A History of

THE COLLEGE OF ENGINEERING

University of Utah

Historical notes relating to the teaching of Engineering at the
University of Utah
1850 to 2000

By

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Foreword

The title of this work is “A History of the College of Engineering”, but it is perhaps better described by the sub-title, “Historical notes relating to the teaching of Engineering” in the College of Engineering and it’s predecessors, The State School of Mines, and the School of Mines and Engineering. Much of the history of the first 100 years, starting with “pre-engineering”, came from early University of Utah Bulletins. Details for the last 50 years came from University of Utah Bulletins, College of Engineering bulletins and newsletters, departmental newsletters, and newspaper clippings saved by Professor Joseph Andrade while he was dean. Other material was gleaned from stacks of “stuff” I have accumulated in my 50+ years in the Electrical Engineering department and in the Dean’s office.

Clearly, this history is not complete; I am sure that others could add much to it. I would encourage anyone that is so inclined to do so. Also I end my work with the end of the century, and trust that someone else will carry on with the history of the College of Engineering from 2000 on.

An addendum to this work is a short pictorial section that is entitled: “Where Engineering Education Happened”. In it, I have tried to show pictures of the actual buildings where pre-engineering and engineering education took place, and where those buildings were located, both in the down-town locations of the original University of Deseret, and on the present day campus.

I am indebted to the members of the Dean’s office, College of Engineering, for their support and interest in this work, and for providing space and facilities for my use. My special thanks go to Anne Grossenbach and Michael Kay for their encouragement, assistance and suggestions that were always cheerfully given.

My special thanks to Dana Robison, Executive Secretary in the Dean’s Office, College of Engineering, for her careful and detailed reading and correcting of the document.

Deter Gehmlich
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HISTORY OF THE COLLEGE OF ENGINEERING UNIVERSITY OF UTAH

DIETRICH K. GEHMLICH

1. INTRODUCTION – The Early Beginnings of the University of Utah

Very soon after the arrival of the Mormon pioneers in the valley of the Great Salt Lake, **Brigham Young** and others began making plans for an institution of higher learning to be located in Salt Lake City. Brigham Young staked off a proposed campus on the east bench, roughly east of 1300 East and extending east to the mountains allowing for growth and eventually a large campus. On February 28, 1850 the University of Deseret was incorporated by an act of the provisional government of the state of Deseret. In 1851, the legislature of the newly formed Territory of Utah ratified the incorporation act and approved the class-work, which had already begun the previous fall.

The first session was to have been held in the new State House (later called the Council House) being built on the southwest corner of Main and South Temple Streets; however, it was not ready by the fall of 1850. On November 11, 1850 the first class of 25 male students began classes in rented space in the home of **Mrs. John Pack**, near the corner of West Temple and First North (now Second North) Streets.

By February 1851, the Council House was ready and the second term commenced in it with about 40 students attending. The tuition was $5.00 per term. During 1851-1852, the third and fourth terms were held in the 13th Ward schoolhouse with nearly 80 students enrolled. Emphasis was given to mathematics, English, grammar, geography, and other subjects necessary for the training of teachers.

In 1852, the first general school law was passed by the territorial legislature setting up districts to oversee the education of those in the district. In parallel with this bill, the legislature passed a resolution rescinding the $5000 annual support for the University of Deseret. As a result, the University closed its doors in the spring of 1852.

However, a chancellor and a board of regents who were elected by the legislature in 1850 continued meeting and planning for a full-scale university. Under the direction of Dr. **John R. Park**, chancellor, classes were reestablished in 1869, the sessions being again held in the Council House. In September 1876, the University moved to the old Union Academy on First North and Second West. The LDS Church had need for the Council House, so the move was made in one weekend before the Academy Building was fully ready. During this period, basic courses in classical, normal (teaching), and science were offered at freshman and sophomore university levels. In the science area, basic courses were offered in physics, chemistry, mathematics, geography, geology, and architectural and mechanical drawing.

Meanwhile, the city of Salt Lake gave the University a ten-acre block, known as Union Square, to establish a new campus with the expectation that the University would be able to raise sufficient funds to pay for the construction of the physical plant necessary. The 1879 territorial legislature had given the University a $20,000 grant to begin the planning and building of the new campus. Plans were drawn for a new university hall. With the partial funding provided by the

legislature, foundations and part of the building were underway with the expectation that more funds would be available from the territorial legislature to complete the building.

The 1886-87 Annual Bulletin of the University of Deseret describes the problems in getting the building built for the University. The city of Salt Lake donated the 10-acre block so that the state funds could be used to begin the building with the anticipation that subsequent legislatures would appropriate more money to finish construction. In 1882, neither the governor nor the legislature provided any funds, and the partial building was in danger of being destroyed through exposure and lack of care. Therefore, private donations were found to at least put up the walls and complete the roof of the building. In 1884, it was again expected that the legislature would provide some funds, but again no money was forthcoming. The legislature did upgrade the University's charter to allow it to grant degrees. Supported by tuition fees and other donations, enough rooms were completed in the building so that in August of 1884, it was occupied and classes were begun. The 1885, 1886, and 1887 legislatures provided no further funding for the University of Deseret.

By 1888, the faculty had grown to twelve, and the coursework considerably expanded as indicated by the following list of faculty and their teaching assignments:

John R. Park - Normal School, arithmetic and grammar

Joseph B. Toronto - mathematics, surveying and history

Joseph T. Kingsbury - physics, chemistry, mineralogy, geology, civil government, and geography

Orson Howard - zoology, physiology, botany, astronomy

Joshua H. Paul - writing, elocution, grammar, reading, and English

Henry C. White - studies in the deaf/mute department

George M. Ottinger - free-hand drawing

Evan Stevens - vocal music

Henry A. Tuckett - vocal music

Honorable J. G. Sutherland - law

Don Carlos Young - civil, mechanical and architectural drawing and architecture

Alfred Andre - French

Basic chemistry, physics, and mathematics were taught as well as mechanical and architectural drawing so as to prepare students in the practice and elements leading to engineering and architecture. Classes taught on the new campus were divided into four ten-week terms. The following dates from the 1886-87 bulletin were typical:

Term 1 September 6-November 12

Term 2 November 15-January 28

Term 3 January 31-April 8

Term 4 April 11-June 17

Tuition was $12.00 per term for science oriented curricula.

As reported in the 1888-89 Annual Bulletin of the University of Deseret, the legislature of the State of Utah finally made a generous appropriation not only to complete the University building that had been, for many years, in an unfinished condition, but also to liquidate the indebtedness that had been incurred in its partial erection. The building was complete and ready for occupation by the fall of 1889. As of the Fall term of 1889, the University was organized into the following six departments:

The Department of Science, Literature, and the Arts

The Normal Department

The Department of Music
The Department of Art
The Deaf/Mute Department
The High School Department

The University had grown to eighteen faculty, with three of them, **Joseph B. Toronto**, **Joseph T. Kingsbury**, and **Orson Howard**, involved in the teaching of sciences, mechanics, math, and drawing. A new faculty member, Mr. **William Ward**, was added to the faculty, teaching architecture and mechanical drawing.

The building as described in the 1889-90 Annual of the University of Deseret "*is now so far completed as to furnish nearly every convenience to the students in the way of facilities for instruction and comfort. It is supplied with the latest and best improvements in the way of capacity, natural light, steam heating, gas and electric lights, water, and other facilities for the accommodation of the school. The building is a solid structure of rock and brick, 100 feet by 130 feet in lateral dimensions and is four stories in height. It contains the library, reading room, laboratories, classrooms and a museum. The University building is located on the corner of First North and Second West Streets*[1] *, and with its accessories occupies an entire city block. It's conveniently reached from any part of the city. The Warm Springs Street Car-line passes along Second West immediately east of the University square."*

The 1889-90 Annual also shows as one of the graduates in 1889, **Joseph Francis Merrill** of Richmond, Cache County, Utah, graduating from the Normal course. In 1889 a new faculty member, **Charles Veneziani**, was added to the faculty teaching mathematics, surveying, and astronomy. In this year a three-year program in architecture was added in conjunction with the one-year mechanical drawing courses. The physics sequence had the following subjects:

Term 1 Mechanics
Term 2 Hydrostatics, pneumatics and acoustics
Term 3 Optics and heat
Term 4 Magnetism and frictional, static and dynamic electricity.

The 1889 legislature appropriated sufficient funds to establish a chair in mineralogy and geology at the University, and special efforts were made to fill that chair with a view to the establishment, in the near future, of a school of mines.

THE MINES DEPARTMENT: Where Engineering Began

In 1891, departments were reorganized at the University and new ones added, making nine in total: Liberal Arts, General Science, Letters, Mining, Normal, Music, Fine Arts, Preparatory, and the School for the Deaf. A three-year course in mining and mining engineering was added to the curriculum. The faculty in the Mining Department included:

Joseph T. Kingsbury-chemistry and physics
Henry Montgomery-mineralogy and geology
Charles Veneziani-mathematics
William Ward-mechanical Drawing
Richard H. Terhune-lecturer in metallurgy

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[1] Now 2nd North and 3rd West Streets.

Charles P. Brooks-instructor in civil and mining engineering

Programs of study were outlined which in three years would lead to either a degree in mining engineering or a degree in civil engineering.

In 1892, the name of the school was changed to the University of Utah, and a new catalog published containing courses of study for 1892-1893. Also, in 1892, **John R. Park** resigned as president of the University and the position was unfilled at the time of the publishing of the catalog.

A new charter for the University was developed in 1892, and departments were reduced to Liberal Arts, General Science, Letters, Mining, and Normal with the degree in engineering being that of Bachelor of Mining Engineering. The only course with an engineering label was called Civil and Mining Engineering.

A major turning point in the history of the University of Utah occurred in 1892, when the Federal Government gave the University 60 acres of land in the area originally envisioned by **Brigham Young** and the early planners as the campus for the University of Deseret. Young's plans for the space had been interrupted by the coming of Colonel **Sidney A. Johnston's** military force in 1857, and the subsequent founding in 1862 of Fort Douglas by Colonel **Patrick E. Conner**. With the gift of the 60 acres plus an additional 32 adjoining acres a year later, the University began plans for a large campus at the eastern end of Second South Street.

By 1893, the campus on University Square had grown to include: the original building (University Hall) on the corner of First North Street and Second West Street, the West Building (77 feet by 127 feet, three stories), and the boiler house (near the West Building) with the second story housing workshops for the industrial department. Between the Main Building and the West Building stood the residence for the custodian.

In 1893, several new faculty members in the sciences and engineering were recruited. **James E. Talmage** was added as professor of metallurgy and biology, **Joseph F. Merrill** was hired as assistant professor of chemistry, **Joseph P. White** was added as instructor in physics and math, and **William D. Neal** was added as instructor in geology and mineralogy. The terms in the calendar were changed to essentially conform to a three-quarter system; Fall term ending in December, Winter term beginning in January ending in March, and Spring term ending on the 15th of June. Also in 1893, the first degree in Mining Engineering was conferred upon **Joseph Bonde Swenson**.

In April 1894, the University became the recipient of a handsome endowment, the first of its kind in the history of the institution to come from private sources. As recorded by **Ralph V. Chamberlain** in his book *"The University if Utah-A History of it's First Hundred Years – 1850 to 1950"* (University of Utah Press, 1960, pp203-204), the University was struggling to meet it's financial obligations because of a lack of support from the State Legislature, and was forced to borrow from its land fund to stay open. An editorial in the Deseret News condemned the Legislature and appealed to the public for support. Chamberlain reports:

> "In accordance with this sentiment the Mormon Church, through a subsidiary corporation, The Salt Lake Literary and Scientific Association, made a gift to the University in the form of an endowment that greatly strengthened its condition in supplying at once desperately needed additional classroom and laboratory space and extensive scientific apparatus and equipment that had been provided for the newly established Church University, then holding its first session in the newly completed Deseret Museum Building.

> The conditions of the endowment implied the abandonment of the Church University and the establishment of a professorship at the State institution."

The State Legislature then passed an act called "Endowing the University of Utah" which set forth the endowment process and allowed for the naming of endowed professorships.

> "In accord with the provisions of this act and immediately after its approval, the Salt Lake Literary and Scientific Association proposed to endow a chair in Geology to the extent of $60,000, this fund to be kept intact and the proceeds to be used for the support of the chair named, "The Deseret Professorship of Geology." The Regents, in accepting this professorship, agreed to accept a collection of apparatus for the physical sciences, then the largest and finest in the state, in satisfaction of $15,000 of the endowment, the remaining $45,000 to be paid in cash. It was also agreed that the University of Utah should have the use of the laboratories and class and lecture rooms in the Church University or Museum Building for a period of two years.
>
> At the expiration of the two year period, however, the Association proposed to deed to the University this building and the adjacent building then in use by the L.D.S. College with the grounds on which they stood in satisfaction of the $45,000 due as balance of the endowment. At their meeting of March 21, 1896, the Regents voted to accept this property in full payment of the indebtedness owed by the Association to the University."

The upper floor of the Museum Building was maintained as a depository of the invaluable Deseret Museum collection and the rest of the building was devoted to physical science classrooms and laboratories. The endowed professorship was filled almost immediately. In July, 1894, Dr. **James E. Talmage**, who was instrumental in obtaining the endowment, was elected by the Regents to be Acting President of the University and nominated to be the first occupant of the Deseret Professorship in Geology.

A calendar for 1895-1896 showed that instruction changed to the semester system, beginning September 24 and ending February 7 for the first semester, and the second half beginning February 10 ending June 10. Also, **Joseph F. Merrill** was shown on leave of absence doing graduate work. The 1895-96 catalog showed, for the first time, a four-year curriculum leading to the degree of Bachelor of Science in Mining Engineering. The first year was composed of basic courses in math, English, drawing, chemistry, and language. Mathematics, physics, chemistry and mechanical drawing were taught in the second year; and mechanics, civil engineering, metallurgy, mineralogy, surveying, geology, and mining engineering in the third year. In the last year astronomy, mechanical engineering, designing, metallurgy II, geology III, and chemistry were taught. This was the first time that courses entitled Mechanical Engineering and Civil Engineering were shown in the catalog.

The 25th annual commencement (1895) showed **William D. Neal** as receiving the first Master of Science degree. There were no graduates in engineering in either 1894 or 1895. In 1896-97, Professor **Joseph F. Merrill** was still on leave but a new instructor, **Richard R. Lyman**, was added in engineering and mechanical drawing. The faculty had increased to 23. In 1897, **Joseph T. Kingsbury** became president of the University and **James E. Talmage**, who had been acting president, returned to fill the chair of Deseret Professor of Geology. **Joseph F.**

Merrill returned and became Professor of Physics and Physical Chemistry and Principal of the Mining School.

ELECTRICAL ENGINEERING

The catalog of 1898-99 announced the first course leading to the Bachelor of Science degree in Electrical Engineering. Citing the many recent applications of electricity to various branches of mining, which forced mining engineers to be well rounded in the principles of applied electricity, the University equipped a significant electrical laboratory with all the necessary apparatus for an extended course in applied electricity. To satisfy the needs of those who wanted to make fuller use of this equipment than possible for the regular students, it was decided to offer this course in electrical engineering. The first year was the same as the freshman year in the mining engineering degree. The second year called for courses in drawing, surveying, mathematics, physics, and geology. The third year consisted of courses in electricity (Electricity I, Electricity II, Electricity III), and other engineering courses in mechanisms, machine design, mechanics of materials and differential equation mathematics, as well as drawing and mechanics.

The senior year was not announced in the 1898-99 catalog, but delayed to the 1899-1900 catalog. The announcement from the 28th Annual Commencement, listing those who graduated from the University in 1897, showed three students graduating in general science and no engineering graduates.

In 1899, **Joseph Francis Merrill** received his Ph.D. degree from Johns Hopkins University, and returned to become the principal of the Mining School and Professor of Physics.


Joseph F. Merrill
Principal, Mining School, 1899 - 1925

As noted previously, the federal government gave the University of Utah a 60-acre area of land on Fort Douglas under the condition that the institution should occupy the new site within five years from the date of the grant (which was afterward extended to ten years). The state legislature in 1899, provided for the removal of the University to this site by the appropriation of $200,000 for the erection of suitable buildings there. In the same year, the city council of Salt Lake granted the University a new deed to the ten acre city block (commonly known as University Square) removing any conditions of the former deed which required that the actual occupancy of the block be by the University of Utah. By provision of the bill appropriating the means for the removal of the University to the new site, the square block called University Square and its buildings, and the buildings and grounds transferred to the University by the Salt Lake Literary and Scientific Association as part payment of an endowment given to the University, were all to be turned over to the state on the completion of buildings and the removal of the University to the new campus.

In 1899, the senior year of electrical engineering was described as follows; lectures and laboratory work relating to alternating current phenomena, alternating current machinery, transmission and distribution of electric power, design of electric machinery, studies in steam and hydraulic engineering and thesis work. All of these classes in electricity were taught by Dr. **Joseph Merrill** and Mr**. Taylor** (a new member of the faculty).

The 29th Annual Commencement of the University of Utah in 1898, lists the first Bachelor of Science in Mining Engineering awarded to **Herbert Thayer Hills** of Salt Lake City. The Utah Engineer, Vol. 1, No. 4, June 1903 described Mr. Hills this way: *"Mr. Herbert T. Hills was taught his ABC's and a few other things in the district schools of Salt Lake City. This early instruction over with, he progressed steadily and graduated from the district schools in 1889. That same year the High School was first organized and courses of instruction offered to the public school graduates. That fall Mr. Hills entered the High School and graduated from the General Science course in 1893, with the first graduating class.*

"In the fall of '93 he entered the University, registering for the General Science Course. However he changed his course in 1895 to that of Mining Engineering and graduated in 1898. Besides the regular work prescribed, he took special work in electrical measurements under Dr. Merrill.

*"During the summer 1896-97 Mr. Hills assisted Mr**. L. G. Burton**, M.E., of this city, in U.S. patent surveying and also in underground work. After graduating from the University he was employed by the Utah Light and Power company on construction work for about six months when he again went with Mr. Burton on patent and underground surveying of the principal mines of the Tintic Mining district.*

"During the summer of '99 he was employed on private agricultural surveying by the Deseret Live Stock company. At present Mr. Hills is in the office of the U.S. Surveyor General, this city, where he has been since the fall of '99-or since his marriage. When in search of Mr. Hills, look for the man with the button labeled 'I-am-a-married-man.'"

By the time of his untimely death in 1905, in a mining accident, Mr. Hills had become a noted mining engineer.

Of historical note, the Utah Engineer claimed Mr**. Joseph B. Swenson** as the first to graduate in Mining Engineering in 1893. He did complete the three-year Mining Engineering program, but did not receive a Bachelors of Science degree (which was not authorized until 1894).

In September of 1900, the University of Utah moved into the first three buildings of the present campus located on what was then a circle. Maps for this circle, and drawings of the three buildings are contained in the 1900-1901 annual catalog[2]. Engineering was headquartered in the Physical Building, which was later called the Physical Science Building located directly east of the present Kingsbury Hall. **Joseph F. Merrill** was still principal of the Mining School, but also professor of Physics and Electrical Engineering.

The 30th Annual Commencement listing graduates from the University during 1899, showed no new graduates in engineering (either mining or electrical). It is of interest to note that for several years, no tuition was charged in any of the regular departments or courses, but an annual registration fee of $10.00 was required each year. Those working in laboratories were charged laboratory fees varying from $1.00-$5.00 depending on the nature of the laboratory, and graduating fees were $5.00 for a certificate or $10.00 for a degree.

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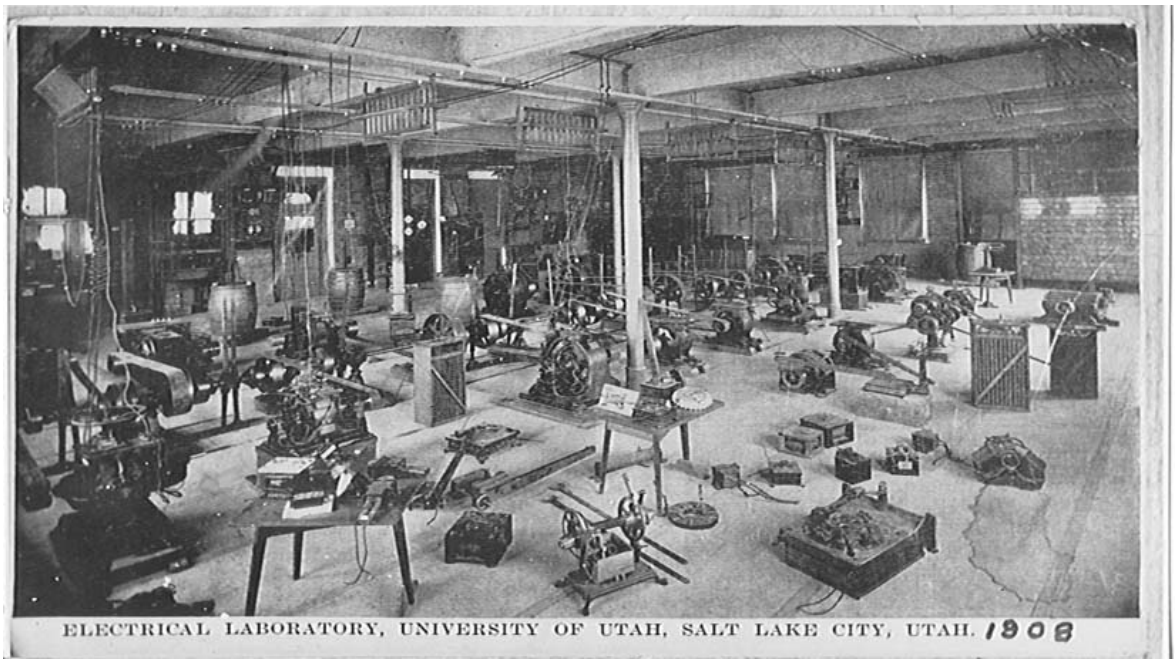
[2] See the separate document "Where Engineering Education Happened-Physical Facilities"

Pursuant to the first curriculum in mining engineering being offered in 1895, and the first course in electrical engineering being offered in 1898, the legislature of the State of Utah in 1901 formally established the State School of Mines as a department of the University. At the same time provision was made for greatly increasing the facilities for continuing the work of the school. The staff was increased to include **Elias Hyrum Beckstrand**, an instructor in electrical engineering, and **William T. Ward**, an assistant in physics. These two along with **Joseph F. Merrill** taught the courses in physics and electrical engineering.

In 1900, students graduated in general science, but no engineering graduates were listed in the 31st annual commencement.

In 1902 a new building came into use. The Museum and School of Mines Building, 140 by 64 feet, was used for work in geology, mineralogy, and biology, and the museums of these three departments. Also, two shop buildings were built, one used for casting and forging, and the other used for work in carpentry, wood turning, pattern making, work in metals, and for practical work in steam and hydraulic engineering. The latter also contained the heating plant for all the University buildings

In this year the Dynamo Room, used for electrical engineering testing was installed in the north end of the physical science building. The photograph below was taken of the laboratory in 1908. Later, the room was made into a large lecture class room (PS104).



The 32nd Annual Commencement (1901), listed two Bachelor of Science in Mining Engineering graduates; **John F. Hoffman** and **Ephraim Royal Morgan**.

In 1903, **Richard R. Lyman** became the first professor of Civil Engineering. Previous to this, his title was professor of Mining Engineering. He taught most of the engineering courses in the mining curriculum such as mechanics, drawing, surveying, kinematics, structures, mechanics of materials, steam engines, hydraulics, and general machine design. He was on leave for the 1903-04 year and therefore, **Edgar B. Kay** was hired as assistant professor of civil engineering.

Construction began on a new metallurgy building (104 by 62 feet), to be used in assaying, metallurgy, and mining.

CIVIL ENGINEERING AND MECHANICAL ENGINEERING

The language of the legislative act formally establishing the School of Mines stated its purpose was to "offer to students, studies and courses of instruction relating to mining, metallurgical, electrical and such other branches of engineering as pertained to the pursuit and development in all its branches of the mining industry in Utah." To accomplish this purpose the School of Mining added two more sets of courses leading to Bachelor of Science degrees in Civil Engineering and Mechanical Engineering. The course in civil engineering was much the same as that for mining engineering with the addition of significantly more mathematics, drawing, kinematics, railroad engineering, surveying, structures, municipal and sanitary engineering, and engineering design. The course in mechanical engineering was still being designed in 1903; only the sophomore and junior years were listed in the catalog, being very similar to those of civil engineering. All four engineering disciplines had a common first year. Seven faculty members were involved in the teaching of the courses in the four engineering disciplines.

In 1902, **Thomas Francis McDonald** graduated with a Bachelors of Science degree in Mining Engineering, and **Jay Sutherland Groo** with a first Bachelor of Science degree in Electrical Engineering.

