

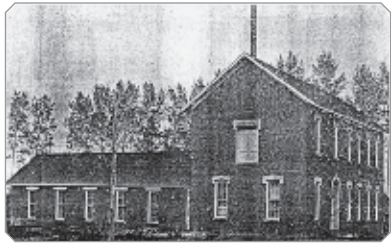


The Forge, Foundry, and Shop Era (1882–1914)

It must have become practicable quite soon, as the college name was changed to the Colorado School of Agriculture and the Mechanic Arts in 1882. The curriculum was revised and enlarged and the Department of Mechanics and Drawing was added. Frank H. Williams was hired as professor of mechanics and drawing. Mr. Williams served as department head for less than one year and was replaced by James W. Lawrence in March, 1883. At that time Mr. Lawrence had not yet received his BS degree; this was conferred on him by the college in 1891, eight years after being hired as professor of mechanics and drawing and one year after serving as acting president of the college. The college also conferred the ME degree on him in 1902, in recognition of his outstanding contributions to the college. Mr. Lawrence was clearly a remarkable man. In addition to serving as professor and head of mechanical engineering from 1895 to 1915, and dean of the faculty from 1906 to 1912, he designed and supervised the construction of the college heating plant. The heating plant remained under the direct supervision of the mechanical engineering department head until 1949; it was used by mechanical engineering students in their studies involving steam and heat. The stack for the plant remained standing until 1989 when it was determined that it needed major maintenance in order not to become a potential hazard. Rather than spend the necessary funds the decision was made to remove it. Some attempt was made by the mechanical engineering students at that time to save it and have it declared a historic monument but the costs of stabilizing it were too high and the resources were not available. Mr. Lawrence also directed the construction of the 4040 square foot Mechanic Arts Hall in 1883. Another interesting anecdote is that he married the first woman (Elizabeth Cox) to graduate from the college.

The Mechanic Arts Hall was one of the earliest buildings on campus and resulted from an authorization from the State Board of Agriculture of \$7500 for the erection of a mechanic shop in 1882 [SBOA, 1882]. The building was initially named the Mechanic Shop but the name was changed to the Mechanic Arts Hall in 1891 [Thirteenth Annual Register]. However, it seems that

some students continued to refer to it by its original name as indicated by the following statement: “The Mechanic Shop is now one of the most elegant buildings on the college grounds.” The red brick building consisted of a two-story 25 by 56 foot front section facing east (the long axis was north-south) and a single-story tee 20 feet wide by 62 feet long (east-west). A photo from the 1889–90 catalog is shown below. The first floor housed a machine shop for iron working and the second floor housed a wood shop. The tee section housed the boiler and coal room. The boiler provided steam for heating the building and for running a 12 hp steam engine that was used to drive the shafts



Mechanic Shop

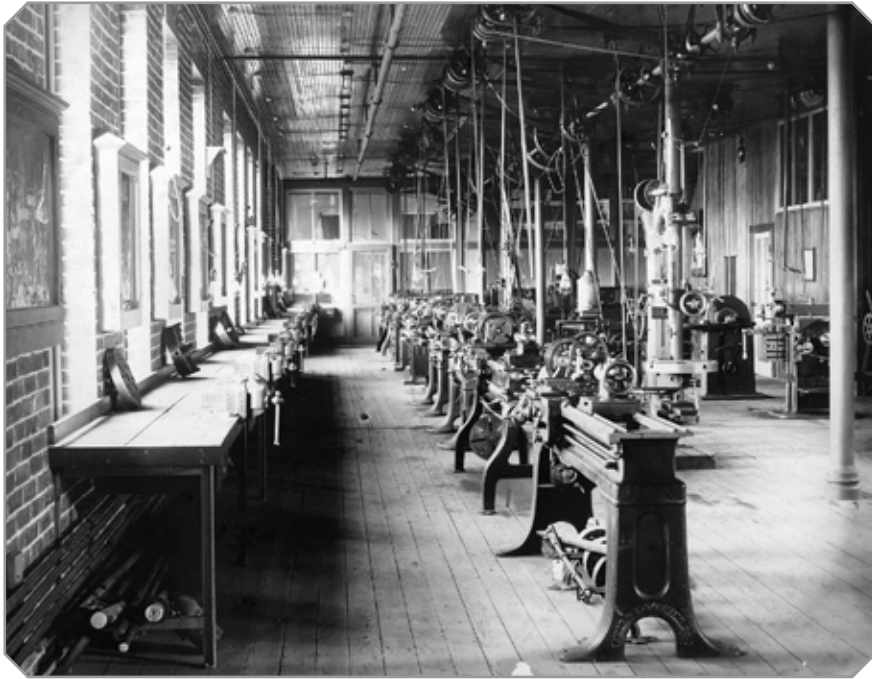
for the machine shop and wood shop. Professor Lawrence requested \$10,000 for an addition to the Mechanic Shop in 1891. His request was initially denied but later approved and reported on in the initial edition of the Rocky Mountain Collegian. One factor leading to the approval was probably the extensive use of the facility, as indicated by the following quotation:

“Owing to the large number of students taking shop work, Professor Lawrence has been compelled to make two divisions, each section working two hours each afternoon.” Professor Lawrence had an interest in manufacturing. He prepared detailed catalog descriptions of course work indicating that the purpose was to train students for work in the manufacturing industries. Manufacturing companies were tending to hire machinists who were specialists in only one type of operation and Professor Lawrence wanted his students to be knowledgeable in the principles of all machines and processes. Hence, when supervisory positions became available the mechanical engineering students would be selected. The catalog description of 1882–83 contains the first references to manufacturing. Professor Lawrence wrote the following description for the Practical Mechanics course:

“The old system of apprenticeship is rapidly becoming a thing of the past, and it is now almost impossible for a boy to learn a trade in any modern shop or factory. This is owing, largely, to the introduction of special machinery, necessitating special workmen to manage it, and the workman who has learned to run a machine of this kind is kept at that work, as being most



Mechanic Shop (1883)

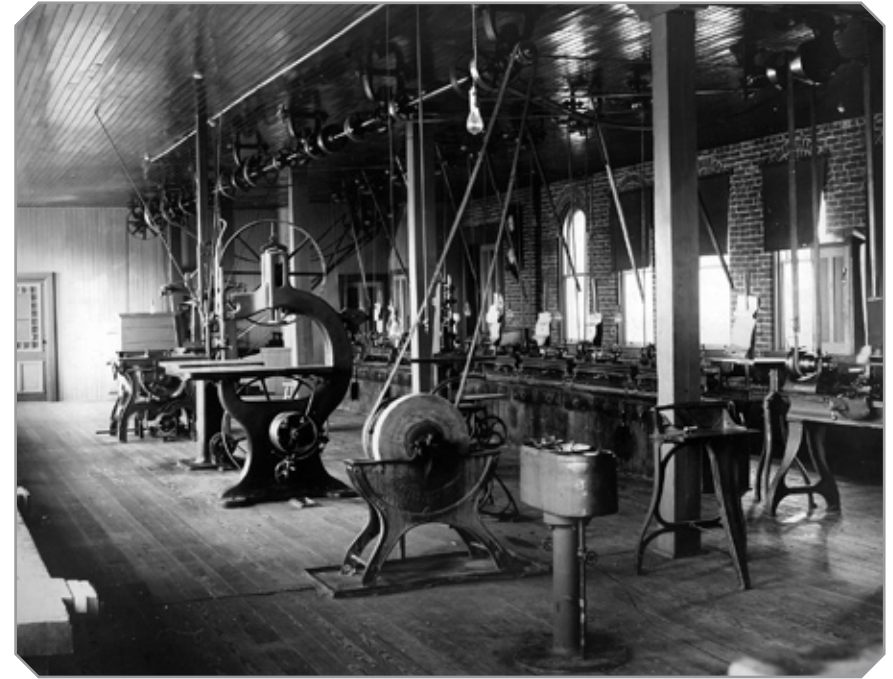


Machine Room

profitable to his employer; his practical knowledge of other methods and machines is, therefore, confined to narrow limits, and, should a vacancy occur in a superior position, he is not the man for the place, from the fact of his being unacquainted with other practical parts connected with his trade, the manipulations and principles involved in which he has not had an opportunity to learn.”

(Author’s note: Mr. Lawrence and William Faulkner must have learned to write from the same teacher.) Mr. Lawrence continued with:

“Should his surroundings be such that he enters manufacturing, his ideas having been broadened by this training, he will the more rapidly grasp anything new that may come up in his business, or if he takes up farming, he will with greater ease, be able to understand the mechanical principles and workings of his machinery, and also how to keep them and his buildings in proper repair.”



