. W.	Mechanical Engineering	Orion.

NOTE.—A star (\*) indicates that a student\* has not secured the full number of credits belonging to the class in which he is enrolled. He may have fallen behind this class, or he may have advanced beyond the class below.

NAME.	COURSE.	RESIDENCE.
McKee, Will E.	Mechanical Engineering	Rising.
Manny, Walter I.	Literature and Science	Mound Station.
Moore, Byron L.	Chemistry	Champaign.
Nesbit, Edwin	Mechanical Engineering	Charleston
Peoples, U. J. Linc'n	Architecture	Alleghany City, Pa.
*Piper, Edward D.	Mechanical Engineering	Chicago.
Proctor, Orla A.	Literature and Science	Rome.
Schaefer, Philm'n A.	Civil Engineering	Parral, Mexico.
Shamel, Charles H.	Chemistry	Wiley.
*Shamel, Clar'nce A.	Agriculture	Wiley.
*Smolt, Franklin O.	Chemistry and Military	Paw Paw.
Snyder, C. Henry	Civil Engineering	Fulton.
Stevens, Fred W.	Chemistry	Odell.
*Storer, Frederic E.	Architecture and Military	Spring Ranch, Neb.
Terbush, Linsley F.	Literature and Science	Champaign.
Tresise, Frank J.	Civil Engineering & Military	Sharon, Pa.
Tscharner, John B.	Civil Engineering	Okawville.
Waterman, Fred W.	Mechanical Engineering & Mil.	Sycamore.
White, James M.	Architecture and Military	Peoria.
Wilber, Frank D.	Literature and Science	Champaign.
Wilkinson, Geo. E.	Natural History and Military	Argenta.
Wilson, Robert C.	Natural History	Bloomington.

## LADIES.

NAME.	COURSE.	RESIDENCE.
Boyle, Annie C.	Literature and Science	Champaign.
Brumbach, Lucia R.	Literature and Science	Gilman.
Clark, Edith L.	Literature and Science	Urbana.
Ellars, Jessie	Ancient Language	Tuscola.
Jones, Mabel	Literature and Science	Champaign.
Kennard, Katherine L.	Literature and Science	Champaign.
*Paine, Sarah M.	Natural History	Orizaba.

## JUNIOR CLASS.

## GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Barclay, Thomas	Chemistry	Plainfield.
Bouton, Charles S.	Chemistry	Hyde Park.
Braucher, Ernest N.	Architecture	Lincoln.
Chester, D. Hubert	Chemistry	Champaign.
Chester, John N.	Civil Engineering	Champaign.



NAME.	COURSE.	RESIDENCE.
Clarke, Edwin B.	Architecture and Military	Quincy.
Clarke, Frederic W.	Architecture and Military	Quincy.
*Crissey, John W.	Civil Engineering	Chester.
*Dinwiddie, Edwin	Mechanical Engineering	Maroa.
Eno, Frank H.	Civil Engineering & Military	Pomona, Cal.
*Fischer, Lawrence	Architecture	Oregon.
*Foster, Zebulon	Civil Engineering	Armstrong.
*Frahm, Hans	Literature and Science	Tuscola.
Frederickson, Jno. H.	Civil Engineering	Champaign.
French, Ransford M.	Architecture	Pana.
Fuller, James R.	Civil Engineering	Buda.
Gardner, Frank D.	Agriculture	Gilman.
Gibson, Charles	Civil Engineering	South Grove.
Green, Thomas S.	Natural History	Jacksonville.
*Hall, Fred A.	Chemistry	Tonica.
Harris, Jay T.	Civil Engineering	Champaign.
*Harris, William H.	Civil Engineering	Seymour.
Harvey, Alfred E.	Civil Engineering & Military	Paris.
Hay, Walter M.	Civil Engineering	Sandwich.
*Hildrup, James J.	Civil Engineering	Belvidere.
*Hobbs, Glen M.	Literature and Science	Yorkville.
Howorth, Thomas J.	Ancient Language	Chester.
Lewis, G. Felix	Mechanical Engineering	Deer Creek.
McClure, Ora D.	Mechanical Eng. and Military	Gibson City.
McCormick, Wirt	Literature and Science	Mahomet.
*Martin, William A.	Mechanical Engineering	Chicago.
Maue, August	Literature and Science	Mokena.
Merritt, Charles J.	Civil Engineering	Champaign.
Mitchell, Charles J.	Civil Engineering	Fulton.
Peabody, Lorin W.	Mechanical Engineering	Aurora.
Piatt, Herman S.	Ancient Language	Champaign.
Powell, John H.	Civil Engineering	Shawneetown.
Richart, Fredr'k W.	Mechanical Engineering	Fredonia.
*Shannon, Jas. S., Jr.	Architecture	Hinsdale.
Shattuck, Walter F.	Architecture	Champaign.
*Siebernes, John R.	Civil Engineering	Peoria.
*Spencer, James E.	Civil Engineering	Champaign.
Vail, Charles D.	Civil Engineering and Military	Lone Tree.
Wallace, R. Strawn	Mechanical Engineering & Mil.	Pontiac.
Young, Charles B.	Architecture	Aurora.

**LADIES.**

NAME.	COURSE.	RESIDENCE.
Beach, Laura M.	Natural History	Champaign.
Broadbuss, Alice V.	Natural History	Urbana.
Butterfield, Helen E.	Literature and Science	Champaign.
Carson, Annie	Literature and Science	Urbana.
*Cunningham, Clara	Natural History	Champaign.
*Darby, Nellie M.	Literature and Science	Urbana.
*Gilman, Bessie A.	Literature and Science	Warrensburg.
*Heller, Opal B.	Literature and Science	Urbana.
Jones, Isabel E.	Natural History	Champaign.
*Maxwell, Nellie	Literature and Science	Champaign.
Myers, Clara	Literature and Science	Newport, Ind.
Shattuck, Anna F.	Literature and Science	Champaign.
Shattuck, Edith A.	Architecture	Champaign.
Sibert, Emma E.	Literature and Science	Champaign.

**SOPHOMORE CLASS.****GENTLEMEN.**

NAME.	COURSE.	RESIDENCE.
*Aranda, Ezequiel	Mechanical Engineering	Allende, Mexico.
*Arbeiter, George	Natural History	Plainfield.
*Armstrong, Jas. L.	Ancient Language and Military	Hayes.
*Atkinson, Oloff	Architecture	Rock Island.
*Bacon, Cecil H.	Chemistry	Champaign.
*Bainum, Curtis S.	Architecture	Champaign.
*Baker, John P.	Civil Engineering	Parkersburg, Ia.
Barker, John K.	Civil Engineering and Military	Three Rivers, Mass.
Baughman, Chas. O.	Mechanical Engineering	Camp Point.
Belden, Edgar S.	Architecture	Evanston.
*Beuthien, Arnold	Mechanical Engineering	Durant, Ia.
*Bevis, Albon	Architecture	Virginia.
*Blaine, Walter C.	Chemistry	Champaign.
*Bond, Joseph E.	Mechanical Engineering	Tolono.
Burrows, Parke T.	Architecture and Military	Davenport, Ia.
*Butler, William T.	Civil Engineering	Franklin, O.
*Carnahan, Frank G.	Ancient Language	Champaign.
*Carr, Robert F., Jr.	Chemistry	Argenta.
*Carrick, William	Chemistry	Newton.
*Coffeen, Fred G.	Chemistry	Champaign.

NAME.	COURSE.	RESIDENCE.
Cross, Charles W.	Architecture	Kewanee.
*Crowell, S. Went'h	Literature and Science	Oregon.
*Dunaway, W. Alf'd	Architecture	Ottawa.
*Eastman, Chas. E.	Architecture	Petersburg.
Forbes, Robert H.	Chemistry	Princeton.
Foster, Winslow H.	Mechanical Engineer. & Mil.	Chicago.
Funston, Edm'd B.	Architecture	Fisher.
Gates, Andrew W.	Civil Engineering and Military	Earlville.
*Guenther, Alfred	Agriculture and Military	Quincy.
*Gulick, Edward E.	Literature and Science & Mil.	Mahomet.
*Gulick, Joseph P.	Literature and Science	Mahomet.
*Gunn, Charles A.	Architecture and Military	South Evanston.
*Hall, Lyman	Chemistry	Savoy.
Hallinen, Joseph E.	Natural History	Champaign.
Hammett, Wm. A.	Agriculture	Camargo.
Harris, B. Frank	Literature and Science & Mil.	Champaign.
Hart, Ralph W.	Architecture	Aberdeen, S. Dak.
*Harvey, Walter C.	Architecture	Paris.
*Heaton, Edward J.	Civil Engineering	Emden.
Herrick, Lott R.	Literature and Science	Farmer City.
*Hubbell, James P.	Architecture and Military	Davenport, Ia.
*Huff, Geo. A., Jr.	Chemistry	Englewood.
Jerry, Edward E.	Civil Engineering	Curran.
Kellogg, Edward F.	Mechanical Engineering	Champaign.
Kiler, Charles A.	Natural History	Urbana.
Klingelhoefcr, Wm.	Civil Engineering	Mascoutah.
*Kramm, Harry	Mechanical Engineering	Peoria.
Lewis, George E.	Mechanical Engineering & Mil.	Chicago.
*Lockhart, John W.	Mechanical Engineering & Mil.	Owensville, Ind.
*Lockwood, F. M.	Architecture	Champaign.
McCartney, Wm. P.	Chemistry and Military	Metropolis.
McCormick, Thos P.	Mechanical Engineering	St. Louis, Mo.
McLane, Cyrus D.	Architecture	Allerton, Ia.
Mage, June B.	Literature and Science	Havana.
Mather, Roy A.	Civil Engineering and Military	Naperville.
*Merrifield, Alb't W.	Civil Engineering	Ottawa.
Miller, William G.	Mechanical Engineer and Mil.	Chicago.
Morehouse, M J.	Architecture	Mt. Pleasant, Ia.
*Morgan, John B.	Literature and Science	Kinmundy.
Morse, Burt	Architecture	Farmington.

NAME.	COURSE.	RESIDENCE.
Mosier, Jeremiah G.	Natural History	Urbana.
Nelson, Elnathan K.	Chemistry	Paris.
Page, John W.	Civil Engineering and Military	Waukegan.
*Parker, Hervey E.	Ancient Language	Champaign.
Parkman, Chas. C.	Architecture	Philo.
Pasfield, George L.	Literature and Science & Mil.	Springfield.
*Paul, William L.	Mechanical Engineering	Peoria.
*Peterson, Adolph B.	Architecture	Chicago.
*Phillips, James D.	Architecture	Englewood.
Pierce, Charles I.	Mechanical Engineering	Kewanee.
Pillsbury, Arthur L.	Civil Engineering and Military	Urbana.
*Pillsbury, Ithamar	Natural History	Macomb.
Plank, Ulysses S. G.	Natural History	East Lynne, Mo.
*Pullen, Rome	Literature and Science	Centralia.
*Quinn, Edward J.	Chemistry	La Salle.
*Reat, Samuel C.	Literature and Science	Tuscola.
Sandford, Wm. E.	Chemistry	Kewanee.
*Sargent, Ernest T.	Literature and Science	Carlinville.
*Seaman, George W.	Mechanical Engineering & Mil.	Beardstown.
Scheidenhelm, E. L.	Civil Engineering and Military	Mendota.
*Shamel, J. Young	Agriculture	Willey.
*Smith, Sherman	Architecture	Leroy.
Snodgrass, William	Mechanical Engineering	Urbana.
Steele, James	Chemistry and Military	Henry.
*Steinwedell, Wm. E.	Mechanical Engineering	Quincy.
*Stewart, John T.	Civil Engineering and Military	Onarga.
*Swenson, Bern'd V.	Mechanical Engineering & Mil.	Chicago.
*Tschanner, Frank P.	Natural History	Okawville.
*Wagner, Joseph R.	Natural History	Spring Bay.
Wait, Benj. A., Jr.	Civil Engineering	Armstrong.
*Wilder, Charles T.	Natural History and Military	Champaign.
Williamson, Fr'k R.	Civil Engineering	St. Anne.
*Woodruff, Thos. T.	Mechanical Engineering	Quincy.
*Woodworth, H. O.	Natural History	Champaign.
Wright, Royal	Literature and Science	Urbana.

## LADIES.

NAME.	COURSE.	RESIDENCE.
Barber, Alice M.	Natural History	Lafox.
Bennett, Sarah	Literature and Science	Mattoon.
Boggs, Cassie	Literature and Science	Hayes.

NAME.	COURSE.	RESIDENCE.
*Ermentrout, R. L.	Literature and Science	Urbana.
*McWatty, Mattie M.	Natural History	Champaign.
Maxwell, Anne M.	Literature and Science	Champaign.
*Merritt, Luella	Literature and Science	Champaign.
*Pearman, Myrtle	Natural History	Champaign.
*Philbrick, Margr't	Natural History	Champaign.
Spencer, Julia A.	Literature and Science	Urbana.
Thompson, Susan E.	Literature and Science	Bement.
*Turnell, Amy	Natural History	Champaign.

## FRESHMAN CLASS.

### GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Andrews, Herbert F.	Natural History	Piasa.
*Armstrong, J. Wm.	Mechanical Engineering	Toulon.
Bacon, Harlow	Civil Engineering & Military	Huntsville.
*Bailey, Fred L.	Chemistry	Champaign.
Barnett, Robert C.	Mechanical Engineering	Keokuk, Ia.
*Barrett, Edw. E.	Civil Engineering	Port Byron.
Bartlett, H. Emmett	Civil Engineering & Military	Mt. Sterling.
†Bassett, Grove M.	Mechanical Engineering	Kewanee.
*Bates, Theodore	Civil Engineering	Pittsfield.
Bawden, H. H., Jr.	Ancient Language	Champaign.
Behrensmeyer, G. P.	Architecture	Quincy.
Bing, Edward W.	Chemistry	Urbana.
Blakesley, Geo. W.	Mechanical Engineering	Rock Island.
Boger, J. Fred	Civil Engineering	Camp Point.
*Bowen, Herbert L.	Civil Engineering	Kewanee.
Braucher, Herb't H.	Agriculture	Lincoln.
Brown, Frank	Natural History	Monticello.
Brown, Frank M.	Architecture	Champaign.
Brownell, Chester D.	Chemistry and Military	Champaign.
Burt, Henry J.	Civil Engineering	Urbana.
*Carpenter, Harv'y J.	Literature and Science	Urbana.
Carter, Charles W.	Natural History and Military	Aledo.
Chambers, Wm. R.	Literature and Science	Sadorus.
*Chester, O. Paul	Agriculture	Champaign.
*Clark, Cyril B.	Mechanical Engineering	Champaign.
Coffman, Birch D.	Natural History	Champaign.
Cook, James W.	Mechanical Engineering	Rock Island.

NAME.	COURSE.	RESIDENCE.
Cornell, Wm. H.	Mechanical Engineering & Mil.	Grant Park.
Craig, Edward C.	Literature & Science & Mil.	Mattoon.
Crawford, Chas. F.	Civil Engineering	Chicago.
Danley, Willis W.	Civil Engineering	Hennepin.
Davis, Jonathan S.	Architecture and Military	Atwater.
*Dickinson, Rich'd J.	Civil Engineering	Eureka.
Earl, Mark A.	Civil Engineering & Military	Centralia.
*Farrar, George A.	Architecture	Quincy.
*Gilman, Richard E.	Agriculture	Warrensburg.
Graham, Louis T.	Natural History & Military	Pittsfield.
Graham, William J.	Literature and Science & Mil.	Aledo.
*Green, N. Raym'd	Civil Engineering	Champaign.
Gulick, Frank	Natural History	Urbana.
Harvey, Nathan A.	Ancient Language	Champaign.
*Herrick, George I.	Civil Engineering	Wheaton.
Hewett, Herbert E.	Architecture	Morgan Park.
Higgins, Albert G.	Architecture	Elmwood.
*Hoag, Parker H.	Architecture	Champaign.
Hopkins, Frank C.	Mechanical Engineering	Buffalo, Wyo.
Hucke, Philip M.	Natural History & Military	Mascoutah.
Hunt, Edward E.	Chemistry	Urbana.
Johnston, Herbert	Natural History	Champaign.
*Kenaga, Wm. C.	Literature and Science	Kankakee.
Kerns, Shirley K.	Chemistry	Champaign.
*Kimball, Conrad B.	Architecture	Champaign.
Kinkead, James A.	Chemistry	Earlville.
Levy, Alexander	Architecture	Brookfield, Mo.
*Levy, Frank H.	Chemistry	Urbana.
*Lewis, Adelbert	Literature and Science	Pawnee.
Locke, Alfred	Mechanical Engineering & Mil.	La Salle.
Lodge, William F.	Natural History	Monticello.
Loomis, Arthur B.	Civil Engineering	Fulton.
McClure, Clyde B.	Civil Engineering	Gibson City.
*McElroy, Howard	Civil Engineering	Rossville.
McGee, Walter S.	Natural History	Deers.
McMains, Louis	Natural History	Armstrong.
Mann, Jacob G.	Civil Engineering	Mascoutah.
Metcalf, James D.	Mechanical Engineering	Girard.
Millar, Clendon M.	Chemistry	Mattoon.
*Miltimore, Guy	Engineering	Mitchell, S. Dak.

NAME.	COURSE.	RESIDENCE.
Needham, James	Mining Engineering	Collinsville.
Parker, Charles A.	Mechanical Engineering	Champaign.
*Patton, Otto C.	Chemistry	Mt. Vernon.
Pearson, William W.	Chemistry	Springfield.
Powers, Will A.	Chemistry	Belvidere.
Rea, Alfred W.	Architecture and Military	Urbana.
*Rippon, Charles A.	Chemistry	Springfield.
Roodhouse, Jas. P.	Chemistry and Military	Carrollton.
Rowe, William B.	Ancient Language	Ottawa.
Russell, Winfred	Natural History	Champaign.
Scott, Donald G.	Civil Engineering	Champaign.
*Scott, William J.	Architecture	Champaign.
Sharpe, Richard W.	Natural History	Tiskilwa.
Shiga, Shigetsura	Architecture	Tokio, Japan.
Skielvig, Severin C.	Architecture & Military	Chicago.
*Smith, Harry K.	Mechanical Engineering	Quincy.
Smith, Riley E.	Mechanical Engineering & Mil.	Stonington.
*Somers, Bert S.	Architecture	San Diego, Cal.
Spalding, Fred M.	Civil Engineering & Military	Gibson City.
*Strout, Frank A.	Mechanical Engineering	Utica.
Tackett, William C.	Natural History	*Sadorus.
Thielbar, Fred'k J.	Architecture	Peoria.
Thompson, Almon D.	Civil Engineering & Military	Gilman.
Toerring, Christ'n J.	Mechanical Engineering	Davenport, Ia.
Tominaga, Kotara	Agriculture	Tokio, Japan.
*Townsend, William	Civil Engineering	Champaign.
Troll, Ernest C.	Natural History	Oswego.
Vial, Robert C.	Civil Engineering & Military	Western Springs.
*Wade, Lenoard G.	Chemistry	Champaign.
Walker, Edward L.	Literature and Science	Petersburg.
*Watson, John B.	Mining Engineering	Opeechee, Mich.
*White, Carle B.	Chemistry	DuQuoin.
Wilhelm, Augustus	Architecture	Cincinnati, Ohio.
Young, Orres E.	Natural History	Stonington.