As of 1904, the number of students registered in the State School of Mines was 117 in the collegiate registration and 132 preparatory students as compared to 81 students in the school of Arts and Sciences with 101 in preparatory, and 84 in the State Normal school in collegiate tracks with 251 in preparatory. The rapid increase in the number of students in the State School of Mines had made it the largest of the three schools on the University Campus. The 34th Annual Commencement (1903) listed three graduates with Bachelor of Science degrees in Mining Engineering; **Austin Garr Burton**, **Arthur Dale Knowlton**, and **Roy Kirk Patterson**.

The new campus grew rapidly thanks to continued financial support by the legislature. In 1901, they appropriated $67,675 more for buildings and equipment, and again in 1903, $35,000 additional for building and equipment for the School of Mines, and in 1905, $12,000 for the extension of the Physical Building, $5,000 for the extension of the shops, $12,000 for a hydraulic laboratory, $15,000 for a gymnasium and $5,000 to make rooms in the attic of the Normal School Building.

By 1905, there were seven new buildings on the new site. Each was planned and built to meet the specific demands of the work for which it was intended; the Library Building 140 by 62 feet was used for the library, administrative purposes and for class work in mathematics, languages, philosophy, psychology and other subjects. The Physical Building, 128 by 62 feet, was used for physics and chemistry and for some of the teaching in engineering and laboratories. The Museum Building, 104 by 44 feet, was used for work in geology, mineralogy, and biology and housed the museums for these three departments. The Normal Building, 140 by 68 feet, was used for work of the kindergarten, the Normal training school and also for nature study, domestic science, and shop work in wood. The Metallurgical Building, 104 by 62 feet, was used for assaying metallurgy and mining. There were two more shop buildings, one used for casting and forging, and the other for work in carpentry, wood turning, pattern making, work in metals and for practical work in steam

and hydraulic engineering. All of these buildings were heated by a steam plant one hundred yards away.

CHEMICAL ENGINEERING

By 1905, the State School of Mines offered five engineering courses, each leading to a Bachelor of Science degree and requiring four years for completion. In addition to the mining, electrical engineering, civil engineering, and mechanical engineering courses already in existence, chemical engineering was added in this year. All five degrees had a common first year and then branched out into the appropriate departmental specialties, each course ending with a thesis.

In the years following the founding of the Agricultural College (A.C.) at Logan in 1889, many attempts were made to consolidate the University of Utah and the Agricultural College under one governing board mainly because of the duplication of offerings at the two schools. Finally, the Legislature in 1905 passed an act specifying what the Agricultural College could and could not teach. The act allowed the A.C. to teach agriculture, irrigation, domestic sciences, basic physical sciences and so on but the A.C. was not to "offer courses in Engineering, liberal arts, pedagogy, or the profession of law or medicine." The law was later amended to allow the A.C. to teach Agricultural Engineering. Of course discussions of consolidation and duplication have continued in the 100 years since then!

A Normal School branch of the University of Utah was established at Cedar City in September of 1897 to provide courses to train teachers in the southern part of the state. Students took the first three years at the branch school then transferred to the University of Utah Normal school for the last year. By 1909 the full Normal course was available there and courses in pre-engineering and pre-law were being taught. By 1913, the branch wanted to become a stand-alone college but was denied by the University of Utah administration. They were finally able to transfer to the A.C., but were still a branch! This allowed the A.C. to teach Normal School subjects which they were enjoined from doing by prior law. This also maintained a state school presence to balance the colleges at Beaver and St. George that were supported by the LDS Church.

In 1906, there were still no regular tuition fees charged for students who were residents of Utah. A $10 registration fee was required of all students each year. Out of state students paid, in addition to the annual registration fee, $15 per year for work in all departments except medicine where the general tuition fee was $25 per year.

Specific requirements for entrance into all courses in the State School of Mines, were as follows: English, 3 units; Algebra A, 1 unit; Algebra B, 1/2 unit; Plane geometry, 1 unit; Solid geometry, 1/2 unit; Plane trigonometry, 1/2 unit; Physics 1 unit; History, 1 unit; and electives, 6 1/2 units. It was urged that not fewer than two units of the elective work be chosen in foreign language; French or German was especially recommended. Applicants for the course of chemical engineering had to present two units in German.

In 1906, a course in irrigation engineering was offered jointly by the Agricultural College of Utah (Logan) and the State School of Mines. "This course was aimed at preparation of young men for one of the most important branches of engineering work in the west." (1906-07 Bulletin of the University of Utah).

The Master of Science degree in all of the engineering disciplines was offered as early as 1905. In 1908, a new professional graduate degree was offered. The degree Mining Engineer, Electrical Engineer, Civil Engineer, Mechanical Engineer, Chemical Engineer, or Irrigation Engineer was conferred upon graduates of the School of Mines at the University of Utah who had spent three years in professional work, one of which had to have been in a position of responsibility, and who presented a satisfactory thesis. Candidates for this non-resident degree had to be registered at the University as a student in absentia during the college year in which they obtained a degree, and had to present the subject of the thesis to the director of the School of Mines no later than December 1 of that year.

In 1908, another engineering course called General Engineering was added to the curriculum of the State School of Mines. This allowed a student to combine the fundamentals of a specific engineering curriculum with other engineering areas to provide a very general course in engineering. The freshman year was common to all engineering courses, the sophomore year was the same as the specific engineering course chosen and in the junior and senior years, the student was allowed a wide choice of electives with very few courses required other than the thesis in the senior year.

The Utah Engineering Experiment Station

The faculty in the School of Mines, in order to maintain a close working relationship between the school and the industrial interests of the State, petitioned the State to set up the means by which investigation and research might properly be undertaken to further the interests of industry in the State. There existed at that time many unsolved problems pertaining to mining, smelting, building-materials, hydraulics, and so on. Therefore, in order to encourage this work and give it due recognition, the legislature of 1909 established by law the Utah Engineering Experiment Station in connection with, and as a department of, the State School of Mines. The Station staff consisted, at the beginning, of the heads of the engineering departments and several other departments in the University. The Station was "authorized to carry on experiments and investigations pertaining to any and all questions and problems that admit all laboratory methods of study and the solution of which would tend to benefit the industrial interests of the State or would be for the public good."
Staff of the Engineering Experiment Station, 1909-1910:

Joseph T. Kingsbury - President
Joseph F. Merrill - Director and Electrical Engineer
Richard R. Lyman - Civil Engineer
Robert H. Bradford - Metallurgist
William C. Ebaugh - Chemist
Gustave A. Overstrom - Mining Engineer
Elias H. Beckstrand - Mechanical Engineer
Robert W. Fisher, M.D. - Public Health

Five year and six year courses

From the 1908-1909 University Catalog: "the work of the engineer is continually extending into new and broader fields. These changing conditions demand that his training shall be as deep and as broad as possible, for experience shows that the successful handling of large enterprises requires a broad point of view coupled with high technical attainments and serves a growing demand

for a broader training of the engineer than can be secured in a four year course following the high school course. Indeed a broader training is coming to be recognized as essential for him who would obtain the most responsible positions in the engineering profession."

The University of Utah therefore urged those who could spare the time to extend their studies over a period of at least five or six years, devoting the extra time to electives in the School of Arts and Sciences or in the School of Education. The bulletin described how students could postpone some of their technical subjects and put into their sophomore, junior and senior years, courses that would lead to a Bachelor of Arts degree or a teaching certificate, giving them a much more rounded education.

In 1911 the legislature passed a law bonding the state for $300,000 for the erection of an administration building and passed a law for permanent maintenance providing that the University shall receive 64.43% of 28% of the State levy of 4 1/2 mills. In 1913 the legislature appropriated $30,000 for a new heating plant, $55,000 for an industrial building for the School of Education and $12,500 for improving the men's gymnasium.

By 1916, the new administration building, (later called the Park Building), was occupied by the President, Deans, library, bookstore, and post office. The library building was changed to the Liberal Arts building. The tuition still was limited to an annual registration fee of $12, or $5 per course for non-credit courses. Non-resident students paid $25 per year registration fee. Of course, numerous laboratory fees were in place at this time.

Engineering students, nearing the turn of the century, had created the Engineering Society, which was a club for students who met together at irregular intervals to listen to and discuss technical topics. In 1915, another group called the U-Tech was formed. These students met regularly twice a month, again to hear and discuss topics of interest in engineering. By this time, the irrigation program which had been jointly sponsored with the Utah Agricultural College (now Utah State University) was discontinued and some irrigation courses were continued in the Civil Engineering program. This meant that the State School of Mines offered only the following six degrees: Mining Engineering, Civil Engineering, Electrical Engineering, Chemical Engineering, Mechanical Engineering, and Engineering Science. In this year (1915), the number of students in the State School of Mines totaled 87 in the undergraduate programs and 13 in graduate programs, this accounting for approximately 10% of the total number of students at the University of Utah.

In 1917, the name of the school was changed to the State School of Mines and Engineering. In 1918, the university changed from the semester system back to the quarter system. Also, the legislature approved $16,000 for an addition to the Metallurgical building, provided that a like sum was raised by the university from private sources. This sum was readily obtained from mining and machinery companies in the state. Also, the course leading to the degree of Chemical Engineering was dropped and students were recommended to take a Bachelor of Science degree in Chemistry. By 1920, the Bachelor of Science degree in Chemical Engineering was reinstated in the Department of Chemistry and several other courses were allowed, including a B.S. degree in Automotive Engineering, a B.S. degree in Geological Engineering, and extra work in irrigation, architectural engineering, and highway engineering in the Civil Engineering department.

By 1922, the annual registration fee for Utah residents increased to $25 and the non-resident fee increased to $50. An annual incidental fee of $17.50 was also assessed along with a towel fee of $1.25 and the annual student body fee of $10. Class fees were assessed to members of senior, junior, sophomore and freshman classes anywhere from $1.50 to $2.25 and “in addition, freshman men shall pay the price of the freshman cap.”

On the 29th of May, 1922, Dr. Merrill established the **Joseph Hyde Merrill Memorial Fund** in memory of his son who died of influenza-pneumonia while in the Student-Army Training Corp. The endowment consisted of 10 shares of Utah Power and Light 7% preferred stock worth $1000,and one Utah-Idaho Sugar Company bond worth $1000. The income from this endowment was made available as a loan fund for students in the State College of Mines and Engineering, or for students in the Physics department. Interest on the loans was set at 4%.

Of incidental interest, the 52nd annual commencement showed a number of students graduating with Bachelor of Science degrees in Electrical, Civil, Mechanical, Chemistry, Geology, Metallurgy, Mining, and one Bachelor of Science in Physics, that graduate being **Thomas Jenison Parmley** of Sandy, Utah. Also, **Richard R. Lyman**, who had been chairman of Civil Engineering since its beginning was no longer shown as a member of the faculty having been called to an ecclesiastical position with the L.D.S. Church in 1918. In 1923, **A. LeRoy Taylor** became Associate Professor of Mechanical Engineering although his undergraduate degree in 1907 was in Electrical Engineering. He taught many of the courses in Automotive Engineering**. Thomas J. Parmley** was accepted as an instructor in Physics in 1923.

In 1923, the registration fee for three quarters rose to $38; non-resident fees increased to $63. The curriculum was modified to make the freshman year common for all engineering and mineral industries students:

Chemistry	3 quarters	15 Hours
General Ed.	3 quarters	9 Hours
English	3 quarters	9 Hours
Mathematics	3 quarters	15 Hours
Phys. Ed. and Hygiene	3 quarters	3 Hours
Introductory Lectures	1 quarter	1.5 Hours

The Sophomore year for Civil Engineering, Electrical Engineering and Mechanical Engineering was common and consisted of courses in: Shop (3), Business (5), Materials (3), Economics (6), Surveying (6), Calculus (15), Physics (12), and Physics Labs (3). Also, Chemical Engineering, Metallurgical Engineering, Geological Engineering, and Mining Engineering had a common Sophomore year with courses in Surveying (6), Chemistry (9), Calculus (15), Mineralogy (6), Geology (4), Physics (12), and Physics Lab (3).

In 1924, the registration and tuition fees were separated so that the annual registration fee was $10 for all students (and $35 for non-residents), tuition fees for all colleges except Medicine, Law and Pharmacy were $13 per quarter.

In 1925, after receiving Bachelor and Master of Arts degrees from the University of Utah in 1908 and 1917 respectively, Miss **Clara A. Latimer** became the first-ever woman faculty member in Civil Engineering. She taught mechanical drawing, advanced mechanical drawing, descriptive geometry, and architectural perspective as well as free-hand drawing, topographical drawing and advanced architectural perspective.

By 1925, there were the following seven departments in the State School of Mines and Engineering: Chemistry, Civil Engineering, Electrical Engineering, Mechanical Engineering, Geology, Metallurgy, and Mining. Each offered a curriculum leading to a Bachelor of Science degree. In the case of Chemistry, the degree was Bachelor of Science in Chemical Engineering. The State School of Mines continued to offer a Bachelor of Science degree in General Engineering, which was designed to give engineering students an opportunity to obtain knowledge of the fundamentals of both engineering and business in preparation for those administrative and commercial positions

where training in both lines was requisite. For all Bachelor of Science degrees a minimum of 200 credit hours was required, including a thesis. Also offered through the Mechanical Engineering department was a Bachelor of Science degree in Automotive Engineering. Most of the courses in automotive engineering were sponsored and/or taught by **A. Leroy Taylor.**
The faculty listed under engineering included Professors **Merrill, Dextrand**, **Leary**, **R.S. Louis, Ketchum**, and **Tugman**, Associate Professors **Baldwin**, **Taylor,** and instructors **Borgquest, Silver, Blake, Miss Latimer, Sidwell, Goodmundson**, and a number of graduate assistants.

As of 1926, the buildings in which engineering courses were taught or departments were housed were as follows: The Physical Science Building was occupied by physics and chemistry departments as well as electrical and mechanical engineering. The Metallurgy Building was occupied essentially by the mines departments, and also the United States Bureau of Mines. The Smelter Laboratory was the center of activities of the metallurgical research of the United States Bureau of Mines. The Hydraulic Laboratory was devoted to the work of mechanics of hydraulics and irrigation engineering in the Civil Engineering department. The shops consisted of four separate buildings, one of them given to casting and forging, two were used for the teaching of automobile mechanics and one building was for carpentry and manual training. The Mechanical Laboratory was devoted to steam engineering and a number of other areas of commercial testing. Of interest, the ROTC was housed in the State School of Mines and Engineering. Associated with the ROTC was a military building providing accommodations for two classrooms. Also nearby were two field artillery ROTC stables that housed seventy animals. In addition, a gun shed housed the artillery material provided by the government.

The tuition fees in 1926, for all except medicine, law, and pharmacy went up to $19 per quarter, with an additional annual registration fee of $10 per year. Non-resident students paid a $35 registration fee. The requirements for graduation with a Bachelor of Science degree in engineering increased to 202 credit hours minimum, of which 90 credit hours were required in the junior and senior year.

In 1925, **Joseph F. Merrill** was appointed to an ecclesiastical position with the LDS church and **Richard Burt Ketchum** was appointed Dean (note the name change) of the School of Mines and Engineering. **Albert Leroy Taylor** changed from Associate Professor in Mechanical Engineering to Associate Professor in Electrical Engineering.


Richard Burt Ketchum
Dean, Mines and Engr'g, 1925 -1938

More buildings were begun on the campus. In 1928, ground-breaking ceremonies for the Union Building were held. The building was constructed at the cost of approximately $400,000, none of which were state funds. Kingsbury Hall, the auditorium, was begun in August 1928. This was funded by an appropriation of the 1926 and subsequent legislatures at the total cost reaching over $200,000. In 1926, the legislature approved another $45,000 to construct a mining building which was built directly east of the Metallurgy Building and was to house the departments of mining and metallurgy. The 1928 legislature approved an

additional $75,000 for the completion of Kingsbury Hall, and also appropriated $100,000 for the first phase of an engineering building. In 1929, the School of Mines and Engineering joined the law, medicine, and pharmacy schools in creating a differential tuition of $23 per quarter. The rest of the University stayed at $19 per quarter.

In the Fall of 1930, Engineering Hall was completed at the cost of $100,000. This was to be the first of three units, the other two units to be built later (this never happened). Engineering Hall housed the departments of electrical and mechanical engineering and later the Dean's Office.

By 1932, the faculty in engineering had increased to 21. They were Professors **Beckstrand, Louis, Ketchum, Tugman, Lyon, Brighton**, and **Taylor,** Associate Professors **Jensen, Blake, Adams, Hamilton**, Assistant Professors **Latimer, Kidd, Cope, Haycock, Hogan, Crawford**, and Instructors **Dice, Powells, and Johnson**. In 1933, the State School of Mines and Engineering became a member of the Society for the Promotion of Engineering Education later to become the American Society for Engineering Educators (ASEE). By this time the degree of Automotive Engineering was dropped from the curriculum, as was the degree of General Engineering. However, a Bachelor of Science degree in Commercial Engineering was added. This degree combined the general engineering degree with business preparation so that students would be able to work both in administrative and commercial positions.

2. RAPID GROWTH OF ENGINEERING AND MINES

At the beginning of the 1933 school year, the president of the University of Utah was **George Thomas** and the officers and faculty of the School of Mines and Engineering were;

Dean:	**Richard B. Ketchum**
Professors:	**Elias H. Beckstrand** (ME) **Thomas Brighton** (MET) **Richard B. Ketchum** (ME) **Robert S. Lewis** (Mining & Milling) **D. Lyon** (Exp. Station) **Frederick J. Pack** (Geo) **Hyrum Schneider** (Geo & Minerals) **A.Leroy Taylor** (EE)
Assoc. Prof.:	**Thomas C. Adams** (CE) **A. Harold Blake** (ME) **J. Hugh Hamilton** (EE) **Ferdinand F. Hintze** (Geo)
Asst. Prof.:	**Wm. John Cope** (ME) **Arthur Crawford** (Ore Dressing) **Obed C. Haycock** (EE) **Mervin B. Hogan** (ME) **R. L. Kidd** (Ore Dressing) **Clara Latimer** (CE)
Lecturers:	**Otto Duke** (ME) **George Jones** (ME)
Instructor:	**Ray E. Marsell** (Geo)

Registration fees were still $10 for residents and $35 for non-residents while tuition for the School of Mines and Engineering increased to $23 per quarter compared to $48 for the School of Medicine and $20 for the rest of the university. Additional fees included $3 for the Union Building Fund, $9.25 for activities, and $2 to $3 for most lab classes in Engineering.

There were eight separate departments in the School of Mines and Engineering in 1932 with a total enrollment of 350 men and one woman out of a total university enrollment of 3,547. The number of graduates in 1933 decreased slightly over the 1932 numbers but all departments were represented. Significant increases in the numbers of graduates occurred in 1934 and 1935.

	Graduates			
	1932	1933	1934	1935
Mining Engineering	3	3	4	5
Metallurgical Engineering	0	4	4	1
Electrical Engineering	15	10	11	14
Civil Engineering	13	9	15	10
Mechanical Engineering	5	12	8	12
Chemical Engineering	0	2	2	3
Geological Engineering	0	1	2	2
Commercial Engineering	0	3	2	4
	36	34	48	51

- In 1933, the first two graduates in the Chemical Engineering (ChE) were noted. No formal department yet existed in Chemical Engineering, nor were there any classes listed as ChE classes. Most courses and faculty for ChE were in the Department of Chemistry.

- Student branches were established for four professional societies:
  American Institute of Electrical Engineers (AIEE)
  American Institute of Mining Engineers (AIME)
  American Society of Civil Engineers (ASCE)
  American Society of Mechanical Engineers (ASME)

- In June of 1934, the Federal Government deeded an additional 61 acres from the Fort Douglas Reserve to the University, increasing the campus size to 153 acres. The additional space was welcomed but the campus was still nowhere near the size envisioned by **Brigham Young** in 1850 when he proposed a campus extending east of 13th East to the mountains. Perhaps it was fortunate that this space was reserved by the government, because eventually most of it was given to the university in separate pieces as the school grew and needed to expand the campus. By the turn of the century, the campus was nearly ten times the original 153 acres of 1934.

- Prior to the beginning of the 1936-37 school year, professors **Thomas Brighton** and **D. Lyon** left the University and new assistant professors **H. O. Cowles** (Met) and **S. Frederick Ravitz** (Met. and Director of the Utah Engineering Experiment Station (UEES), replacing Prof. Lyon) were hired. Also, **Wm. John Cope** (ME) was promoted to Assoc. Prof., **Ray E. Marsell** (Geo) was promoted to Asst. Prof., and **Mervin B**. **Hogan** was promoted to Associate Professor.

- *Of Interest: The 1936 enrollment was 454 men, 1 woman out of a university enrollment of 3730.*

- The Joseph H. Merrill Memorial Loan Fund increased to $4,183.

Degrees conferred in the School of Mines and Engineering, 1936 - 1939

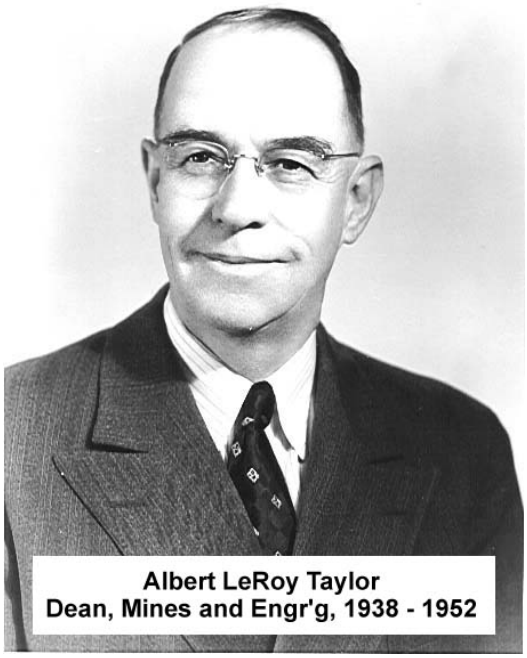
	1936	1937	1938	1939
Mining Engineering	2	4	6	8
Metallurgical Engineering	1	3	1	5
Electrical Engineering	11	13	9	13
Civil Engineering	9	8	12	9
Mechanical Engineering	10	9	6	15
Chemical Engineering	5	1	6	2
Geological Engineering	1	2	1	1
Commercial Engineering	4	4	2	2
.	43	44	43	55

The differential tuition fees for the School of Mines and Engineering were increased to $30.00 in the fall of 1938 while the fees for other schools remained the same. Also two new faculty were hired**. Ralph Baker** came into the Mechanical Engineering Department as an Assistant Professor and **Fred L. Poole** joined the Electrical Engineering Department, also as an Assistant Professor. Enrollment in the School dropped slightly to 458 students, which was about 11% of the total lower division enrollment of the University.

For the first time, five departments, Civil Engineering, Electrical Engineering, Mechanical Engineering, Mining Engineering, and Metallurgical Engineering were accredited by the *Engineers Council for Professional Development*.

1938 marked the end of two common sophomore years, one curriculum used by Civil Engineering, Electrical Engineering, and Mechanical Engineering, and another one used by Chemical Engineering, Mines, and Metallurgical Engineering. The freshman year was still common to all departments with a slight modification for Chemical Engineering in which extra chemistry replaced Analytical Drawing for Chemical Engineering students.

Sometime during 1938 or 1939, fire destroyed the south end of the Metallurgy Building (the original Met. Bldg. constructed in 1903), after which the north end, which was an addition in 1918, was refinished to house the Civil Engineering Department, leaving the Electrical and Mechanical Engineering Departments and the Deans office in the Engineering building.



Albert LeRoy Taylor
Dean, Mines and Engr'g, 1938 - 1952

Dean **Richard B. Ketchum** retired and **A.Leroy Taylor** accepted the position of Dean while retaining chairmanship of the Electrical Engineering Department. Late in 1937, the School decided to discontinue the Commercial Engineering degree so that in 1938 the phase-out of this curriculum was begun. Enrollment increased in the 1937-38 school year to 498 (still 11% of the University).

The Beginning of Television

April 20, 1939
DESERET NEWS: *New York (AP) – The advent of television, long heralded as the beginning of a new American industry, was announced today by* ***David Sarnoff****, president of Radio Corporation of America, in a television broadcast from the RCA exhibit building at the New York World's Fair grounds.*

"Today, we are on the eve of launching a new industry" Sarnoff said, "based on imagination, on scientific research and accomplishment.

"We are now ready to fulfill the promise made to the public last October when RCA announced that television program service and commercial television receivers would be made available to the public with the opening of the New York World's fair."

Eight miles away, in the RCA building at Rockefeller Center, an audience watched and heard the ceremonies. The television models on display ranged from an attachment which reproduces pictures only and which plugs into a radio set for sound, to a large console type combination television and sound radio receiver, employing a 12-inch kinescope tube. Price of the television attachment will be about $175. Complete sight and sound receivers will be priced about $300 to $600.

No mention was made of the contributions of Utah native (born in Idaho) **Filo Farnsworth,** whose work as early as 1927 demonstrated clearly the possibility of television broadcasting. At the time, Farnsworth was embroiled in lawsuits with RCA and others over the ownership of the basic television process. Eventually, he was given credit for the concepts but realized very little money for his ideas.