Wood Working Room

Mr. Lawrence then followed this with three pages of detailed course description. No other course description in the catalog took up more than two pages.

Mr. Lawrence also wrote that “Our other extention (sic) work is what we may call state work, where we go out into the industries and help the workers wherever possible.” It is interesting to note that this was the concept behind the Manufacturing Excellence Center, started by the department in 1987, approximately 100 years later.

1882–83, 1883–84 & 1884–85

The course of study for the college shown in the catalogue for 1882–83 remained essentially the same through 1884–85. However, additional faculty were hired. For example, Elwood Mead was hired as instructor in mathematics in December 1882 and was promoted to full professor of mathematics in April 1883. Obviously, the criteria for promotion have changed since then. The course of study for 1882–83 is shown in Table 1 on the following page.

Table 1. Course of Instruction and Labor, 1882.

Preparatory Year**First Term**

Arithmetic, U.S. History, Physical Geography, English Analysis, and labor on the farm, two hours daily.

Second Term

Arithmetic, Elocution, El. Physiology, English Analysis, and shop practice, two hours daily.

Third Term

El. Algebra, Elocution, El. Physiology, Word Analysis, and labor on garden, two hours daily.

Freshman Year**First Term**

Geometry, El. Rhetoric, Drawing, Agriculture and labor on farm, two hours daily.

Second Term

Geometry, Bookkeeping, Drawing, Botany, and shop practice, two hours daily.

Third Term

Algebra, Ancient History, Drawing, Botany, and labor on farm, two hours daily.

Sophomore Year**First Term**

Algebra, History, Drawing, El. Chemistry, and Laboratory practice, two hours daily.

Second Term

Trigonometry & Surveying, English Literature, Drawing, Organic Chemistry & Zoology, shop practice, two hours daily.

Third Term

Geometry, English Literature, Drawing, Zoology, Field Surveys.

Junior Year**First Term**

Physics, Rhetoric, Geology, Agricultural Chemistry, and Laboratory, two hours daily.

Second Term

Physics, Floriculture, Anatomy & Physiology, Agricultural Chemistry, and

continued

Laboratory, two hours daily.

Third Term

Microscopy, Horticulture, Physiology, Entomology, and labor on garden, two hours daily.

Senior Year**First Term**

Chemical Physics, Agriculture, Veterinary Science, Psychology, and Mechanics, shop practice, two hours daily.

Second Term

Meteorology, Moral Science, Veterinary Science, Logic, and Mechanics, shop practice, two hours daily.

Third Term

Astronomy, Landscape Gardening, U.S. Constitution, Political Economy, and Mechanics, shop practice, two hours daily.

1885–86 & 1886–87

Elective courses were added for the first time in 1885–86. The first two years consisted of a core curriculum but in the junior and senior years the student could choose between Irrigation Engineering, Mechanics and Drawing, Veterinary Science, or Language. The junior and senior year curricula are shown in Table 2.

Table 2. Junior and Senior Year Curricula, 1885–86 & 1886–87.

Junior Year**First Term:**

Required Courses; Physics, Zoology
Electives; Hydraulics, Drawing, or German

Second Term:

Required; Physics, Geology
Electives; Agricultural Chemistry, Drawing, or German

Third Term:

Required; Physics, Agriculture or Entomology
Electives; Reservoirs, Drawing, or German

Senior Year**First Term:**

Required; Psychology and Agriculture, Landscape Gardening, or French
Electives; Canal Work, Steam Engine & Structures,

continued

Veterinary Science, or German

Second Term:

Required; Logic and Horticulture or French
Electives; Irrigation Law, Power Transmission, Veterinary Science, or German

Third Term:

Required; Political Economy and either Floriculture or Entomology or French
Electives; Astronomy, Special Machines, Veterinary Science, or German

1887–88

For the 1887–88 academic year there was a two year core followed by two basic stems: the Agricultural Course and the Mechanical Course. In addition, there was a Ladies' Course described as follows: "The young ladies pursue the same course as the young men during the first three years. During the junior and senior years they may, if they choose, substitute the study of German for the special studies of the Agricultural course, or the Mechanical Course..." Also, the first mention of a Master of Science degree was in the catalogue for 1887–88. It was stated that the degree of master of science could be conferred upon any graduate in good standing who had pursued some line of work after graduation and had submitted an acceptable thesis. There was no mention of course work or time required. The curriculum for the Mechanical Course is shown in Table 3.