## LADIES.

NAME.	COURSE.	RESIDENCE.
Ayers, Grace	Literature and Science	Urbana.
*Borden, S. May	Literature and Science	Champaign.
Dickinson, Grace G.	Literature and Science	Eureka.
Folger, Rachel E.	Natural History	Ridge Farm.

NAME.	COURSE.	RESIDENCE.
*Gaston, Hattie J.	Natural History	Normal.
*Harvey, Mrs. C. A.	Literature and Science	Champaign.
Johnson, Harri'te A.	Literature and Science	Rock Island.
*Kenworthy, C. F.	Literature and Science	Rock Island.
Lamkin, Nina B.	Literature and Science	Champaign.
*Mathews, L. Mae	Literature and Science	Urbana.
*Myers, Maud O.	Literature and Science	Champaign.
Peterson, Sophia M.	Literature and Science	Champaign.
Ritter, Mrs. Angie	Natural History	Mattoon.
*Sedgwick, Mary E.	Ancient Language	Champaign.
Townsend, Mary C.	Natural History	Champaign.
*Wilder, Elizab'h C.	Literature and Science	Champaign.
Wingard, Anna L.	Literature and Science	Champaign.
Yeomans, Frances A.	Literature and Science	Danville.

## PREPARATORY CLASS.

### GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Adams, William E.		Charleston.
Arms, Frank D.	Architecture	Chicago.
Armstrong, John A.	Mechanical Engineering	Kewanee.
Arnold, Benj. A.	Natural History	Haldane.
Bardill, John O.		Grant Fork.
Barker, Louis G.	Mechanical Engineering	Three Riv'rs, Mass.
Bassett, John B.	Chemistry	Kewanee.
Bauman, Otto		Quincy.
Benson, Oliver N.	Architecture	Omaha, Neb.
Berry, Oren J.	Mechanical Engineering	Mendota.
Blakeslee, A. Harl'y	Mechanical Engineering	DuQuoin.
Bruer, William	Mechanical Engineering	Urbana.
Buck, James	Literature and Science	Bloomfield, Mo.
Burt, James D.	Architecture	Aurora, Neb.
Clemens, Andrew M.		Marion.
Cone, George C.	Literature and Science	Farmington.
Cornell, Frank H.	Literature and Science	Yorkville.
Crawford, John	Mechanical Engineering	Jonesboro.
Crawford, Thomas	Mechanical Engineering	Sterling.
Cunningham, Bert		Hoopeston.
Davis, Frank J.		Tremont.
Decius, Lyle	Literature and Science	Toledo.



NAME.	COURSE.	RESIDENCE.
Decius, Owen	Literature and Science	Toledo.
Dewey, George F.	Civil Engineering	Cairo.
Dunseth, William H.	Literature and Science	Urbana.
Ellsworth, Frank S.	Mining Engineering	Rochester, N. Y.
Faris, Israel J.	Mechanical Engineering	Charleston.
Foreman, Orville	Literature and Science	Pittsfield.
Foster, Alfred B.	Literature and Science	Bradford.
Fowler, David	Literature and Science	Charity.
Fraser, Wilbur J.	Architecture	Plainfield.
Funston, Jesse G.	Mechanical Engineering	Fisher.
Gill, Harry	Literature and Science	Champaign.
Goldschmidt, Otto E.	Mechanical Engineering	Davenport, Ia.
Greene, Herbert M.	Architecture	Peoria.
Gulick, Seeley		Urbana.
Hahn, Howard H.	Architecture	Freeport.
Hall, E. Stanford		East Lynn.
Hamon, William	Civil Engineering	Sedan, Kas.
Harris, George A.		Beatrice, Neb.
Hayes, A. Howard	Mechanical Engineering	Litchfield.
Heideman, Geo. H.	Mechanical Engineering	Elmhurst.
Hiles, Elmer K.	Mechanical Engineering	Chicago.
Hill, Thomas K.	Mechanical Engineering	Quincy.
Hoblit, John A., Jr.	Literature and Science	Atlanta.
Holbrook, Fred S.	Horticulture	Englewood.
Houghton, Geo. W.		Hudson.
Hughes, John W.	Literature and Science	Pierson.
Humrichouse, Geo.	Chemistry	Homer.
Ingalls, Fred O.	Literature and Science	Phoenix, Ari.
Jasper, Thomas	Mechanical Engineering	Quincy.
Kennedy, John	Civil Engineering	Murphysboro.
Kerchner, Fred W.	Mining Engineering	Belleville.
Kingman, L. S.		Peoria.
Kriete, Frank M.	Mechanical Engineering	Chicago.
Kuhnen, Adolph		Highland.
Lambert, John D.	Mechanical Engineering	Quincy.
McCloy, Robert E.	Literature and Science	Welton.
McNutt, John, Jr.	Literature and Science	Humbolt.
Miles, Tarlton V.		Charleston.
Mitchell, Gay E.	Literature and Science	Havana.
Morrow, Clar'nce G.		Champaign.

NAME.	COURSE.	RESIDENCE.
Muns, Andrew C.	Ancient Language	Champaign.
Peabody, John R.		Stonington.
Persinger, Rol'nd E.	Natural History	Maroa.
Phelps, Albert C.	Literature and Science	Lockport.
Poling, Otho C.		Quincy.
Pool, Marshall		Shawneetown.
Powell, Bradford		Carmi.
Pulliam, A. Delmar	Literature and Science	Urbana.
Russell, Chas. W.	Ancient Language	Virginia.
Rutledge, John J.	Mining Engineering	Alton.
Scherer, Willis A.	Mechanical Engineering	Raymond.
Schricker, Rich'd L.	Mining Engineering	Davenport, Ia.
Seastone, Chas. V.		New Boston.
Shillington, Thos. W.	Architecture	Omaha, Neb.
Shurts, Straut	Natural History	Champaign.
Snider, Harry H.	Mechanical Engineering	Rantoul.
Sommer, Walter B.		Quincy.
Sperling, Godfrey	Civil Engineering	Dewey.
Stowell, Hanson A.	Engineering	Anona, Fla.
Suppiger, Albert E.		Edwardsville.
Swartz, William C.	Literature and Science	Urbana.
Swigert, Arthur W.	Architecture	Springfield.
Thornton, Carl H.	Mechanical Engineering	Farragut, Ia.
Tower, Willis E.		Chana.
Trego, Charles H.	Mechanical Engineering	Hoopeston.
Whitaker, Ruben S.	Natural History	Forest City.
Wilbanks, Tanner A.		Chicago.
Wilkinson, Arthur L.		Argenta.
Williams, Scott	Mechanical Engineering	Bloomington.
Winchell Harley C.	Ancient Language	Champaign.
Withers, Willie A.	Chemistry	Englewood

**LADIES.**

NAME.	COURSE.	RESIDENCE.
Barnes, Jessie	Literature and Science	Champaign.
Campbell, Lena		Clinton.
Fletcher, Minnie L.	Literature and Science	Girard.
Fowler, Nellie	Literature and Science	Charity.
Gilman, Sadie G.	Literature and Science	Warrensburg.
Havard, Jennie		Homer.

NAME.	COURSE.	RESIDENCE.
Heil, Julia	Literature and Science	Decatur.
Hill, Agnes G.	Literature and Science	Nevada, Mo.
Keller, Lydia A.	Literature and Science	Monticello.
Lockhart, Emma L.		Owensville, Ind.
McCaskrin, Lou'a E.	Natural History	Rantoul.
McCormick, Flora	Literature and Science	Mahomet.
Mann, Estelle	Literature and Science	Geneva.
Nydegger, Louise	Literature and Science	Farmer City.
Parsons, Ella B.	Literature and Science	Trave, Ia.
Pettit, Anna V.	Literature and Science	Bement.
Powers, Frances M.	Natural History	Belvidere.
Powers, Jessie L.	Literature and Science	Belvidere.
Scott, Anna M.	Literature and Science	Champaign.
Trenchard, Frances	Literature and Science	Deland.

## SPECIALS.

### GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Allen, David H.	Agriculture	Delavan.
Baldwin, Wm. H.	Agriculture	Delavan.
Brown, Fred G.	Architecture	Urbana
Clark, Rev. Thornton	Literature and Science	Champaign.
Ellis, Edwin B.	Architecture	Ridge Farm.
Lay, E. Herman	Ancient Language	Fulton.
Phelps, Herbert	Agriculture	Lockport.
Stritesky, Louis	Architecture	Tabor, Wis.
Thomas, William S.	Agriculture	Camp Point.
Yamada, Sitzuro	Chemistry	Wakamatzu, Japan.

### LADIES.

NAME.	COURSE.	RESIDENCE.
Cranston, Mary E.	Art and Design	Gibson City.
Sim, Anna	Art and Design	Urbana.
Wilber, Ella	Art and Design	Champaign.

# SUMMARY. <sup>1889-90</sup>

BY CLASSES.	GENTLE- MEN.	LADIES.	TOTAL.
Resident Graduates .....	3	3	6
Seniors .....	45	7	52
Juniors .....	45	14	489
Sophomores .....	95	12	107
Freshmen .....	101	18	119
Preparatory .....	93	20	113
Special .....	10	3	13
Total .....	392	77	469
BY COURSES.			
Agriculture .....	14	.....	14
Mechanical Engineering .....	78	.....	78
Civil Engineering .....	71	.....	71
Mining Engineering .....	6	.....	6
Architecture .....	60	1	61
Chemistry .....	40	.....	40
Natural History .....	37	16	53
Art and Design .....	.....	3	3
English and Modern Languages .....	50	51	101
Ancient Languages .....	12	3	15
Not Specified .....	24	3	27
Total .....	392	77	469

# UNIVERSITY OF ILLINOIS.

## HISTORY.

The University of Illinois had its origin in a movement for the higher education of the industrial classes, begun in Illinois in 1851, and resulting in the congressional grant of lands for this purpose, made to the several states in 1862, and amounting in this state to 480,000 acres. The University was chartered in February, 1867, and opened to students in March, 1868. In addition to the endowment from the land grant, over \$400,000 was donated by Champaign county in bonds, buildings, and farms. The state also has made large appropriations for fitting up and stocking the farms, for library and apparatus, and for buildings, including the large main building erected in 1872 and 1873, the mechanical building, the chemical laboratory, and a commodious military building finished in 1890. Successive colleges and schools have been added as required, until four colleges, including eleven distinct schools, have been organized.

The whole number matriculated as students since the opening is 2,486. The number graduated from the several colleges, including the class of 1889, is 600. In 1871 the University was opened for lady students, on the same terms as to gentlemen. In 1874 a fine art gallery was established.

The University has a beautiful and healthful situation on the high grounds between the cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles south from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railways. The country is a region of beautiful rolling prairies, with large belts of timber along the streams, and is one of the richest farming districts of the state.

## BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 610 acres, including stock farm, experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The main University building, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrial art. The chapel wing contains the chapel, the physical laboratory and lecture room, and rooms occupied by the schools of architecture and of art and design. In the main front are convenient class-rooms, with, on the upper floor, elegant halls for literary societies. The building is warmed by steam.

The mechanical building is of brick, 126 feet in length, and 88 feet in width. It contains a boiler-room, a machine shop, furnished for practical use with a steam engine and lathes, and other machinery; pattern and finishing shop; testing laboratory; shops for carpentry and cabinet work, furnished with wood-working machinery. The blacksmith shop, 32 by 36 feet, contains sixteen forges with anvils and tools, and a cupola for melting iron.

The chemical building, erected in 1878, at a cost, including furniture, of \$40,000, contains five laboratories, and is one of the best and largest in the United States.

A new military building, erected in 1889-90, 100 by 150 feet in one grand hall, gives ample space for company and battalion maneuvers and for large audiences upon special occasions.

There are, in addition, a veterinary hall, a small astronomical observatory, two dormitories, three dwellings, two large barns, and a greenhouse.

#### MUSEUMS AND COLLECTIONS.

The museum of zoölogy and geology occupies a hall sixty-one by seventy-nine feet, with a gallery on three sides, and is completely furnished with wall, table and alcove cases. It already contains interesting and important collections, equaled at few, if any, of the colleges of the West. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

*Zoölogy.*—The mounted *mammals* comprise an unusually large and instructive collection of the ruminants of our

country, including male and female moose, elk, bison, deer, antelope, etc.; and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, and good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted *birds* (about five hundred and fifty specimens of three hundred species) includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of *skeletons* contains examples of all the orders of mammals and birds except proboscidæ, together with typical representatives of the principal groups of reptiles, amphibians and fishes.

The *cold-blooded vertebrates* are also represented by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both terrestrial and marine.

*Embryology* is illustrated by a set of Ziegler wax models, and several series of slides, sections and other preparations.

*Conchology* is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is fair, but incomplete.

The *entomological cabinet* contains about three thousand species (principally American) named, labeled, and systematically arranged.

The *lower invertebrates* are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

*Geology*.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest palæozoic time to the present. A fine set of fossils from Germany, and collections suitably arranged for practical study, from this and other states, illus-

trate the different formations. There is a good collection of foot-prints from the Connecticut river sand-stones.

*Botany.*—The herbarium contains about one thousand species of plants indigenous to Illinois, including nearly complete sets of grasses and sedges. There are, besides, many other North American plants and some exotics. A collection of fungi, includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees, well illustrates the varieties of native wood. The trees and shrubs of Stephenson county, Illinois, are represented by a distinct collection.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

*Lithology.*—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

*Mineralogy.*—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented, also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystallography.

*Agriculture.*—A collection of soils from different portions of Illinois and other states; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official state inspection of grains at Chicago, showing the quality of the different grades recognized; models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs and photographs of typical animals of noted breeds.

The farms give good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

*Physics.*—The cabinets of the physical laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of mechanics, pneumatics, optics, and electricity. Ample facilities



are afforded to students for performing experiments of precision by which the theories of physical science may be tested and original work may be done.

A five-light Weston dynamo at the machine shop is connected with the physical and chemical laboratories for experimental purposes, and is supplemented by a valuable series of instruments for accurate electrical measurements.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States may be consulted at the physical laboratory.

*The Mechanical Laboratory* is provided with a steam engine, engine and hand lathes, planer, shapers, milling-machine, drill presses, and the requisite hand tools, benches, vises, anvils, etc., for pattern-shop, blacksmith shop, moulding-room, and bench work. Its cabinets contain several hundred models of elements of mechanism and machines from Schroeder, Riggs, the Patent Office, and from the workshops of the University. Important additions to the equipment of tools and machines have lately been made, including a testing machine of most approved design, having a capacity of 100,000 pounds, and a mercury column for accurate testing of water and steam-gauges.

*Mining Engineering* is illustrated by a valuable series of models, obtained from Freiburg, illustrating sections of mines, machinery for elevating and breaking ore, with furnaces and machinery for metallurgical processes.

An extensive mining and metallurgical laboratory is in process of arrangement. A considerable portion of the machinery is already in working condition.

#### ART GALLERY.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly

all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France. The value of this splendid collection, as a means of education, is shown in the work of the school of drawing and design of the University.

#### MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various schools of science. Prominent among the agricultural specimens here exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds, a considerable collection of small grains and of grasses, a collection of fibers in various states of manufacture, and a series of analyses of grains showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; Patent Office models, etc., samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of University work. The elegant exhibit made by the University at the Centennial and Cotton Exposition at New Orleans finds a permanent abode in this apartment.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster, and a complete set of drawings, of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors; but both the first and second were set aside for political reasons. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

#### LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, includes about 19,000 volumes, and additions are made every year.

The large library hall fitted up as a reading room, is open throughout the day for study, reading, and consulting authorities. It is intended that the use of the library shall largely supplement the class-room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art. The following periodicals are regularly received:

## PERIODICALS IN THE LIBRARY, 1890.

## AGRICULTURAL AND HORTICULTURAL.

Prairie Farmer.	Veterinary Journal.
Western Rural.	Industrialist.
Country Gentleman.	Farm, Field and Stockman.
Breeder's Gazette.	Rural New Yorker.
Indiana Farmer.	Fruit Growers' Journal.
American Agriculturist.	American Garden.
Western Agriculturist.	Wisconsin Agriculturist.
Farm and Home.	Rural World.
Farmers' Review.	American Florist.
Hellenike Georgia.	

## ENGINEERING.

Builder, <i>London</i> .	Car and Locomotive Builder
American Engineer.	American Architect.
Trans. Am. Soc. of Civil Engineers.	American Machinist.
Engineering News.	Western Manufacturer.
Scientific American.	Gazette of Patent Office.
Scientific American Supplement.	Mechanics.
Electrician, <i>London</i> .	Locomotive.
Engineering and Building Record.	American Artisan.
School of Mines Quarterly.	

## SCIENTIFIC.

Annales des Sciences Naturelles, Botanique, <i>Paris</i> .	Zeitschrift für Analytische Chemie.
Annales des Sciences Naturelles, Zoölogie, <i>Paris</i> .	Popular Science Monthly.
Science.	American Journal of Mathematics.
Nature, <i>London</i> .	American Journal of Science and Art.
American Naturalist.	Journal of Franklin Institute.
Grevillea, <i>London</i> .	Mathematical Quarterly.
Decorator and Furnisher.	Annals of Mathematics.
Art Amateur.	Monthly Weather Review.
Portfolio, <i>London</i> .	Proceedings of American Philosophical Society.
Chemical News, <i>London</i> .	Lancet, <i>London</i> .
Journal of Chemical Society, <i>London</i>	Geological Magazine.
Annals and Magazine of Natural History, <i>London</i> .	Journal of Military Service.
	American Journal of Chemistry.
	Boston Journal of Chemistry.

## LITERARY AND NEWS.

Andover Review.	Political Science Quarterly.
Nineteenth Century.	Congressional Record.
Edinburg Review.	Champaign Times.
Contemporary Review.	Musical Record.
Fortnightly Review.	Witness.
North American Review.	Library Journal.
Forum.	United States Government Publi-
Dial.	cations.
Literary World.	The Writer.
Education.	Voice (Elocution).
Legal Adviser.	Champaign County Herald.

The exchanges of the *Illini* are also free to the students in the library.

## GEOGRAPHICAL POSITION OF THE UNIVERSITY.

The Observatory has the following position:

Latitude,  $40^{\circ} 6' 29''.66$ .

Longitude, west of Washington,  $11^{\circ} 10' 37''.5$  or  $44m. 42.5s$ .

Elevation above sea level, 720 feet.