It wasn't until 1947 that television finally came to Utah. Several of the then existing radio stations added television capabilities to their stations. The original radio station, KZN, had changed to KSL and became one of the first to begin T.V. broadcasting. KZN began as a Deseret News sponsored radio transmitter and sent out the first radio broadcast in Utah in May of 1922, transmitting from the top of the Deseret News building. By the middle 1940's, there were six radio stations listing programming in the Deseret News: KUTA, KSL, KVNU, KOVO, KDYL and KLO.

During the 1939-40 school year, the name of the Engineering building was officially changed to Engineering Hall. Also, an extension to the Mines Building was completed, and the U. S. Bureau of Mines complex was built by the Federal Government, so that Mines and Metallurgical Engineering and the Utah Engineering Experiment Station occupied all of the Mines Building.

New faculty members **A. Diefendorf** (Professor, CE) and **L. Dale Harris** (Instructor, EE) were hired and **Mervin B. Hogan** was promoted to Professor in Mechanical Engineering. Enrollment increased to 544, increased by 1 to 545 in 1941 and surged to 659 (16% of the University total) in 1942. The Second World War took its toll as young men were drafted into the service. By 1943 enrollment dropped to 420 and hit bottom at 210 in 1944, which was less than 6% of the University total.

President **George Thomas** signified his desire to resign in November of 1941. After much deliberation and the screening of 77 names, the Board of Regents elected Dr. **Leroy E. Cowles**, a Utah native, as president of the University. He took charge of his office November 15, 1941 and was inaugurated on April 26, 1942. His was the heavy responsibility of leading the University through the difficult years of World War II.

Advisory Boards were created by Mines, Metallurgy, Electrical, Civil and Mechanical Engineering departments to counteract the reduced size of the faculty. The Bulletin of the University of Utah for 1942-43 lists the faculty as follows:

University President: **LeRoy E. Cowles**

Dean: **A. Leroy Taylor**

Professors:
* **Walter D. Bonner** (Chem., ChE)
* **William J. Cope** (ME)
A. Diefendorf (CE)
* **Ferdinand F. Hintze** (Geo)
* **Mervin B. Hogan** (ME)
* **John R. Lewis** (Chem., ChE)
Robert S. Lewis (Mines)
* **Hyrum Schnieder** (Geo)
A.LeRoy Taylor (EE)

Assoc. Prof.:
* **Ralph D. Baker** (ME)
A. Harold Blake (ME)
. **Obed C. Haycock** (EE)
* **S. Frederick Ravitz** (Met)

Asst. Prof.:
H. O. Cowles (UEES)
Arthur Crawford (Ore Dressing)
Carl M. Dice (Met)
Howard J. Hassell (ME)
Douglas K. Jones (CE)
Clara Latimer (CE)
Ray E. Marsell (Geo)
Robert H. Hull (EE)
* **George Selfridge** (Geo)

R. L. Sloane (CE)
* **Bronson F. Stringham** (Geo)

.Instructor: * **George V. Beard** (Chem, ChE)
George W. Carter (ME)
L. Dale Harris (EE)
Mack S. Kesler (CE)

* indicates earned Ph.D. or D.Sc. Degree.

Degrees conferred in the School of Mines and Engineering, 1940 through 1946

	1940	1941	1942	1943	1944	1945	1946
Chemical Engineering	1	3	8	6	12	4	0
Civil Engineering	7	19	8	13	15	3	2
Commercial Engineering	3	0	1	0	0	0	0
Electrical Engineering	11	15	5	7	18	4	4
General Engineering	0	0	0	0	1	0	0
Geological Engineering	1	0	0	1	0	0	0
Mechanical Engineering	13	16	16	27	24	2	7
Metallurgical Engineering	5	7	4	5	3	0	2
Mining Engineering	4	4	4	1	3	0	1
Totals	46	64	46	60	84	13	16

Number of students registered/Percentage of total U of U registration 1939 through 1945

	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45
School of Mines and Eng'rg/ Percentage of U of U registrations	498/11%	544/12%	545/13%	659/16%	420/12%	210/6%

Departments of instruction and their heads 1944-45

Chemistry (Chemical Engineering)	**Walter D. Bonner**
Civil Engineering	**A. Diefendorf**
Electrical Engineering	**A. LeRoy Taylor**
Geology	**Hyrum Schneider**
Mechanical Engineering	**William J. Cope**
Metallurgical Engineering	**John R. Lewis**
Mining Engineering	**Robert S. Lewis**

New hires for the 1944-45 school year were:

J. Hugh Hamilton, Professor and Director of UEES
Arthur A. Center, Professor and Head, Mining & Metallurgical Research
George Minard, Asst. Professor, Chemical Engineering
Roscoe H. Wolley, Instructor, Mechanical Engineering

Transferred from Chemistry to Metallurgical Engineering was:
John R. Lewis, Professor and department head.

Promotions included the following:
George W. Carter, to Asst. Prof., Mechanical Engineering
L. Dale Harris, to Asst. Prof., Electrical Engineering
Robert H. Hull, to Assoc. Prof., Electrical Engineering

- The *David H. Christensen Loan Fund for Engineering Students* was created by a gift of $1000 from the Christensen Construction Company. This fund and the *Joseph Hyde Merrill Memorial Loan Fund* are the only two of 22 loan funds that are specified for Engineering Students only. Ten of the other 20 are open to all students.

- The differential tuition in the School of Mines and Engineering rose to $30 compared to $22 for all others except Business ($23), Law ($41) and Medicine ($135).

The Utah "RT" (Radio Technician) Training Group[1]

With the Draft in place, many of the students at the University, including 95 in the School of Mines and Engineering, had been given 2A deferments to allow them to complete their technical training. On April 4, 1944, Selective Service Memorandum 115 was issued canceling this deferment except for those who would graduate by July 1, 1944. The day after this memorandum was received by the University of Utah administration, engineering students arrived at their classrooms to find them closed and a note directing them to meet with Dean **A. Leroy Taylor** in P.S. 104. There the Dean informed the students of the change in their draft status and that they would be drafted (probably into the Army Infantry) unless they voluntarily joined another Service. He suggested that because of their technical training they would probably qualify for the Navy's Radio Technician Training Program. Taking his advice, 49 engineering and mines students calling themselves the Utah RT Gang enlisted in the Navy, qualified for the Radio Technician (RT) training program and, according to one of the group members, **Dr. Richard Grow,** "went home without any homework for a change". Besides Dr. Grow (EE), the group included three other future faculty members, **Ivan B. Cutler** (Ceramics), **Dale L. Salt** (ChE) and **Ted C. Smith** (Sociology).

[1] From the Fiftieth Anniversary Reunion record of the Navy 1944 Utah RT Group

On April 19, 1944 all 49 were sworn into the Navy and left the next day for boot camp at the U.S. Navy Radio Technician training school in Chicago in two WWII troop transport rail cars pulled behind the Burlington Zephyr streamliner. The group remained together through boot camp and the 4-week Pre-Radio course in Chicago. After finishing the Treasure Island Radio Material school, the group was scattered to individual assignments. Most of them returned to the University of Utah and completed their studies in engineering and mines.

3. POST-WAR ERA BRINGS GROWTH AND CHANGE

As might be expected, the war took a significant toll on the enrollment at the University of Utah and in the engineering school particularly. Engineering enrollment dropped from 420 in the 1943-44 school year to 210 in the 1944-45 school year while the university totals dropped from 3693 to 3418 in the same school years. This meant little or no change in the faculty with the exception of a few advancements. In 1945 **Howard J. Hassell** (ME) was promoted to Assistant Professor, **George Selfridge** (Geo) was promoted to Associate Professor, and **Bronson F. Stringham** (Geo) advanced to Assistant Professor. Tuition increased to $37 for the Mines and Engineering school and $27 for the University in general.

The 1945-46 school year brought the first break in the heretofore "common core" freshman year for mines and engineering students. The curricula in Chemical Engineering, Geology, Mining Engineering, and Metallurgical Engineering were modified to replace Speech (2 hrs.) and Advanced Drawing (3 hrs.) with a third quarter of Chemistry (5 hrs.)

The Placement Bureau was elevated to a division as **Herald L. Carlston** was named Director in 1944. The Bureau began in 1936 (with Carlston as the head of the bureau) as a vehicle to help place teachers in joB.S. upon graduation from the Normal school and began to place other University graduates in commercial positions as well as coordinate part-time work opportunities for students. Under the direction of Carlston, the Bureau grew significantly during the next 20 years, expanding corporate recruiting services and job opportunities for graduating students and alumni. The placement services of the Bureau became invaluable to Mines and Engineering graduates as the numbers of graduates increased dramatically after the War and more and more graduates had to find joB.S. outside the State.

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The retirement of President **LeRoy E. Cowles** and the appointment of a new President on Jan 1, 1946 was to have an enormous effect on the School of Mines and Engineering. President **A. Ray Olpin** graduated with a science degree from B.Y.U. in 1925 and accepted an appointment to the technical staff of Bell Telephone Laboratories. During the 8 years that he was at the laB.S., he completed a Ph.D. degree in Physical Science at Columbia University. He then directed research divisions at Kendall Mills in North Carolina and at Ohio State University before coming to the University of Utah as President. His agenda included:

Buildings and space to accommodate the swell of post-war enrollment
Reorganization and faculty expansion
Campus planning and building construction
Research and Graduate work

BUILDINGS AND SPACE

The huge influx of students post-war included large numbers of war veterans so that it was appropriate that the Army come to the rescue to help with the space problem. The University first leased land and buildings from Fort Douglas in 1946. The following year, the Fort was partly deactivated as a military installation and a large part of the post was declared surplus. Under Pres. Olpin's direction, the University applied for the buildings and property and by October, 1948, received title to nearly 300 acres of land, 59 buildings on the land and 45 buildings "off site" to be moved to University property. This brought the total area of the University to just under 447 acres, nearly equal to that which **Brigham Young** originally intended for his University of Deseret in 1850.

The surplus buildings were quickly remodeled into classrooM.S., offices, laboratories, and support spaces. The largest of these, Building 105, was converted into "temporary" classrooM.S. and offices and immediately put to use. Civil Engineering moved their drawing and surveying laboratories and offices for the faculty involved into this building in 1947. Affectionately labeled the Annex, this "temporary" building is still in use 50 years later! By 1950 the new Chemical Engineering department had moved into Building 437 and the Electrical and Mechanical Engineering departments took over Buildings 513 and 514 for research work. About 30 of the temporary buildings were brought together to form Stadium Village, providing living quarters for married students.

REORGANIZATION AND FACULTY EXPANSION

Within a month of his taking office, President Olpin set about to separate the Engineering departments from the Mines and Metallurgical and Geology departments by creating the School of Engineering and the School of Mines and Mineral Industries. The School of Mines and Mineral Industries was organized into three divisions with **Dr. Carl J. Christensen** as the Dean:

Division of Earth sciences:
- Department of Geology
- Department of Geography
- Department of Geophysics
- Department of Meteorology
- Department of Mineralogy

Division of Mineral Engineering:
- Department of Mining

Division of Mineral Technology:
- Department of Metallurgy
- Department of Ceramics
- Department of Fuel Technology

The School of Engineering

The new School of Engineering retained **A. LeRoy Taylor** as dean and consisted of four engineering departments:

Department of Civil Engineering
Department of Chemical Engineering
Department of Electrical Engineering
Department of Mechanical Engineering

The size of the faculty had to be increased three-fold to handle the burgeoning enrollment in Engineering. For example, the 1945-46 enrollment in the combined schools was 582. The next year enrollment in the School of Engineering increased to 1259 and enrollment in the School of Mines and Mineral Industries was 89. The faculty listing for the new School of Engineering in the 1947-48 Bulletin included the 33 men named below:

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THE SCHOOL OF ENGINEERING FACULTY, 1947-48

Dean: **A. LeRoy Taylor**

Chemical Engineering: **Elton LeRoy Quinn**, Prof. Chemistry, Ph.D.
George W. Minard, Asst. Prof., Ph.D.

Civil Engineering: **A. Deifendorf**, Chair, Prof., CE
Harold Carter, Prof., CE
Richard L. Sloane, Assoc. Prof., M.S.
James R. Barton, Asst. Prof., M.S.
Mack S. Kesler, Instr., B.S.
W. V. Brinegar, Instr., M.A.
Joseph J. Brubaker, Instr., B.S.
Grant K. Borg, Instr., B.S.
Preston D. Linford, Instr., M.S.
Edwin C. Nordquist, Instr., B.S.
Ralph D. Rees, Instr., B.S.
Robert L. Sanks, Instr., B.S.

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- **Norman W. Ryan** joined the Chemical Engineering department as Associate Professor and **Willis L. Emery** was hired by the Electrical Engineering department as an Associate Professor in 1949.
- By 1949, all Engineering departments offered the Master's and Ph.D. graduate degrees. The first Ph.D.'s in the Engineering departments were:

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- With the advent of more funded research, the numbers of Masters Degrees began to increase significantly.

Number of Masters Degrees

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1948		5	2	
1949	3	16	5	
1950	2	6	7	2
1951	1	5	5	
1952	1	2	3	1
1953	2		1	
1954		3	10	
1955		6	5	1

- The differential tuition for students in the College of Engineering and the College of Mines and Mineral Industries was abolished in 1949. The tuition for most of the University increased to $37.00 plus registration, building and student activities fees so that the total cost for Autumn Quarter, 1949 came to $60.00. The Colleges of Law and Medicine continued to charge differential tuition.
- The common first year curriculum for all engineers remained essentially unchanged through the previous two decades. It consisted of:

  3 qtrs. of Math – trigonometry, college algebra, analytical geometry ……...13 hrs
  3 qtrs. of English/speech…… 9 hrs
  3 qtrs. Chemistry……..15 hrs
  3 qtrs. Civil Engrg. – engineering drawing, descriptive geometry…….. 9 hrs
  3 qtrs. Health and physical education…… 3 hrs
  2 qtrs. General Education and Engineering orientation……..2 hrs

  In 1945, Political Science 50 (5 hrs) was added as a requirement. All departments dropped the third quarter of Chemistry to accommodate this addition except Chemical Engineering which dropped the second quarter of Engineering Drawing. By 1949 another class called Engineering Problems and Slide Rule (1 hr.) was added to the freshman year.
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measurements on the ionosphere using Radio Frequency transmitters and receivers transmitting between sounding rockets and the ground. Initially the vehicles used were V-2 rockets salvaged from Germany after the close of World War II. The research team included Prof. **Ray L. Doran** (Physics) and Professors **Obed C. Haycock** and **M. E, VanValkenburg** (Electrical Engineering) and students from both departments. The team prepared instrumentation and participated in their first V-2 Launch at White Sands Proving Ground on March 21, 1949. Of the five V-2 launches in 1949, 1950, and 1951, four misfired or blew up and there was equipment failure on the fifth. Only after switching to the *Aerobee* sounding rocket did the team finally obtain ionospheric data in January of 1953.

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In the 25 years at the University of Utah, 130 students were involved and supported, 170 rockets were flown, instruments were flown on 21 Earth satellites, and 11 instrument packages were ejected from Atlas and Titan II missiles.

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3. POST-WAR ERA BRINGS GROWTH AND CHANGE

As might be expected, the war took a significant toll on the enrollment at the University of Utah and in the engineering school particularly. Engineering enrollment dropped from 420 in the 1943-44 school year to 210 in the 1944-45 school year while the university totals dropped from 3693 to 3418 in the same school years. This meant little or no change in the faculty with the exception of a few advancements. In 1945 **Howard J. Hassell** (ME) was promoted to Assistant Professor, **George Selfridge** (Geo) was promoted to Associate Professor, and **Bronson F. Stringham** (Geo) advanced to Assistant Professor. Tuition increased to $37 for the Mines and Engineering school and $27 for the University in general.

The 1945-46 school year brought the first break in the heretofore "common core" freshman year for mines and engineering students. The curricula in Chemical Engineering, Geology, Mining Engineering, and Metallurgical Engineering were modified to replace Speech (2 hrs.) and Advanced Drawing (3 hrs.) with a third quarter of Chemistry (5 hrs.)

The Placement Bureau was elevated to a division as **Herald L. Carlston** was named Director in 1944. The Bureau began in 1936 (with Carlston as the head of the bureau) as a vehicle to help place teachers in joB.S. upon graduation from the Normal school and began to place other University graduates in commercial positions as well as coordinate part-time work opportunities for students. Under the direction of Carlston, the Bureau grew significantly during the next 20 years, expanding corporate recruiting services and job opportunities for graduating students and alumni. The placement services of the Bureau became invaluable to Mines and Engineering graduates as the numbers of graduates increased dramatically after the War and more and more graduates had to find joB.S. outside the State.

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The retirement of President **LeRoy E. Cowles** and the appointment of a new President on Jan 1, 1946 was to have an enormous effect on the School of Mines and Engineering. President **A. Ray Olpin** graduated with a science degree from B.Y.U. in 1925 and accepted an appointment to the technical staff of Bell Telephone Laboratories. During the 8 years that he was at the laB.S., he completed a Ph.D. degree in Physical Science at Columbia University. He then directed research divisions at Kendall Mills in North Carolina and at Ohio State University before coming to the University of Utah as President. His agenda included:

Buildings and space to accommodate the swell of post-war enrollment
Reorganization and faculty expansion
Campus planning and building construction
Research and Graduate work

BUILDINGS AND SPACE

The huge influx of students post-war included large numbers of war veterans so that it was appropriate that the Army come to the rescue to help with the space problem. The University first leased land and buildings from Fort Douglas in 1946. The following year, the Fort was partly deactivated as a military installation and a large part of the post was declared surplus. Under Pres. Olpin's direction, the University applied for the buildings and property and by October, 1948, received title to nearly 300 acres of land, 59 buildings on the land and 45 buildings "off site" to be moved to University property. This brought the total area of the University to just under 447 acres, nearly equal to that which **Brigham Young** originally intended for his University of Deseret in 1850.

The surplus buildings were quickly remodeled into classrooM.S., offices, laboratories, and support spaces. The largest of these, Building 105, was converted into "temporary" classrooM.S. and offices and immediately put to use. Civil Engineering moved their drawing and surveying laboratories and offices for the faculty involved into this building in 1947. Affectionately labeled the Annex, this "temporary" building is still in use 50 years later! By 1950 the new Chemical Engineering department had moved into Building 437 and the Electrical and Mechanical Engineering departments took over Buildings 513 and 514 for research work. About 30 of the temporary buildings were brought together to form Stadium Village, providing living quarters for married students.

REORGANIZATION AND FACULTY EXPANSION

Within a month of his taking office, President Olpin set about to separate the Engineering departments from the Mines and Metallurgical and Geology departments by creating the School of Engineering and the School of Mines and Mineral Industries. The School of Mines and Mineral Industries was organized into three divisions with **Dr. Carl J. Christensen** as the Dean:

Division of Earth sciences:
- Department of Geology
- Department of Geography
- Department of Geophysics
- Department of Meteorology
- Department of Mineralogy

Division of Mineral Engineering:
- Department of Mining

Division of Mineral Technology:
- Department of Metallurgy
- Department of Ceramics
- Department of Fuel Technology

The School of Engineering

The new School of Engineering retained **A. LeRoy Taylor** as dean and consisted of four engineering departments:

Department of Civil Engineering
Department of Chemical Engineering
Department of Electrical Engineering
Department of Mechanical Engineering

The size of the faculty had to be increased three-fold to handle the burgeoning enrollment in Engineering. For example, the 1945-46 enrollment in the combined schools was 582. The next year enrollment in the School of Engineering increased to 1259 and enrollment in the School of Mines and Mineral Industries was 89. The faculty listing for the new School of Engineering in the 1947-48 Bulletin included the 33 men named below:

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THE SCHOOL OF ENGINEERING FACULTY, 1947-48

Dean: **A. LeRoy Taylor**

Chemical Engineering: **Elton LeRoy Quinn**, Prof. Chemistry, Ph.D.
George W. Minard, Asst. Prof., Ph.D.

Civil Engineering: **A. Deifendorf**, Chair, Prof., CE
Harold Carter, Prof., CE
Richard L. Sloane, Assoc. Prof., M.S.
James R. Barton, Asst. Prof., M.S.
Mack S. Kesler, Instr., B.S.
W. V. Brinegar, Instr., M.A.
Joseph J. Brubaker, Instr., B.S.
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4. 1950 TO 1960 - A DECADE OF REAL GROWTH

In the school year 1950-51, enrollment in the College of Engineering dropped to 665, consistent with a drop in the University to 8108 for the regular school year. Some of this drop was to be expected as the bolus of veterans graduated. Still some faculty began to look for other reasons that more students were not electing Engineering studies. Technology was rapidly expanding and the curricula were extended to keep up to date. Program requirements had been steadily rising until by 1951 all departments were requiring between 211 and 215 quarter-hours for graduation. This was about 30 hours more than the rest of the University required. For example, the minimum hours required for graduation in the University College and the Colleges of Business, Education, Fine Arts and Nursing were 183. The program requirements, in hours, for the College of Engineering are shown below by department and year.

1951 PROGRAM REQUIREMENTS BY DEPARTMENT AND YEAR

Year	ChE	CE	EE	ME
Freshman	53	53	53	53
Sophomore	54	53.5	55	53
Junior	54	54.5	54.5	54
Senior	54	53.5	49.5	51
Totals	215	214.5	212	211

The administration and many faculty began to discuss ways to decrease the required hours for graduation and still find room for the new technologies beginning to surface. The first transistor was brought to the campus by Prof. **Philip Weinberg**, in the Electrical Engineering department. Analog computing was being applied to many systems and control problems in all four engineering departments. More mechanical and electrical elements and components were being characterized using advanced calculus and differential equations. The discovery of the principles of Radar during the Second World War led to higher power and higher frequency electronic communications and instrumentation. New chemicals and plastics were rapidly being commercialized. The atom bomb opened the nuclear age leading to the call for training of Nuclear Engineers. Electronic digital computing was a reality, creating a whole new industry and a new discipline in engineering and science.

The need to do something with the curriculum was strengthened by a further decline in enrollment to 591 (including two women) in the 1951-52 school year. The University acted to increase interest in graduate work by offering through the University Research committee 30 research fellowships that paid $800 for first year graduate students, $1000 for second year students and $1200 for third year students. In addition, there were two privately

sponsored fellowships, the Charles Boettcher fellowship for a C.E. graduate student ($1000) and the W.W.Clyde fellowship for any Engineering student ($1000). The Utah Engineering Experiment Station also offered several fellowships for engineering graduate students. Scholarships available exclusively for undergraduate engineering students were:

Josephine Beam, variable number, up to $500 for any one student
John B. Koch, $250
Associated General Contractors (Intermountain Section) $250
William E. Ryberg (Utah Sand and Gravel Products Co.) $200

In addition to the scholarships, there were 31 separate loan funds for students at the University, many designated for specific departments or disciplines. Two were restricted to engineering students:

Joseph Hyde Merrill Memorial Loan Fund
David H. Christensen Loan Fund

The enrollment numbers for the 1952-53 school year increased to 683 (including 3 women). However the faculty continued to discuss ways to include the new technologies in the curriculum and also decrease the required hours for graduation. They looked at decreasing the non-engineering required courses such as English, Health and Physical Education, Economics, Political Science, Liberal Education and basic science courses such as Chemistry and Physics. Another alternative involved the movement of some of the freshman courses back to the high schools, making them entrance requirements for the college. The most likely candidates for such a move were the freshman math courses (trigonometry, college algebra and geometry) and the drawing classes.

Plans for revamping the curricula were temporarily halted in 1952 when the new requirements for the General Education Program were introduced. The University-wide program required the following of all students:

	1 hour	General Education Seminar--	freshman orientation
	9 hours	Basic Communication--	three classes of basic comm. or English
	3 hours	Phys. Ed. and/or Mil. Sci.--	three courses
	1 hour	Health Ed.--	one course
	36 hours	Area Requirements--	9 hours in each of four areas:
Total	41 hours		(1) Biological Sciences
	(32 for Engineering students)		(2) Humanities
			*(3) Physical Sciences
			(4) Social Sciences

*Automatically filled by Engineering students

In 1952, **A. LeRoy Taylor** retired as dean of the College of Engineering, and, continuing his emphasis on strengthening research in the University, President Olpin appointed Dr. **Samuel S. Kistler** as the new dean of the College of Engineering. Dean Kistler received the Ph.D. in Physical Chemistry from Stanford in 1929. His early experience included advanced studies at the Kaiser-Wilhelm Institute in Berlin, engineering

with Standard Oil of California, faculty positions at the College of the Pacific and the University of Illinois, and research at the Norton Company where he became Director of Research in 1949. During his first year at the University, Dean Kistler appointed **L. Dale Harris** as only the second Head of the Electrical Engineering department, and **Mervin B. Hogan** replaced **William Cope** as Head of the Mechanical Engineering department.