Table 3. Mechanical Course Curriculum, 1887–88.

Junior Year

First Term:

Physics, Zoology, Drawing

Second Term:

Physics, Geology, Drawing

Third Term:

Physics, Entomology, Drawing

Labor, two hours, shop practice each term. Also, analytic geometry and conic sections, one exercise per week, and military drill, four exercises each week.

continued

Senior Year

First Term:

Psychology, Landscape Gardening, Steam Engines

Second Term:

Logic, Horticulture, Power Transmission

Third Term:

Political Economy, Horticulture, Special Machines
Labor, two hours, shop practice each term, plus astronomy and meteorology, one exercise each per week for one-half year and military drill, four exercises each week.

1888–89

The curriculum for the Mechanical Course remained the same for 1888–89 except that German was added to each term in the junior and senior years and the exercises in astronomy and meteorology were apparently dropped. There was no mention of the Ladies' Course in the catalog for 1888–89.

1889–90, 1890–91 & 1891–92

An Irrigation Engineering Course was added in 1889–90. Also, the Ladies' Course was again described. There were some rather significant changes in the Mechanical Course, as shown in Table 4.

Table 4. Mechanical Course Curriculum, 1889–90.

Junior Year

First Term:

Higher Algebra, Physics, Zoology, Drawing. Plus labor, two hours;
Physical Laboratory, two days; mechanic shop, two days;
Zoological Laboratory, one day.

Second Term:

Analytic Geometry, Physics, Geology, Drawing. Plus labor, two hours;
Physical Laboratory, two days; mechanic shop, three days.

Third Term:

Descriptive Geometry, Physics, Geology, Drawing. Plus labor, two hours;
Physical Laboratory, two days; mechanic shop, three days.

Senior Year

First Term:

Differential Calculus, Astronomy, seven weeks, Meteorology, six weeks,

continued

Psychology, The Steam Engine. Plus labor, two hours; mechanic shop, five days.

Second Term:

Integral Calculus, Logic, Transmission of Power, Thesis Work. Plus labor, two hours; mechanic shop, five days.

Third Term:

Special Chemistry, Political Economy, Special Machines, Thesis Work. Plus labor, two hours; mechanic shop, five days and military drill, daily.

1892–93, 1893–94 & 1894–95

Professor Lawrence hired L.D. Crain as his assistant in 1892. Mr. Crain had received the BME degree from Purdue University. He later became department head and, as was the case with Professor Lawrence, supervised the design and construction of many buildings on campus, including Ammons Hall, the chemistry building, the library building, the Administration Building, the men's gymnasium, and the wood shop and forge and welding shop for the department. He also served as building superintendent for the campus. It seems that the mechanical engineering department played a strong role in the development of the campus.

The foundry (photo on next page) was completed in the Mechanic Shop in 1890 and this resulted in a change in the curriculum for the Mechanical Course as shown in the Register for 1892–93. This new curriculum is shown in Table 5 and remained in effect through 1894–95.

Table 5. Mechanical Course Curriculum, 1892–93.

Junior Year

First Term:

Foundry Practice, Chemistry, Physics, Higher Algebra, and Labor: Shop, 2-5; Chemistry, 3-5.

Second Term:

Chemistry, Geology, Analytic Geometry, Drawing, and Labor: Chemistry.

Third Term:

Drawing, Calculus, Elements of Mechanism, Work-Shop Appliances, and Labor: Shop.

Senior Year

First Term:

Drawing, Calculus, Logic, Psychology, and Labor: Shop.



Foundry (1890)

Second Term:

Drawing, Strength of Materials, Transmission of Power, Steam Engine, Boilers, and Labor: Shop, 4-5; Testing Materials, 1-5.

Third Term:

Special Chemistry, Special Machines, Political Economy, Thesis work, and Labor: Chemistry.

Also, military drill and rhetorical work one hour per week throughout the course.

The register for 1893–94 contained the first description of mechanical engineering. The following description was provided.

“This course is designed to prepare students for the profession of Mechanical Engineering. It teaches the general principles of engineering and unites theoretical work and practical research to accomplish this end. Instruction is imparted by means of text-books, lectures, illustrations, and experiments in testing materials, machines and motors.”