# ORGANIZATION OF THE UNIVERSITY.

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The institution is a University in the American sense, though differing designedly in the character of some of its colleges from the older institutions of this country. It embraces four colleges, which are subdivided into schools. A school is understood to embrace the course of instruction needful for some one profession or vocation. Schools that are cognate in character and studies, are grouped in the same college. The following are the colleges and schools:

I. COLLEGE OF AGRICULTURE.

II. COLLEGE OF ENGINEERING.

School of Mechanical Engineering.

School of Civil Engineering.

School of Mining Engineering.

School of Architecture.

III. COLLEGE OF NATURAL SCIENCE.

School of Chemistry.

School of Natural History

IV. COLLEGE OF LITERATURE AND SCIENCE.

School of English and Modern Languages.

School of Ancient Languages.

V. ADDITIONAL SCHOOLS.

School of Military Science.

School of Art and Design.

Vocal and instrumental music are also taught, but not as parts of any regular course.

PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of some of the common schools and that of the University.

# COLLEGE OF AGRICULTURE.

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## FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, PH. D., LL. D., REGENT.

GEORGE E. MORROW, A. M., *Dean*, Agriculture.

THOMAS J. BURRILL, PH. D., Botany and Horticulture.

SAMUEL W. SHATTUCK, C. E., Mathematics.

EDWARD SNYDER, A. M., Modern Languages.

JAMES D. CRAWFORD, A. M., History.

PETER ROOS, Industrial Art.

STEPHEN A. FORBES, PH. D., Zoölogy and Entomology.

JAMES H. BROWNLEE, A. M., Rhetoric and Oratory.

ARTHUR W. PALMER, SC. D., Chemistry.

DONALD MCINTOSH, V. S., Veterinary Science.

CHARLES W. ROLFE, M. S., Geology.

NATHANIEL BUTLER, JR., A. M., English Language and  
· Literature.

CURTIS B. HOPPIN, Lt. U. S. A., Military Science.

GEORGE W. PARKER, Wood-work.

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## ADMISSION.

Candidates for admission to the College of Agriculture must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches and in the studies of the preliminary year. While by law students may be admitted at fifteen years of age, in general it is much better that they shall be eighteen or twenty. It will be well if candidates shall have pursued other studies besides those required for admission. The better the preparation the more profitable the course.

## OBJECT OF THE COLLEGE.

The aim of this college is to educate scientific agriculturists and horticulturists. The frequency with which this aim is misunderstood, demands that it shall be fully explained. Many, who look upon agriculture as consisting merely in the manual work of plowing, planting, cultivating, and harvesting, and in the care of stock, justly ridicule the idea of

teaching these arts in a college. The practical farmer who has spent his life in farm labors, laughs at the notion of sending his son to learn these from a set of scientific professors. But all this implies a gross misunderstanding of the real object of agricultural science. It is not simply to teach *how* to plow, but the reason for plowing at all—to teach the composition and nature of soils, the philosophy of plowing, of manures, and the adaptation of the different soils to different crops and cultures. It is not simply to teach *how* to feed, but to show the composition, action and value of the several kinds of food and the laws of feeding, fattening and healthful growth. In short, it is the aim of the true agricultural college to enable the student to understand thoroughly all that man can know about soils and seeds, plants and animals, and the influences of light, heat, and moisture on his fields, his crops, and his stock; so that he may both understand the reason of the processes he uses, and intelligently work for the improvement of those processes. Not “book farming” but a knowledge of the real nature of all true farming, of the great natural laws of the farm and its phenomena—this is the true aim of agricultural education. Agriculture involves a larger number of sciences than any other human employment, and becomes a fit sequence to any collegiate training.

The steady aim of the trustees has been to give the College of Agriculture the largest development practicable, and to meet the full demand for agricultural education, as fast as it shall arise. Agricultural students are especially invited to the University.

Boards of agriculture and agricultural and horticultural associations are invited to co-operate with the University in its efforts to awaken a more general appreciation of the value of education, and to aid those who desire to avail themselves of its facilities for instruction.

#### INSTRUCTION.

The instruction unites, as far as possible, theory and practice—theory explaining practice and practice illustrating theory. The technical studies are taught mainly by lectures with readings of standard agricultural books and periodicals, and frequent discussions, oral and written, of the principles

taught. These are also illustrated by demonstrations and observations in the fields, stables, orchards, gardens, plant-houses, etc.

#### SPECIAL STUDIES.

*Elements of Agriculture.*—Outline of the general principles underlying agriculture in its theory and practice, introductory to the technical and scientific studies of the course.

*Agricultural Engineering and Architecture.*—Arrangement of the farm; its improvement by mechanical means, as drainage and irrigation; its divisions, fences, hedges, etc.; its water supply; the construction of roads; arrangement, planning, and construction of farm buildings; the construction, selection, care, and use of farm implements and machinery.

*Animal Husbandry.*—Principles of breeding and management of our domestic animals; description of all important breeds and varieties, giving their history and adaptations.

*Rural Economy.*—Relation of agriculture to other industries and to national prosperity; influences which should determine the class of farming to be adopted; comparisons of special and general systems; uniting of manufacturing with farming; culture of the various farm crops—cereals, grasses, etc.; farm accounts.

*History of Agriculture.*—Progress and present condition in this and in other countries. Influence of climate, civilization, and legislation in advancing or retarding. Agricultural literature and organizations.

*Rural Law.*—Business law; laws especially affecting agriculture—tenures of real estate; road, fence, drainage laws, etc.

*Elements of Horticulture.*—The following topics are discussed: Orchard sites; the age of trees to plant; the season to plant; how to plant; what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. Each student has usually grafted from two hundred to one thousand root-grafts of apples.



*Landscape Gardening.*—Lectures are given upon the general principles of the art, the history, and the styles, the kinds and uses of trees, shrubs, grasses, and flowers, the introduction and management of water, the construction and laying out of drives and walks, fences, buildings, etc. The class draw first from copy, then, after the actual study of some locality with its environments, design and draw full plans for its improvement, indicating positions of all prominent objects, including the kinds and groups of trees and other plants. These plans, with specifications, are to be deposited in the library of the school. Excursions are made when found practicable, for the study of public and private grounds.

The three following studies constitute a year's work designed for those who wish to prepare themselves for special horticultural pursuits, and may be taken as substitutes for agricultural or veterinary studies:

*Floriculture.*—The study of the kinds, propagation, growth, and care of flowering and other ornamental plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatments. Insects and diseases, with the remedies, are thoroughly treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice.

*Pomology and Forestry.*—Much of the first half of the term is spent in the orchards, nurseries, and forests, making observations and collections, and in the laboratory work determining species, varieties, etc. A large collection of apples, pears, grapes, peaches, etc., is made each year, and the chief characteristics of each are pointed out. Practice is had in making drawings and plaster casts. Written descriptions of the fruits are carefully made and compared with those given in the books, and systems of analysis and classification are put to practical tests. Students see and perform the skilled operations usually practiced in the propagation and growth of trees. Various methods of pruning and training, especially of grapes, are discussed in the class-room, and illustrated upon the grounds. Students study the injurious insects and fungi which cause or accompany diseases of trees and fruits, and the methods of preventing or diminishing their ravages. The

native forests of the vicinity and of the country at large are studied as a foundation for the lessons upon the influence and value of timber and other trees and their artificial culture. For the latter, the forest tree plantation on the University grounds, and the aboretum, afford practical illustrations.

*Plant-Houses and Management.*—This study includes gardening and landscape architecture; the methods of construction, heating and ventilation, and general management, so as to secure, under the different circumstances, the best plant growth. The class-room work consists of lectures and architectural designing and drawing. Illustration and practice are afforded by the plant-houses of the University.

#### VETERINARY SCIENCE.

This science is taught during the third year. In the first term the anatomy and physiology of the domestic animals are taught by lectures, demonstrations, and dissections. Post-mortems of healthy and diseased animals are made, so that the students may become practically acquainted with the tissues in health and in disease. The second term is devoted to the study of veterinary medicines, their action and uses, and to lectures on the principles and practice of veterinary science. During the entire year practical instruction is given in clinical work at the veterinary infirmary, where animals are treated or operated on free of charge, for the instruction of the students. Lectures are given on veterinary sanitary science and the principles and practice of veterinary surgery.

A veterinary hall and stable have been provided and a clinic is held to illustrate the lectures on veterinary science. The department has Dr. Auzoux's celebrated complete model of the horse in 97 pieces, exhibiting 3,000 details of structure; also *papier maché* models of the foot and the teeth of the horse at different ages.

Students desiring to pursue the study of veterinary science further than is laid down in the agricultural course, will find ample facilities for so doing.

#### LABORATORY WORK.

Experiments and special investigations by each student. A thesis is required embodying the results of original observation and research.

For details as to the study of botany, chemistry, zoölogy, entomology, geology, and meteorology, see statements in *College of Natural Science*.

## APPARATUS.

The college has for the illustration of practical agriculture, a stock farm of 400 acres, provided with a large stock-barn fitted up with stables, pens, yards, etc.; also an experiment farm of 180 acres, furnished with all necessary apparatus to illustrate the problems of breeding and feeding. It has fine specimens of neat cattle, Shorthorns, Herefords, Holsteins, and Jerseys, and of Poland-China swine. The Agricultural Experiment Station, recently established as a department of the University, exhibits field experiments in the testing of the different varieties and modes of culture of field crops and in the comparison and treatment of soils. It includes experiments in agriculture and horticulture, under the direction of the professors of agriculture and horticulture, and experiments in feeding animals of different ages and development, upon the various kinds of food. In common with similar departments in the several agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science.

Surveying and drainage are illustrated by field practice, with instruments and by models. Agricultural chemistry is pursued in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The college has fine collections of soils, seeds, plants, implements, skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the college there are:

A very large specimen apple orchard, planted in 1869, and originally containing about 1,000 varieties—many varieties of pears, cherries, grapes, and small fruits.

A forest tree plantation, embracing the most useful kinds of timber.

An aboretum, in which all hardy indigenous and exotic trees are planted as fast as they can be secured, and which now contains nearly 100 varieties. The ornamental grounds which surround the University building contain about twenty acres, and are kept in neat and attractive style.

These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustration to the class-room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The cabinet contains a series of colored plaster-casts of fruits prepared at the University; models of fruits and flowers by Auzoux, of Paris; collections of seeds of native and exotic plants; of specimens of native and foreign woods; of beneficial and injurious insects, and specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The college has a supply of compound microscopes and apparatus, and students have opportunity to learn their use, and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

#### AGRICULTURAL COURSE.

*Required for the degree of B. S., in College of Agriculture.*

##### FIRST YEAR.

1. Elements of Agriculture; Chemistry; Trigonometry; Shop practice (optional).
2. Elements of Horticulture; Chemistry; British Authors, or Free Hand Drawing.
3. Economic Entomology; Chemistry; Rhetoric.

##### SECOND YEAR.

1. Chemistry and Laboratory Practice; Botany; German.
2. Agricultural Chemistry (Soils and Plants); Zoölogy or Botany; German.
3. Agricultural Chemistry (Tillage, Fertilizers, Foods); Vegetable Physiology; German.

##### THIRD YEAR.

1. Agricultural Engineering and Architecture; Animal Anatomy and Physiology; German.
2. Animal Husbandry; Veterinary Science; Veterinary Materia Medica (optional extra); Physics or Geology.
3. Landscape Gardening; Veterinary Science; Physics or Geology.

##### FOURTH YEAR.

1. Physiography; Mental Science; History of Civilization.
2. Rural Economy; Constitutional History; Logic.
3. History of Agriculture and Rural Law; Political Economy; Laboratory Work.

N. B.—Students in Horticulture will take the special branches in horticulture described on pages 38, 39, and 40.

#### FARMERS' SHORT COURSE.

Students who have not the time necessary for the full course, and yet desire better to fit themselves to be successful farmers, may give exclusive attention to the technical agricultural studies, including veterinary science, and complete these in one year.

The studies of the second or winter term of this course, are arranged so as to be studied profitably by those who can be in attendance only during that term.

Students will be admitted to this course on passing a satisfactory examination in the common school branches, but they will receive greater benefit from it if they have made better preparation, especially if they have a good knowledge of botany and chemistry. They should not be less than eighteen years of age. Special fee, \$5 per term.

They will be admitted to the following classes:

1. Elements of Agriculture; Agricultural Engineering and Architecture; Animal Anatomy and Physiology; Shop Practice.
2. Animal Husbandry; Rural Economy; Veterinary Science.
3. History of Agriculture and Rural Law; Veterinary Science; *Economic Entomology or Landscape Gardening.*

# COLLEGE OF ENGINEERING.

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## SCHOOLS.

MECHANICAL ENGINEERING; CIVIL ENGINEERING;  
MINING ENGINEERING; ARCHITECTURE.

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## FACULTY AND INSTRUCTORS.

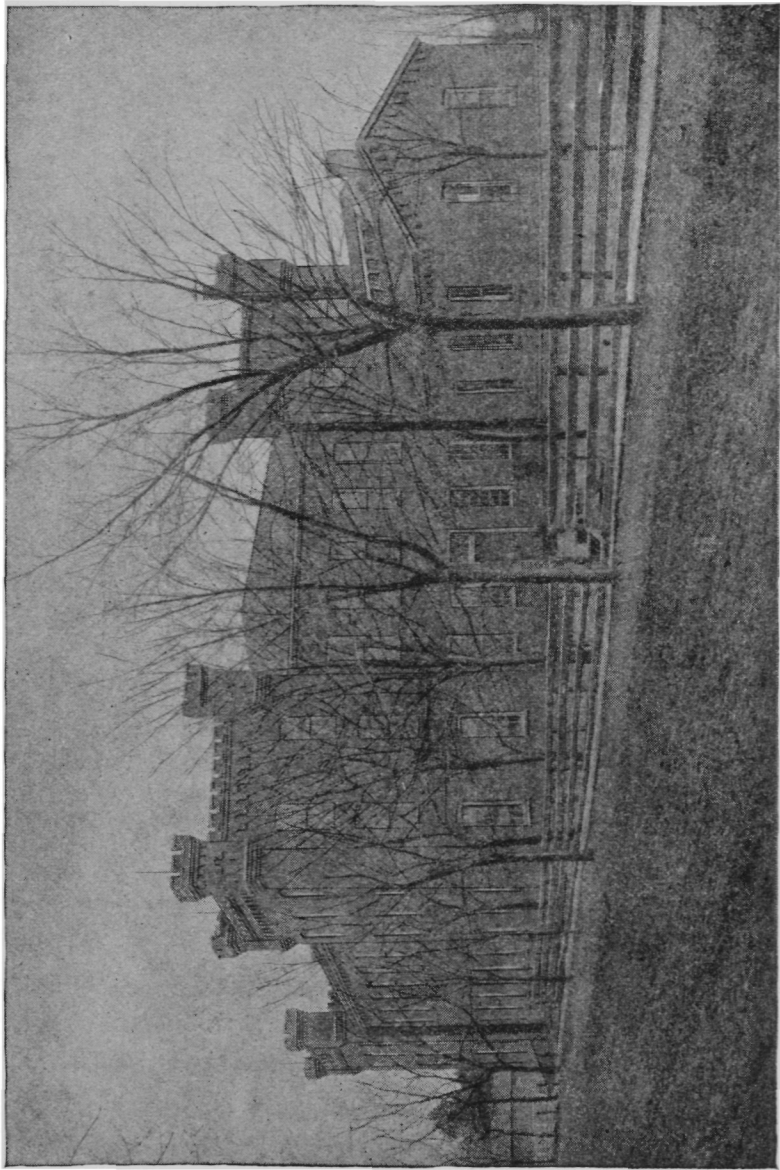
SELIM H. PEABODY, PH. D., LL. D., REGENT.  
N. CLIFFORD RICKER, M. Arch., *Dean*; Architecture.  
SAMUEL W. SHATTUCK, C. E., Mathematics.  
EDWARD SNYDER, A. M., Modern Languages.  
JAMES D. CRAWFORD, A. M., History.  
PETER ROOS, Industrial Art and Design.  
IRA O. BAKER, C. E., Civil Engineering.  
ARTHUR W. PALMER, Sc. D., Chemistry.  
JAMES H. BROWNLEE, A. M., Rhetoric and Oratory.  
CHARLES W. ROLFE, M. S., Geology.  
ARTHUR T. WOODS, Mechanical Engineering.  
ARTHUR N. TALBOT, C. E., Engineering and Mathematics.  
RUFUS ANDERSON, M. E., Iron Work.  
GEORGE W. PARKER, Wood Work.  
CURTIS B. HOPPIN, U. S. A., Military Science.

## ADMISSION.

Applicants should be at least eighteen years of age. None are admitted under fifteen. The requirements for admission embrace the common school branches and the studies of the preliminary year. The examinations in mathematics are especially thorough.

Those who make further preparation than that required before entering can make their course more extensive and profitable. The following suggestions are offered to such as wish to make thorough work:

Either French or German are studied during two years; some preparation in Latin will be of great assistance in these



MECHANICAL BUILDING.





languages. The engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will be of great advantage. Faunce's Mechanical Drawing may be used as a text book, and the drawings made on smooth paper, eight by ten inches.

The subjects common to all the schools in the College of Engineering are here described; the topics peculiar to each will be noticed under their specific names.

PURE MATHEMATICS, FIRST YEAR.

*Trigonometry.*—Plane and spherical. Fundamental relations between trigonometrical functions of angles or arcs; construction and use of tables; solution of triangles; projection of spherical triangles; angles as functions of sides and sides as functions of angles; general formulas; applications.

*Analytical Geometry.*—The point and right line in a plane; conic sections, their equations and properties; the tangent and sub-tangent, normal and sub-normal, pole and polar, supplementary chords, conjugate diameters, etc. Discussion of the general equation of the second degree containing two variables.

*Advanced Algebra.*—Functions and their notation; series and the theories of limits; imaginary quantities; general theory of equations.

PURE MATHEMATICS, SECOND YEAR.

*Differential Calculus.*—Rules for the differentiation of functions of a single variable; successive differentiation; development of functions; maxima and minima of functions of a single variable; differentials of an arc, plane area, surface and volume of revolution; elementary discussion of higher plane curves; the spirals, logarithmic curve, trochoid, etc.; algebraic curves.

*Integral Calculus.*—Integration of elementary forms and rational fractions; rectification of plane curves; quadrature of plane areas and surfaces of revolution; cubature of solids of revolution.

*Advanced Analytical Geometry.*—Loci in space; in point, right line, plane, and surfaces of the second order.

*Advanced Calculus.*—Development of the second state of functions of any number of variables; differential equa-

tions; maxima and minima of functions of two or more variables; construction and discussion of curves and surfaces; integration of irrational and transcendental differentials and of differential equations of the higher orders and degrees; applications; elements of elliptic integrals.

#### APPLIED MATHEMATICS.

*Analytical Mechanics.*—Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction; application of these principles and methods to the solution of numerous and varied engineering problems.

*Resistance of Materials.*—Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment, shear, and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing.

*Hydraulics.*—Weight and pressure of water; head; center of pressure, velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; water power.