Samuel S. Kistler
Dean, Col. of Engr'g, 1952 -1964

- In 1951, the first course in computers was added to the Graduate program in Electrical Engineering and covered principles of analog and digital computing.
- In 1953 tuition fees increased to $50 (double for non-resident students) for 11 to 18 quarter hours with a sliding decrease for 10 hours ($37) down to 6 hours ($25)
- Chemical Engineering received accreditation by the Engineers Council for Professional Development (ECPD)

Pres. Olpin reorganized his staff in 1953. Already in place were **Paul W. Hodson** as Assistant to the President, **Parry D. Sorensen** as Director of Public Relations, and **Jacob Geerlings** as the Dean of the Faculty. **G. Homer Durham** became the first Vice-President for Education and **Elmo R. Morgan** was appointed Vice-President for Business. President Olpin continued to chair the Deans Council and the Faculty Council with the Vice-Presidents joining these two councils as ex-officio members.

- In 1954 the course Political Science 50 was dropped as a required class in the common freshman year curriculum and replaced by a General Education elective. Chemical Engineering continued to require Chemistry 6 instead of the General Education elective.
- Areas of specialization began to reflect the new technologies and research emerging in the departments. Those listed in the 1954-55 University Bulletin were:

  EE: Electronics, radio, television, servomechanisms, communications, power, radar. (To allow for specialization, students could choose up to18 hours of free technical electives, 9 of which were to be in EE)

  ME: Aeronautical, design, management, power. (Students were allowed 8 or 9 free technical electives with which to specialize.)

  CE and **ChE** both had completely specified programs with no free technical elective hours.
- The 1953-54 enrollment increased to 701 including three women, giving the College of Engineering about 10% of the total enrollment of the University.

Dean Kistler intensified the push for a new building to house the College of Engineering, and recognized that he may have to find alternative ways to finance the construction. One suggestion came in an article in the *Data Sheet* (Vol. 4, Oct. 16, 1953). He wrote:

Twenty-three years ago when Engineering Hall was constructed, it was the plan to build another wing of the same style and floor area where the observatory now stands (directly north of E.H.), and a connecting structure with substantial laboratory and office space in it. The expectation was that the State would finance this much needed addition to the State College of Engineering in order to bring all departments together and give them adequate facilities for instruction and research. In the interim, the succeeding Deans have revised these plans in the hope of getting action. It was a project close to Dean Taylor's heart.

Not only were the plans not realized, but Engineering Hall proved to be the last building on the University campus financed by the State, and to be practical, we must face the possibility that the State, in the near future, will not look more favorably upon supporting a new structure for the engineers than it has in the past. Certainly every opportunity and encouragement will be given to the Legislature to meet our great need for suitable accommodations, but it seems wise to plan on other means of financing the structure.

Dean Kistler went on to suggest that corporations take some fiscal responsibility for the continued operations of the educational units that provide them with the trained graduates necessary for the corporation's continued viability and profitability. He recommended that each corporation give a University $3000.00 for each technically trained graduate that they obtain from it. Translated into local terms, the 112 engineers of the 1953 graduating class would have brought $336,000.00 into the College. The estimated cost for Phase 2 of Engineering Hall had risen to nearly $1,000,000.00 which could have been raised in three years if his plan had been implemented.

The Dean's plan for private financing never received much support from industry, and so more pressure was applied to the State for a new building for Engineering. Also, plans to build Phase II of Engineering Hall were dropped in favor of a completely new complex that would comprise of a large 2-story laboratory and research building and an adjoining 7-story office and classroom building. The grand plan was to bring all laboratories, research labs, offices and classrooms together in the Engineering complex on the north side of the campus. The need for more space intensified as the enrollment burgeoned from 683 regular full-time undergraduate students in the 1952-53 school year to nearly double that (1230) in the 1956-57 school year.

The 1955-56 University of Utah Bulletin listed the following laboratories associated with the four departments in the College:

CHEMICAL ENGINEERING:

General Laboratory	Building 437
Physical Measurements Laboratory	Building 437

CIVIL ENGINEERING:

Surveying Laboratory	Annex
Structures Laboratory	CE Building
Hydraulics Laboratory	13th East Reservoir
Concrete Materials Laboratory	CE Building

Bituminous Materials Laboratory	CE Building
Sanitation Laboratory	CE Building
Soil Mechanics Laboratory	CE Building
Highway Materials Laboratory	CE Building

ELECTRICAL ENGINEERING:

General Machines Laboratory	EH
Standards Laboratory	EH
Electronics Laboratory	EH
Servomechanisms Laboratory	EH
Electronics Measurements Laboratory	EH

MECHANICAL ENGINEERING

Aeronautical Laboratory	ME Building
Heat Power Laboratory	ME Building
Materials Testing Laboratory	ME Building
Photo Elasticity Laboratory	ME Building
Shop Laboratories	ME Building

Dean Kistler argued that Engineering was spread all over the campus, making it difficult for students to get to classes in a timely manner (it was nearly a mile from the Annex to EH). Many labs and offices were located in ancient facilities. Chemical Engineering was in a WWII surplus building on the southern edge of the campus. Part of Civil Engineering was in the CE building, which was formerly the 1914 addition to the Metallurgical building built in 1904. The original Metallurgical building burned in the 1930's and the addition was saved and remodeled for the Civil Engineering department. The Mechanical Engineering labs were mostly in the ME building, part of which was built in 1903 and other parts built on over the next decade. Many research projects were forced into other surplus buildings on the eastern edge of the campus. Pressure was mounting for new facilities for the College of Engineering.

- In 1954, Mechanical Engineering offered its first course in Nuclear Engineering taught by **Wayne Brown**.
- **Armand J. Eardley** became the Dean of the State College of Mines and Mineral Industries, replacing **Carl J. Christensen** who became the first Director of Cooperative Research.
- In 1955, Chemical Engineering added the Nuclear Option to its undergraduate program, allowing students to take several Nuclear classes from the Physics department.
- Chemical Engineering also added a Fundamentals Option, heavy on Physics and Physical Chemistry, and a Petroleum Option to its undergraduate curricula.
- In 1956, **Adelbert Diefendorf** retired to Emeritus status and **Grant Borg** was made head of the Civil Engineering department.
- Also, **Arlo F. Johnson** succeeded **Mervin B. Hogan** as Head of the Mechanical Engineering department.
- The 1955-56 daytime undergraduate enrollment increased to 962 with 3 women, 11.5% of the University daytime undergraduate enrollment.

- In 1956, the first required courses in analog and digital computing were added to the EE undergraduate program and were taught by **Robert E. Stephenson**.

FACULTY LISTING - 1956-57 SCHOOL YEAR

Dean, College of Engineering: **Samuel S. Kistler**, Ph.D., Professor of Chemical Engineering

Chemical Engineering:	**E.B.Christiansen**, Ph.D., Professor and Head
Associate Professor:	**Norman W. Ryan**, Sc.D.,
Assistant Professor:	**Dale L. Salt**, Ph.D.
Civil Engineering:	**Grant K. Borg**, M.S., Associate Professor and Head
Associate Professors:	**Garnett Littlefield**, M.S.
	Mack S. Kesler, M.S.
	Ralph L. Rollins, Ph.D.
Assistant Professors:	**Robert L. Sanks**, M.S.
	Preston D. Linford, M.S.
	Edwin C. Nordquist, M.S.
	Neal E. Wood, M.Ed.
	Calvin G. Clyde, Ph.D.
	Horace Glidden, B.S.
Instructors:	**Clifford G. Bryner**, B.S.*
	John A. Nicholayson,
Electrical Engineering:	**L. Dale Harris**, Ph.D., Professor and Head
Professors:	**Obed C. Haycock**, M.S.
	Robert E. Stephenson, Ph.D.
Associate Professor:	**Morris M. Christensen**, M.S.
Associate Research Professor:	**William S. Partridge**, Ph.D.
Assistant Professors:	**Seymore B. Hammond**, M.S.**
	Philip Weinberg, M.S.
	Charles Alley, M.S.**
	Clay D. Westlund, M.S.**
Instructors:	**Kenneth Atwood**, M.S.**
	John C. Clegg, M.S.**
	Raymond C. Davidson, M.S.**
	Dietrich K. Gehmlich, M.S.**
	Charles W. Simmonds, M.S.
Mechanical Engineering:	**Arlo F. Johnson**, Ph.D., Professor and Head
Professors:	**Ralph D. Baker**, Ph.D.
	Mervin B. Hogan, Ph.D.
Associate Professors:	**William P. Barnes**, M.E.
	Lee M. Olsen, M.S.
	Raymond V. Smith, M.S.
Assistant Professors:	**Wayne S. Brown**, M.S.**

	Philip C. Pfister, M.S.
Instructors:	**Edmund W. Matrejek**, B.S.
	Donald J. Mayhew, M.S.

*--Working on M.S. degree
**--Working on Ph.D. degree

- In 1957, tuition increased by $10 per quarter to $60.00 per quarter, double that for out-of-state students.
- ChE, CE, and ME established optional 5-year extended programs that allowed the student to spread the first two years over three years allowing greater flexibility in scheduling specialty courses, and reduced load for those who had to work, make up high school deficiencies, or participate in R.O.T.C. The Electrical Engineering department did not prescribe a specific 5-year plan but counseled students about which courses were "keystone" courses and which courses students could postpone without serious consequences, allowing students to work out their own extended programs.
- Mechanical Engineering added a Science Option to the undergraduate program, which was heavy in Math and Physics electives.
- All departments enforced the requirement of a "C" or better grade for basic groups of courses and a "C" or better average in all lower division (dual enrollment) classes before being admitted to upper division status.
- As enrollments in lower division soared, faculty and space were in short supply forcing the Dean to request that the faculty be allowed to officially limit admissions to upper divisions.
- In 1957, the EE department offered the first undergraduate course in transistors taught by **Ken Atwood**.
- The Utah Engineering Experiment Station was moved administratively from the College of Engineering to the Office of Cooperative Research, **Hugh Hamilton** (EE department) resigned as director, replaced by **Carl J. Christensen**.
- Enrollment of full-time undergraduate students in the College of Engineering in 1957-58 soared to an all-time high of 1330 students.

During 1956 significant pressure was put on the Legislature by the University to begin a building program to satisfy the ever-increasing demands placed on the facilities of the campus by the rising numbers of students. Led by **Elmo R. Morgan**, Vice-President for Business (a civil engineer), Pres. Olpin and the Dean's office, the University's team finally convinced the Legislature of the need for new construction in several areas beginning with the Engineering Center. The 10-year building plan proposed by the University was the most ambitious ever seen in the state and, understandably, the Legislature was hesitant to fully fund the plan all at once. **Paul Hodson** described the atmosphere at the State House and at the University in his book "*Crisis on Campus*" (Keeban Corporation, 1987), pp 19, 20, as follows

"Two items are of significance: one, announcement that a ten-year building program would be prepared; and two, that while building and planning seemed to be under way, we were actually faltering, patching here, building piecemeal there.

For example the Engineering Center had been broken up by the Legislature into three phases with funds appropriated for the first phase only. Picture, if you will, having approximately one-third of the funding for a project! The site was selected by leap-frogging over the thirteen acres belonging to the U.S. Bureau of Mines to the Fort Douglas land north of the main campus, which had been deeded over by the government in 1948. It was literally out in the boondocks. It meant long-extended utility lines. Furthermore, since much of a laboratory cost is in the utilities and equipment – in other words, mostly in the basement – a disproportionate chunk of money had to be spent in the beginning.

The citizenry, largely, was critical of the site selection and mistrustful of the judgement being shown. The future would show that we had selected the correct site, but the whole problem lay in thinking too small and refusing to consider a state general obligation bond as the solution. The fact the Russians had launched Sputnik, the first orbiting satellite, in the fall of 1957 made it possible to dramatize the need."

The Legislature had broken the laboratory and research building into three phases and did not consider at all the "4th phase", which was to have been the classroom and office building. Therefore, the plans for the use of the new building had to include "temporary" classrooms and all the offices for faculty and staff. The first money for the building was awarded in the appropriations bill passed on February 27, 1957, to be available July 1st. The parts of the appropriations act relating to the University were:

1. For addition to the central heating plant	$150,000
2. For constructing an operable unit of an education building	$1,500,000
3. For constructing an operable unit of an engineering building	$1,300,000
4. For furnishing Orsen Spencer Hall, grading, landscaping	$1,150,000
5. For initial planning and construction of Medical Center	$1,500,000
6. Matching funds for the Salt Lake Theatre replica	$500,000

The Legislature at that time met every two years, so funding for Phase II of the Engineering Center came in 1959 along with funds for Bennion Hall, new Physics facilities, the medical center, a new Law building and Phase I of a business building. Construction of Phase I began late in 1957 with a scheduled completion date of fall, 1959. Dedication was delayed till spring of 1960 so that even before Phase I was finished, work commenced on Phase II.

- In 1958, **Ralph D. Baker** replaced **Arlo F. Johnson** as Head of the Mechanical Engineering department.
- The College of Engineering obtained it first digital computer, a Datatron 205 Electronic Computer, housed it on the second floor of Engineering Hall, and established the University of Utah Computer Center under the direction of **Robert E. Stephenson**, Electrical Engineering department. At the time the specifications of the machine were impressive. Storage on a magnetic drum was 4,080 ten-digit numbers and the "electronic brain" could add 300 ten-digit numbers in a second. Much of the data input and output was via IBM data cards and output could also be printed at the rate of 16,000 digits per minute. With the addition of a floating-point control unit to the computer in 1959, the range of numbers the machine could handle was from $.00000001 \times 10^{-50}$ to 99999999×10^{49}. **Dr. Robert E. Stephenson**, Director of the

Computer Center predicted that "one day students will no longer stand in long lines for University of Utah registration. The computer will prepare the schedule and assign sections". The computer was already being used in computations for off-campus firms and on-campus research projects and for the computation of the University payroll, calculations of student grade-point averages, and correction of some mark-sense examinations. The assistant director of the Center was **Miss Dee Morgan** and operations and maintenance was under **Joe Rice**.

- Also in 1958, the Institute of Metals and Explosives Research was established by **Melvin A. Cook**. Some faculty and students in ME and EE were involved in several research projects carried out by the Institute.
- In 1959**, Elmo R. Morgan** left the University and **Paul W. Hodson** became Business Vice-President. **Neal A. Maxwell** replaced Hodson as Assistant to the President. Hodson continued the efforts begun by Morgan to create a master plan for the campus and obtain funding for buildings and facilities in anticipation of the doubling of enrollments at the University predicted by 1975.
- In 1959, the common first year was altered slightly as ChE and EE dropped CE 3 (descriptive Geometry) and replaced it with a General Education elective course, freeing up three hours for departmental engineering courses.
- A new graduate program in Nuclear Engineering was jointly offered by ChE and ME. Practical experience was available on the small AGN-201 nuclear reactor in the Physics Department.
- ME also added Graduate Programs in Applied Mechanics and Engineering Administration.
- By the 1958-59 school year, enrollment had reached 1349 regular undergraduate students
- The 1959-60 school year marked the first classes for the new **University of Utah Institute for Technological Training** sponsored by the College of Engineering. The Institute was created to supply technicians for the estimated 200-300 openings in industry in Utah. Instructors for the program represented a cross section of local industry and University of Utah professors. Two of the part-time teachers in Electrical Technology were **Robert Skinner** and **Frank Longson**, partners in their own electronics design and technology firm, ENSCO Inc. **John R. Barnett**, a graduate of North Carolina State College taught full-time in the Electrical Technology program, while **Dr. H. Edward Flanders**, Professor of Metallurgy at the U. of U., taught courses in physical metallurgy. Other instructors included **Eric Roth**, Industrial Engineer and Systems Analyst at Sperry Utah, and **Bruce Bemis**, Hercules Powder Co. The first year of the technology curriculum was mostly the basics including math, physics, English, technical drawing, and a little chemistry. In the second year, students took technical courses in the professional field chosen.

Demand for Engineering Graduates Up

By 1960, the demand for engineering graduates had increased dramatically, as evidenced by recruiting activities at the Placement Center. Long-time director of the Center, **Herald L. Carlston**, provided the statistics for the 1959-60 placement season.

- Recruiters came from twenty-one states to interview senior and graduate students in engineering.
- One hundred and seventeen of these interviewers were looking for electrical and mechanical engineers.
- Sixty-five were interested in chemical engineers and forty-five considered civil engineers.
- Hundreds more job opportunities were posted by the Center for employers who did not send recruiters to the campus.
- There were more recruiters on campus than there were candidates available for placement in any of the four engineering disciplines.
- Of the one hundred and sixty-seven engineers receiving bachelor's degrees in June or August of 1960, ten entered the military service, eleven enrolled in graduate school, and one went on an L.D.S. mission. Seventy-one accepted employment in Utah (Hercules – 27, Sperry Utah – 4, Utah Power and Light, Geneva Steel, Hill Air Force Base, Utah State Road Commission, Mountain States Telephone, Kennecott Copper Corp., Eitel McCullough, and others). Sixty-seven accepted employment outside of the State of Utah, in thirteen states including California (37), Washington (11), New York (7), Michigan (2), Pennsylvania (2), Oregon, Wisconsin, Minnesota, New Mexico, and Texas. One of the electrical engineering graduates passed away and the whereabouts of six were unknown. It was rumored that one of the electrical engineering graduates became a full time Fuller Brush salesman!
- Highest in demand were electrical engineers with computing or transistor specialties.

The Oyster Stew of 1960

The 31st annual Oyster Stew was produced in November of 1960. Following the dinner (minus the oysters), the Electrical Engineering queen candidate, Miss **Deanne Tanner**, was crowned Engineering Queen. The beards grown by faculty and students were judged next, with prizes being awarded for the longest, the most unique, the most colorful, the most grotesque, and the least for the most effort. The EE's skit, "Dangerous Press McGrew" was judged the winner by the judge's panel led by **Fred Thomas**, who as a student helped to create the Oyster Stew. The sweepstakes were won by the Civil Engineers but when **Frank Adams,** president of the Engineering Council asked for the trophy so it could be presented to the Civils, it had disappeared. Professor **Preston Linford** who had brought the trophy finally deduced that it had vanished during the "blackout " portion of the Mechanical Engineers skit and demanded that the ME's return it. It was later determined that by this time the trophy was far past the northern limits of the city. Mr. Adams closed the Oyster Stew by saying, "The Civil Engineering department is now the owner of the Oyster Stew trophy – if they can find it."

A month later a card postmarked El Paso, Texas came to the CE's with a picture of the trophy on it. Pressure was brought to bear on the ME student officers to return the trophy, which was finally done in the CE seminar in January of 1961. The ME's left their mark on the trophy in the form of the following inscription:

Blessed is he
that does not protect

his possessions
for he shall
surely lose them.

Lost by
Civil Engineers
Nov. 19, 1960

Found and returned
By
Mechanical Engineers
Jan. 23, 1961

Retired by the
Civil Engineers

Seek and Ye
Shall Find

COLLEGE OF ENGINEERING GRADUATION STATISTICS 1947-1959

Bachelor of Science (B.S.) Degrees by Department

Dept.	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
ChE	10	10	9	27	15	10	18	9	12	16	16	15	22
CE	32	26	54	61	48	35	22	23	23	20	18	22	19
EE	27	35	96	88	59	40	42	47	31	45	62	73	73
ME	29	41	69	54	45	51	47	37	32	49	45	49	57
Totals	98	112	228	230	167	136	129	116	98	130	141	159	171

The decade of the 50's ended with enrollments up, morale high, the new building under way, research growing and salaries on the rise. All signs pointed to a great decade ahead!

5. THE DECADE OF THE 60'S

New building, expanding curricula, steady growth.

The years of planning and working for new space finally came to fruition in 1959, as E.E. and Ch.E. moved into the first phase of the new engineering building to become known as Merrill Engineering Building (M.E.B.). The first phase of M.E.B. was dedicated and named in a ceremony held on February 26, 1960 under the direction of President **A. Ray Olpin**, and attended by such notables as Gov. **George D. Clyde**, Board of Regents chairman **Royden Derrick**, **Henry D. Moyle** of the First Presidency of the Church of Jesus Christ of Latter Day Saints, and Dr. **Rowland Merrill** representing the Joseph F. Merrill family. President Moyle dedicated the building to "science, education and the training of youth and to carrying out more fully the purposes for which the university was founded". Governor Clyde, President Olpin and Dr. Merrill also spoke at the dedication. In reporting the dedication, a local newspaper called the building the "Engineer's Glass House", and further described M.E.B. as a "sparkling, glass-walled structure --- the unusual building, first of its kind in the area, used more glass, by weight, than any previous building in the Mountain West area".

The building dedicated was only about one-fourth of the final structure. The plan was for the eventual building to be divided into 4 slices north and south, one for each of the four departments. Chemical Engineering had the eastern slice and designed their laboratory to allow for equipment to extend from the basement to the second floor. Electrical Engineering moved into the next portion, placing their heavy transformers in the basement and the machinery laboratory, equipment cage and electronics laboratories on the first floor. Of course, because Phase I of the building was just one-quarter of the final structure, Ch.E. and E.E. only got half of their slice to begin with. In addition, several offices were reserved for the Dean's Office and for the Mechanical Engineering departmental offices.

The 1961 legislature provided $800,000 for the construction of Phase II of M.E.B., which began in 1961, providing Mechanical Engineering and Civil Engineering with half of their slices by 1963. Because the funding for Phase II was inadequate, only about 40% of the space was actually usable; some flooring, heating, ventilating and illumination systems were not complete.

Of course this was not the only building going on at the University. At the end of 1961, $27,000,000 in construction and remodeling was in process. The projects were as follows:

Rehabilitation Center
A.E.C. Kennels (at medical center)
Student Residence Hall
University Village (replacing old temporary barracks with new buildings)
Bennion Hall (part 2)
University Book Store
Merrill Engineering Building Phase II
Pioneer Memorial Theater
Physics building and laboratories
New campus heating system

Medical Center
New Law building
Business building (part 2)
Campus utilities and improvements

The University administration requested another $27,000,000 from the 1961 Legislature for further construction of a new Library, air-conditioning for Orson Spencer Hall, a Park Building addition, a Biology building, a Chemistry building, a Pharmacy building, completion of the Physics building, a new Mines building, a Physical Education building, Phases III and IV of M.E.B., and more utilities and landscaping. By this time a new "Campus Master Plan" was in place calling for peripheral roads and parking with major walking thoroughfares connecting main sections of the campus. Decorative berms were placed strategically between buildings and walkways and service areas.

Neither the 1961 nor the 1963 Legislatures were able to fully fund the building needs of the University but did earmark $10,358,000 in 1961 and $5,800,000 in 1963. The 1963 Legislature also passed a bill allowing loans and bonding for construction purposes, which was vetoed by Governor Clyde. The 1965 Legislature finally passed the Building Commission Bonding bill allowing the State to bond up to $67 million, of which over $27 million was authorized for the University of Utah. This, along with the earlier appropriations, student building fee revenues, Federal matching funds and private donations, allowed the University to continue a building program that by the end of the decade would exceed $100 million for 30 major buildings and as many smaller ones, as well as upgrades of campus facilities and grounds. The trials and excitement of this unprecedented decade are well documented by **Paul W. Hodson**, then Business Vice-President in his book, "Crisis on Campus", *Keeban Corporation*, 1987, from which most of the above data were taken.

The 1965 Legislature allotted $2,173,000 for the third phase of M.E.B., which was finally finished in 1967. Phase IV, the classroom building, was never funded.

- In 1960, the common Freshman year program was modified by moving Math 4 (Trigonometry) to a high school requirement, allowing the first quarter of calculus to be moved into the Freshman year, with the second and third quarters of calculus in the Sophomore year.
- The University established the 2-year Diploma Program managed by the College of Letters and Sciences. Civil Engineering immediately introduced the Drafting Diploma Program, requiring 93 hrs of University work including eight courses in Civil or Mechanical Engineering and two in Math, and the standard General Education required courses.
- Daytime full-time enrollment in the College of Engineering in the 1960-61 school year reached 1142 (including two women) which was 11% of the total university enrollment. The following year enrollment dropped to 1062 while the University totals increased from 10,583 to 11,016.
- The first issue of the Engineering College's magazine *UTECHNIC* was issued in April of 1960 under the editorship of **Larry Lockwood** and **Tom Johnson**. The goal of the editors and Dean **Samuel S. Kistler** was to produce a high quality publication for students and alumni that would bring unity to all disciplines in Engineering and help alumni to know what is going on in their alma mater. The articles in the first issue

included a treatment of stress analysis by **John C. Stensel**, (M.E. '60), a description of a new shaft mucker at the Park City Ontario mine by **Michael Wright**, (Mines '60), computing at the University of Utah by **Teruo (Ted) Fujii**, (E.E. '58), a piece on Rocketry by **Stephen B. Affleck**, (Ch.E. '60), the U.S. Geological Survey for Highways by **John Farrell**, (C.E. '61), and a guest editorial on Creativity and the Young Engineer by **Dr. Simon Ramo**, (E.E. '33). Support for the first issue came from the Dean's office and five advertisers: Shaft and Development Machine Inc., Western Phosphate, Garfield Chemical, ENSCO Inc., and Archer Tractor. Regular publication of the slick paper quarterly began with the March, 1961 issue.

- The Engineers Week celebration on campus was held in conjunction with the national Engineers Week sponsored by the National Society of Professional Engineers. The off-campus events included a banquet and address by **Dr. Werner von Braun**, Director of the George C. Marshall Space Flight Center at NASA. On campus, all departments prepared displays by students and researchers and tours of the department laboratories and displays were open to the public afternoons and evenings for three days during the week of Feb. 19-25.
- U.S. Patent 2,030,685 was issued March 29, 1960 to **Dr. Melvin A. Cook**, Professor of Metallurgy and Director of the Institute of Metals and Explosive Research. The patent described a new, inexpensive slurry explosive that was to become the blasting agent of choice in most mining and construction projects. Dr. Cook became president of Intermountain Research and Engineering Company (IRECO) in Salt Lake City and Mesabi Blasting Agents, Inc., in Minnesota, both of which became major suppliers of the new slurry explosives.
- In 1961, **Daniel J. Dykstra** replaced **G. Homer Durham** as Academic Vice-President.
- Students and Faculty in the Mechanical Engineering department designed and built a new recirculating wind tunnel, which increased the available maximum test speed to 125 mph. Professor **Karl L. Koerner** and technician **Art Nettleship** supervised students **Tom Man** and **David Hills** in the redesign of the old 50-mph open tunnel. The size of the new test section was three feet by two feet, the same as the old one.
- In December of 1961, the AGN-201 nuclear reactor was moved from its temporary location in the old foundry building to the specially designed laboratory in the new Merrill Engineering Building. The low-level training reactor was built on campus in 1957 under the direction of Professor **Richard E. Turley**, Mechanical Engineering department. Most of the $88,600 cost of the project came from a grant from the Atomic Energy Commission. The ten-ton reactor stood 12 feet tall and had a diameter of about 9 feet. It was fuelled with 1.4 pounds of U235 and 5.6 pounds of U238. The reactor continued to be used in some research projects and as a teaching laboratory instrument associated with the five courses specifically related to Nuclear Engineering being taught in the College of Engineering in the 1961-62 school year.
- The *HONORS* program was organized with a subsidy from the Fund for the Advancement of Education, to enrich and improve the education of capable students, both undergraduates and graduate students, who were preparing for advanced study and/or college teaching.
- In 1962, tuition and fees increased to $100 ($75 tuition, $10 registration, $8 student activities, and $7 building fee) for 10 to 18 hours. Out-of-state students paid $175.
- In 1962, an I.B.M. 1620 computer was added to the Computer Center.

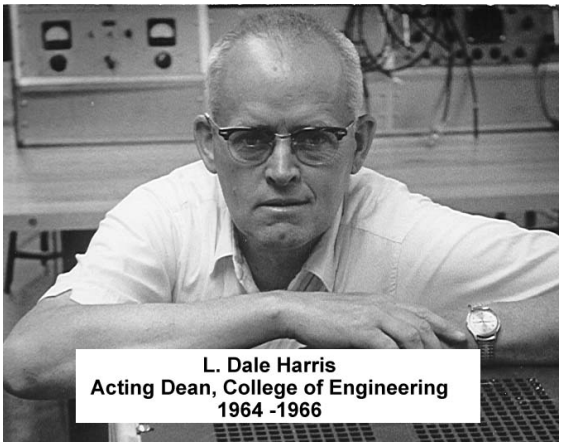
Opposition to the common first year curriculum began to increase. The Electrical Engineering faculty were anxious to move more of the basic courses to the first year, allowing them to start the major courses in the Sophomore year to leave room for the rapidly increasing number of new technology subjects in the upper division years. Also, moving calculus into the first year would allow the teaching of the first courses in Electrical Engineering to be calculus-based. In a move to eventually eliminate the uniformness of the first year, the Dean's Office removed the first year listing from the College of Engineering section of the 1962-63 Bulletin and each of the departments listed the freshman year in their own departmental descriptions. Departments were still urged by the Dean to maintain the first year as common as possible so that students would have the option of choosing or switching major departments at the end of the first year without major "makeup" problems.

- In 1963, **J. Boyer Jarvis** took over as assistant to the President, replacing **Neal A. Maxwell,** who became the Dean of Students.
- The Computer Center added an I.B.M. 1401-1009 teleprocessing system to communicate with the I.B.M. 7090 at the Western Data Processing Center at U.C.L.A. The Computer Center became an independent center with **Paul L. Tuan** as the Director. The college-wide Analog Computer facility was not made a part of the Computer Center but kept as a College of Engineering laboratory.
- The Mechanical Engineering department offered the first Bachelor of Science (B.S.) degree in Industrial Engineering and a Master of Science (M.S.) in Engineering Administration. Both of these programs drew significant interest immediately.
- The College of Engineering established an Applied Engineering Mathematics interdepartmental program that did not lead to any degrees but was available as a minor for M.S. programs or part of a Ph.D. program. Courses offered included elementary computer programming, Numerical Analysis, Statistics for Engineers, and Applied Engineering Math.
- Chemical Engineering and Civil Engineering dropped their listings of the Extended Study options, and Chemical Engineering no longer listed the Fuels Engineering option in their curricula.
- Enrollment of full-time regular students in the College of Engineering increased to 1,119 (with four women) in the 1962-63 school year and increased slightly the next year to 1,131 (seven women).

James C. Fletcher, University President, July 1, 1964

President Olpin elected to retire in 1964 and enthusiastically nominated his wife's sister's son, **James Chipman Fletcher** as his successor. Fletcher received his A.B. degree from Columbia University in 1940, and a Ph.D. in 1948 from the California Institute of Technology. His experience in industry included Laboratory Director at Hughes Aircraft Company, ICBM program technical director at Ramo-Wooldridge Corporation, board chairman at Space-General Corporation, and vice-president for systems at Aerojet General. The Board of Regents concluded that Fletcher's record of competency and technical management, and his understanding of mathematics, science and engineering was what the

institution needed in the period of explosive growth and advancements in technology, space and computers. President Fletcher took office on July 1, 1964 and immediately recognized a need to reorganize the administration of the University. Over the next four years, he added and shuffled positions in the top administration, trying to streamline reporting responsibilities and reduce the number of people reporting directly to the president. His only immediate change was to appoint **J. H. Adamson** as Academic Vice-President, replacing **Daniel J. Dystra**.


L. Dale Harris
Acting Dean, College of Engineering
1964 -1966

- Also on July 1, 1964, **Samuel S. Kistler** returned to teaching and research and **L. Dale Harris** became acting Dean of the College of Engineering.
- The Department of Biophysics and Bioengineering was organized in the College of Engineering, with **Homer R. Warner**, M.D., Ph.D., as the Head. Department facilities were located at the L.D.S. hospital; the laboratory was equipped with an I.B.M. 1620 digital computer and a large analog computer system. The department offered only the Ph.D. degree initially and relatively few graduate classes.
- The University Computer Center received and installed a state-of-the-art I.B.M 7040 digital computer replacing the aging Burroughs Datatron 250 machine.
- In a move soon to be followed by several other departments, Chemical Engineering decreased the number of required C.E. drawing classes to one, and further allowed that one class to be exempted by examination.
- In the fall of 1964, over the protests of students and faculty alike, the administration assessed the first fee of $7.50 to register each automobile brought to the campus.
- In 1963 the Utah State Legislature enacted a law requiring all students graduating with a Bachelors degree to demonstrate reasonable understanding of the history, form of government, and the economic system of the United States. The requirements of the law could be met by passing one of several designated courses in History of Economics.

Faculty Listing, 1964-65 School Year

College of Engineering: **L. Dale Harris**, Ph.D., Acting Dean, Prof. of E.E.

Biophysics and Bioengineering: **Homer R. Warner**, M.D., Ph.D., Prof. and Head
Professor: **Robert E. Stephenson**, Ph.D.
Assistant Professor: **W. Sanford Topham**, B.S.
Assistant Research Professors: **Albert S. Johnson**, M.S.
F. McKay Smith, M.S.

Chemical Engineering: **E. B. Christiansen**, Ph.D., Prof. and Head
Professors: **Samuel S. Kistler**, Ph.D.
Norman W. Ryan, Ph.D.

Associate Professor: **Dale L. Salt**, Ph.D.
Assistant Professors: **Alva D. Baer**, Ph.D.
Noel H. deNevers, Ph.D.

Civil Engineering: **Grant K. Borg**, M.S., Prof. and Head
Associate Professors: **Mack S. Kesler**, M.S.
Preston D. Linford, M.S.
Garnett Littlefield, M.S.
David O. Van Strien, M.S.
Assistant Professors: **Clifford G. Bryner**, M.S.
Horace K. Glidden, B.S.
Edwin C. Nordquist, M.S.
Wayne E. Pratt, M.F.A.
Bennell O. Willhite, M.A.
Instructor: **John A. Nicholaysen**, B.F.A.

Electrical Engineering: **L. Dale Harris,** Ph.D., Prof. and Head
Professors: **Obed C. Haycock**, M.S.
Robert E. Stephenson, Ph.D.
Seymour B. Hammond, Ph.D.
Research Professor: **Richard W. Grow**, Ph.D.
Associate Professors: **Charles L. Alley**, M.S.
Dietrich K. Gehmlich, Ph.D.
Clay D. Westlund, Ph.D.
Associate Research Professors**: Curtis C. Johnson**, Ph.D.
E. Paul Palmer, Ph.D.
Assistant Professor: **Kenneth W. Atwood**, Ph.D.
Assistant Research Professor: **Carl H. Durney**, Ph.D.
Instructor: **M. Don Merrill**, B.S.

Mechanical Engineering: **Wayne S. Brown**, Ph.D., Prof. and Head
Professors: **Neil P. Bailey**, M.S.
Ralph D. Baker, Ph.D.
G. Victor Beard, Ph.D.
Arlo F. Johnson, Ph.D.
Associate Professor: **Leland M. Olsen**, M.S.
Assistant Professors: **K. Lawrence Devries**, Ph.D.
L. King Isaacson, Ph.D.
Wadim Komkov, Dipl. Ing.
Donald J. Mayhew, M.S.
Assistant Research Professor**: C. Eugene McDermott**, M.S.
Instructor: **Gary M. Sandquist**, M.S.

SUMMARY OF COLLEGE OF ENGINEERING

Accomplishments as of December, 1964

From 1897 to 1964 the College had given approximately 5,500 B.S. degrees, 300 M.S. degrees, and 50 Ph.D. degrees. During this period, the College had received nearly $4,000,000 in research projects, half of which came after 1960. It was predicted that within 5 years, the research budget would be $4,000,000 per year.

The new Biophysics and Bioengineering department was just beginning but already had 19 graduate students enrolled and was temporarily housed in the L.D.S. hospital.

The Chemical Engineering department moved some of its operations to M.E.B. Phase I, but continued to use Building 437 for research functions. The research budget in solid propellant and fuels research was over $200,000 per year with over 30 graduate students involved. Much of the research was associated with Hercules Powder Company and Thiokol Chemical Company; both with plants in the state of Utah.

Civil Engineering moved some of its operations into M.E.B. but continued to use the Annex Building for surveying labs and drafting classes and the Hydraulics laboratory at the 13th East reservoir, the latter two locations being a mile apart. The department offered a number of short courses for engineers working in water and sewage, highways, surveying, and reclamation, as well as giving refresher courses for engineers preparing to take the State Registration Examination.

The Electrical Engineering department was housed mostly in M.E.B. except for some research projects in Building 514. Major research areas were the Microwave Devices Laboratory and the Upper Air Research Laboratory which, along with other smaller projects brought in over $750,000 each year. The undergraduate (UG) enrollment was the largest of the four UG programs graduating 53 students with B.S. degrees in 1964. The fastest growing component of the department was the Computer Science division that would soon become a separate department. Faculty and Graduates of the Electrical Engineering department of the University of Utah had founded four local manufacturing and research companies:

1. *Montek Associates* – Manufacturer and designer of electronic equipment - $4,000,000 gross annual.
2. *Utah Research and Development* – Research in high velocity impact - $300,000 gross annual.
3. *ENSCO company* – designer and manufacturer of electronic instrumentation for medical applications - $150,000 gross annual
4. *Cordin Company* – designer and manufacturer of high-speed photography equipment - $250,000 gross annual

The Mechanical Engineering department moved some offices and labs into M.E.B. but maintained other labs and research in the Mechanical Engineering building and Building 514. In addition to the standard degrees in Mechanical Engineering, the department had developed strong programs in Industrial Engineering and Engineering Administration. Faculty and Graduates of the Mechanical Engineering department had founded the following local companies:

1. *En Tec* – manufacturers of fiberglass vessels - $700,000 annual gross
2. *Kenway Engineering* – design engineers and consultants. – new
3. *Ball Manufacturing Co., Inc.* - manufacturing flow control devices for the petroleum industry - $100,000 annual sales

The Computer Center was a service department in the College of Engineering, but served the entire University. Established in 1958 in Electrical Engineering, it had grown to thirty staff, making it the largest university computing center in the Intermountain West. It serviced 150 research projects and over 2000 students per year in computer courses. Research in computational science was supported by a $250,000 National Science Foundation grant and 12 other research contracts.

Much of the above information was contained in a *Fact Book* used by the College of Engineering to lobby the State Legislature to provide funding to complete Phase II of M.E.B and begin as soon a possible the construction of Phases III and IV. Phase III was finished three years later but Phase IV was never funded.

- In 1965, President Fletcher appointed **Sterling M. McMurrin** to the newly created post of Provost and **Neal A. Maxwell** to the newly created post of Vice-President for Student and Public Affairs. Also, **Alfred C. Emery** replaced **Jack H. Adamson** as Academic Vice-President.
- Tuition and fees rose to $125 per quarter for 10 to 18 hours with incremental decreases for 9 hours and less. Parking remained at $7.50 per car.
- The high school entrance requirements for students entering the College of Engineering and the College of Mines and Mineral Industries increased by adding more math.
- **David O. Van Strien** replaced **Grant K. Borg** as the Chairman of the Civil Engineering department. **The title of Department Head was dropped in favor of Department Chairman.**

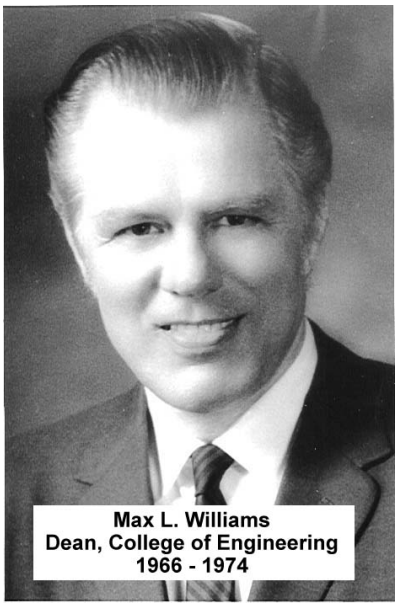
- **George R. Hill** became the Acting Dean of the College of Mines and Mineral Industries, replacing **Armand Eardly**. At this point both the College of Engineering and the College of Mines and Mineral Industries had acting deans. The administration was pursuing the possibility of combining the two colleges into one but encountered strong opposition from Mining interests in the state so that no action was taken.

- The Electrical Engineering department established the Division of Computer Science with **William Viavant**, Ph.D., as the director. The division offered B.S. and M.S. degrees and was making plans to offer the Ph.D. degree. This brought the number of degrees offered in the Engineering College to 19.

DEGREES OFFERED BY THE COLLEGE OF ENGINEERING

Major	Department	Degrees
Biophysics & Bioengineering	Biophysics & Bioengineering	Ph.D.
Chemical Engineering	Chemical Engineering	B.S., M.S., Ph.D.
Civil Engineering	Civil Engineering	B.S., M.S., Ph.D.
Electrical Engineering	Electrical Engineering	B.S., M.S., Ph.D.
Computer Science	Electrical Engineering	B.S., M.S.

Mechanical Engineering	Mechanical Engineering	B.S., M.S., Ph.D.
Industrial Engineering	Mechanical Engineering	B.S.
Engineering Administration	Mechanical Engineering	M.S.
Nuclear Engineering	Mechanical Engineering	M.S., Ph.D.


Max L. Williams
Dean, College of Engineering
1966 - 1974

- On January 1, 1966 **Max L. Williams** was appointed Dean of the College of Engineering and **L. Dale Harris** became the first Associate Dean of the College. **Richard W. Grow** replaced **L. Dale Harris** as the Chairman of the Electrical Engineering Department.
- **J. Edmund Fitzgerald** took over as chairman of the Civil Engineering Department, replacing **David O. Van Strien** who returned to teaching and research.
- New hire Dr. **David C. Evans** became the Director of the Computer Science Division of Electrical Engineering and accepted the challenge of bringing the Division to Department status.
- The Colleges of Engineering and Mines and Mineral Resources announced the creation of a heavily science oriented graduate degree called the Master of Engineering Science degree. The 48-hour degree included the following:

Advanced mathematics	12 hours
Advanced physics	9 hours
Eng. Science of Materials & Processes	12 hours
Electives (from a selected list)	6 hours
Either a Masters Thesis	9 hours
or:	
A paper and	3 hours
Additional electives	6 hours

- In 1966, three departments, ChE, CE, and EE adjusted their math courses by making both trigonometry and algebra high school requirements. This allowed them to move two quarters of calculus into the freshman year and shift more of the Engineering Math into the sophomore year. Some of the impetus for this move was to allow more of the basic courses in the major to be taught earlier and with higher math levels. The Mechanical Engineering department made the change a year later.
- New faculty added during 1966 included **David C. Evans**, **Om P. Gandhi**, **Doran J. Baker, Carl H. Durney**, **Forest Staffanson** and **LaMar K. Timothy** in EE, **Earl S. Mason** and **Otto W. Steinhardt** in CE, **Fabio R. Goldschmied**, **Otto C. Davidson**, **Fred R. Wagner** and **E. S. Folias** in ME.

STATUS OF THE UNIVERSITY OF UTAH, FALL 1967

- 10 colleges
- 2 graduate schools
- 90 major fields of study
- 1000 faculty
- 17,000 students
- 637 acre campus
- Branch campus (College of Eastern Utah) at Price, Utah
- Recently finished or current construction of buildings for:
  - Engineering
  - Business
  - Medicine
  - Library
  - Physics
  - Pharmacy
  - Chemistry
  - Biological Sciences
- Plans being drawn for buildings for:
  - Nursing
  - Social Work
  - Behavioral Sciences
  - Fine Arts
  - Physical Education
- No longer a "state supported" institution but a "tax assisted" institution having three roughly equal sources of financial support:

Legislative appropriation	1/3
Tuition	1/3
Gifts, grants, and research	1/3

The University, "the oldest State University west of the Missouri River" had students from every county in Utah, every state in the nation and more than 50 foreign nations.

- In 1967, tuition and fees increased to $130 per quarter for residents and $296 for non-residents
- An *Air Pollution Science* graduate program, administered jointly by the colleges of Engineering, Letters and Sciences, and Mines and Mineral Industries was first offered in 1967. The program was designed for students having a Bachelor's degree in Engineering or any of the physical, biological, social or earth sciences and who wished to add the inter-departmental minor in air pollution science to their Master's or Doctorate degrees. The minor required the completion of 13 hours of coursework selected from a set of core pollution and toxicology courses. The Ph.D. minor required the same 13 hours from the core set and an additional 20 hours from a selected list and taken in at least two departments besides that of the major.
- Computer Science obtained final approval for their Ph.D. program.

- Phase three of the Merrill Engineering Building (M.E.B.) was completed. The concept of the four slices for the four departments was abandoned because of the need for space for Computer Science, the Computer Center and research laboratories.
- The Computer Center upgraded by adding a Univac 1108 with its associated support devices to the machine room.
- The language requirement for the Ph.D. degree was modified to allow for "advanced proficiency" in one language or the previous standard proficiency in two languages. The language requirement could be satisfied either by taking a language class (or classes) or by taking the Graduate Language Exam as in the past.
- New faculty added in 1967 included **J. D. Seader** and **Glenn A. Secor** to ChE, **Robert S. Barton** to CS, and **Kay D. Baker** to EE.
- Pres. Fletcher made further modifications to his administration by appointing **Alfred C. Emory** to the newly created position of Provost, and established the position of Executive Vice-President to which he appointed **Neal A. Maxwell**

Grading System at the University of Utah

Early in 1967, the Pass/Fail option was established as a two-year experiment. This option was created to encourage students to enroll in selected courses outside of their major areas of study without the pressure of competing for grades, thus allowing students to expand their interests and broaden their experience outside of their major. Students were expected to do as much work as those enrolled for regular credit. Students were limited to 3 pass/fail courses in the lower division and 6 pass/fail courses in upper division courses outside the students major. Certain required basic courses in English, Math, and General Education were excluded. Students were not allowed to change back and forth between credit and pass/fail once enrolled in the class. Graduate students were limited to one pass/fail class per quarter and no more than 25% of their graduate classes could be pass/fail. In 1968 the pass/fail option was reviewed and judged to be worthwhile and was adopted into the University of Utah grading system. In Engineering, the structured curricula left little room for many pass/fail classes. As of the fall of 1968, the grading system at the University was as follows:

Grade	Description	Grade points
A	Excellent	4
B	Good	3
C	Standard	2
D	Sub-standard	1
E	Unsatisfactory/fail	0
P	Passing	Credit for Graduation, not included in G.P.A.
EW	Withdrawn for non-performance or non-attendance	
W	Withdrawal by the 13^{th} day of class	
WP	Withdrawal passing after the 13^{th} day of class	
WF	Withdrawal failing after the 13^{th} day of class	
I	Incomplete. Deficiency that can be made up within 4 quarters	

X	Incomplete. Deficiency that can be made up within 4 quarters but The final grade can be no higher than a C.	

Late in 1968, the University added two more grades:

C+	Between Good and Standard	2.4 grade points
C-	Between Standard and Sub-standard	1.6 grade points

COMMON CORE PROGRAM IN ENGINEERING

For several years the faculty of the Electrical Engineering department lobbied to modify or eliminate the common first year curriculum so that they could push math courses earlier in the curriculum. This would have allowed them to offer their basic electrical courses early in the sophomore year, making use of the calculus and Engineering Math courses proposed for the freshman and sophomore years. This would allow them to get a broader coverage of the expanding technologies required of their graduates. The Mechanical Engineering department also hoped to get their basic statics/dynamics courses offered earlier with the broader math background. At the same time the Dean's office was pushing an expanded common core program espousing concepts of a two-year common core curriculum proposed earlier by Dean **Samuel S. Kistler**. Such a program would allow students to be somewhat more generalized and would enable them to delay choice of a major until the end of the sophomore year. Finally, after two years of often heated discussions, a two-year common core program was introduced in 1968 over the objections of some of the faculty. The first year included one quarter of Engineering Drawing, one quarter of college algebra followed by two quarters of calculus, a computer programming class, three quarters of chemistry, the usual courses in English, speech, physical and health education, two general education classes, and a general engineering seminar course taught separately by each department. The sophomore year included the third quarter of calculus, the first quarter of the engineering math series, three quarters of physics, statics, dynamics, an introduction to E.E., and two general education courses.

Expanding the first year common core to two years was not popular with all faculties and was an uneasy compromise. It limited the trend by several departments to move more of their basic major courses into the sophomore year, not only to expand their offerings in the upper division classes but also to allow major professors access to their major students earlier in the curriculum. Other faculty objected to the "college" control of departmental curricula. This significant opposition doomed the two-year common core experiment to failure.

- In 1968, the Utah Engineering Experiment Station (UEES) was placed administratively under the College of Mines and Mineral Industries with **Raymond Hixson** as the Acting Director.
- New faculty included **Richard H. Boyd**, Ph.D., Professor in ChE, **Louis A. Schmittroth**, Ph.D., Professor, **Ivan E. Sutherland**, Ph.D., Associate Professor, and **Roy A. Keir**, Visiting Associate Professor, all in the Computer Science Division, **Neal A. Buholz**, Ph.D., and **William J. Hanckley**, Ph.D., both Assistant Professors in EE, **Abraham Sosin**, Ph.D., Professor, and **Frederick R. Wagner**, Assistant Professor in ME.