*Projection Drawing.*—Use of drafting instruments in the elements of mechanical drawing; geometric constructions; orthographic projection and representation of objects; sections; isometric drawing; cabinet projection and false perspective; use of water colors; conventional signs; drawings finished by line shading and by colors; miscellaneous plans and drawings.

*Free Hand Drawing.*—Outline sketches; drawing from casts; sketches of machines, etc.

*Lettering.*—Plain and ornamental alphabets; titles and title pages; round and stump writing.

*Descriptive Geometry.*—Problems on the point, right line, and plane; single-curved surfaces; double-curved surfaces; development and intersections; shades and shadows; perspective; numerous and varied practical problems requiring the application of these principles and methods.

#### PHYSICS.

The course of physics embraces the kinds of work following:

1. Recitations, in which a text book is used as a guide.
2. Experiments in the physical laboratory, in which the student uses the instruments in testing the principles taught.
3. Illustrated experiments once each week, in which the more costly apparatus is used before the whole class in such experiments as are difficult to perform, and which are more effective when prepared for an audience.
4. Higher physical experiments by advanced classes, consisting either of researches, or of reviews of careful and elaborate experiments previously worked up by others.

The department of physics is provided with illustrative apparatus for use in the lecture-room, and with an extensive physical laboratory. The collection of instruments embraces acoustic apparatus from R. Koenig, of Paris; apparatus for heat and molecular physics from J. Salleron, of Paris; for light, optics, and electricity from Stoehrer, of Leipsic, and Browning and Newton, of London; pneumatic and electrical apparatus from E. S. Ritchie, of Boston; and a large number of pieces prepared at the mechanical shops of the University. It includes, also, Browning's electric lamp; and from Eliot Brothers, and other makers, London, resistance coils, galvanometers, ammeters, and voltmeters for higher researches in electricity.

A large dynamo in the machine shops is connected with the laboratory. A room on the ground floor is especially devoted to instruction in electrical measurements.

#### FRENCH AND GERMAN.

See *College of Literature and Science*.

## THESES.

In all the schools in this College a thesis is required as a condition of graduation. It must be an original composition of suitable length, upon a subject appropriate to the school, and approved by the professor in charge. It must be upon regulation paper; must be illustrated with such photographs, drawings, and sketches as may be needed; and embellished with a title page neatly printed or lettered with India ink or colors. It will be prepared during the latter part of the fourth year, and presented at the close of the course, after which it will be deposited in the library of the University.

## CONTRIBUTIONS.

Our friends and students are invited to send us specimens of material and manufactures, and drawings, models, or photographs of machinery, bridges, and other engineering and architectural works. Finished and detailed working drawings, perhaps otherwise useless, may be of great value for instruction. Illustrated circulars and price lists of manufacturing firms are desired. Contributions will be labeled with donors' names, and placed in the museum of industrial arts for the inspection of students and the illustration of lectures.

## SCHOOL OF MECHANICAL ENGINEERING.

## OBJECT OF THE SCHOOL.

This school seeks to prepare students for the profession of mechanical engineering. It aims to fit them to invent, design, construct, and manage machinery for any branch of manufactures. The state needs men who, to a thorough knowledge of the principles of machinery and of the various motors, add the practical skill necessary to design and construct the machines by which these motors are made to do work.

## INSTRUCTION.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the workshop is required as one of the studies of the course.

In *principles* instruction is imparted by lectures, illustrated plates, and text books. Examples are given, showing the application of the theories and principles taught. Ex-

periments in the testing of machines and motors are undertaken by the student.

In *practice* elementary forms are produced and projects are executed, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In *designing* the student begins with elements and proceeds with progressive exercises till he is able to design and represent complete machines.

#### MECHANICAL ART AND DESIGN.

An elementary course of shop practice has been carefully arranged, to familiarize the student with the forms of the parts of machines, and the mode of producing them. He is made familiar with all the ordinary cutting tools for iron or wood; with the form and condition for most effective work; with the machines and appliances by which they are put in action, and the instruments by which desired dimensions of product are obtained. This practice is obtained in the mechanical laboratory, and represents five different shops, viz:

- 1—PATTERN MAKING.
- 2—BLACKSMITHING.
- 3—FOUNDRY WORK.
- 4—BENCH WORK FOR IRON.
- 5—MACHINE TOOL WORK FOR IRON.

In the 1st, the practice consists in planing, turning, chiseling, etc., in producing true surfaces in various forms in wood, and also in combining pieces by glue joint, etc., preliminary to correct pattern making. Patterns are finally made from which are cast pieces in iron, brass, etc., to be worked in the subsequent shops.

In the 2d, the student uses the forge and performs the various elementary operations, such as drawing, upsetting, bending, welding, etc.

In the 3d, the processes of moulding and casting are fully illustrated.

In the 4th, there is first a course of free-hand bench work, the cold chisel and file being the only tools. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses, and other auxiliary bench tools are used. Pieces are then fitted together by the file, with surfaces carefully finished,

In the 5th shop, the ordinary machine tools of the machine shop are used. The first practice employs these machines with their cutting tools or bits, in common operations, such as turning cylinders, discs, grooves, and fillets; boring, drilling, hand-turning, milling, planing, etc. Following this is a course of practice in fitting and finishing, in which calipers, rules, etc., are introduced, and many of the various fittings employed in machinery are produced.

Previous to the shop-work, drawings of the pieces are made by the student, and the exact thing to be done is indicated; thus mistakes are avoided and practice facilitated.

The designing of such machine elements as pulleys, journal boxes, cranks, stuffing boxes, etc., cultivates a knowledge of proportion, and of its proper representation on paper. This course of elementary practice fits the student for the advanced shop practice in designing and construction of complete machines undertaken later in the course.

#### SPECIAL STUDIES.

*Principles of Mechanism.*—Relative motion of points in a system of connected pieces; motion independent of force; velocity ratio; investigation of motion of elementary parts of machines, as friction and non-circular wheels in rolling contact, cams and curves in sliding contact; teeth of wheels; spur, bevel, and screw gearing; link-work; quick-return motions; escapements; trains of mechanism; epicyclic trains; straight line motions.

*Heat Engines.*—The theories of air, gas, and steam engines; discussion of the various types; efficiency; proportions of steam boilers.

*Hydraulic Engines and Wind Wheels.*—Water-pressure engines; turbines and other water wheels; principles of design and efficiency. Theory of wind wheels; types and methods of governing; applications and comparative economy.

*Machine Drawing.*—Detailed designs of machines in whole or in part, such as links and valve motions, governors, steam boilers and engines, hydraulic presses, etc., with due consideration of strength, economy of construction, accessibility for repairs, etc.

*Mill work and Machinery.*—Methods of transmitting power; calculations for shafting, gearing, pulleys, belts,

chains, wire and hemp rope; efficiency of various modes of transmission; best forms for long and short distances.

*Dynamo-electric Machinery.*—The theory of dynamos and motors; principles of design; discussion of different types; efficiency; methods of governing; electric distribution of power; long distance transmission.

#### PROJECTS AND PRACTICE.

The shop practice of the first year has already been described. The second-year practice has for its object the production of some model or machine. The students, under the immediate direction of the teachers, carefully determine the dimensions and shapes best suited for the parts of some machine, produce them in neat and accurate working drawings, and make tracings for shop use. No student will commence his advanced shop practice without working drawings. The designs are such as require execution in iron, brass, and wood, for the purpose of giving variety of practice. The student is required to make the patterns and castings, finish the parts, and put them together in accordance with the working drawings and the required standard of workmanship. This acquaints him with the manner in which the mechanical engineer carries his design into execution, and teaches him so to shape, proportion, and dispose the parts of a machine as to secure the greatest economy of construction and durability in use. The practice of the third year includes the careful construction of mechanical movements, strictly in accordance with the theoretical determination of the form of the parts.

The steam engine, large drill press, one engine lathe, the hand lathes, the milling machine, and other machinery now in use, were designed here, and built in the shop by students in the department.

Besides these practical exercises, students of sufficient skill may be employed in such commercial work as is undertaken by the shop.

*Experiments and Practical Problems.*—Experiments in the testing of prime movers and other machines, are undertaken by the students. They take indicator diagrams from the engines of the mechanical laboratories, analyze them, and by means of the friction brake determine the loss in engine friction. They make evaporative tests of boilers and

determine the percentage of moisture in the steam by the use of the calorimeter.

#### APPARATUS.

This school is provided with plates and a cabinet of models illustrating mechanical movements and elementary combinations of mechanism. This collection is rapidly increasing by our own manufacture, and by purchase from abroad. It includes many of Riggs's models, and others from the celebrated manufactory of J. Schroeder, of Darmstadt, Germany. About two hundred valuable models from the United States Patent Office are also included in the cabinet.

The state has provided a large mechanical laboratory and workshop, furnished with complete sets of tools, benches, vises, and forges, with flasks for moulding in sand, and cupola for melting iron.

#### STUDIES.

The studies are given by the year and term in the tabular view of the course. The order there indicated should be closely followed, that the student may avoid interference of his hours of recitation.

### MECHANICAL ENGINEERING COURSE.

*Required for the Degree of B. S., in School of Mechanical Engineering.*

#### FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; German or French.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; German or French.
3. Advanced Algebra; Free-Hand Drawing; Shop Practice; German or French.

#### SECOND YEAR.

1. Designing and Construction of Machines; Calculus; German or French.
2. Designing and Construction of Machines; Advanced Analytical Geometry; German or French.
3. Engineering Materials and Construction of Machines; Advanced Calculus; German or French.

#### THIRD YEAR.

1. Mechanism; Analytical Mechanics; Chemistry.
2. Physics; Resistance of Materials; Chemistry.
3. Physics; Advanced Descriptive Geometry and Hydraulics; Astronomy.

#### FOURTH YEAR.

1. Heat Engines; Machine Drawing; Mental Science.
2. Hydraulic Engines and Wind Wheels; Machine Drawing; Constitutional History.
3. Dynamo-electric Machinery; Mill Work; Political Economy.



In this course the student will take two years of either French or German, but not one year of each.

## SCHOOL OF CIVIL ENGINEERING.

### OBJECTS OF THE SCHOOL.

The school is designed to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

### INSTRUCTION.

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so-called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text books, and reading, to which are added numerous problems and practical exercises, as will serve best to explain principles completely and fix them in mind. Models and instruments are continually used, both in lectures and by the students themselves.

### APPARATUS.

*For Field Practice.*—The school is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, base rods and comparing apparatus, sextants, engineer's transits arranged for astronomical observation, and solar compass attachments for transit.

A portable altitude and azimuth instrument of the latest and best form, from the celebrated makers, Troughton & Simms, of London, is used for instruction in geodesy and practical astronomy. It is read by micrometer microscopes to single seconds, both of altitude and of azimuth. The astronomical observatory is provided with an equatorial tele-

scope, an astronomical transit, with attachment for zenith telescope work, a chronometer, and a set of meteorological instruments.

To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known; hence the instructor knows beforehand the precise result which the student should obtain. Not a single problem or exercise is given in which there is wanting an absolute check upon the accuracy of the work. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained and also to point out errors.

*For the Lecture Room.*—The school has numerous models for illustrating its specialties, including models of bridges, roofs, joints, and connections; a large collection of drawings, photographs, and photo-lithographs of bridges, roofs, and engineering structures, numerous railway maps, profiles, etc.; maps of government surveys, and plans and specifications. It has access to a complete set of lithographs of the lectures and drawings used in the government polytechnic schools of France. The industrial museum contains a large collection of building materials, of wood, brick, stone, and iron. The testing laboratory has a machine with a capacity of a hundred thousand tons for tension, compression, or bending; also a cement testing machine.

The library is well supplied with the best and latest periodicals and books upon engineering subjects, to which the students have full access.

#### PRACTICE.

In the fall term of the second year the class solves numerous problems in distances, areas, etc., using the chain, compass, and plane table. During the winter term the students have practice with all the engineering instruments and solve problems with the transit, stadia, level, and sextant. In the spring term the class makes a topographical survey of a locality, using the stadia and plane table as in the United States surveys.

In the fall term of the third year the class executes a project in railroad engineering, which consists of pre-

liminary surveys, location, staking out, drawings, computation of earth work, etc. The preliminary survey consists in an examination of the locality, and in running tangent lines, with leveling and topographical sketching. The location consists in running the line over the route decided upon, with all the necessary measurements and calculations for establishing the grade, setting slope stakes, etc. The drawings include alignment, profile, etc.

In the fall of the fourth year the student has practice with the alt-azimuth instrument in reading horizontal and vertical angles, and in determining latitude; with the astronomical transit in finding time; with the sextant in getting time and latitude; with the aneroid and mercurial barometers in measuring heights, and with the precise level in leveling.

#### SPECIAL STUDIES.

*Astronomy.*—Descriptive astronomy is given with a text book. The equatorial telescope is in constant use during favorable weather. Practical astronomy is given by lectures and the use of the alt-azimuth instrument, the astronomical transit, the sextant, and the engineer's transit, adapted to astronomical calculations. The work includes the use and adjustment of instruments, and the determination of time, latitude, longitude, and azimuth.

*Bridges.*—The instruction in bridges occupies two terms. The first is devoted to the calculations of the strains in the various forms of bridging, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. The second is devoted to designing trusses, proportioning sections, and working out of details. Each student designs and makes a full set of drawings of a bridge.

*Geodesy.*—From a text book studies are made upon the instruments, methods, formulas, etc., employed in spirit, barometrical, and trigometrical leveling; the apparatus, methods, etc., used in measuring base lines; the location and construction of stations; the method of measuring the angles and reducing the triangulations; the principles of projecting maps; the means employed in running parallels and meridians.

*Land Surveying.*—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including

legal points involved in the re-establishment of boundaries; magnetic variation and determination of true meridian.

*Masonry Construction.*—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability; cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches.

*Railroad Engineering.*—Instruction is given from text book and by field practice. In the former are studied the principles of economic location, particularly the effect of distance, grade, and curve upon operation; the inter-adjustment of grades and curves; also the mathematical theory of curves, turnouts, crossings, and the calculation of earth work. In field work the class makes at least two preliminary surveys and one location of a short line, of which each student is to present a complete set of notes, calculations, maps, etc.

*Topography.*—Use of stadia, plane table, and level in topographical surveying. Topographical drawing includes sketching, platting field notes, conventional signs, and city and county maps.

*Theory of Engineering Instruments.*—Examination of workmanship and design; testing instrument maker's adjustments; making engineer's adjustments; determination of areas with transit; inaccessible and air line distances with transit; profiles and practice with level; heights and distances with stadia; measurement of angles with sextant, etc.

#### COURSE OF STUDY.

The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations per week, and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours; as a rule the latter require less time for preparation. The order of studies as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

## CIVIL ENGINEERING COURSE.

*Required for the degree of B. S., in School of Civil Engineering.*

## FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French or German.
3. Advanced Algebra; Free-Hand Drawing; Shop Practice; French or German.

## SECOND YEAR.

1. Land Surveying; Calculus; French or German.
2. Surveying and Theory of Instruments; Advanced Analytical Geometry; French or German.
3. Topographical Surveying and Drawing; Advanced Calculus; French or German.

## THIRD YEAR.

1. Railroad Engineering; Analytical Mechanics; Chemistry.
2. Resistance of Materials; Chemistry; Physics.
3. Astronomy and Hydraulics; Advanced Descriptive Geometry; Physics.

## FOURTH YEAR.

1. Geodesy and Practical Astronomy; Mine Attack; Mental Science.
2. Bridge Analysis; Masonry Construction; Constitutional History.
3. Bridge Construction; Geology; Political Economy.

In this course the student will take two years of either French or German, but not one year of each.

## SCHOOL OF MINING ENGINEERING.

## OBJECT OF THE SCHOOL.

The school has been established to meet the growing demand of a very important industry for thoroughly trained engineers, fitted to solve the numerous perplexing problems which are constantly arising in all mining work. The subjects of the discovery, opening, economical working and proper ventilation of mines, the prevention of accidents, transportation above and below ground, treatment of products, with many others which fall within the scope of the mining engineer, can be mastered only by a careful study of facts and principles. This is the proper foundation for the practical work of the profession, and it is the aim of this school to present this in the most complete and thorough manner.

## INSTRUCTION.

It is important that a broad basis be laid by way of general preparation for the more technical studies here included. Whatever of general culture the student may obtain before entering the University, will not come amiss, and, although the requirement is not made, it is advised that all who can do so should acquire a reading knowledge of French or German before beginning this course.

The course comprises the greater part of the pure and applied mathematics of the course in mechanical and civil engineering. Much time is devoted to chemistry and geology, with the addition of metallurgy and other technical studies peculiar to mining engineering.

Students who are graduated from this school are not supposed to be familiar with all the details of mine management from actual experience, but they will have obtained such a knowledge of the principles underlying all successful practice, and such a familiarity with the science of mining in all its branches, that the art may be acquired with the minimum of practice.

Lectures are given when desirable, but these are to be regarded as supplementary to other modes of instruction which are made to conform as closely as possible to the routine of the engineer in practice. In every detail the student is made to feel that he is dealing with the actual problems which he will meet in his professional work.

Plans, estimates, drawings, reports, and calculations, based upon data obtained in the student's own experience, are constantly required, and no pains is spared to familiarize each member of the class with the duties and responsibilities of every grade, from miner to manager.

## COURSE OF STUDIES.

In the first two years the work is similar to that required in the course in civil engineering, but more time is given to chemistry. In the third year geology and mining engineering, with assaying and metallurgy, take the place of special technical studies in the other engineering courses. In the fourth year, with the exception of two terms of prime movers taken with the students in mechanical engineering and some studies of general character, the work is strictly technical.

## SPECIAL STUDIES.

*Mine Surveying and Reconnoitering.*—History, uses and adjustments of instruments; solar compass and various solar attachments; practical problems involving the running of surface lines and lines under ground; connecting of surface and underground surveys; practice of U. S. deputy surveyors. Details of mine surveys, setting of bench marks; lines through shafts, drifts, stopes, etc.; keeping of records, plans, etc. Surveys required to determine best locations for test borings, shafts, adits, etc.; methods of reconnoitering.

*Mining Engineering.*—1. *Attack.*—Tools, implements, machinery, and explosives, with principles governing their use. Methods of boring, sinking, and driving through hard, soft, wet, dry, loose, or compact material.

2. *Timbering.*—Objects, methods, etc.; framing, fitting, bracing.

3. *Transportation.*—Underground haulage, hoisting, use of chutes; apparatus and appliances, cars, tracks, switches, cables, cages, motive power, connections; haulage in inclines, "man-engines," etc.

4. *Drainage.*—Pumps, pumping, sumps, ditches; drainage of working shafts and inclines.

5. *Ventilation.*—Means and appliances. Importance of subject; laws of various states and countries. Discussion of fundamental principles and practical applications, with results.

6. *Buildings and Machinery.*—Hoisting apparatus, air compressors, power drills, etc.

7. *Exploration.*—To determine general character and extent of deposits in advance of development; methods and aims.

8. *Development.*—Blocking out of deposits to prove values of partly explored ground, and to prepare for further explorations.

*Exploitation.*—Laying out work; winning of coal, ore, etc.; stoping, overhand and underhand; winzes and intermediate levels; economical handling of product. Methods to be employed under various conditions.

*Dislocations.*—Faults, upthrows, downthrows, feeders, leaders, rolls, swells, etc. Means of overcoming difficulties.

*Dressing of Products.*—Coal screening and washing; sampling and grading ore; assorting, crushing, spalling, cobbing, concentrating.

*Mining Machinery.*—Elements of construction, designing of plant, combination of parts; setting, arranging, adjusting. Preservation and operation, general economy.

*Organization.*—Economy of management. Secondary superintendence; division of labor and adjustment of responsibility. Prevention of accidents.

*Administration.*—Review of principles. System of reports from sub-officers, and tabulation of records. Accounts, forms, analyses, pay-rolls, cost sheets, etc. Letting and measuring contracts. Miscellaneous details.

*Engineering Geology.*—Applications of geology to engineering and mining. Nature and distribution of deposits of economic value, as coal, water, metallic ores, etc.; advanced structural geology and lithology; discussion of principles underlying successful working of mines, placing of foundations, setting of machinery, and erection of structures in various situations. Relation of geological structure to drainage, economy of working, selection of points of attack, methods of exploration, etc.

#### APPARATUS.

The department has a valuable collection of models of mining and metallurgical machinery.

The newly equipped laboratory now contains a very complete line of illustrative machinery, designed for practical use, and covering a wide range of metallurgical processes. The machines are operated by steam power, and include apparatus for crushing, screening, washing, concentrating, leaching, precipitating, and many other methods of ore treatment of the latest modern types.

In the manipulation of these machines, and the tests made on a working scale, the student is afforded opportunity for practice illustrative of the class-room work. The plant consists of a Dodge ore-crusher, a pair of Cornish rolls, elevator with deflecting spouts, automatic sampler, revolving screens, separators, rotating table, jigs, etc.; chlorine generator, tanks, vats, and troughs, gas and blast furnace, with suitable appliances so arranged that they may be used together or separately as occasion may require.

The extensive apparatus of other departments is equally available for this.



## COURSE IN MINING ENGINEERING.

*Required for the Degree of B. S., in School of Mining Engineering.*

## FRESHMAN YEAR.

1. Trigonometry; Projection Drawing; Chemistry; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Chemistry; French or German.
3. Advanced Algebra; Free-Hand Drawing; Chemistry; French or German.

## SOPHOMORE YEAR.

1. Land Surveying; Calculus; Chemistry.
2. Theory of Instruments; Advanced Analytical Geometry; Physics.
3. Topographical Surveying; Advanced Calculus; Physics.

## JUNIOR YEAR.

1. Mine Attack; Analytical Mechanics; Mineralogy.
2. Geology; Resistance of Materials; Assaying.
3. Geology; Mining Surveying; Metallurgy.

## SENIOR YEAR.

1. Mining Engineering; Heat Engines; Mental Science.
2. Engineering Geology; Hydraulic Engines and Wind Wheels; Constitutional History.
3. Mining Engineering; Mine Administration; Political Economy.

## SCHOOL OF ARCHITECTURE.

## OBJECT OF THE SCHOOL.

The object of this school is to prepare students for the practice of the profession of architecture. A thorough knowledge of scientific principles applied to construction, ability and refined taste in design, a technical acquaintance with the processes of the various building trades, and some skill in the use of tools, are necessary for this, and are made prominent objects of the course of instruction.

The course of study comprises the theory and practice of construction, the history and esthetics of architecture, draughtsmanship, and the usual work of office practice, so far as this can be taught in a professional school. Technical instruction is imparted by recitations from text books, lectures, and especially by the application of principles to practical cases; engravings, photographs, and models are employed as illustrations.

Drawing is practiced during the entire course, and designing is introduced early, so that original work is done whenever possible. Drawing from casts and modeling in

clay give command of the hand, facility in sketching, and a knowledge of beautiful forms.

Shop practice comprises elementary forms and joints in carpentry and joinery, and experience in cabinet-making and turning, as well as the construction of models of architectural structures at a reduced scale.

#### SPECIAL STUDIES.

*Elements of Drawing.*—Lectures; designs for specified problems; outline sketches and finished drawings from casts, in pencil, crayon, charcoal, etc.

*Water Color Painting.*—Practice in elementary landscape painting and sketching from nature in water colors.

*Wood Construction.*—Materials and tools; frames, floors, roofs, ceilings, domes, heavy frames, roof trusses, stairs, doors, windows, cornices, etc.; external and internal finish.

*Stone Construction.*—Materials, mortars, and cements; concrete; walls, foundations, arches, and vaults; tools and processes of stone-cutting.

*Brick Construction.*—Materials, bonds, walls, arches, vaults, centerings, terra cotta, tiles.

*Metal Construction.*—Manufacture and uses of cast iron, wrought iron, and steel; forms employed in construction; connection by joints, rivets, pins, etc.; columns, lintels, girders, and beams.

*Tinner's Work, Slating, Plastering, etc.*

*Sanitary Construction.*—Principles of sanitary science; plumbing, water supply, and sewerage; uses of engineering instruments in surveys for drains, buildings, etc.

*Architectural Drawing.*—Preparation of a set of drawings as practiced in offices; conventional coloring; drawing the orders; finishing drawings in line, ink, sepia, and color; architectural shades and shadows.

*Architectural Perspective.*—Study and application of the practical methods explained in Ware's Perspective; original designing in perspective applied to practical problems.

*Architectural Designing.*—Original sketches and finished designs for specific projects. Several problems are given each term, progressing from simple to complex. Drawings neatly finished in shade and colors,

*History of Architecture.*—Careful study of the leading historical styles, their derivation, characteristics, construction, applications; most important monuments of each style. Especial prominence is given to those ideas in design which might be useful and suggestive in the development of American architecture.

*Esthetics of Architecture.*—Study of principles of esthetics as applied to architecture and allied arts; proper treatment of building materials and of the different portions of a building, as well as of its general form; problems requiring original designs.

*Estimates.*—Methods of measuring builders' work; cost of labor and materials; preparation of estimates for numerous practical examples.

*Agreements and Specifications.*—Study of principles and examples; preparation of a set of papers for letting contracts for building.

*Heating and Ventilation.*—Heat, production, losses through walls; flow of air in ducts; obstructions; heating by fireplaces, furnaces, stoves, steam, and hot water. Ventilation, requirements and methods; application to numerous problems.

*Graphical Statics.*—Elements; equilibrium polygon and its applications; loads and wind pressures on roofs; typical forms of roof trusses; examples; determination of strains in members, sectional dimensions, and details of connections at the joints; construction and use of graphical tables.

#### SPECIAL EXERCISES.

Specimen plates or tracings are required of each student at the close of each term in drawing or designing, to form a part of his record. These must be made in accordance with the materials and dimensions prescribed, and be finished as directed.

#### SHOP PRACTICE.

To give a practical knowledge of various kinds of work, three terms are devoted to a course of instruction, which all architectural students are required to pursue, unless they have previously had equivalent practice and obtain credit therefor.

*First Term.*—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with

single, double, and oblique tenons; splices, straight and scarfed; mitre, lap, and gained joints; through and lap dovetails; mouldings, mitres, mitre-box, and panels.

*Second Term.*—Turning and Cabinet-making. Glue-joints; mouldings; inlaying; ornamental veneering; turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

*Third Term.*—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawings.

#### APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the Schools of Architecture and Design; models of ceilings, roof trusses, stairs and Schroeder's models of joints in wood-work and of constructions in cut stone-work, in the engineering museum.

The School of Architecture possesses a large and rapidly increasing collection of engravings and photographs illustrating the history of architecture and art and their practical applications in all ages. The collection is mounted on about 5,000 cards 11x14 inches, and is classified in two parts, one for the use of the class in history of architecture, the other for use by the various classes in designing; both series are minutely subdivided to facilitate easy reference, and are always open for free use, thus forming a most valuable working library. The plates issued by the most important American architectural journals are to be found here.

The casts, photographs, etc., of the art gallery. In the University Library are many of the best English, German, French, and American architectural works and periodicals.

A large and well-equipped carpenter and cabinet shop, containing cabinet benches and sets of fine tools for class in shop practice; foot and power lathes; machine saws planer, moulder, tenoner, shaper, jig saw, etc.

The use of the large testing machine, capacity 50 tons.

## ARCHITECTURAL COURSE.

*Required for the Degree of B. S. in School of Architecture.*

## FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French or German.
3. Advanced Algebra; Graphical Statics; Shop Practice; French or German.

## SECOND YEAR.

1. Elements of Wood Construction; Calculus; Free-Hand Drawing and Modeling.
2. Elements of Stone, Brick and Metal Construction; Advanced Analytical Geometry; Architectural Drawing and Designing.
3. Elements of Sanitary Construction; Advanced Calculus; Water Color Sketching.

## THIRD YEAR.

1. Architectural Drawing; Analytical Mechanics; Chemistry.
2. History of Architecture; Resistance of Materials; Physics.
3. History of Architecture; Advanced Descriptive Geometry; Physics.

## FOURTH YEAR.

1. Esthetics of Architecture; Architectural Perspective; History of Civilization.
2. Architectural Designing; Heating and Ventilation; Constitutional History.
3. Architectural Designing; Estimates, Agreements, and Specifications; Political Economy.

## BUILDERS' COURSE

The Trustees permit persons desiring to fit themselves for foremen and builders to take a course of a single year, pursuing only the selected studies of the architectural course prescribed in the following course of study.

For admission to the builders' course, students must pass the examinations in English grammar, arithmetic, geography, and U. S. history, but are not required to pass in the studies of the preliminary year, unless they wish to pursue the studies other than those prescribed in the following list. A special fee of \$5 per term is charged in addition to the other University fees.

## BUILDERS' COURSE OF STUDY.

1. Wood Construction; Projection Drawing; Shop Practice (Carpentry and Joinery).
2. Stone, Brick, and Metal Construction; Architectural Drawing; Shop Practice (Stair Building).
3. Graphical Statics; Architectural Designing; Shop Practice (Cabinet Making).

# COLLEGE OF NATURAL SCIENCE.

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## SCHOOLS.

CHEMISTRY, NATURAL HISTORY.

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### FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., REGENT.

STEPHEN A. FORBES, Ph. D., *Dean*; Zoölogy and Entomology.

THOMAS J. BURRILL, Ph. D., Botany and Horticulture.

SAMUEL W. SHATTUCK, C. E., Mathematics.

EDWARD SNYDER, M. A., Modern Languages.

JAMES D. CRAWFORD, M. A., History.

PETER ROOS, Industrial Art.

JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.

CHARLES W. ROLFE, M. S., Geology.

CURTIS B. HOPPIN, Lt. U. S. A., Military Science.

ARTHUR W. PALMER, Sc. D., Chemistry.

HOWARD S. BRODE, Asst. in Zoölogy.

CHARLES E. BOGARDUS, B. S., Asst. in Chemistry.

HARRY S. GRINDLEY, B. S., Asst. in Chemistry.

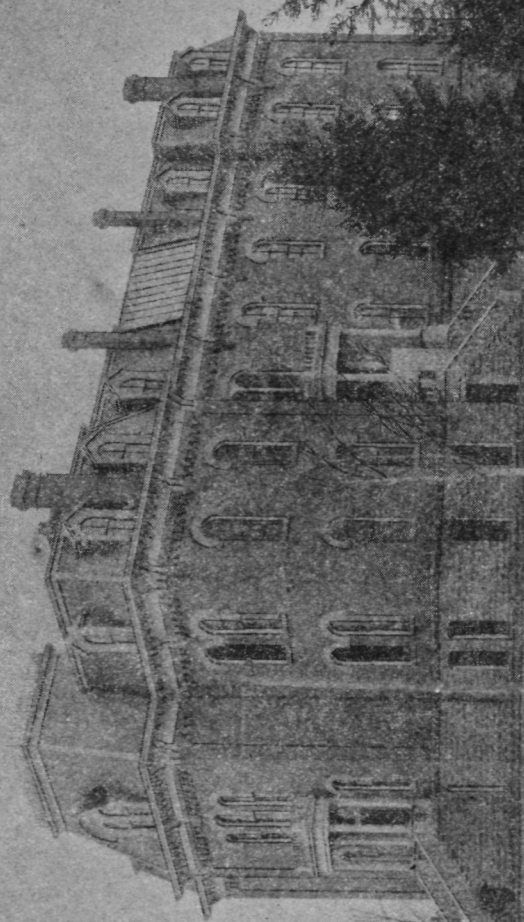
FANNY M. RYAN, Instructor in French.

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### ADMISSION.

Candidates for the College of Natural Science should be eighteen years of age, and must pass satisfactory examinations in the common school branches, and in the studies of the preliminary year.

Their preparation should be especially good in the scientific studies of the preliminary year. Practice in the drawing of natural objects will greatly facilitate the student's progress. A knowledge of the Latin language is a good preparation for the mastery of the scientific terms which must be learned in the course.



CHEMICAL BUILDING.





## SCHOOL OF CHEMISTRY.

This school aims to impart such knowledge of chemistry as will enable the student to apply the principles of the science to the related arts, and as will fit him for original research, or for the business of the druggist, pharmacist, and practical chemist.

## INSTRUCTION.

The first term of the first year is occupied by text-book instruction, lectures, and experiments in the laboratory illustrating the elementary principles of chemistry, chemical physics, and inorganic chemistry. The second term is devoted to laboratory practice in qualitative analysis. In the third term recitations upon organic chemistry and illustrative synthetic experiments alternate with laboratory practice in qualitative analysis. During the next three years, besides the required recitations, each student is expected to work two hours daily in the laboratory. Before graduation, each is required, at the end of his course, to make an original investigation, and present a thesis.

Students who pursue chemistry as a part of other courses work at least two consecutive hours daily, during such time as their specialties may require.

*Deposits.*—At the beginning of each term of laboratory practice, each student will deposit twelve dollars with the business agent of the University. At the end of the term, the balance left, after deducting payment for gas, chemicals and apparatus used, will be refunded.

Five courses of laboratory work have been arranged, as follows:

## CHEMICAL COURSE.

## FIRST YEAR.

*First Term.*—General, theoretical, and applied chemistry. Lectures, text book, and illustrative experiments in the laboratory.

*Second Term.*—Qualitative analysis. Test and separation of the bases and acids. Examination of simple substances.

*Third Term.*—Qualitative analysis completed. Examination of natural and artificial substances. Organic chemistry. Text book and recitations, with illustrative synthetic experiments in the laboratory.

## SECOND YEAR.

*First Term.*—Quantitative analysis. Class room and laboratory exercises. Gravimetric analysis of salts of known composition; sodium chloride, sodium phosphate, copper sulphate, calcite, ammonium ferric sulphate. Volumetric analysis; acidimetry and alkalimetry, etc.

*Second Term.*—Quantitative analysis of compounds of unknown composition. Limestone, clay, feldspar, iron ore. Lectures in agricultural chemistry begun.

*Third Term.*—Examination of agricultural products. Analysis of soil. Valuation of commercial fertilizers—phosphates, nitrogenous matters, and potash salts. Analysis of fodders, grains, and milk. Examination of alcoholic liquors.

#### THIRD YEAR.

*First Term.*—Organic chemistry. Principles and practice of organic synthesis. Preparation of carbon compounds, and study of their composition and properties.

*Second Term.*—Assaying. Dry assays of gold, silver, lead, and tin ores. Valuation of bullion. Blowpipe assays of silver ores. Volumetric assays of ores of silver, lead, copper, zinc, etc. Electrolytic separation of the metals.

*Third Term.*—Agricultural chemistry completed. Ultimate organic analysis. Determination of carbon, hydrogen, nitrogen, chlorine, phosphorus, and sulphur in carbon compounds. Metallurgy.

#### FOURTH YEAR.

*First Term.*—Gas analysis. Calibration of eudiometers. Analysis of air from lungs, atmospheric air, artificial gaseous mixtures, crude coal gas, furnace gases, etc. Analysis of waters, mineral and potable. Chemical theory.

*Second Term.*—Toxicology. Micro-chemistry of poisons. Tests for mineral and vegetable poisons. Separation from organic mixtures.

*Third Term.*—Original research. Thesis.

### PHARMACEUTICAL COURSE.

#### FIRST YEAR.

Same as in chemical course throughout the year.

#### SECOND YEAR.

*First Term.*—Same as in chemical course.

*Second Term.*—Quantitative analysis of commercial drugs, bismuth subnitrate, tartar emetic, sodium bicarbonate, potassium iodide, sodium bromide, cream of tartar, ammonium carbonate, potassium nitrate. Volumetric determinations.

*Third Term.*—Same as in chemical course, substituting materia medica for agricultural chemistry.

#### THIRD YEAR.

*First Term.*—Same as in chemical course.

*Second Term.*—Isolation and quantitative estimation of active proximate principles of vegetable drugs—oils, resins, gums, alkaloids, glucoses; etc.

*Third Term.*—Practice of pharmacy. Reading and compounding prescriptions. Preparation and valuation of tinctures, extracts, syrups, etc. Examination of commercial organic drugs.

## FOURTH YEAR.

*First Term.*—Analysis of urine, normal and pathological. Examination of waters, mineral and potable. Alcoholic liquors, proprietary articles, etc.

*Second Term.*—Toxicology. Micro-chemistry of poisons. Separation of poisons from organic mixtures.

*Third Term.*—Original research. Thesis.

## COURSE IN AGRICULTURAL CHEMISTRY.

A. Arranged for students who desire to make a specialty of chemistry in its application to agriculture and allied branches.

## FIRST YEAR.

Same as in chemical course.

## SECOND YEAR.

*First Term.*—Same as in chemical course.

*Second Term.*—Lectures and class work in agricultural chemistry. Analysis of feldspar, soil, ash of plants, drain waters.

*Third Term.*—Agricultural chemistry. Analysis and valuation of commercial fertilizers, and manures, and material used for manures, apatite, phosphates, guanones, nitrates, ammonia salts, animal matters, and potash salts.

## THIRD YEAR.

*First Term.*—Proximate analysis of farm products and cattle foods; grain, roots, fodders, commercial foods, etc.

*Second Term.*—Analysis of milk, butter, and cheese. Determination of sugars by polariscope and by titration. Examination of alcoholic liquors.

*Third Term.*—Original research.

B. Arranged especially for regular students in the school of agriculture.

## FIRST YEAR.

Same as in chemical course.

## SECOND YEAR.

*First Term.*—Same as in chemical course.

*Second Term.*—Agricultural chemistry. Lectures and class work. Analysis of feldspar, soil, plant ash, fertilizers and manures, and the materials used in their productions; phosphates, nitrogenous matters, and potash salts.

*Third Term.*—Agricultural chemistry. Lectures and class work. Analysis of farm products—grains, roots, fodders, commercial foods, milk, butter, and cheese.

## METALLURGICAL COURSE.

## FIRST YEAR.

*First Term.*—Same as in chemical course.