- Chemical Engineering added a Materials option to the undergraduate program and a Living Science (Bioengineering) option to the Graduate Program, Computer Science began to offer courses under the Computer Science (CS) label, Electrical Engineering added Social Engineering and Human Engineering options to the undergraduate program, and Civil Engineering discontinued the two year certificate program in Drawing.
- **Willem J. Kolff**, pioneer in artificial kidney research (who came from Cleveland Clinic as Professor of Surgery in 1967) was appointed Research Professor in Engineering, and, with **L. Dale Harris**, formed the Institute for Biomedical Engineering. Faculty from Medicine, Engineering, and others began research on internal artificial organs, specifically kidney, heart, eye and artificial membranes
- After a six month fundraising effort spearheaded by EE graduate student **Hyde Merrill**, the Gertsch student study room was furnished, funded by $17,000 in donations received from student groups, faculty, alumni, and business concerns. The room was named for the major contributor **Elmer P. Gertsch**, (EE 1930), president of Gertsch Products Inc., Los Angeles. The Dean's office provided space in Rm. 3128, MEB, for the study room, which was ready for student use at the beginning of Fall quarter, 1968.
- The first Wankel engine-powered automobiles were introduced in 1968 by the German automobile firm of N.S.U., and in Japan by Toyo Kogyo Co. A Frenchman named Maillard in 1908 first proposed the Wankel engine but it was not until 1954 that Felix Wankel devised the first operating rotary combustion engine combining the Otto four-stroke cycle with a three-sided rotor. The Wankel engine, even though lighter, more efficient, and smoother running than the equivalent horsepower V-8 reciprocating engine, was not widely accepted. It required larger mufflers and cooling systems and produced larger amounts of pollutants because of the 40:1 gas-oil mixture that it burned.
- In 1968, President Fletcher added two more offices to his administrative staff: **William S. Partridge** became the first Vice-President for Research, and **L. Ralph Mecham** was appointed Vice-President for Economic and Community Development. The following year two more Vice-Presidents were appointed: **Kenneth W. Castleton** as Vice-President for Medical Affairs and **Ted E. Davis** as Vice-President for Financial Affairs. The staff also included several Associate and Deputy Vice-Presidents.
- The demand for engineering graduates continued to surge ahead. During the 1967-68 year recruiters conducted more than 13,000 interviews on the University if Utah campus, most of these being with Engineering and Science majors. According to the College Placement Council (Report No. 2, March, 1969), recruiting activity was at an all-time high. From Feb. 13, 1968 to Feb. 13, 1969, college placement for the bachelor's degree was up 13% over the same period the previous year. Based on the beginning starting salaries, chemical engineers were the most sought out candidates at the bachelor's level, followed by electrical engineers and then mechanical engineers. At the Master's level, the MBA candidates with a technical background drew the highest starting salaries, followed by chemical engineers and electrical engineers. Electrical engineers with a doctorate drew the highest staring salaries. Starting salary offers for male engineering graduates with less than one year of experience are shown in the table below.

Engineering Degree	Bachelors	Masters	Doctorate
Aeronautical	$9,612	-	-
Chemical	10,116	$11,652	$15,624
Civil	9,504	10,728	14,652
Electrical	9,804	11,496	16,164
Industrial	9,576	11,124	-
Mechanical	9,744	11,208	15,696
MBA – Technical	-	11,244	-
MBA – Non-technical	-	10,980	-

- Tuition and fees increased to $140 per quarter for 10 hours and above and the non-resident tuition and fees jumped to $313. A year later tuition and fees went up again to $160 and $355, respectively.
- At the beginning of the 1969-70 school year, bar-coded I.D. cards were issued to all students and faculty for the first time
- The freshman curriculum was modified again by moving Algebra to a high school requirement and bringing a full three quarters of calculus to the first year. Engineering Math in the sophomore year was also moved ahead by one quarter.
- In 1969 the Graduate School dropped the Language requirement for the Ph.D. degree, leaving it to each department to determine whether a foreign language was necessary for their Ph.D. candidates. All departments in the College of Engineering dropped the requirement entirely.
- **Thomas Stockham** was appointed Associate Professor in EE and **Po Cheng Chang**, **E. S. Folias**, **James S. Lai**, **Glenn A. Secor**, and **R. K. Vyas** were all appointed Assistant Professors in Civil Engineering.
- Civil Engineering added the professional degree of Master of Civil Engineering (M.C.E.) to their graduate program. The degree was meant to broaden the basic CE education; neither a minor nor a Thesis was required.
- In 1969, the Ceramic Engineering Major was transferred from the College of Mines and Mineral Industries to the Mechanical Engineering department in the College of Engineering. ME also added a Materials Science and Engineering major to their program. This brought to 12 the number of majors in the College of Engineering, four of which were Graduate only.
- **Alan Kay** earned his Ph.D. from the Computer Science department in 1969 and went on to develop the use of graphical user interfaces at Xerox Corp. Another Computer Science Ph.D. graduate that year was **John Warnock** who later founded Adobe Systems.
- Shortly after **Nolan Bushnell** completed his Bachelor's degree in Electrical Engineering in 1969, he was able to get some of the first "computers on a chip" and proceeded to invent a simple computer game. He told graduating students at a University of Utah Engineering convocation years later that he bought an old T.V. set and a coin operating machine, put them together with the computer chip which he programmed to play the simple game he labeled Pong. He placed the game in a bar in Sacramento and set the price at 25 cents per play. Some time later, the bar called him to say that the game wouldn't work any more. When he arrived at the bar, he discovered that the coin machine was jammed full of quarters and couldn't accept any more. That convinced him

that there was a future in computer games so he began to make more units, eventually forming his first company called Atari. The explosion of computer games and companies followed.

- In January, 1970, the Division of Materials Science and Engineering installed a scanning electron microscope (SEM) having a high resolution (200 A) and a large depth-of-field, making it suited for the study of many problems that could not be adequately examined by the more conventional optical and electron microscopes.

Problem Oriented Education

An Experiment in Engineering Pedagogy

Beginning in 1966, several EE professors lead by Professors **L. Dale Harris** and **Richard W. Grow** began to experiment with a problem-oriented approach to engineering education. Their goal was to provide students with a more substantial background in problem solving and help them to learn early in their careers to recognize and solve engineering problems. Beginning with the 1969-70 school year, 6 EE department-required courses were bifurcated, allowing students a choice between the traditional lecture method and the problem-oriented approach in the teaching of the courses. Students in the problem-oriented sections were separated into groups of eight with every two groups assisted by an advanced graduated student. Acting as teams, the students worked through specially designed problems together, pursuing new materials as needed to solve the problem. The professor assigned to the class made presentations on specific topics to the groups on demand. Both the professor and the graduate student helped to maintain the teams on a well organized but flexible program. Students learned to seek possible solutions to the problem and find and use resources (textbook, professor, library, etc) sufficient to solve the problem. Grades for the course were based on straightforward testing, the professor and graduate assistant's evaluations, and the students own evaluations of each other in the team.

The experiment required special team rooms (like small conference rooms) and substantially more personal attention by the professor and assistants. As space became critical and larger numbers of students entered the EE program, the experiment had to be retired. Some of the concepts of problem-oriented teaching, however, continued to be practiced successfully by several EE professors thereafter.

MAJORS AND DEGREES OFFERED IN ENGINEERING

Major	Department	Degrees
Biophys. & Bioengrg	Biophys. & Bioengrg	Ph.D.
Ceramic Engineering	Mechanical Engineering	B.S., M.S., Ph.D.
Chemical Engineering	Chemical Engineering	B.S., M.S., Ph.D.
Civil Engineering	Civil Engineering	B.S., M.S., Ph.D.
Electrical Engineering	Electrical Engineering	B.S., M.S., Ph.D.
Computer Science	Electrical engineering	B.S., M.S., Ph.D.
Materials Science & Engrg.	Mechanical Engineering	B.S., M.S., Ph.D.
Mechanical Engineering	Mechanical Engineering	B.S., M.S., Ph.D.
Industrial Engineering	Mechanical Engineering	B.S.

Engineering Administration	Mechanical Engineering	M.E.A.
Nuclear Engineering	Mechanical Engineering	M.S., Ph.D.
Engineering Science	College of Engineering	M.E.S.

ENGINEERING STUDENT ACTIVITIES

At the time the School of Mines was established in 1901, there were two major groups of students on the campus, the students of the Normal School (budding teachers) and the students in the School of Mines (engineers). Much of the activity on the campus was sponsored by these two groups, some jointly and some separately. A report by the teachers in a 1905 yearbook described a visit to the State Capital Building by all students at which the "engineers were their usual obnoxious selves". Apparently the engineers asked the legislators some hard questions. By 1910, the engineers were celebrating St. Patrick's day as a holiday and were being initiated into the "Guard of St. Patrick" as "Knights of St. Patrick". The origin of this association with St. Patrick was purely accidental. The following explanation was printed in the Engineers Week Edition of the UTAH ENGINEER, official publication of the Engineering Council of Utah, March, 1932.

> "Credit goes to the University of Missouri for the initial founding of what has now become an undisputed custom.
>
> It seems that in the spring of 1903 when excavation was under way for the Engineering Annex at the University a queer stone was discovered which puzzled scientists for some time until the engineers employed their "engenuity" and identified the bit of granite as being a piece of the Blarney Stone. The mysterious hieroglyphics that had disconcerted the scientists were found to prove that "Erin go Braugh" did not mean "To hell with Ireland" but, when freely translated indicated that "St. Patrick was an engineer".
>
> To the lay mind such deductions would seem slightly irrelevant, but the engineers were (and still are) very practical. They seized this discovery as a justification to proclaim a holiday. Delving into the history of the Emerald Isle, they learned that in the fifth century A. D. there came a fellow by the name of Patrick – last name unknown but probably O'Flannigan or Murphy. By hard work and no mean diplomacy, Pat converted the country from Paganism to Christianity. After his death, his name soon gained a place in popular legend, which held that he drove the snakes and other vermin from Ireland. This claim is not supported by biologists. The engineers, however, defend the venerable saint by stating he was an engineer, basing their belief on more substantial evidence. According to tradition, Pat was the first to instruct the Irish in the science of distillation, the results being a favorite beverage, Poteen. With such strong evidence the engineers at the Missouri school immediately proclaimed March 17 a holiday. Patrick was adopted as the Patron Saint, and students and a few of the faculty joined in its observance.
>
> These decisions were merely arbitrary student actions; official sanction was needed. In the early part of 1908, the University of Missouri extended an invitation to the School of Mines at Rolla to send a delegation to Columbia to witness

Missouri's ceremonies. At a mass meeting held in front of the Post Office the miners settled important questions of "state" and named one of their number to represent them at Columbia. In the meantime, the spirited mining school made arrangements for a celebration of its own, though skepticism of many of the students and opposition on the part of the faculty were handicaps. March 17, 1908, was nevertheless declared a free day by popular vote of the student body. The faculty finally acquiesced to the scheme. St. Pat in the personage of a **George Menefee** came by way of the Grand Central Station, was met by a gala crowd armed with "shilalahs" and wearing green sashes, and, at the head of the hastily arranged parade, was escorted to Norwood Hall on the campus.

Such startling events could not fail to affect the other members of the country's great undergraduate engineering fraternity. Shortly after 1908 the students at the University of Utah felt the urge to dub themselves "Knights of St. Patrick" and to yearly pay homage to his memory. Donning green caps and gowns, the slide-rule men would hold mock initiation ceremonies into the "Ancient and Honorable Order of St. Patrick", awarding themselves life membership diplomas. These procedures, too, were student-appointed and, conducted in true undergraduate fashion, were no more than a "brawl". Of course the University authorities frowned."

In 1930 the St. Patrick's day celebration was extended to a full week celebrating engineering and mining under the direction of Elton Pace then ASUU president, sponsored by the Engineering Society, supervised by the faculty and sanctioned by the Deans Council. The aim of the week-long celebration was to show to the public and prospective engineering and mines students the progress and development made in the departments and in the School as a whole. The schedule for the 1932 Engineer's Week indicates how full the week was.

MONDAY, MARCH 28 –

Election of Queen
Election of Engineering Society officers
Illumination of the Campus for the entire week
Unburying of the Blarney Stone

TUESDAY, MARCH 29 –

Feature "Engineers Edition" of the Utah Chronicle
Loudspeaker announcements in front of Park Bldg.

WEDNESDAY, MARCH 30 –

Loudspeaker announcements in front of Park Bldg.
Engineer's rally at 12:20 p.m. on campus
6:00 to 8:00 p.m. Dinner at the Union Bldg. for students and downtown engineers
8:15 p.m. Lecture by A. B. Young, "Economic Future of Utah"

THURSDAY, MARCH 31 –

4:00 to 6:00 p.m. Reception in the Union Bldg. for mothers and fathers of engineering students, and downtown engineers.

7:00 to 9:00 p.m., Laboratories open for inspection

FRIDAY, APRIL 1 –

11:30 a.m., St. Patrick's initiation
12:20 p.m., Parade
2:00 to 4:00 p.m., Baseball game, Faculty vs. Students
9:00 p.m. to 1:00 am, Engineers Week Dance.

By 1940, the dinner had been designated the "Oyster Stew" and included skits by students from the various departments, judging of the beard growing contests and the crowning of the Engineering Week Queen and her attendants. Student activities dwindled during the war years until the surge of veterans and other students brought back many of the Engineering Week activities including the Oyster Stew and Departmental open houses. Student interest in the Engineering Week activities peaked during the late 1950's and early 1960's. Then as more and more students felt the pinch of rising tuition costs and cost of living, interest in campus activities waned. St. Patrick and the Oyster stew disappeared. Engineers Week centered around St. Patrick's day also disappeared.

Samuel S. Kistler

Former Dean **Samuel S. Kistler** retired in 1969 with little fanfare but left a significant heritage for the college. He spent the five years before retirement in research and lecturing. His overall research history was phenomenal. While still at Stanford in 1930, he developed silicon aerogel, which was patented in September of 1937, followed by, during the next 30 years, over 70 patents in the U.S.A. and Canada in the area of abrasives. While at the University of Utah, he invented a process for hardening the surface of glass, which was patented in 1963. The process was immediately licensed to Corning Glass, leading to their introduction of their "unbreakable" glassware. Dean Kistler negotiated an exceptional royalty package, insisting that a significant portion of the royalty income be returned to the College of Engineering and placed into the *Kistler Glass Patent Account*. Grants from the fund were to be made to Faculty in the college by petition and the funds were to act as seed money or start-up funds for new and budding research projects. By 1987, after the patent had expired, royalty payments and interest totaled over $235,000, of which over $125,000 had been paid out for equipment, supplies, faculty and staff support and graduate tuition. At the request of the Chemical Engineering department and with the approval of Mrs**. Margaret C. Kistler**, then widow of Dean S.S.Kistler, the fund was renamed the *S.S.Kistler Quasi-Endowment for Graduate Fellowships in Chemical Engineering* on December 15, 1987.

As Dean and a member of the faculty, Dr. Kistler stimulated research in the college, while continually seeking ways and means of upgrading teaching and improving and strengthening the engineering curriculum. He was a strong proponent of some form of common core curriculum for all of the majors in the college. He followed carefully the introduction of the "ultimate" common core at George Washington University in the fall of 1963, where departments as such were abolished in favor of a "unified" faculty. All students took the same undergraduate curriculum, which had components of all of the major engineering disciplines included. The intent was to produce broadly educated engineers, all

of whom would be capable of working in any engineering environment. Kistler worried that *"they are worshipping before the God of Change thinking He is the God of Education. My personal opinion is that in ten years, the program will have pulled back from the extreme position now taken but that it will not return completely to the old traditional practices".* (*Utechnic, 4,1, Jan., 1963, p.14).*

In 1963, Kistler recommended to the University of Utah College of Engineering an extension of the then first year common core to a 2-year common core, arguing that there was a field of intellectual and scientific knowledge that should be a part of the background of all engineers. While the faculty agreed in principle, the choice of the specific elements of the common core was difficult to agree upon. It was not until 1968 that a 2-year common curriculum was finally installed. By this time the support for the concept of any type of common core was eroding and so the 2-year program soon broke down and eventually disappeared.

Dean Kistler was a brilliant researcher, a dedicated teacher, a decisive administrator and a role model for engineering students and faculty alike. Former dean and department chairman **L. Dale Harris** said of Kistler:

> *"In a minimum of words, **Samuel S. Kistler** is an intellectual gentleman. He is intensely dedicated and committed to the better products of the human mind. Although, in his association with other individuals, he is tolerant, understanding, and highly ethical, you will not necessarily find him to be comfortable company. In a kind and considerate way, he can, to uncomfortable depths, probe and pry in his associates' minds. More than any other individual I have known, he is highly skilled in the art of radiating mental stimulation."*
>
> *Utechnic, 4 (January 1963), p26.*

UPPER AIR RESEARCH LABORATORY

The Upper Air Research Laboratory (UARL), then under the direction of Dr. **Kay D. Baker**, Electrical Engineering, had participated in over 200 rocket flights carrying UARL instruments. The flights included captured V-2, Thor Agena, Atlas, Titan, Blue Scout, Aerobee, Nike-Cajun, Astrobee, Black Brant, Javelin, Eros and Arcas rockets. Though the original purpose of the Laboratory was to investigate the structure of the quiescent atmosphere, the charter was expanded to study atmosphere disturbances due to different energy sources. The UARL staff went to Johnson Island to measure atmospheric parameters during nuclear detonations; to Brazil, to study changes of atmospheric parameters, which occurred during a total solar eclipse; and to the Bahamas to investigate missile trail effects. Rockets were launched from Ft. Churchill, Canada, Fairbanks, Alaska, and Thule, Greenland to study and measure effects of the Aurora Borealis and Polar Cap Absorption. Almost all of the electronic instrumentation and the mechanical devices were designed and built by faculty, staff and students in the Electrical Engineering and Physics departments at the University of Utah.

TEXTBOOK WRITING

The decade of the 60's brought a surge of new texts written by the faculty, with Electrical Engineering leading the way. Many of the faculty, to fulfill their commitment toward quality education, began writing their own course material. Once these materials had been proven and tested in the classroom, they were submitted to publishing houses and published. By 1965, seven texts had been completed and were on the market, and several publishing companies were actively soliciting new manuscripts and prospective authors. The texts actually published by 1965 were:

Introduction to Feedback Systems, By L. Dale Harris, John Wiley and Sons, 1961.

Electrical Power Systems, by L. Dale Harris and R. E. Stephenson, written in English, translated into Indonesian by Stephenson and Soelaiman, 1962

Numerical Methods Using Fortran Programming, by L. Dale Harris, Charles E. Merrill Publishing Company, 1964

Fortran Programming II and IV, by L. Dale Harris, Charles E. Merrill Publishing Company, 1964.

Electrical Engineering, by S. B. Hammond, McGraw-Hill Book Company, 1961. Spanish Edition, 1965.

Field and Wave Electrodynamics, by C. C. Johnson, McGraw-Hill Book Company, 1965.

Electronic Engineering, by Charles L. Alley and Kenneth W. Atwood, John Wiley and Sons, 1962.

Six other books were under contract and/or in preparation by the Electrical Engineering faculty:

Microwave Devices, by Richard W. Grow

Electromechanical Systems, by D. K. Gehmlich and S. B. Hammond, McGraw-Hill Book Company

Analog and Digital Computers, by R. E. Stephenson.

State Space Analysis, An Introduction, by LaMar K. Timothy, McGraw-Hill Book Company.

Fortran For Business, by L. Dale Harris, William Holstein, and Peter Dress, Charles E. Merrill Publishing Company.

Introduction to Modern Electromagnetics, by C. H. Durney and C. C. Johnson, McGraw-Hill book Company.

Several of these books were widely accepted and used. The Alley-Atwood text **Electronic Engineering**, for example, was adopted by 108 institutions in 1965 and eventually sold over 100,000 copies through several editions.

Faculty Listing, 1969-70 School Year

College of Engineering: **Max L. Williams**, Ph.D., Dean, Prof. of Engrg.
L. Dale Harris, Ph.D., Assoc. Dean, Prof. of E.E.

Biophysics and Bioengineering: **Homer R. Warner**, M.D., Ph.D., Prof. and Chr.
Assistant Professor: **Reed M. Gardner**, Ph.D.
T. Allan Pryor, M.S.
W. Sanford Topham, Ph.D.

Chemical Engineering: **E. B. Christiansen**, Ph.D., Prof. and Chairman
Professors: **Richard H. Boyd**, Ph.D.
Norman W. Ryan, Sc.D.
Dale L. Salt, Ph.D.
J. D. Seader, Ph.D.
Associate Professor: **Alva D. Baer**, Ph.D.
Noel H. deNevers, Ph.D.

Civil Engineering: **J. Edmond Fitzgerald**, M.S., Prof. and Chairman
Professors: **Grant K. Borg**, M.S.
David O. VanStrien, M.S.
Associate Professors: **Clifford G. Bryner**, M.S.
Mack S. Kesler, M.S.
Preston D. Linford, M.S.
Garnett Littlefield, M.S.
Edwin C. Nordquist, M.S.
Assistant Professors: **Po-Cheng Chang**, Ph.D.
E. S. Folias, Ph.D.
James S. Lai, Ph.D.
James A. Secor, Ph.D.
R. K. Vyas, Ph.D.

Computer Science **David C. Evans**, Ph.D., Professor and Director
(Division of EE)

Professors: **Robert S. Barton**, Ph.D.
Robert E. Stephenson, Ph.D.
William Viavant, Ph.D.

Associate Professors: **Roy A. Keir**, M.B.A.
Thomas G. Stockham, Ph.D.
Ivan E. Sutherland, Ph.D.

Associate Research Professor**: Harvey S. Greenfield**, Ph.D.

Assistant Professor: **William A. Hanckley**, Ph.D.

Assistant Research Professor**: William M. Newman**, Ph.D.

Electrical Engineering: **Richard W. Grow,** Ph.D., Prof. and Chairman

Professors: **Charles L. Alley**, M.S.
Seymour B. Hammond, Ph.D.
L. Dale Harris, Ph.D.

Associate Professors: **Kenneth W. Atwood**, Ph.D.
Kay D. Baker, Ph.D.
Carl H. Durney, Ph.D.
Om P. Gandhi, Ph.D.
Dietrich K. Gehmlich, Ph.D.
LaMar K. Timothy, Ph.D.
Clay D. Westlund, Ph.D.

Assistant Professor: **Neal E. Buholz**, Ph.D.

Research Professor: **Stephen L. Macdonald**, Ph.D.

Associate Research Professor**: Earl F. Pound**, Ph.D.

Assistant Research Professors: **David A. Burt**, M.S.
Clifford S. Kwan-Gett, M.B.B.S.
Forrest L. Staffanson, M.S.

Materials Science & Engineering: **Abraham Sosin**, Ph.D., Prof. and Director
(Division of Mechanical Engineering)

Professors: **Richard H. Boyd**, Ph.D.
J. Gerald Byrne, Ph.D.
Ivan B. Cutler, Ph.D.
Donald J. Lyman, Ph.D.
William D. Statton, Ph.D.

Associate Professor: **Ronald S. Gordon**, Sc.D.

Assistant Professors: **Joseph D. Andrade**, Ph.D.
Gerald R. Miller, Ph.D.

Mechanical Engineering: **Wayne S. Brown**, Ph.D., Prof. and Chairman

Professors: **K. Lawrence DeVries**, Ph.D.
Arlo F. Johnson, Ph.D.
Leland M. Olsen, M.S.

Associate Professors:	**Gary A. Flandro**, Ph.D.
	Donald J. Mayhew, M.S.
	L. King Isaacson, Ph.D.
Assistant Professors:	**Robert F. Boehm**, Ph.D.
	Harold E. Gascoigne, Ph.D.
	Roger W. Haskell, Ph.D.
	H. Robert Jacobs, Ph.D.
	Patrick S. Nicholson, Ph.D.
	Gary M. Sandquist, Ph.D.
	Fredrick R. Wagner, M.S.
	Wolfgang Waversnick, Ph.D.
Research Professor:	**William S. Partridge**, Ph.D. .

During the 1960's, both deans of the College of Engineering (Dean Kistler and Dean Williams) continued to urge the departments to reduce the required hours for graduation to nearer the University suggested number of 183 quarter hours for a Bachelors degree. Hours required for graduation varied by department but all had been rising during the previous two decades. Some progress was made by putting more of the "freshman" math courses into high school requirements, and deleting the basic drawing courses that had earlier been required. By 1969, departments had reduced their graduation requirements to the following:

Chemical Engineering	192 hours, (general option)
Civil Engineering	183 hours
Computer Science	183 hours
Electrical Engineering	183 hours
Material Science & Engineering	187 hours
Ceramic Engineering	186 hours
Mechanical Engineering	183 hours

The number of hours listed were the published requirements and could only met if students came into the program with all the prerequisite high school courses, followed the published program requirements for each of four successive years, and took no other engineering or general education courses. Rarely did any student graduate with exactly the listed number of credits.

STATISTICS

	Autumn Quarter Enrollments and SCH-Engineering.				University.	
Year	UG Men	UG Women	UG Total	Total SCH	UG	Grad.
1960-61	1,140	2	1,142	N/A	9,333	1,250
1961-62	1,059	3	1,062	N/A	9,715	1,301
1962-63	1,115	4	1,119	N/A	10,903	1,352
1963-64	1,124	7	1,131	N/A	11,714	1,487
1964-65	1,101	6	1,107	N/A	12,819	1,668
1965-66	1,133	7	1,140	25,976	13,475	1,797

1966-67	978	10	988	25,515	11,954	2,651
1967-68	1,069	13	1,082	26,721	12,476	2,862
1968-69	1,305	21	1,326	29,620	13,406	3,079
1969-70	1,396	33	1,429	34,782	14,217	3,439

BACHELOR OF SCIENCE DEGREES AWARDED

(Sum of degrees awarded in June and previous August Commencements)

Year	ChE	CE	CS	EE	IE	ME
1961	22	4	-	81	-	59
1962	21	22	-	75	-	66
1963	17	25	-	72	1	52
1964	21	22	-	53	7	33
1965	18	20	-	50	4	44
1966	20	25	-	80	4	43
1967	17	38	1	78	11	47
1968	17	33	2	57	11	34
1969	17	29	15	58	11	35
1970	21	32	13	65	14	44

.

MASTER OF SCIENCE DEGREES AWARDED

(Sum of degrees awarded in June and previous August Commencements)

Year	ChE	CE	CS	EE	IE	ME
1961						
1962	-	4	-	10	2	4
1963	2	2	-	8	1	2
1964	1	4	-	9	2	3
1965	2	1	-	10	1	2
1966	3	11	-	10	2	6
1967	3	4	4	8	2	8
1968	1	4	3	8	1	3
1969	5	11	5	7	1	8
1970	17	10	4	9	-	10

.

DOCTOR OF PHILOSOPHY DEGREES AWARDED

(Sum of degrees awarded in June and previous August Commencements)

Year	ChE	CE	CS	EE	IE	MATS	ME
1961							
1962	1	-	-	-	-	1	1
1963	1	1	-	2	-	-	1
1964	3	-	-	6	-	-	1
1965	6	-	-	3	-	-	-
1966	1	-	-	4	-	-	-
1967	1	1	-	5	-	-	1
1968	3	-	-	8	-	-	2
1969	6	-	-	12	-	2	5
1970	3	2	-	15	-	4	4

CAMPUS PROTESTS

Many students throughout the country became very concerned with the war in Southeast Asia and on some campuses this concern translated into disruption and violence. A small group of students on the University of Utah campus were involved in a non-violent sit-in at the Park Building where rhetoric became shrill but there were no incidents or damage except for a fire set by an arsonist. No demonstrations or disruptive behavior occurred in the College of Engineering. As a result of complaints about the existence of the ROTC programs on the campus, a study was made resulting in suggestions for reforms and improvements in the ROTC programs but strongly recommended the retention of these programs at the University of Utah.

6. The Decade of the 70's – Expansion

Early in 1970, two new degrees were announced. The College of Engineering added a **Master of Engineering** degree for graduate students who wanted to broaden their engineering education through specialization in a major engineering field without having to produce a thesis. The degree required 45 hours of class-work and/or design projects and was administered by the College.

The Graduate School introduced the new **Master of Philosophy (M Phil)** degree. The admission requirements were the same as the Ph.D. and candidates for the M Phil degree were held to the same scholarly achievements as the Ph.D. except that no dissertation was required. The M Phil degree was classified as a terminal degree; students were not allowed to be candidates for both the Ph.D. and the M Phil degrees in the same department. It was the intent of the Graduate School that this degree not be considered a default degree for those Ph.D. candidates who were unable to complete a dissertation although use of the M Phil degree for this purpose was not prohibited.

The governance of Higher Education in the State of Utah was altered by the 1969 Legislature replacing the old Board of Regents with (1) a 15 member State Board of Higher Education and (2) Institutional Councils for each of the State Institutions. The first 9-member University of Utah Institutional Council began operation in 1970.

- **Noel H. deNevers** succeeded **L. Dale Harris** as Associate Dean for the College of Engineering
- **K. L. DeVries** replaced **Wayne S. Brown** as Chairman of the Mechanical Engineering Dept.
- **Wayne S. Brown** became a second Associate Dean in the College of Engineering and co-director of the Institute of Biomedical Engineering.
- **Obed C. Haycock** retired from the Electrical Engineering department and **Kay D. Baker** took over as the director of the Upper Air Research Laboratory.
- Dean **Max L. WilliaM.S.** headed up the new interdisciplinary Institute for Materials Research, created to promote research and education in the broad field of Materials Engineering.
- **A. Lamont Tyler**, Ph.D., joined the Chemical Engineering department as an Assistant Professor.

University of Utah Cadet Engineering Program

The Dean's Office of the College of Engineering announced the formation of a Cadet Engineering program designed to introduce high school students to the engineering program at the U. The program was aimed at outstanding high school students who had completed their junior year and had performed exceptionally well in mathematics and science. These students were invited to the campus during the summer for an eight week initiation into the studies and careers of civil, mechanical, materials science, electrical, chemical, fuels, metallurgical and mining engineering, computer science, physics and related fields.

The 1970 summer Cadet Engineering program was supported by several engineering firM.S. including ITT Rayonier, Inc., Litton SysteM.S., Utah Power and Light Co., Standard Oil Company of California, Mountain Fuel Supply, Utah Electronic Co., Phillips Petroleum Co., and Skyline Electric Co. A total of 61 students participated in the program, 52 of whom were able to work with researchers at the U during a part of the summer. The expenses for the program, including a picnic for students, parents and research supervisors, and scholarships, printing, and administrative salaries came to $6048, or about $99 per student.

A study of 165 entering freshman engineering students in the fall of 1970 seemed to indicate that the Cadet Program did not significantly influence the decisions of students to enter the engineering school. Only 5% of the entering freshmen had been in the cadet program (9 students) and 4 students replied that they had been somewhat influenced by a cadet. Partly as a result of the study, the College of Engineering decided on a slight change of emphasis for the 1971 Cadet program. Associate Dean **Noel deNevers** described the change in a letter to potential industrial contributors:

> "This year we intend to concentrate our recruiting and scholarship efforts in the areas of minority and disadvantaged students. This does not mean that middle-class of well-to-do students will be excluded, but does mean that our financial resources will be directed more heavily toward encouraging members of minority groups to seek careers in engineering,"

The Cadet program continued for several more years and then was dropped as the Minority Engineering program developed into a major component of the college's educational objectives.

- The University of Utah created the new University Research Park, a 300-acre site south of the University Campus to house high-tech research and development laboratories and associated support units. **Mark L. Money** was appointed to manage this new park.
- The departments of Chemical and Electrical Engineering began to list separate freshman and sophomore curricula signaling the approaching disintegration of the 2-year Common Core for engineering.

The Rise of the Digital Era

Soon after coming to the University of Utah in 1968, **Thomas Stockham**, Jr. began using digital techniques to enhance signals and images. He invented and developed the technique of blind deconvolution, a mathematical system used to weed out unwanted signals (noise) from digital data. His method was used extensively in deblurring photos and other digitized images. In 1971, Dr. Stockham was able to apply his system to audio signals. His first application was the restoring of a collection of old 78 rpm Caruso records. He digitized the records, digitally removed the surface and background noise and compensated for the distortion caused by the recording horns used early in the 20th century. The resultant restorations were astonishing and established Stockham as a world leader in digital restoration and de-blurring. His work led to real-time digital audio recording, first on tape and then on compact discs. In 1975, Dr.

Stockham founded Soundstream Inc. to develop and produce digital commercial sound recordings.

- In 1971, the grading system at the University of Utah was further modified by adding the grades of: A-, 3.6 grade-points, B+, 3.4 grade-points, and B-, 2.6 grade-points.
- Academic recognition upon graduation: Upon graduation with a Bachelor's degree and with at least 90 hours of graded credit at the University of Utah, students were accorded academic recognition as follows: a student whose grade-point average (GPA) in all graded course work was not less than 3.5 was designated "Magna cum laude", and those with a GPA between 3.15 and 3.5 were designated "Cum laude"
- Seven new faculty joined the College of Engineering during the 1970-71 school year:
  Professor: **Roland Ure Jr.**, Ph.D., Electrical and Material Science Engineering
  Associate Professor: **Bard Glenne**, Ph.D., Civil Engineering
  Assistant Professors: **Charles L. Seitz**, Ph.D., Computer Science
  William L. Hufferd, Ph.D., Civil Engineering
  Lawrence D. Reaveley, M.S., Civil Engineering
  Wayne T. VanWagoner, M.S., Civil Engineering
  William E. Mason, Ph.D., Mechanical Engineering
- In June of 1971, President **James Fletcher** left the University to direct the National Aeronautics and Space Administration (NASA) and **Alfred C. Emery** agreed to a two-year term as president while a national search was carried out for a permanent president.
- Intel unveiled their first microprocessor, the 4004, a 4-bit device.
- During the 1971-72 school year, Industrial Engineering and Materials Science and Engineering were both accredited for the first time by the Engineers Council for Professional Development (ECPD) and the Chemical, Civil, Electrical and Mechanical Engineering progra M.S. were re-accredited.
- **R. E. Stephenson** replaced **Noel deNevers** and **Wayne Brown** as Associate Dean of the College of Engineering.
- **George R. Hill** left the College of Mines and Mineral Industries and **Alex G. Oblad** was appointed as Acting Dean. This prompted Dean **Max Williams.** of the College of Engineering to again push for the combination of the two colleges, at least the engineering departments thereof and the University Administration agreed to the merger. A notice published in the 1973-74 University Bulletin in both the College of Engineering and College of Mines and Minerals overviews read as follows:

  "A merger of the College of Engineering and the College of Mines and Mineral Industries had been proposed by the University administration but is not yet implemented.

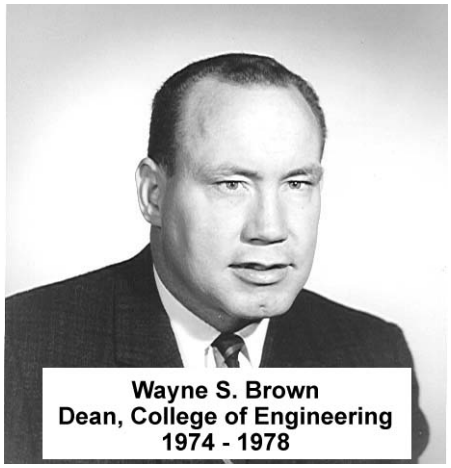
  The material in this catalog was prepared before the decision was finalized. Students in the College of Engineering and the College of Mines and Mineral Industries are advised to contact their respective departmental administrations before making long range plans based on this published material. Supplemental information will be published as it becomes available"

Faced with strong opposition to the merger by some faculty on the campus and a strong mining lobby, the administration delayed implementation of the merger.

- In 1973, the Air Pollution Science Program was discontinued although most of the courses taught in the program remained intact in the Chemical and Civil Engineering departments.
- The years 1971 and 1972 brought perhaps the largest influx of faculty to the College of Engineering ever as 17 people were recruited.

Professors:	**Curtis C. Johnson**, Ph.D., Biophysics and Bioengineering 1972
	Anthony C. Hearn, Ph.D., Director of Computer Science. 1972
	Elliot I. Organic, Ph.D., Computer Science 1971
Assoc. Professors:	**David W. Eckhoff**, Ph.D., P.E., Civil Engineering 1972
	Richard E. Turley, Ph.D., Mechanical Engineering 1972
Asst. Professors:	**Anching Lin**, Ph.D., P.E., Civil engineering 1971
	Robert D. Plummer, Ph.D., Computer Science 1972
	John M. Smith, Ph.D., Computer Science 1972
	Richard F. Riesenfeld, Ph.D., Computer Science 1972
	Rudolph A. Krutar, Ph.D., Computer Science 1971
	Diane C. Smith, Ph.D., Computer Science 1971
	Douglas A. Christensen, Ph.D., Electrical Engineering 1971
	Jacob Tal, Ph.D., Electrical Engineering 1971
	John A. Austin, Ph.D., Mechanical Engineering 1971
	D. R. Edmunds, Ph.D., Mechanical Engineering 1971
	Stephen C. Jacobsen, Ph.D., Mechanical Engineering 1972
	William J. Kennedy, Ph.D., Mechanical Engineering 1971

- **Curtis C. Johnson** was named Co-director with Dr. Kolff in the Institute for Biomedical Engineering.
- The search for a president of the University ended with the appointment of **David P. Gardner** replacing **Alfred C. Emery**.
- In 1974, **Wayne S. Brown** was appointed Dean of the College of Engineering replacing **Max Williams.**. Dean Brown retained **R. E. Stephenson** as Associate Dean and added **Milton E. Wadsworth** from the College of Mines and Mineral Industries as a second Associate Dean. This was an attempt to forward the merger of the two colleges, which was stalled due to mounting opposition. The prospect of the merger grew even dimmer with the appointment of **Lawrence H. Lattman** as the new Dean of the College of Mines and Mineral Industries.


Wayne S. Brown
Dean, College of Engineering
1974 - 1978

- In 1973 **Steven F. Boll**, Ph.D., joined Computer Science as Assistant Professor and **Jiri Janata** was appointed Associate Professor in Bioengineering.

- **Jim Clark** completed his Ph.D. in Computer Science in 1974 and went on to found Silicon Graphics and Netscape Communications. His contemporary in Computer Science, **Edwin E. Catmull**, Ph.D. 1974 became co-founder of Pixar Animation Studios, that became a pioneer firm in computer animation in such films. as "Toy Story."
- By 1974, Intel had introduced the 8-bit 8080 microprocessor chip, followed shortly thereafter by the 8080A, and the race was on! During the next 4 years, Motorola produced the 6800, 6809 and the 68000 chips, Zilog introduced the Z80, Z80A, and the Z8000, Texas Instruments pushed the 16-bit 9900, Fairchild sold the F8, and Advanced Micro Devices the bipolar 2901A microprocessor chip.
- The Division of Process Engineering and Materials was formed to identify and take advantage of areas of commonality between four separate degree granting programs. –Chemical Engineering, Metallurgical Engineering, Fuels Engineering, and Materials Science and Engineering. A further objective was to identify common areas of research and to bring together faculties and facilities in these constituent departments. The Division was directed by a committee consisting of the chairs of the member departments and reported to the Deans of Engineering and Mines and Mineral Industries.

New Departments in the College of Engineering

Under the leadership of Dean Brown, major changes took place in the Engineering College. Biophysics and Bioengineering split into two departments. Bioengineering became a department in the College of Engineering, with **Curtis C. Johnson** as the chairman. **Homer R. Warner** and **Don Lyman** became Professors in the department. The department of Biophysics moved to the College of Medicine**,** with **Homer R. Warner** as the Chairman. Computer Science became a department in Engineering with **Anthony C. Heam** as the Chairman. Also Materials Science and Engineering received departmental status with **Abraham Sosin** appointed as the first chairman. With these changes the College of engineering grew to 7 departments offering 36 separate degrees.

The growth of the Engineering College paralleled the growth of the University as a whole. By 1975, the University had grown to 21,000 students (including summer, extension, non-matriculated and part-time), 2,566 faculty, and 1,500 acres including the University Research Park. Sixty-four percent of the U. of U. faculty held Ph.D. degrees. The College of Engineering had 106 regular faculty of which 89 (84%) held Ph.D.'s. Regular daytime undergraduates enrolled in the College numbered 1,193 and there were 271 graduate students.

TRIGA Mark 1 Nuclear Reactor

Largely through the efforts of Nuclear Laboratory Director **Gary Sandquist**, the new TRIGA Mark 1 reactor was acquired and placed on-line, essentially replacing the aging AGN 201 that was put into service in the late 1950's. The TRIGA consisted of a 24-foot deep tank holding 8,000 gallons of water with the hexagon-shaped reactor core at

the bottom able to generate up to 100 kilowatts of thermal power. The fuel in the core could rise in temperature by about 200 degrees F. and was cooled by the water bath that was kept at less than 100 degrees F. The reactor was used in research and in training of nuclear reactor operators. To qualify as an operator for the TRIGA, candidates had to take two years of class-work and spend over 100 hours in actual hands-on training. Early research involved the exposure of materials to radiation to determine the make-up of the material, and the radiating of platinum-covered "seeds" used to treat cancer.

- Tuition and fees increased to $175 per quarter for 10 or more hours while the equivalent fees and tuition for non-residents jumped to $445. The cost of parking a vehicle on the campus also rose in 1975 to $10 per year.
- The University of Utah joined the National Student Exchange organization allowing full time sophomores and juniors with GPA's greater than 2.5 to apply for study at one of 33 other institutions in the U.S. while paying their tuition at the U of U. Because an exchange was required with the other institutions, few engineering students were able to take advantage of this opportunity.
- **David W. Eckhoff** replaced J**. Edmund Fitzgerald** as chair of Civil Engineering and Fitzgerald replaced **Milton Wadsworth** as the second Associate Dean of Engineering. By the end of the year, Fitzgerald left and **Abraham Sosin** became the Associate Dean for Research in the College.
- New faculty joining the college during 1974 were:
  Jason C. Yu, Ph.D., Professor in Civil Engineering
  James F. Key, Ph.D., Assistant Professor in Materials Science and Engineering
  Ralph J. Nuismer, Ph.D., Assistant Professor in Mechanical Engineering
  Peter Barber, Ph.D., Assistant Professor in Bioengineering
  Harvey Greenfield, Ph.D., Professor in Bioengineering
  Anil Virkar, Ph.D., Assistant Professor, Materials Science and Engineering
  Craig Rushforth, Ph.D., Associate Professor in Electrical Engineering
- In 1975, Mechanical Engineering changed its name to Mechanical and Industrial Engineering to reflect the large numbers of students graduating in the Industrial Engineering program.
- The two-year common core curriculum was still listed by the college but freshmen who had chosen a major on admission were directed to contact their departments immediately and follow the specific freshman and sophomore course listings in that major. Those students who were undecided as to their major were encouraged to follow the common-core program until such time as they could decide. More and more, students who delayed making the decision had difficulty with scheduling as they tried to get on track with their chosen major.
- In July of 1976, **J. D. Seader** became the new chair of Chemical Engineering replacing **E. B. (Bert) Christiansen** who, having served for 25 years as the chair, returned to teaching and research. Bert never retired but died "with his boots on" in his office years later.
- Several new faculty joined the new and growing department of Computer Science (CS) and one new hire occurred in the Mechanical and Industrial Engineering department in 1975:
  Suhas S. Patil, ScD, Associate Professor, CS

Martin L. Griss, Ph.D., Assistant Professor, CS
Martin E. Newell, Ph.D., Assistant Professor, CS
Sanford Baum, Ph.D., Associate Professor, MIE

RESEARCH FUNDING

By 1976, total research funding in Engineering reached an annual rate of nearly $5.4 million, tripling during the previous ten years. This helped to rank the U of U 28th in the nation in federal money received. Major areas of research included energy, bioengineering, computers, materials science, systems. and electronics. These funds were distributed by departments as follows:

Bioengineering	$510,000
Chemical Engineering	374,000
Civil Engineering	110,000
Computer Science	1,424,000
Electrical Engineering	684,000
Materials Science	1,860,000
Mechanical/Industrial Eng'rg	429,000
Total	$ 5,391,000

A separate Flammability Research Center was funded at $720,000

Typical projects:

Materials Science: Research on sodium-sulfur battery for cars

Electrical Engineering: Safe levels of microwave exposure through tests on rats and specially instrumented dolls.

Bioengineering: Microwave treatment of cancer.

Biomedical Institute: Artificial Eye, implants on the visual cortex, artificial ear with electrodes implanted in the cochlea.

Computer Science: Computer graphics, voice recognition

Mechanical and Industrial Engineering: Laser treatment of teeth plus Fluorine to discourage decay

Flammability Research: Behavior of certain gasses involved in fires, flammability testing of clothing and other materials.

NUCLEAR ENGINEERING

The nuclear power industry in 1977 supplied about 12% of the nation's electrical power, compared to nearly 50% supplied by coal-fired generating plants. Engineers began to address the probleM.S. of nuclear waste management. Dr.'s **Richard E. Turley** and **Gary M. Sandquist** of the Mechanical and Industrial Engineering department began to study the particular problem of uranium mill tailings. At the time of their study, there were 18 active uranium mills in the U.S. (two of them in Utah) with tailings piles totaling over 100,000,000 tons, increasing by 14,000,000 tons each year. Until the late 1960's, the U.S. Atomic Energy Commission controlled nuclear energy development and few people worried about management of all types of nuclear waste. Turley and Sandquist estimated that by the year 2000, 70 to 200 new mills would be required to support the nuclear industry, bringing the tailings totals to over one billion tons.

Engineers began to plan for the monitoring and isolation of these enormous radioactive mill sites. Turley and Sandquist recommended that the costs of managing the tailings piles should be borne by the purchasers of the uranium-oxide compound (commonly referred to as "yellow cake") produced by the uranium mills.

The use of nuclear energy peaked during the 70's and then began to decrease as the anticipated rapid deployment of nuclear power plants never materialized. By the year 2000, the number of operating mills had decreased significantly from the 18 operating in 1977; none were left in Utah.

Unfortunately, the recommendations of Turley and Sandquist and many other engineers were mostly ignored until enough people finally became convinced that the tailing piles and mill sites were a major health hazard. The affected states then had to look to the Federal Government to fund the massive clean-up operations.

- 1976 was another good year for faculty recruiting as 11 more educators joined the College:
  David W. Pershing, Ph.D., Assistant Professor, Chemical Engineering
  Paul J. Blatz, Ph.D., Professor, Civil Engineering
  Hwa-Shan Ho, Ph.D., Associate Professor, Civil Engineering
  Joseph M. Olsen, Ph.D., Assistant Professor, Civil Engineering
  Robert L. Siegel, Ph.D., Assistant Professor, Civil Engineering
  Thomas J. Stone, Ph.D., Assistant Professor, Civil Engineering
  Robert E. Barnhill, Ph.D., Professor, Computer Science
  Robert M. Keller, Ph.D., Associate Professor, Computer Science
  Gary E. Lindstrom, Ph.D., Associate Professor, Computer science
  David T. Pratt, Ph.D., Professor, Mechanical and Industrial Eng'rg.
  Roger L. Kirkham, MEA, Instructor, Mechanical and Industrial Eng'rg.

- For the 1977 school year, fees and tuition jumped more than 12% to $196.50 per quarter although the fee for parking remained at $10.
- **Richard H. Boyd** replaced **Abraham Sosin** as chairperson of Materials Science and Engineering.
- In 1977, **Richard C. Aiken**, Ph.D., joined Chemical Engineering as an Assistant Professor, and **George R. Hill**, Ph.D., was appointed to the position of Envirotech

Professor also in Chemical Engineering. Computer Science appointed **Alan L. Davis**, Ph.D., as Assistant Professor, and **Gary E. Lindstrom**, Ph.D., as Associate Professor.

- In 1978, **Wayne Brown** resigned and **Lawrence H. Lattman** took over as Dean of the College of Engineering while still serving as the Dean of the College of Mines and Mineral Industries. **R. E. Stephenson** remained as the Associate Dean in Engineering. Hopes for the combination of the two colleges were rekindled with the appointment of a single dean over both units.
- Professor **David Evans** left his full time position at the University of Utah, Computer Science department to manage Evans and Sutherland, a company founded years earlier by Evans and another faculty member, **Ivan E. Sutherland**

Lawrence H. Lattman
Dean, Colleges of Engineering and Mines and Mineral Industries
1978 - 1983

Demand for Engineering Graduates

The decade of the 70's brought significant increases in the demand for engineering graduates, along with escalating starting salary offers. Salaries for petroleum and chemical engineers were highest, followed by metallurgical and mining engineering and mechanical engineering. The largest numbers of offers made were for mechanical and electrical engineers. The U of U Placement and Career Information Center reported that during the 1978-79 school year, 82 companies came to the Center looking for Engineering graduates during the fall quarter.