*Second Term.*—Same as in chemical course.

*Third Term.*—Same as first term, second year chemical course.

## SECOND YEAR.

*First Term.*—Analysis of ores, iron, manganese, zinc, copper, lead, nickel, etc.

*Second Term.*—Assaying. Same as in chemical course. (Students who pursue this term's work must have one term of mineralogy.)

*Third Term.*—Analysis of refractory materials, fluxes, and slags.

## THIRD YEAR.

*First Term.*—Gas analysis. Same as in chemical course. Study of furnace gases.

*Second Term.*—Analysis of fuels—wood, anthracite and bituminous coals, coke; determination of heating power.

*Third Term.*—Analysis of cast iron, wrought iron, and steel. Determinations of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

The above course has been arranged for students desiring to make a specialty of chemistry in its applications to metallurgy. For students in the School of Mining Engineering the work of the first year described, together with the following, is presented:

## SOPHOMORE YEAR.

*First Term.*—Analysis of ores—iron, zinc, copper. Analysis of crude metals—iron, determination of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

## JUNIOR YEAR.

*Second Term.*—Assaying, same as in chemical course, third term. Metallurgy, with laboratory practice. Analysis of fluxes, slags, fuels, etc.

## APPARATUS.

The facilities offered for obtaining a practical knowledge of chemistry are believed to be unsurpassed by those of any other institution in the West. A large laboratory building, 75x120 feet, and four stories in height, has been erected at an expense, including furniture, of \$40,000.

The basement contains furnace room for assaying and metallurgical operation; a mill room for storing and crushing ores; and a large room for the manufacture of chemicals and pharmaceutical preparations.

The first story contains a lecture room capable of seating 200 persons, and a qualitative laboratory, which, when completed, will accommodate 152 students; one hundred and four desks are now fitted, each having an evaporating hood, gas, and water. There are a spectroscope table, a blow-pipe table for general use, and a store-room stocked with apparatus and chemicals.

The second story, designed for the use of advanced students, has the following apartments; A lecture room

with mineralogical cabinet, and furnace models for illustrating lectures on metallurgy; laboratory for students in agricultural chemistry; large laboratory for quantitative analysis, now containing sixty-four desks; a balance room, containing chemical balances of the manufacture of Bunge (short beam), Becker & Son, Troemner; a pharmacy, furnished like a drug store, with shelves, drawers, prescription desk, balance, graduates, etc., and containing a full set of drugs and pharmaceutical preparations made in the laboratory by students in pharmacy; private laboratory for instructors; a gas analysis room, entirely cut off from the system of heating and ventilating, to avoid undue fluctuations of temperature, furnished with a table specially constructed, and containing a full set of Bunsen's gasometric apparatus, an inductive coil, battery, mercury, etc.; and a store room with apparatus for all kinds of work in quantitative analysis.

The apparatus for general use includes a large platinum retort for the preparation of hydrofluoric acid; a Geissler's mercurial air pump; Hoffman's apparatus for illustrating the composition of compound gases; a Soliel-Scheibler's saccharimeter; an excellent set of areometers; a Hauy's goniometer; a camera with Ross lenses; a Ruhmkorff's coil; galvanic batteries; a galvanometer; a spectroscope; microscopes; gas combustion furnaces for organic analysis, etc.

On the mansard floor ample provision has been made for the study of photography.

### COURSE IN CHEMISTRY.

*Required for Degree of B. S., in School of Chemistry.*

#### FIRST YEAR.

1. Chemistry, general and applied; Trigonometry; Free-Hand Drawing; French
2. Chemistry and Laboratory Practice; Conic Sections; Free-Hand Drawing; French.
3. Organic Chemistry and Laboratory Practice; Free-Hand Drawing; Calculus; French.

#### SECOND YEAR.

1. Chemistry and Laboratory Practice; Physiology or Botany; German.
2. Agricultural Chemistry and Laboratory Practice; Microscopy; German.
3. Agricultural Chemistry and Laboratory Practice; Vegetable Physiology; German.

## THIRD YEAR.

1. Laboratory Practice; Mineralogy; German.
2. Laboratory Practice; Physics; German.
3. Laboratory Practice; Physics; German.

## FOURTH YEAR.

1. Laboratory Practice; Mental Science; Physiography.
2. Laboratory Practice; Constitutional History; Logic.
3. Laboratory Practice; Political Economy; Geology.

Students who are candidates for the degree of B. S. in the School of Chemistry must perform the laboratory work as laid down in some one of the prescribed chemical courses.

## SCHOOL OF NATURAL HISTORY.

The School of Natural History is especially intended to provide a general preparation for the professions and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically, it is designed:

To afford a thorough and liberal education with a basis in the sciences and modern languages.

To prepare for the teaching of the natural history subjects either in the higher schools or as a professional specialty.

To lay a liberal foundation in biological work and study for a course in medicine.

To prepare for the pursuit of specialties in zoölogy, botany, general biology, and geology, as a scientific career.

The natural history course of four years leads to the degree of bachelor of science. It is distinguished by unusually full instruction in the biological subjects and in the other modern sciences, combined with a thorough course in French and German. It offers two hours a day for a year in botany, and the same each in zoölogy and general or special biology; a term each of entomology, human anatomy and physiology, microscopy, and mineralogy; two terms each of geology and physics; a year of chemistry; a term each of physiography and astronomy; a year each of free-hand drawing and French; five terms each of German and history; one term each of conic sections, trigonometry, political economy, mental science, and logic; and the equivalent of twenty-nine weeks' work, for one hour a day, in practical English composition and oratory.

In zoölogy, botany, general biology, entomology, geology, microscopy, chemistry, and mineralogy, the subjects are developed by a thorough course of laboratory work and practice by the students, done under the guidance and criticism of an instructor, supplemented by lectures and the study of text.

The biological work of the senior year is rendered so far elective in character that it may be made to lead towards the study of medicine, natural history teaching, or the pursuit of a special scientific career.

Special and elective study is permitted and provided for, but does not lead to a degree.

Graduates in literary courses who wish also the advantages of a scientific course, may pursue elective work, or may usually take in two years the degree of bachelor of science by carrying the scientific studies of the course alone.

#### SPECIAL STUDIES.

*Botany.*—Candidates for admission are examined upon Gray's Lessons in Botany, or an equivalent, and are expected to be able to analyze common wild flowers. Beginning with the fall term of the sophomore year, systematic and structural botany is continued by recitations, illustrated lectures, and laboratory work upon fresh, dried, and alcoholic specimens. Students, throughout the course, are required to observe for themselves, and to make notes and drawings of their investigations. A series of these drawings, upon a uniform scale, together with the accompanying descriptions, is deposited in the laboratory. Each student provides himself with suitable pencils, drawing pens, paper, needles in handles, glass slides for mounting objects, and a razor for making thin sections.

The first half of the fall term is devoted to the study of the natural orders of flowering plants, their geographical distribution, importance, etc., together with a history of a few special plants and their products. During this time, students analyze in the laboratory flowering plants of the more difficult orders, compositæ, gramineæ, etc., especially such as are best obtained in autumn. During the last half of the term the general morphology of plants, including vegetable anatomy and histology, is studied, practical labor-

atory work with the microscope being the basis of the instruction.

The special morphology of the great divisions of the vegetable kingdom, their chief characteristics, their classifications, and the identification of species of flowerless plants, constitute the work of the second term. Special attention is given to injurious fungi. Aquaria furnish numerous kinds of fresh water algæ, and the greenhouses supply specimens in nearly all the groups studied.

*Vegetable Physiology* is studied in the third term. The instruction is given by lectures or text-book, and by experimental practice. The work includes: The food of plants and its absorption and assimilation; fluids, their kinds, uses, causes of movement, transpiration, respiration, etc.; processes, peculiarities, and results of growth; relations and effects of temperature, light, gravitation, etc.; self- and cross-fertilization, movements, "sleep of plants," tendrils, climbing vines, etc.

For illustration the school has a collection of about one thousand species of the plants indigenous to the State of Illinois, including a very nearly complete set of the grasses; a collection of Rocky Mountain and western plants; and many others obtained by exchange from various parts of the United States. A collection of fungi contains numerous species. The greenhouses and out-door plantations furnish a large amount of illustrative material for the classes. Enlarged *papier maché* models of flowers and fruits, exhibiting structure and development, are in the cabinet.

Throughout the course the attempt is made to introduce the students to the literature of the various subjects and to acquaint them with the authorities for the facts stated.

*Microscopy*.—Students have in this study further practice in the use of the compound microscope, the management of light for particular purposes, the testing of lenses, measurement of magnifying powers and angles of aperture, drawing and photographing objects, the preparation and mounting of material, etc. The application is mainly, but not exclusively, devoted to vegetable tissues and products.

The special aim is to afford the opportunity of gaining a skillful and rational use of the instrument, and an acquaintance with the best methods and processes of preparing and



mounting objects. Students provide themselves with slides and covers, needles, forceps, brushes, and razors. Microscopes, section cutters, turn tables, etc., are furnished by the University.

About thirty compound microscopes represent the best American and European makers.

*Anatomy and Physiology.*—The students admitted to this class have already passed an entrance examination in the elementary principles of anatomy and physiology. They have also had a year's training in zoölogy, which makes a free use of the facts of comparative anatomy possible, and aids greatly in the work of the course.

The main objects of the course are to make the student familiar with the position, structure, and healthy action of those organs most liable to become diseased; to make plain the part which the nervous system plays in both the healthy and morbid action of the various organs, and in the problems of nutrition and energy.

The subject is taught during the fall term of the junior year. The plan embraces lectures, recitations from the text book, frequent readings from standard authors, and demonstrations from fresh dissections, alcoholic specimens, microscopical preparations, skeletons, and the manikin.

*Zoölogy.*—The object of the zoölogical course is primarily to give the students command of the methods of zoölogical research and study, and to derive from these their distinctive discipline. The subject is taught ten hours a week during the whole of the sophomore year, the course being based throughout on individual work in the zoölogical laboratory, and in the field.

The more important features of the work are comparative dissections, descriptions, drawings, and microscopic preparations of types of the greater groups, as a basis for the study of the sub-kingdoms and their more important divisions; lectures on the comparative physiology of selected forms, with especial reference to their relations to their environment, organic and inorganic, present and past; studies of the zoölogical classification, commonly introduced by analytical synopses, exhibiting the technical relations of groups; lectures and elaborate reviews directed especially to the general system of homologies by which zoölogical science is organized

as a coherent whole; a course of lectures in general embryology, given with principal reference to the descent of animals, and as a preparation for later work in special embryology; and lectures on the history of zoological science and its final generalizations.

The *general biology* of the senior year includes comparative histology of animals, and the embryology of the chick; in plants, development and reproduction in the various groups of cryptogams and phanerogams and bacteriology.

The library and collections of the University are supplemented by those of the State Laboratory of Natural History, and of the State Entomologist, to which the students in this department have access.

*Entomology.*—The study of entomology, pursued during a single term of the freshman year, is necessarily made largely empirical and practical, the subject to which it is principally directed being the place of insects in the general system of organic life; and, incidentally to this, the relations of insects to the interests of man.

The foundation for a knowledge of structural entomology is laid by the discussion and detailed study of a typical insect; and for that of the orders, by a generalization of the characters of selected groups of specimens representing each.

A large part of the time is devoted to the study of the characters, life histories, habits, and economic relations of a selected list of especially important insects. Specimens of these in their different stages, together with synopses and descriptions of the families to which they belong, are furnished the students, and the essential facts, not discoverable by direct observation, are given in lectures or acquired by study of text.

Practice in field observation is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation, and care of specimens, together with the approved methods of controlling the ravages of the injurious species.

A personal study, continuous for the term, of the life, history and habits of some insect species is made by each student and is finally reported in the form of a thesis.

In both field and laboratory work, an extraordinary opportunity is offered to competent students of this course to

observe and assist in practical entomological work and original research.

*Geology.*—The course in geology covers a period of twenty-two weeks, two hours daily. The scheme of instruction comprises: The study of a series of localities in which great surface changes have recently taken place, in order to discover the characteristics of the forces which produced the changes and the tool-marks by which their action in former times may be traced.

The mineral composition of the different kinds of rocks; the changes produced in their composition by the action of underground water; the conditions under which each species was formed and the relation between these conditions, and the structure of the resulting rock; a series of analyses covering most of the varieties of crystalline and sedimentary rocks, and the collection and identification of such erratics as can be obtained from the drift.

A somewhat rapid review of the qualities and distribution of those substances found most useful in the arts, together with the conditions which have produced them.

A study of the sub-divisions of geologic time as laid down in Dana's Manual, with the physical and organic changes which characterize them, and the distribution of the rocks laid down during each period.

An analytical study of the larger groups of fossils, with many of the more common genera and species.

A second course of 11 weeks, 2 hours daily, is offered to students from the chemical, civil engineering, and language courses, in which the entire subject is outlined; detailed study is made of a few of the more important points, and some acquaintance with both rocks and fossils is gained.

A third course, one hour daily for 11 weeks, for students in mining, is devoted entirely to a detailed study of the origin, qualities, and distribution of substances having economic value.

*Mineralogy.*—Fourteen weeks; about six weeks are occupied in lectures on crystallography; Nauman's system of symbols is used and explained. A collection of models, comprising the most important forms and combinations in the various systems of crystalization, is used for illustration and study. The remainder of the term is occupied by the de-

scriptive determination of minerals, and the use of the blow-pipe. The cabinet of minerals contains a valuable and extensive collection of leads of the state, and a very considerable collection of other minerals, American and foreign.

*Physiography.*—This name is given to the work in a term of the senior year. The purpose is to gather the lines of investigation previously followed in the development of the physical and natural sciences into a consistent whole, culminating in a natural history of the earth and its inhabitants, including anthropology; an account of the past and present distribution of plants and animals; and an explanation of the general phenomena of meteorology and climatology.

#### COURSE IN SCHOOL OF NATURAL HISTORY.

*Required for the Degree of B. S., in School of Natural History.*

##### FIRST YEAR.

1. Chemistry; Free-Hand Drawing; Trigonometry; French.
2. Chemistry; Free-Hand Drawing; Conic Sections; French.
3. Chemistry; Free-Hand Drawing; Economic Entomology; French.

##### SECOND YEAR.

1. Zoölogy; Botany; German.
2. Zoölogy; Botany; German.
3. Zoölogy; Vegetable Physiology; German.

##### THIRD YEAR.

1. Anatomy and Physiology; Mineralogy; German; Ancient History (optional, extra).
2. Geology; Physics; German; Mediæval History (optional, extra.)
3. Geology; Physics; Modern History.

##### FOURTH YEAR.

1. Physiography or Biology; History of Civilization; Mental Science.
2. Microscopy or Biology; Constitutional History; Logic.
3. Biology; Astronomy; Political Economy.

In this course three terms of University Latin will be accepted in lieu of the three terms of French; and five terms of such Latin for the five terms of German.

# COLLEGE OF LITERATURE <sup>AND</sup> SCIENCE

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## SCHOOLS.

ENGLISH AND MODERN LANGUAGES.

ANCIENT LANGUAGES.

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### FACULTY AND INSTRUCTORS.

SELIM H. PRABODY, PH. D., LL. D., REGENT.

EDWARD SNYDER, M. A., *Dean*; Modern Languages.

THOMAS J. BURRILL, PH. D., Botany.

SAMUEL W. SHATTUCK, C. E., Mathematics.

JAMES D. CRAWFORD, M. A., History and Ancient Languages.

PETER ROOS, Industrial Art.

STEPHEN A. FORBES, PH. D., Zoölogy and Entomology.

JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.

CHARLES W. ROLFE, M. S., Geology.

NATHANIEL BUTLER, JR., M. A., English Language and Literature.

CURTIS B. HOPPIN, LT. U. S. A., Military Science.

S. ROBERTSON WINCHELL, M. A., Latin.

ARTHUR W. PALMER, Sc. D., Chemistry.

FANNY M. RYAN, Modern Languages.

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### ADMISSION.

Candidates for the School of English and Modern Languages will be examined in algebra, geometry, natural philosophy, physiology and botany, and Latin but not Greek.

Candidates for the School of Ancient Languages will be examined in Greek, but not in Botany, Physiology or Natural Philosophy.

Students desiring to enter the College of Literature and Science must pass the examinations in preparatory Latin before they can be matriculated.

## OBJECT OF THE SCHOOLS.

The object of the schools in this college is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors and publishers, for teachers in the higher institutions, or for the transaction of public business.

## INSTRUCTION.

The plan of instruction embraces, besides the ordinary text-book study, lectures and practical exercises in all the departments, including original research, essays, criticism, and other work intended to illustrate the studies pursued, and to exercise the student's own powers.

A prominent aim will be to teach the right use of books, and thus to prepare the students for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the library will be required and encouraged.

Of special value as an incentive to, and the means of practice in, English composition, should be mentioned THE ILLINI, a semi-monthly paper edited and published by the students of the several colleges, each of which is appropriately represented in its columns. A printing office has been provided in the mechanical building, and a press with a requisite supply of type.

The *Library* is well supplied with works illustrating the several periods of English, American, French, and German literature, as also those of ancient literature. It contains at present over nineteen thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and foreign periodicals are received regularly in the reading room. (See list on pages 33 and 34.

The following subjects are common to the schools of this college, and may be appropriately described in this place.

## MATHEMATICS.

*First Term.*—Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an

angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications.

*Second Term.*—Conic sections, geometrical method. Definitions and general properties of the ellipse, hyperbola, and parabola; curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane; of the conic sections.

*Third Term.*—Differential calculus; the differentiation of functions of a single variable; development of functions. Infinitesimals; order of an infinitesimal; the substitution of one infinitesimal for another; the limit of the ratio of two infinitesimals; the limit of the sum of infinitesimals. Integral calculus; formulas for direct integration and by substitution; integration by parts; simplification by transformation; area of a segment of a circle, of an eclipse, of an hyperbola; length of an arc of a circle, of a parabola, etc.

#### PHYSICS AND ASTRONOMY.

See College of Engineering, page 44.

#### NATURAL SCIENCE.

See College of Natural Science, page 66.

#### HISTORY AND SOCIAL SCIENCE.

The historical studies are designed to afford a general view of the history, social organization, and progress of the race. They embrace also the history of the arts and sciences, and of civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law.

The course occupies six terms in the junior and senior years of the University course.

#### JUNIOR YEAR.

History of Greece and Rome, and of other ancient nations; Ancient Geography; Mediæval History; Modern History; European Geography.

#### SENIOR YEAR.

Constitutional History of England and the United States; History of Civilization; Political Economy.

## PHILOSOPHY AND LOGIC

The studies of this department require much maturity of powers and are therefore confined to the senior year.

**Mental philosophy.** Analysis and classification of mental phenomena; theories of perception, consciousness, imagination, memory, judgment, reason. Mental physiology, or connection of body and mind, healthful condition of thought, growth and decay of mental and moral powers. Philosophy of education, theory of conscience; nature of moral obligation; moral feeling. The right. The good. Practical ethics; duties. Formation of character. Ancient schools of philosophy; modern schools of philosophy. Influence of philosophy on the progress of civilization, and on modern sciences and arts.

Principles of logic; conditions of valid thinking; forms of arguments; fallacies and their classification. Inductive and deductive reasoning; principles and methods of investigation. Practical applications of logic in the construction of arguments, in the detection and answer of fallacies, and the formation of the habits of thinking and common judgment of life.

SCHOOL OF ENGLISH AND MODERN  
LANGUAGES.

## ENGLISH LANGUAGE AND LITERATURE.

*Studies of the School.*—In the arrangement of the studies the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English language, affording a training equivalent to the ordinary studies of the classical language. This drill extends through three years of the course.

The first two terms of the first year are given to a general survey of the whole field of British and American literature from the middle of the sixteenth century to the present time. All the representative writers come into notice, and representative specimens from the writings of each are carefully read in class. Moreover, each student is required each term to read an entire work of some classic author, making choice from a prescribed list. Frequent ex-



ercises in writing abstracts, or original compositions on themes assigned, are also required. The study of rhetoric occupies the third term.

During the second year a few of the great masters are studied, their work analyzed, and the shaping forces of their times, with their influences upon succeeding times, are investigated. Lectures are given from time to time on topics relating to the class work. Writing and reading required as in first year.

In the senior year the first term is devoted to Anglo-Saxon (A. D. 500-1200), for which the way has been prepared by the study of both English and German. In the second term the study of middle English (A. D. 1200-1500) is taken up, and during the third term philology is studied. Essays, forensics, and orations are required.

*French and German.*—The course in modern languages in this school embraces two years of French and two years of German. The chief aim is mastery in translation and composition, constant attention being also given to the etymologies common to these languages and the English; the study is thus made to contribute to the student's knowledge of his own tongue, and to the power of expression in the same.

In the first year the student completes the study of a grammar and reader, acquiring a knowledge of the technicalities of the idiom, with a vocabulary sufficient for the use of books of reference in his course. The second year is devoted to a course of select reading and composition, involving a critical study of the languages and their literature.

French and German are used in the class room as a means of conversation, as far as practicable, but this is made subordinate to the main purpose, which is to enable the student to read the languages with ease, rather than to speak them indifferently.

#### COURSE IN SCHOOL OF ENGLISH AND MODERN LANGUAGES

*Required for Degree of B. L.*

##### FIRST YEAR.

1. American Authors or Cicero de Amicitia; French; Trigonometry.
2. British Authors or Livy; French; Conic Sections.
3. Rhetoric or Horace; French; Calculus or Free-Hand Drawing.

## SECOND YEAR.

1. English Classics; German; Physiology or Botany.
2. English Classics; German; Zoölogy or Botany.
3. English Classics; German; Astronomy.

## THIRD YEAR.

1. German; Chemistry; Ancient History; French (optional).
2. German; Physics; Mediæval History; French (optional)
3. German; Physics or Chemistry; Modern History; French (optional).

## FOURTH YEAR.

1. Anglo-Saxon; Mental Science; History of Civilization.
2. Early English; Logic; Constitutional History.
3. Philology; Political Economy; Geology.

## SCHOOL OF ANCIENT LANGUAGES AND LITERATURE.

Instruction in the School of Ancient Languages and Literature, while aiming to impart a sufficiently full and critical knowledge of the Latin and Greek languages and writings, makes the study of these tongues subservient, in a more than usual degree, to a critical and correct use of the English. With this view, written translations, carefully prepared, with due attention to differences, equivalences, and substitutions of idioms, and the comparison and discrimination of synonyms, form a part of the entire course.

The study of Latin and Greek composition is continued through the first year, and, to some extent, through the course. Essays, historical and critical, are required from time to time, in connection with the works read, and a free use of the library is urged. It is intended that each student who completes the course in ancient languages shall have a clear knowledge of the history of Greek and Latin literature, and of the principal authors in both languages. As an aid to the appreciation of the literature of the two peoples, Greek and Roman history form an important part of the course, and are taken up in the beginning, illustrating the works read. In the first term of the third year ancient history is taken up as a separate study, and especial attention is then given to the history of Greece and Rome, and the nations with whom they came in contact. Classes will be formed for students who wish to carry their classical study

further than the prescribed course, and every assistance will be given them.

### COURSE IN SCHOOL OF ANCIENT LANGUAGES.

*Required for Degree of B. A.*

#### FIRST YEAR.

1. Cicero de Amicitia; Iliad; Trigonometry.
2. Livy; Odyssey; Conic Sections.
3. Odes of Horace; Memorabilia; Calculus.

#### SECOND YEAR.

1. Satires of Horace; Thucydides or German; Physiology.
2. Tusculan Disputations or Terence; Sophocles or German; Zoölogy.
3. Tacitus; Demosthenes or German; Astronomy.

#### THIRD YEAR.

1. Juvenal or French; Chemistry; Ancient History.
2. Quintilian or French; Physics; Mediæval History.
3. De Officiis or French; Physics; Modern History.

#### FOURTH YEAR.

1. Mental Science; History of Civilization; Physiography.
2. Logic; Constitutional History; Early English.
3. Political Economy; Philology; Geology.

### DEPARTMENT OF RHETORIC AND ORATORY.

All students are required to participate in the exercises of this department. Such a course of instruction in composition and oratory is provided as makes it probable that all who complete it faithfully will be able to express their thoughts, both with voice and pen, in a clear, intelligent manner, and without affectation or embarrassment.

With the exception of one term of the freshman year, which is devoted to the text book of rhetoric, the required theme work extends over the first two years of the course, the remaining two being given to the art of oratory, including the principles of delivery.

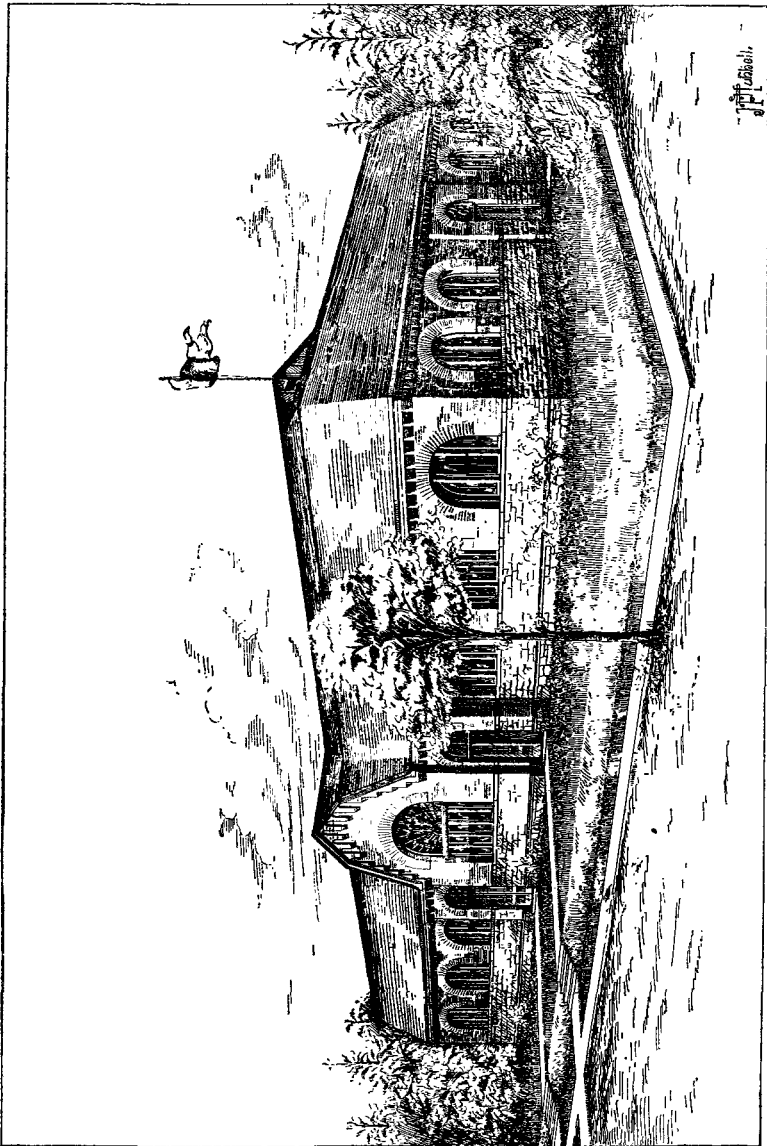
The number of themes from freshmen is eight, and from sophomores twelve, and each paper, after correction, is returned to the student to be re-written. For composition the classes are divided into sections of about twenty, which meet weekly. At these meetings, questions of students are answered, the faults and merits of the essays of the preceding week are pointed out, and subjects assigned for the next week. One lecture each term is given by the professor to

the whole class, on the kind of writing involved in the next twelve weeks; as, narration, description, argument, etc.

In oratory, the classes are also divided into sections. A critical analysis is made of some of the master-pieces of the great orators of England and America. The life and character of the orator, the circumstances that called forth the oration, his object in pronouncing it, are considered, and a study is made of his diction, sentences, paragraphs, figures of speech, etc. In addition, selections from the oration are assigned to the members of the class, which, after being well committed to memory, are carefully prepared, under the supervision of the instructor, for delivery in the presence of the whole class. Each member of the junior class is required to write an oration and hand it to the committee of the Faculty having supervision of the annual junior exhibition. From the whole number the committee selects ten, upon the basis of merit, to be presented at the exhibition.

Each member of the senior class is required to prepare a suitable oration or essay and to deliver it before the Faculty and students in the chapel.





J. P. Schell.

DRILL HALL.

# ADDITIONAL SCHOOLS.

## NOT INCLUDED IN THE FOUR COLLEGES.

### SCHOOL OF MILITARY SCIENCE.

PROFESSOR CURTIS B. HOPPIN,  
1ST LIEUTENANT 2ND CAVALRY, U. S. A.

By the law of Congress, and of the State, the University is required to teach military tactics to its students. All able-bodied male students of the preparatory year and of college classes of the first, second, and third years are enrolled in the companies of the University battalion, and receive instruction in the following military exercises:

School of the Soldier; Manual of Arms.  
School of the Company; Movements by Platoons, Firings, etc.  
School of the Battalion; Ployment and Deployment of close Columns.  
Battalion and Company Skirmish Drill; Bugle Calls.  
Bayonet Fencing; Target Practice.  
Guard and Picket Duties of Sentinels.

#### CLASS IN MILITARY SCIENCE.

Classes are taught in military science and tactics, as far as is requisite for officers of the line. At the end of the junior year each member of the class is required to present an essay upon some military subject. This is retained in the library of the department. From these classes are selected the officers of the several companies, for which they act as instructors. The military instruction is under the charge of Lieut. Curtis B. Hoppin, a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. A full supply of arms and ammunition is furnished by the war department, including 300 cadet rifles and accoutrements, and two pieces of field artillery. Ammunition is furnished for practice and target firing, and for artillery use.

No student is eligible to the military class until he has reached the third term of the freshman year, nor unless he is in good standing in all his studies. The course of instruc-

tion is confined strictly to two years. No student will be permitted to retain a command who does not maintain a good standing in conduct and scholarship.

The instruction and class exercises occupy about three hours each week, arranged, as far as possible, so as not to interfere with any other course of study. Students must be careful, however, to ascertain, before entering the military class, that the proper studies and exercises of their chosen course will not be interfered with.

*Commissions.*—The Governor of the state is accustomed to commission as captains, by brevet, in the state militia, such graduates of the University as have completed the studies of the military classes and have obtained the requisite experience in command in the University battalion. In order to obtain the commission the student must be approved by the Faculty and pass, satisfactorily, an examination in military science and tactics before a committee appointed by the Faculty of the University. It is expected that in order to get the required experience in command, the members of the military class of the third or junior year will serve as commissioned officers of the several companies of the battalion.

The standings obtained in military science are not counted in the number required for graduation or class standing; the commissions above named being deemed sufficient reward for proficiency in this department.

*University Uniform.*—Under the authority of the acts of incorporation, the trustees have prescribed that all male students, after the first term of their attendance, shall wear the University uniform. The University cap is to be worn from the first. The uniform consists of a suit and a cap of cadet gray cloth. Students can procure them ready made on their arrival here. The University cap is ornamented in front with the initials, U. of I., surrounded by a wreath. Students will always wear their uniforms on parade, but in their rooms and at recitation may wear other clothing.

The University library contains many books on military science, military history and engineering.

*Gymnasium.*—The drill hall is furnished with a full set of gymnastic apparatus, and classes in gymnastic exercises are organized in the fall and winter terms, under careful leaders. Fee, 50 cents.



*The University Cornet Band* is composed of students who, while members of the band, are excused from drill. Instruments and music are furnished by the University, and the band plays at drill and other college exercises.

### COURSE IN SCHOOL OF MILITARY SCIENCE.

#### FIRST YEAR.

1. School of the Soldier and Company; Bayonet Fencing.

#### SECOND YEAR.

1. School of Battalion; Skirmish Drill.
2. Ceremonies and Reviews; Military Signaling; Sword Fencing.
3. Guard, Outpost, and Picket Duty; Military Signaling; Sword Fencing.

#### THIRD YEAR.

1. Military Administration; Reports and Returns; Theory of Fire Arms; Target Practice; Artillery Drill.
2. Organization of Armies; Art of War; Field Fortifications; Artillery Drill.

### SCHOOL OF ART AND DESIGN.

#### PROFESSOR PETER ROOS.

This school is to subserve a two-fold purpose. 1. It affords to the students of the several colleges the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. 2. It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art. Schools of design, in Europe and in this country, have been found important aids to the higher manufactures, adding to the beauty of fabrics, and to the skill and taste of workmen.

The increased interest in the decorative arts, and in the manufactures which they require, has added new importance to the study of drawing and designing. It is the purpose to keep this school of design abreast with the best movements in this direction.

### COURSE IN INSTRUCTION.

#### FIRST YEAR.

1. Form analysis and Construction; Elementary Perspective; Combination Drawing.
2. Shading from Objects; Science of Perspective; Clay Modeling.
3. Drawing from casts; Tinted Designs; Modeling of Ornaments.

## SECOND YEAR.

1. Historic Styles of Ornament; Science of Color; Mould making and Casting in Plaster.
2. Monochrome Painting; Designs from Plants; Modeling from Shaded Examples.
3. Constructive Designs; Water Color Drawing; Modeling from Nature.

Students having passed the above course may enter either of the following courses:

## COURSE IN DESIGNING.

## THIRD YEAR.

1. Decoration in Historic Styles; Drawing of Common Objects; Modeling.
2. Designs for specified Material; Study of Drapery; Art Anatomy.
3. Designs for Furniture; Water Color Drawing; Art Anatomy.

## FOURTH YEAR.

1. Tempera Painting; Designs for Monuments; Modeling.
2. Drawing from Life; Designs for Memorial Windows; Modeling.
3. Ecclesiastic Decoration; Emblems and Still Life in Tempera Color; Modeling or Oil Painting.

## COURSE IN PAINTING.

## THIRD YEAR.

1. Drawing from Statuary; Water Color Painting; Art Anatomy.
2. Imitation of Various Stuffs and Materials; Drawing from Life.
3. Painting from Groups; Sketches from Nature; Art Anatomy.

## FOURTH YEAR

1. Drawing from Life; Composition; Painting of Still Life.
2. Painting from Life; Pictures from Description.
3. Painting from Nature; Illustration of Prescribed Subjects.

As a preparation for entering the course in art and design, the study of plane geometry and projection drawing is recommended.

Topics for reading upon art subjects are given weekly.

Detailed studies and sketches, such as are necessary to the successful rendering of things, will be required outside of the regular exercises.

For admission to the advanced classes the student must show proficiency in preliminary work.

The authorities of the University have provided that persons not connected with the institution may join the drawing and painting classes on very moderate terms.

## MUSIC.

CLARA MAUD KIMBALL.

Music constitutes no part of any University course of studies, and is therefore not provided by the Trustees. But, as many students desire instruction in music, competent teachers are selected by the Trustees, and rooms are set apart for instruction.

## TUITION.

Instruction, term of ten weeks—2 lessons a week....\$10.00  
 For term of ten weeks—one lesson a week..... 6.00  
 Practice on piano, one hour daily, per term..... 2.00

The teacher of Vocal Music and Voice Culture, follows the Italian method, giving individual instruction.

## TERMS.

Ten weeks—two lessons a week.....\$12.00  
 Ten weeks—one lesson a week..... 7.00

No deduction on account of absence in either course, except in case of protracted illness.

Special students in music will also be charged the regular term fee charged other students of the University.

## PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of many of the common schools and the University. Candidates for these classes must not be less than fifteen years old. They must pass satisfactory examinations in arithmetic, geography, English grammar, and history of the United States.

Students in the preparatory studies are not matriculated as members of the University. They pay no entrance fee, but are charged a tuition fee of five dollars a term, and the incidental fee of seven and a half dollars a term. They have all the privileges of the library, and of the public lectures, and are required to drill.

The studies taught in the preliminary year are as follows:

FOR COLLEGES OF AGRICULTURE, ENGINEERING, AND  
 NATURAL SCIENCE.

*First Term.—Algebra—(Wells’). Fundamental rules; factoring; common divisors and multiples; powers and roots;*

calculus of radicals; simple equations; proportion and progression. *Physiology*.—(Cutter's.) *Natural Philosophy*.—(Norton's.)

*Second Term*.—*Algebra*.—Quadratic equations, etc. *Geometry*.—(Wells's) Plane geometry, lines, circumferences, angles, polygons, as far as equality. *English*.—Elements of composition. (Clark's.) Orthoepy and word analysis. (Introduction to Webster's Academic Dictionary.)

*Third Term*.—*Geometry* completed, including solid geometry and the sphere. *English*, as in the second term, with addition of Goldsmith's *Traveler* and *Deserted Village*, read for analysis. *Botany*.—Gray's *Lessons and Manual*.

#### FOR SCHOOL OF ENGLISH AND MODERN LANGUAGES.

*First Term*.—*Algebra*, as above. *Physiology*. *Natural Philosophy*. *Latin*.—Cicero's *Orations*. Prose Composition.

*Second Term*.—*Algebra and Geometry*, as above. *Latin*.—*Æneid*. Prose Composition.

*Third Term*.—*Geometry*, as above. *Botany*. *Latin*.—*Æneid*. Prose Composition.

#### FOR SCHOOL OF ANCIENT LANGUAGES.

*First Term*.—*Algebra*, as above. *Latin*.—Cicero's *Orations*. Prose Composition. *Greek*.—*Grammar and Reader*.

*Second Term*.—*Algebra and Geometry*, as above given. *Latin*.—*Æneid*. Prose Composition. *Greek*.—*Anabasis*. Prose Composition.

*Third Term*.—*Geometry* completed. *Latin*.—*Æneid*. Prose Composition. *Greek*.—*Anabasis*. Prose Composition.

#### SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The ADELPHIC and PHILOMANTHEAN societies for men, and the ALETHENAI for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held on Friday evenings throughout term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

THE YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are active and useful.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY.

## REGULATIONS AND ADMINISTRATION

### ADMISSION.

Examinations of candidates for admission to the University, or to any of its departments, are held at the University itself, on the two days previous to the opening of each term.

Applicants must be at least fifteen years of age, must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Entrance, however, may usually be made satisfactorily at the beginning of the winter and spring terms.

*Entrance Examinations.*—The subjects upon which examinations for admission are held are as enumerated below:

*For the Colleges of Agriculture, Engineering and Natural Science.*

Arithmetic; English Grammar; Geography; History of the United States; Algebra, including equations of the second degree and the calculus of radical quantities; Geometry, plane and solid; Physiology; Botany; Natural Philosophy; Rhetoric and Composition.

The text books mentioned in course of study for the preparatory classes, page 91, may be taken as an indication of the requirements in these studies. Any real equivalents for the books named are accepted.

*For the School of English and Modern Languages,* the same as the above, except the Rhetoric and Composition and with the addition of the following Latin:

Four books of Cæsar's Commentaries, six orations of Cicero, six books of Vergil's Æneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero named above. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar.

Harkness's or Allen and Greenough's grammar and Winchell's (Bingham's) Latin Prose Composition are recommended.

Real equivalents for any of the above mentioned works will be accepted.

The Roman method of pronunciation is recommended.

*For the School of Ancient Languages* the same as the first list, except the omission of Rhetoric and Composition, Physiology, Botany, and Natural Philosophy, and with the addition of the Latin described and Greek as follows:

Greek Grammar (Goodwin's or Hadley's), Greek Prose Composition (Jones's), and four books of Xenophon's Anabasis. Writing Greek with the accents will be required.

The so-called Continental sounds of the vowels and diphthongs and pronunciation according to accent are recommended.

*County Superintendents' Certificates.*—To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made:

County superintendents of schools will be furnished with questions and instructions for the examination of candidates in the four common branches, Arithmetic, Geography, English Grammar, and History of the United States; applicants who pass creditably will, when they present the superintendent's certificate to that effect, be admitted to the classes of the preliminary year.

Persons who hold teacher's certificates from county superintendents will be admitted to the preliminary class without further examination.

*Honorary Scholarships.*—Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship is \$90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows:

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the first Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved by the superintendents in the common English branches. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be

awarded to the candidate who passes the best examination, provided he has a standing in each subject not less than 75, and an average standing on all the subjects not less than 80 per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a technical course in Colleges of Agriculture, Engineering, or Natural Science, or a literary course in the College of Literature and Science.

In the first case the subjects of his examination will be Algebra, Geometry, Physiology, Botany, Natural Philosophy, and English Rhetoric.

In the second case the subjects will be Algebra, Geometry, Botany or Natural Philosophy, four books of Cæsar, six Orations of Cicero, and six books of the Æneid.

The two classes of examinations are intended to be as nearly equivalent as possible, and to conform to the requirements already stated under the head, Examinations for Admission. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations can not be considered.

The following persons have received honorary scholarships for the counties named:

CLASS OF 1892.	
NAME.	COUNTY.
*Armstrong, James L.	Douglas.
Bevis, Albon.	Cass.
Forbes, Robert H.	Bureau.
Hart, Ralph W.	Cook.
Snodgrass, William.	Champaign.
CLASS OF 1893.	
Bartlett, H. Emmett.	Brown.
Bennett, Sarah.	Coles.
Braucher, Herbert H.	Logan.
Brown, Frank.	Piatt.
Carrick, William.	Jasper.
Dickinson, Richard J.	Woodford.
Earl, Mark A.	Clinton.
Gaston, Hattie J.	McLean.
*Herrick, George I.	DuPage.
Johnson, Harriette A.	Rock Island.
*Strout, Frank A.	LaSalle.
Woodruff, Thomas T.	Adams.
Yeomans, Frances A.	Vermilion.

\* Withdrawn—Scholarship now vacant.

*Accredited High Schools.*—The Faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without further examination within one year after date of their graduation. These must be schools of first rate character, whose courses of instruction include all the studies required for admission to some one of the colleges of the University. On application, a member of the Faculty is sent to examine the school making application, as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to such of the colleges as their studies may have prepared them to enter. The appointment continues as long as the work of the school is found satisfactory. Annual reports are asked from these schools.

The accredited schools whose graduates are admitted to any of the colleges of the University are the public high schools in

Aurora, East.	Evanston.	Oak Park.
Aurora, West.	Freeport.	Ottawa.
Bloomington.	Galena.	Paris.
Cairo.	Hyde Park.	Peoria.
Champaign.	Jacksonville.	Princeton.
Charleston.	Jerseyville.	Rockford.
Chicago, North.	Kewanee.	Rock Island.
Chicago, South.	Lake View.	Springfield.
Chicago, West.	Lincoln.	Streator.
Danville.	Mattoon.	Tuscola.
Decatur.	Mendota.	Urbana.
Dixon.	Moline.	

Also the high school of the Normal University, at Normal.

The accredited schools whose graduates are admitted to the college of engineering, of agriculture, or of natural history are the public high schools in

Camp Point.	Pekin.	Sheldon.
Farmer City.	Peru.	Sterling.
Gibson City.	Pittsfield.	Sycamore.
Kankakee.	Polo.	Warren.
LaSalle.	Robinson.	Washington.
Marengo.	Rochelle.	Watseka.
Monticello.	Rossville.	Waverly.

Also the Chicago Manual Training School.



## CHOICE OF STUDIES.

From the outset the University has permitted great freedom in the selection of studies. It is, however, necessarily required: that the student shall be thoroughly prepared to enter and to keep pace with the classes in the chosen studies, and that he shall take these studies in the terms in which they are taught. *Candidates for a degree must take the course of study prescribed for that degree.* But in the Colleges of Agriculture, Natural Science, and Literature and Science other University drawing will be accepted for an equivalent amount of free-hand drawing.

Each student is expected to have three distinct studies, affording three class exercises each day. On special request, the Faculty may allow less or more.

No change in studies may be made after the beginning of a term without permission of the Faculty.

Due care will be taken to prevent, as far as possible, all abuse of the liberty of choice. Students failing to pass satisfactory examinations in their chosen studies will not be permitted to remain and take other studies without a vote of the Faculty.

## REQUIRED STUDIES.

To secure the diffusion of the sciences relating to the great industries, the state legislature, in 1873, prescribed that each student should be taught some of those sciences.

The Trustees accordingly require that each student shall take, each term, one study at least from the following list:

Agricultural Chemistry.	Esthetics of Architecture.
Agricultural Engineering and Architecture.	Estimates.
Analytical Mechanics.	Free-Hand Drawing.
Anatomy and Physiology.	Geodesy.
Animal Husbandry.	Geology.
Architectural Drawing and Designing.	Graphical Statics.
Astronomy.	Heat Engines.
Botany.	History of Agriculture.
Bridges.	History of Architecture.
Chemistry.	Hydraulic Engines and Wind Wheels.
Dynamics.	Hydraulics.
Electric Machinery.	Landscape Gardening.
Elements of Agriculture.	Logic.
Elements of Horticulture.	Machine Drawing.
Entomology.	Masonry Construction.
	Mathematics.

Mechanism.	Railroad Engineering.
Mental Science.	Resistance of Materials.
Metallurgy.	Rural Economy.
Military Science.	Sanitary Construction.
Mill Work.	Stone, Brick and Metal Construction.
Mine Administration.	Surveying.
Mine Attack.	Vegetable Physiology.
Mineralogy.	Veterinary Science.
Mining Engineering.	Wood Construction.
Physics.	Zoölogy.
Physiography.	
Political Economy.	

#### TERM EXAMINATIONS.

Written examinations are held at the close of each term or oftener, and whenever any study has been finally completed. Any student failing to answer correctly 75 per cent. of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission.

A record is kept of each student's term work and standing, and from this his final certificate of graduation is made up.

A statement of the scholarship and conduct of each student will be sent to his parent or guardian as soon as may be after the end of each term.

#### DEGREES AND CERTIFICATES.

The law provides that, "on recommendation of the Faculty, the Trustees may authorize the Regent, as president of the University, to issue diplomas to such persons as shall have completed satisfactorily the required studies, and sustained the examination therein, conferring such literary and scientific degrees as are usually conferred by Universities for similar or equivalent courses of studies, or such as the Trustees may deem appropriate." *Approved May 11, 1877.*

In accordance with the law, the following system of degrees has been adopted by the University.

1. All studies will remain, as heretofore, free. Each student may choose and pursue such studies as he may desire, subject only to such conditions as to preparation, times of study and number of studies, as may be necessary to secure efficiency in classes and economy in teaching.

2. But students who wish to be candidates for any degree must complete fully the course of studies prescribed for such degree, and must present an accepted thesis.

3. Students not candidates for any degree will be enrolled as special students, and will receive at the close of their attendance, if not less than a year, the certificates provided by law, with statements of work done and credits attained. Credits from other institutions may not be entered upon such certificates. The form of graduation with a "full certificate" will be discontinued after the commencement of 1891.

4. It is designed that the requirements for all the bachelor's degrees shall be, as nearly as possible, equal in amount and value.

5. The Degree of Bachelor of Science, B. S., will be given to those who complete either of the courses of studies in the College of Engineering, Agriculture, or Natural Science. The name of the School will be inserted after the degree.

6. The Degree of Bachelor of Letters, B. L., will be given to those who complete the course of the School of English and Modern Languages.

7. The Degree of Bachelor of Arts, B. A., will be given to those who complete the course in the School of Ancient Languages.

8. The Master's Degrees, M. S., M. L., and M. A., and the equivalent degrees of C. E., M. E., etc., will be given to those only who have pursued a year of prescribed post-graduate studies, and passed examinations thereon, or after a term of three years' successful practice. In either case an accepted thesis will be required.

#### GENERAL DIRECTIONS TO STUDENTS.

Young men or women desiring a liberal education, and living at a distance from a college or university, are often puzzled to understand precisely what they will be required to know and to do in order to gain admission. To such, these words are addressed:

1. Notice that a college or university (which is properly a collection of colleges) is designed for the higher education only, and not for the study of common branches. None of the common branches, such as arithmetic, geography, English grammar, reading and spelling, are taught in this University. These all must be finished before you come.

2. In order to pursue profitably the true college studies, and to keep pace with the classes, you must be ready to pass a strict examination in the common branches just mentioned, and in certain other preparatory studies, differing with the different colleges of the University. (See pages 93 and 94.)

3. If well prepared only in the common branches above named, you may be admitted, not to the College, but to the preparatory classes, in which you will study the other preparatory studies for admission to college. (See pp. 91-92.) All preparatory studies must be completed before you can be admitted, as a matriculated student, to any college class.

4. All college studies are arranged in regular courses, in which each term's work is designed to prepare for the next. You should enter at the beginning of the college year, in September. If unable to enter at that time, you may enter at any later time by making up the studies already passed over by the class.

5. Enter college with the purpose of going through, and make your course *regular as far as you go*. If obliged to leave before you have finished the course you will have done the best thing for yourself in the meantime; while if you remain, the regular course is in nine cases out of ten the most useful and effective.

Students desiring only a winter's schooling should go to some high school.

#### LABOR.

Labor is furnished as far as possible to all who desire. It is classified into educational and remunerative labor.

Educational labor is designed as practical instruction, and constitutes a part of the course in several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for it.

Remunerative labor is prosecuted for its products, and students are paid what their work is worth. The usual rate paid for ordinary farm, garden, and shop labor is *ten cents* per hour. Students of sufficient experience may be allowed to work by the piece or job, and thus by diligence or skill secure more pay.

Some students who have the requisite *skill, industry, and economy*, pay their entire expenses by their labor; but, in

general, young men cannot count upon doing this at first, without a capital to begin with, either of skill or of money, to serve them till a degree of skill is acquired. As the number of students increases, it is found more and more difficult to furnish the labor needed, and students cannot count certainly upon finding employment.

#### BOARD.

The University does not furnish board. There is no general provision for boarding, but there is an abundance of suitable private places in Urbana and Champaign within a reasonable distance of the University where students can obtain either table board, or board and rooms with the advantages of the family circle. Boarding clubs are formed at which the cost of meals is about two and a half dollars per week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

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## EXPENSES.

THE TUITION IS FREE in all the University classes.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and must be paid before he enters.

Amount .....\$10.00

THE TERM FEE for incidental expenses is for each student..... 7.50

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to \$12, to pay for chemicals and apparatus used, and for any breakages or damages.

A fee of \$2.50 is charged students working in the mechanical and architectural shops.

ALL BILLS due the University *must be paid before the student can enter classes.*

The following are estimated maximum and minimum annual expenses, exclusive of books and clothing, of a residence of thirty-six weeks at the University.

	MIN.	MAX.
Term fees.....	\$ 22.50	\$ 22.50
Room rent for each student.....	18.00	48.00
Table board in boarding houses and clubs.....	90.00	126.00
Fuel and light.....	10.00	15.00
Washing at 60 cents per dozen.....	9.00	18.00
Total amount.....	\$149.50	\$229.50
Board and room in private houses, per week.....	4.00	6.00

FEEs IN THE PRELIMINARY YEAR, OR IN THE BUILDERS'  
OR FARMERS' SHORT COURSES.

Tuition per term.....	\$5.00
Incidental fee, per term.....	7.50

SPECIAL FEES.

For Instrumental Music, for 20 lessons.....	\$10.00
For Painting or Drawing, to special students.....	10.00
Matriculation fee.....	10.00
Graduation fee.....	5.00

CAUTION TO PARENTS—STUDENTS' FUNDS.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons. *No greater error can be committed than to send boys from home with large amounts of spending money*, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money, beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under twenty years of age.

## CALENDAR FOR 1890-91.

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Examination for admission.....	Monday,	September 15
First or Fall Term begins.....	Wednesday,	September 17
First Term ends.....	Friday,	December 19

### WINTER VACATION.

FOR 1891.

Examination for admission to advanced classes,	Monday,	January 5
Opening of the Second or Winter Term.....	Wednesday,	January 7
Second Term ends.....	Wednesday,	March 5
Third or Spring Term begins.....	Thursday,	March 6
Baccalaureate Address in University Chapel....	Sunday,	June 7
Class Day.....	Monday,	June 8
Alumni Day.....	Tuesday,	June 9
Commencement.....	Wednesday,	June 10

### SUMMER VACATION.

Examinations for admission.....	Monday,	September 14
First or Fall Term begins.....	Wednesday,	September 16

## UNIVERSITY BATTALION.

CURTIS B. HOPPIN,

*First Lieutenant 2nd. Cavalry, U. S. A.,*

Commandant.

*Field and Staff.*—Majors, James M. White, Clarence L. Crabbs. Adjutant, Captain, Alfred E. Harvey. Sergeant Major, James P. Hubbell. Quartermaster Sergeant, Parke T. Burrows.

*Company A.*—Captain, Frank H. Eno. Sergeants, James Steele, 1st., Chas. A. Gunn. Corporals, H. Bacon, S. K. Kerns, W. H. Cornell, C. D. Brownell.

*Company B.*—Captain, Ora. D. McClure. Sergeants, Geo. L. Pasfield, 1st., Geo. E. Lewis. Corporals, Chas. W. Carter, W. J. Graham, F. M. Spalding, J. S. Stewart.

*Battery Detachment*—Captain, F. O. Smolt. Sergeant, J. K. Barker, 1st.

*Company C.*—Captain, R. Strawn Wallace. Sergeants, John W. Lockhart, 1st., John W. Page. Corporals, R. C. Vial, M. A. Earl, Louis T. Graham.

*Company D.*—Captain, Chas. D. Vail. Sergeants, Arthur L. Pillsbury, 1st., M. J. Morehouse. Corporals, H. E. Bartlett, B. V. Swenson, R. E. Smith.

*Company E.*—Captain, Fred W. Clarke. Sergeants, E. L. Scheidenhelm, 1st., W. H. Foster. Corporals, E. E. Gulick, P. M. Hucke, A. Locke.

*Company F.*—Captain, Frank Beckwith. Sergeants, W. G. Miller, 1st., R. A. Mather. Corporals, E. C. Craig, A. D. Thompson, J. P. Roodhouse.

*Company G.*—Captain, Edwin B. Clarke. Sergeants, A. W. Gates, 1st., W. P. McCartney. Corporals, S. C. Skielvig, A. W. Rea, J. S. Davis.

*Color Guard.*—Sergeant, George W. Seaman. Corporals, C. W. Carter, E. C. Craig, S. K. Kerns, A. Locke, J. S. Davis, J. P. Roodhouse, C. D. Brownell.

*Band.*—Drum Major, Jay T. Harris. Leader, William E. Sandford.



# UNIVERSITY DIRECTORY.

SPRING TERM 1890.

## ILLINI BOARD.

John Beardsley, '90,  
Wm. M. Gilliland, '90,  
Hugh Hazleton, '90,  
Robert C. Wilson, '90,  
Ora D. McClure, '91,  
A. Maue, '91,  
Herman S. Piatt, '91,  
Arthur L. Pillsbury, '92,  
Royal Wright, '92,  
William Carrick, '93,  
Nathan A. Harvey, '93.  
Editor-in-Chief, Thomas A. Clark.  
Bus. Manager, Clarence L. Crabbs.

FOR 1890-91.

Editor-in-chief, Clarence A. Shamel.  
Bus. Manager, Jay T. Harris.

## THE LITERARY SOCIETIES

*Hold their meetings in their respective  
Halls every Friday evening.*

### ALETHENAI.

President, Anna C. Boyle.  
Secretary, Lucia R. Brumback.

### PHILOMATHEAN.

President, Samuel D. Bawden.  
Secretary, Jeremiah G. Mosier.

### ADELPHIC.

President, Junius B. Mage.  
Secretary, Fred. W. Clarke.

## SCIENTIFIC SOCIETIES.

### NATURAL HISTORY SOCIETY.

President, Charles F. Adams.  
Secretary, John Marten.

## CIVIL ENGINEERS' CLUB.

President, John B. Tschanner.  
Secretary, Frank H. Eno.

## AGRICULTURAL CLUB.

President, Frank D. Gardner.  
Secretary, William H. Baldwin.

## CHEMICAL CLUB.

President, Charles H. Shamel.  
Secretary, James Steele.

## MECHANICAL ENGINEERS' CLUB.

President, Fred. W. Waterman.  
Secretary, Robert C. Barnett.

## THE BLACKSTONIAN SOCIETY.

President, Thomas J. Howorth.  
Secretary, John B. Morgan.

## YOUNG MEN'S CHRISTIAN ASSOC'N.

President, Columbus A. Bowsher.  
Secretary, Fred. A. Hall.

## YOUNG WOMEN'S CHRISTIAN ASSOC'N.

President, Agnes G. Hill.  
Secretary, Sarah M. Paine.

## ATHLETIC ASSOCIATION.

President, Samuel D. Bawden.  
Secretary, Arthur L. Pillsbury.