National Average Salaries and Number of Offers Made – 1978-79*

Degree	Number of offers	Average Annual Salary Offer
Aeronautical	177	$16,248
Chemical	1,714	18,156
Civil	1,315	15,456
Electrical	2,993	16,404
Industrial	613	16,380
Mechanical	3,241	16,848
Metallurgical	248	17,016
Mining	65	17,964
Nuclear	84	16,320
Petroleum	412	19,836

For comparison:

Accounting	3,586	13,488
Business Management	1,238	11,916
Marketing	670	11,520
Humanities	156	10,452

Economics	71	12,228
Chemistry	69	14,292
Computer Science	569	15,192
Mathematics	96	14,220

* Data supplied by the U of U Placement and Career Center

- **Dr. Curtis C. Johnson** died of cancer and **Joseph D. Andrade** became chairman of Bioengineering.
- **John E. Wood**, Ph.D., joined the Bioengineering Department as Assistant Professor in 1978, Electrical Engineering appointed **Magdy F. Iskander**, Ph.D., and **Dwight L. Jaggard**, Ph.D., as Assistant Professors and **Stephen B. Affleck**, M.S., was appointed Assistant Professor by Civil Engineering
- In the fall of 1979, the schedule of fees and tuition became tied to the number of hours registered. For 1 or 2 hours, the cost was $72.50 and increased for each additional hour up to $213.50 for 15 or more hours. Non-resident fees and tuition for 15 hours was increased to $554.00. As might be expected, the fee for parking rose to $12.50 per year.
- **Briant Smith** became the Accounting Supervisor for the College of Engineering early in 1979. His task was to manage the ever-increasing amounts of bookwork required of the faculty and staff especially in many of the large research projects funded by the Federal Government.
- 1979 also brought several department chair changes. **Alva D. Baer** replaced **J. D. Seader** as chairman of the Chemical Engineering department. **David Eckhoff** left the Civil Engineering department to start his own Engineering firm and **Harold R. Jacobs** took over as the acting chairman until **George J. Dvorak** was brought in as the chairman. **Carl Durney** replaced **Richard W. Grow** as chair of the Electrical Engineering department and appointed **Dietrich K. Gehmlich** and **Clay D. Westlund** as Associate Chairs.
- New faculty appointments for the 1979 school year included:

  George J. Dvorak, Ph.D., Professor in Civil Engineering
  Richard A. Normann, Ph.D., Assistant Professor in Bioengineering
  David R. Schamber, Ph.D., Assistant Professor in Civil Engineering
  P. A. Subrahmanyam, Ph.D., Assistant Professor in Computer Science
  Mark R. Plichta, Ph.D., Assistant Professor, Materials Science & Eng'rg
  W. Robert Terry, Ph.D., Assistant Professor in Mechanical and Industrial Engineering

Faculty Listing, 1979-80 School Year

College of Engineering:	**Laurence H. Lattman**, Ph.D., Dean, Prof.
	R. E. Stephenson, Ph.D., Assoc. Dean, Prof. of EE
Bioengineering:	**Joseph D. Andrade**, Ph.D., Prof. and Chair

Professors:	**Harvey S. Greenfield**, Ph.D..
	Donald J. Lyman, Ph.D..
Associate Professors:	**Douglas A. Christensen**, Ph.D.
	Jiri Janata, Ph.D.
Assistant Professors:	**Peter W. Barber**, Ph.D.
	John E. Wood, Ph.D.
	Richard A. Normann, Ph.D.
Chemical Engineering:	**Alva D. Baer**, Ph.D., Professor and Chair
Professors:	**Richard H. Boyd**, Ph.D.
	E. B. Christiansen, Ph.D.
	George R. Hill, Ph.D., Envirotech Prof.
	Noel H. deNevers, Ph.D.
	Norman W. Ryan, Ph.D.
	Dale L. Salt, Ph.D.
	J. D. Seader, Ph.D.
Associate Professor:	**Lamont Tyler**, Ph.D.
Assistant Professors:	**Richard C. Aiken**, Ph.D.
	David W. Pershing, Ph.D.
Civil Engineering:	**George J. Dvorak**, Ph.D., Professor and Chair
Professors:	**Paul J. Blatz**, Ph.D.,
	Clifford G. Bryner, M.S.,
	E. S. Folias, Ph.D.
	David O. VanStrien, Ph.D.
	Jason Yu, Ph.D.
Associate Professors:	**Bard Glenne**, Ph.D.
	Hwa-Shan Ho, Ph.D.
	William H. Hufferd, Ph.D.
	Mack S. Kesler, M.S.
	An-Ching Lin, Ph.D.
	Edwin C. Nordquist, M.S.
	R. K. Vyas, Ph.D.
Assistant Professors:	**Stephen B. Affleck**, M.S.
	Joseph M. Olsen, Ph.D.
	David R. Schamber, Ph.D.
	Robert L. Siegel, Ph.D.
	Thomas J. Stone, Ph.D.
Computer Science:	**Anthony C. Hearn**, Ph.D., Professor and Chair
Professors:	**Robert E. Barnhill**, Ph.D.
	Elliot I. Organic, Ph.D.
	Thomas G. Stockham, Jr., Sc.D.
	William J Viavant, Ph.D.
Associate Professors:	**Robert M. Keller**, Ph.D.
	Gary E. Lindstrom, Ph.D.
	Suhas S. Patil, Sc.D.

Richard F. Riesenfeld, Ph.D.

Assistant Professors: **Steven F. Boll**, Ph.D.
Alan L. Davis, Ph.D.
Martin L. Griss, Ph.D.
P. A. Subrahmanyam, Ph.D.

Electrical Engineering: **Carl H. Durney**, Ph.D., Professor and Chair

Professors: **Charles L Alley**, M.S.
Kenneth W. Atwood, Ph.D.
Om. P. Gandhi, Sc.D.
Dietrich K. Gehmlich, Ph.D., Assoc. Chair
Richard W. Grow, Ph.D.
Robert J. Huber, Ph.D.
Craig K. Rushforth, Ph.D.
R. E. Stephenson, Ph.D.
Thomas S. Stockham, Jr., Sc.D.
Roland W. Ure, Jr., Ph.D.
Clay D. Westlund, Ph.D., Assoc. Chair

Associate Professors: **Douglas A. Christensen**, Ph.D.
Jacob Tal, Ph.D.
LaMar K. Timothy, Ph.D.

Assistant Professors: **Peter W. Barber**, Ph.D.
Magdy F. Iskander, Ph.D.
Dwight L. Jaggard, Ph.D.

Material Science and Engineering: **Richard H. Boyd**, Ph.D., Prof. and Chair

Professors: **Joseph D. Andrade**, Ph.D.
J. Gerald Byrne, Ph.D.
Ivan B. Cutler, Ph.D.
Irving H. Einhorn, B.S.
Ronald S. Gordon, Ph.D.
Donald J. Lyman, Ph.D.
Gerald R. Miller, Ph.D.
William D. Statton, Ph.D.
Roland W. Ure, Jr., Ph.D.

Associate Professor: **Paul J. Phillips**, Ph.D.

Assistant Professor: **Mark R. Plichta**, Ph.D.
Anil Virkar, Ph.D.

Mechanical and Industrial Engineering: **K. Lawrence DeVries**, Ph.D., Prof. and Chair

Professors: **Robert F. Boehm**, Ph.D.
Wayne S. Brown, Ph.D.
Gary A. Flandro, Ph.D.
L. King Isaacson, Ph.D.
Harold R. Jacobs, Ph.D.
Arlo F. Johnson, Ph.D.

Gary Sandquist, Ph.D.
Associate Professors: **John A. Austin**, Ph.D.
Sanford Baum, Ph.D.
Harold E. Gascoigne, Ph.D.
Stephen C. Jacobsen, Ph.D.
W. J. Kennedy, Jr., Ph.D.
Ralph J. Nuismer, Ph.D.
W. Robert Terry, Ph.D.
Richard E. Turley, Ph.D.
Frederick R. Wagner, M.S.
Assistant Professor: **William K. Van Moorhem**, Ph.D.

STATISTICS

Autumn Quarter Enrollments, Full-time, Residence

	Undergraduate		Graduate		Total Engrg		University		Total SCH
Year	Men	Women	Men	Women	UG	Grad.	UG	Grad	Incl. summers
1970-71	1,410	27	246	7	1,437	255	17,087	4,095	33,438
1971-72	1,266	35	257	7	1,301	264	17,595	4,073	34,047
1972-73	1,055	39	256	7	1,094	263	16,897	4,324	32,519
1973-74	997	45	270	5	1,042	275	16,665	4,369	31,588
1974-75	1,142	51	258	13	1,193	271	17,378	4,373	36,481
1975-76	1,217	69	283	8	1,286	291	18,130	4,445	39,261
1976-77	1,343	96	238	13	1,439	251	17,267	4,349	38,667
1977-78	1,483	108	231	12	1,591	243	17,380	4,500	40,974
1978-79	1,618	165	219	19	1,783	238	16,845	4,599	41,355
1979-80	1,725	173	261	22	1,898	283	17,465	4,527	42,957

BACHELOR OF SCIENCE DEGREES AWARDED

(Sum of degrees awarded in June and previous August Commencements)

Year	ChE	CE	CS	EE	IE	MSE	ME	Total
1971	17	31	41	63	11	1	46	210
1972	23	30	40	67	9	4	36	209
1973	19	31	45	63	3	2	33	196
1974	8	29	49	41	11	11	32	181
1975	18	32	29	54	11	4	47	195
1976	21	29	41	59	11	7	41	209
1977	17	26	34	57	7	6	33	180
1978	31	35	33	57	7	7	34	274
1979	31	44	29	66	10	7	52	239
1980	30	41	34	65	12	3	51	236

MASTERS DEGREES AWARDED*

(Sum of degrees awarded in June and previous August Commencements)

Year	Bio	ChE	CE	CS	EE	EA	MSE	ME	Nucl.	Misc**	Total
1971	0	7	7	5	14	60	0	10	0	2	105
1972	0	5	10	10	19	27	2	11	0	2	86
1973	0	8	13	7	8	33	0	17	2	3	94
1974	0	8	14	6	8	48	0	9	2	1	96
1975	5	6	23	9	14	33	1	7	1	2	101
1976	6	13	11	10	12	33	3	10	1	2	103
1977	7	14	5	11	22	35	7	15	2	1	119
1978	3	14	9	14	17	25	6	7	1	2	98
1979	4	12	8	9	12	20	7	12	2	1	87
1980	12	7	11	13	17	20	0	16	1	0	85

*Includes Masters of Science, Philosophy, Engineering Administration, Engineering

**Includes Engineering, Engineering Science, Applied Mechanics, Industrial Engineering

DOCTOR OF PHILOSOPHY DEGREES AWARDED

(Sum of degrees awarded in June and previous August Commencements)

Year	Bio	ChE	CE	CS	EE	MSE	ME	Nucl	Total
1971	2	6	0	0	9	1	2	0	20
1972	2	4	3	0	9	6	1	0	25
1973	0	4	0	1	10	3	3	0	21
1974	1	2	3	0	7	5	2	0	20
1975	2	4	2	4	6	3	2	1	24
1976	2	4	4	7	5	6	2	0	30
1977	0	0	2	2	1	6	1	0	12
1978	0	3	2	5	4	3	0	0	17
1979	1	1	3	5	4	4	0	0	18
1980	2	4	1	3	2	4	2	0	18

7. THE DECADE OF THE 80'S

At the beginning of the decade, Engineering was mostly housed in the Merrill Engineering Building which had an area of approximately 250,000 square feet. In this were housed the Dean's Office, seven departmental offices, faculty offices, student study rooms, graduate student "bull pens," class rooms, shops, and teaching and research laboratories as well as the University of Utah Computer Center. The major laboratories in the building were:

Artificial Organs
Biomaterials
Ceramic
Characterization
Chemical Engineering Unit Operations
Composite Materials
Computer Graphics
Concrete and Asphalt
Electron Paramagnetic Resonance
Electronic Devices
Fluid Mechanics
Heat Power
Hedco Microelectronics
High Altitude Measurements
Information Processing
Materials
Microwave
Nuclear Reactor
Optical Mechanics
Physical Electronics
Polymer
Rheology
Rock Mechanics
Rocket Combustion
Scanning Electron Microscope
Strength of Materials
Subsonic Wind Tunnel
Supersonic Wind Tunnel
Surface Analysis
Surveying and Photogrammetry
Switching Circuits
Undergraduate Electrical Engineering
Waveform Processing

The need for new space was critical causing the College to begin to examine all possible avenues for increasing the space available for teaching and research laboratories and classrooms. Some progress was made during the decade as will be recorded later.

- In 1980, **James J. Brophy** was appointed Vice-President for Research by President Gardner and also joined the faculty in Electrical Engineering as Professor. Other appointments in 1980 were:

  Lee A. Hollaar, Ph.D., Associate Professor in Computer Science
  Naser Mostaghel, Ph.D., Professor in Civil engineering
  David Stensel, Ph.D., Associate Professor in Civil Engineering
  Gerald B. Stringfellow, Ph.D., Professor in Electrical Engineering and Materials Science and Engineering
- The College of Engineering began the decade with 37 degree programs in 10 majors: Bioengineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Computer Science, Material Science and Engineering, Mechanical Engineering, Industrial Engineering, Engineering Administration, and Nuclear Engineering.

- The beginning of the decade also brought the end of the two-year common-core curriculum. There remained some common courses in the first year curricula of most of the departments but greatly reduced commonality in the sophomore year.
- The Electrical Engineering department began restricting enrollment in Upper Division courses by admitting students to the junior year based on their performance in a prescribed Freshman and Sophomore curriculum. Within the next five years most of the College had also instituted some form of restricted enrollment after the freshman year.
- In 1980, **Peter Barber** replaced **Joe Andrade** as Chair of the Bioengineering department and **A. Lamont Tyler** took over the chairmanship of the Chemical Engineering department from **Alva D. Baer**

Roland Walter Ure, Jr.

Roland W. Ure, Jr., Professor of Electrical Engineering and Materials Science and Engineering at the University of Utah, died January 24, 1980, in the crash of a light plane in Salt Lake County.

Professor Ure was a physicist at Westinghouse Research Laboratories for 19 years before joining the U faculty in 1969. His fields of special interest included the physics of semiconductors, thermoelectric materials and devices, microwave solid state devices, and ionic crystals. He was instrumental in organizing and establishing the HEDCO Micro-electronic Laboratory in the College of Engineering. His research at the time of his death involved silicon integrated circuits and devices and the fabrication and testing of chemically sensitive semiconductor devices.

He published 57 technical articles, 43 scientific papers, and a textbook on thermoelectricity. He also held two patents.

Professor Ure received his B.S. degree in physics from the University of Michigan in 1947 and his master's degree from the California Institute of Technology in 1948. In 1957, he received his Ph.D. from the University of Chicago. He was a member of the American Physical Society, Sigma Chi, Phi Kappa Phi, Tau Beta Pi, the American Association for the Advancement of Science, and the Institute of Electrical and Electronic Engineers.

- Seven more faculty were added to the college in 1981:

  Upman Lall, Ph.D., Assistant Professor in Civil Engineering
  Mark J. Baird, Ph.D., Associate Research Professor, Elect. Eng.
  Richard L. Frost, Ph.D., Assistant Professor in Electrical Engineering
  Irene Curelaru, Ph.D., Associate Professor, Materials Science and Engineering
  Hisao Yamada, Ph.D., Associate Professor, Materials Science and Engineering
  Kuan Chen, Ph.D., Assistant Professor, MIE
  Frederick R. Glickman, Ph.D., Assistant Professor, MIE

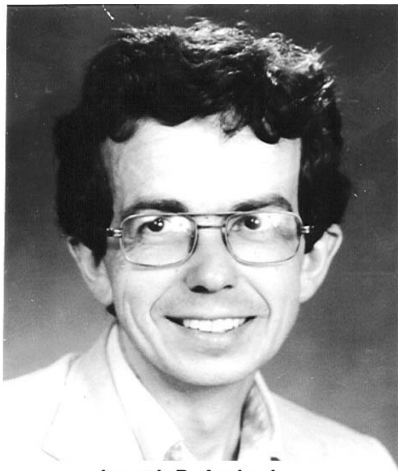
- In 1982, the following faculty joined the College of Engineering:

Kristine Knutson, Ph.D., Assistant Professor, Bioengineering.
Thomas C. Henderson, Ph.D., Assistant Professor in Computer Science
Kent F. Smith, Ph.D., Assistant Professor, Computer Science
Robert E. Benner, Ph.D., Assistant Professor, Electrical Engineering
Richard W. Shorthill, Ph.D., Research Associate Professor, Mechanical and Industrial Engineering
M. Quin Brewster, Ph.D., Assistant Professor, Mechanical and Industrial Engineering
Samuel H. Drake, ScD, Assistant Professor, Mechanical and Industrial Engineering
Sanford G. Meek, Ph.D., Assistant Professor, Mechanical and Industrial Engineering

- Four departments changed chairs in 1982. **Richard F. Riesenfeld** replaced **Anthony C. Hearn** in the Computer Science department, **Robert F. Boehm** took over from **K. Lawrence DeVries** as chair of the Mechanical Engineering department, **Craig Rushforth** replaced **Carl Durney** in the Electrical Engineering department and **Gerald B. Stringfellow** took over the chairmanship of the Materials Science and Engineering department. In addition to these chair changes, Dean Lattman appointed **Harold Robert Jacobs** as Associate Dean for Research.

- Seven faculty were appointed in 1983:
  W. Montgomery Reichert, Ph.D., Assistant Professor, Bioengineering
  Reaz Chaudhuri, Ph.D., Assistant Professor, Civil Engineering
  Alan G. Hernried, Ph.D., Assistant Professor, Civil Engineering
  Richard M. Fujimoto, Ph.D., Assistant Professor, Computer Science
  Spencer W. Thomas, Ph.D., Assistant Professor, Computer Science
  Tien-Hsin Chao, Ph.D., Assistant Professor, Electrical Engineering
  Larry R. Barnett, Ph.D., Research Assoc. Professor, Elect. Eng.

- Research in the College of Engineering increased significantly in the first half of the 1980's. Funding for the 1983-83 school year was over $7 million. Computer Science and Electrical Engineering had by far the most research support.
- In 1983, **Dean Laurence H. Lattman** accepted a position as president of New Mexico Institute of Mining and Technology in Socorro, New Mexico, and **Joseph D. Andrade** was appointed as the new Dean of Engineering. He retained **R. E. Stephenson** as Associate Dean for Academic Affairs and **Harold R. Jacobs** as the Associate Dean for Research. Also that year **Chase N. Peterson** replaced **David P. Gardner** as president of the University of Utah.


Joseph D. Andrade
Dean, College of Engineering
1983 - 1987

American Society for Engineering Education (ASEE)
92nd Annual Conference, Salt Lake City
June 24-29, 1984

During the latter part of the 1970's, Dean **Douglas Smoot** (College of Engineering, B.Y.U.) was very active in ASEE and was interested in having the annual conference held in Utah. Traditionally, the conference was held each year at a different university which had an engineering college associated with ASEE. Because liquor was always a part of the conference, Dean Smoot knew that it would not be appropriate to host the conference at BYU. He therefor approached Dean **Laurence Lattman** of the College of Engineering at the University of Utah about a joint sponsorship, with the University of Utah being the lead school. Of course no liquor was allowed on the University of Utah campus either so the deans proposed to ASEE Headquarters that the conference be held off-campus but near enough to a campus so that some parts of the conference could be on campus. ASEE asked for a specific proposal for the 1984 national conference. The Deans proposed that the conference be co-sponsored by the U of U and BYU, with tours of the two campuses and some functions to be held on the U of U campus. The main activity was proposed for the Salt Palace in downtown Salt Lake City. The Salt Palace appeared to be a perfect size for exhibits and conference sessions.

After a site visit, ASEE awarded the 1984 annual conference to the Utah schools. Professor **Cliff Bryner** was asked to be the general chairman of the conference. It was also decided to expand sponsorship to Utah State University and Weber State College with the four Deans forming an advisory board:

Joseph Andrade, U of U College of Engineering
Douglas Smoot, BYU College of Engineering
Bruce Bishop, Utah State University College of Engineering
Kent Randall, Weber State College, Engineering Technology

Planning and operating committees chaired by Cliff Bryner consisted of faculty from each school:

Division U: University of Utah, **Dietrich K. (Deter) Gehmlich**, Division Chair
Members: **Cliff Bryner**
Elliot Organic
Clay Westlund
Walt Howard
E. B. Christiansen
Robert Boehm
Responsible for: Publicity, Finance, Personal Service, Registration, Administration, Final Report and College of Engineering Arrangements.

Division Y: Brigham Young University, **Olani Durrant**, Division Chair
Members: **Norton Chaston**
Irin Holt
Jens Jonsson
Lynn Wallace

Don Bridge
Jim Polve

Responsible for: Spouses Programs, Youth Programs, Excursions, Transportation, Program Support and Audio-Visual

.

Division A: Utah State University, **Gordon Flammer**, Division Chair.

Members: **Clayton Clark**
Reynolds Watkins

Responsible for: Hospitality, Local Exhibitors, Pre/Post Conference Events, Current Promotion.

Division W: Weber State College, **Max Steadman**, Division Chair.

Members: **Jim Larkin**
Robert Twiggs
Newel Cutler
Roy Thornock
Charles Dinney
Hurschell Urie
Gordon Weight
Keith Allred

Responsible for: Sunday Picnic, Tuesday Breakfast, Wednesday Banquet, Entertainment, Seating and Public Appearances, Food, Graphics.

Intense planning for the conference began early in 1983, with the division chairs and the general chair meeting bi-monthly most of the year. Most of the correlation with ASEE headquarters was with **Barbara Ramey,** Manager of Member Activities in the Washington, D. C. headquarters office. Several members of the committee attended the 1983 Annual Conference in Atlanta to get a feel for how the conferences were managed.

Early registrations indicated that there would be a very good turnout so the committee geared up to handle a record number of attendees. Many faculty, wives and staff were asked to volunteer their time to help with all the details of registration, family activities, transportation, correspondence and housing, so that all was in readiness as people began to arrive on Saturday, June 23rd.

The conference was officially kicked off by the Annual Picnic on Sunday afternoon, June 24th at the Marriott Library Plaza at the University of Utah. Provisions were made for 1200 persons, which turned out to be insufficient. Adjacent lawns, stairs and walls were used as additional seating to accommodate the overflow crowd.

A western style meal, consisting of Baron of Beef with all the trimmings, was served to the picnic goers. Over 4000 soft drinks were served during the afternoon's activities. On an adjacent lawn, a group of "mountain men" with their families set up a typical mountain man village. The display included teepees, trinkets, authentic costumes worn by the men and their families, firing of their black powder rifles, and a tomahawk-throwing exhibition. Picnic goers were treated to samples of roast buffalo meat, invited to inspect the village area and trade for trinkets made by the mountain men. Games for children were played and supervised by the families of the mountain men.

Entertainment for the picnic was presented by the Intermountain Indian Tribes. Authentic Indian dress, dances and stories were provided by the tribes. Highlighting the dance entertainment, picnicers were invited to join the Indians in one of their native dances. Several hundred people took the opportunity to learn part of the dance. The picnic was an unqualified success!

The technical sessions and the exhibits began on Monday, June 25, and continued through Thursday, June 28. In all there were 347 scheduled technical sessions, seminars and luncheon meetings, 36 scheduled family activities (plus over 40 "fun-on-your-own" activities), and 19 special events and major tours.

Exhibits: The 1984 ASEE Exhibit of Educational Resources and Industrial Show consisted of 50 exhibiting firms, assigned to 88 booths, with 214 representatives in attendance. This was up 13% from 1983. The Salt Palace provided "vastly improved facilities" over the facilities available in past years.

Budget: The total budget for the national and local operations was in excess of $350,000 with the final accounting indicating a profit of over $17,000. This was the first conference of its kind and the first for several years to end up in the black.

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Summary: (Excerpts from the evaluation written by the staff at ASEE headquarters)

Overall, the 1984 ASEE Annual Conference was very successful. Attendance was up from previous years and Salt Lake City along with the four host Universities created a warm and welcoming environment for the participants.

The 1984 ASEE Exhibit of Educational Resources and Industrial Showcase was the most professional, profitable and highly successful exhibition held by ASEE to date. Written evaluations from the Exhibitors provided useful input for planning the 1985 exhibit.

Since this was the first ASEE Annual Conference with the bulk of its activities and participants housed off-campus, it was vitally important that the Conference be viewed as successful both financially as well as logistically. **Preliminary reports indicate achieving that goal!**

- In June, 1984, Dean Andrade established the office of Industrial Relations and appointed Mr. **Guil Funston, III**, as Assistant Dean for Industrial Relations, to serve as a liaison between the college and local and national industry. His responsibilities included directing the College's Industrial Affiliates Program, assisting with special university-industry interaction centers and interdisciplinary research areas, and coordinating the publication and distribution of brochures, promotional and informative materials on behalf of the College.
- 1984 was another good recruiting year for faculty in the College of Engineering; the following faculty accepted positions in the departments listed:

  Edward Trujillo, Ph.D., Associate Professor, Chemical Engineering
  Donald A. Dahlstrom, Ph.D., Research Professor, Chemical Engineering
  Bir Bhanu, Ph.D., Assistant Professor, Computer Science
  Tony M. Carter, Ph.D., Assistant Professor, Computer Science

Ramish Gohil, Ph.D., Research Associate Professor, Mat. Sci. & Eng.
James K. Strozier, Ph.D., Research Professor, Mechanical and Industrial Engineering
A. Craig Hansen, Ph.D., Associate Professor, Mechanical and Industrial Engineering

- The University of Utah Computer Center received a $1.2 million grant from Sperry Corp., which included the gift of a large mainframe computer and personal computers, matching funds for related hardware purchases, discounts on software system purchases and grants of cash. **Gerald Probst**, Chairman and Chief Executive Officer of Sperry Corp. announced the gift at the annual shareholders meeting held in Salt Lake City in July of 1984. Sperry also launched the Micro Products Division, charged to produce desktop microcomputer systems. This division was added to the Communications System Division and the System Products division already operating in Utah. In 1984, the total value of Sperry systems produced in Utah and distributed around the world approached $750 million.

  Gerald G. Probst was a native of Ogden and a 1951 honor graduate in Electrical Engineering from the University of Utah. In 1979, he received the University of Utah's outstanding alumnus award. He holds an M.S.E.E. degree from Massachusetts Institute of Technology.

- The Energy and Minerals Research Laboratory (EMRL) was completed in 1984 and jointly occupied by the College of Engineering and the College of Mines and Mineral Industries. It provided research space and laboratories for Chemical Engineering, Bioengineering, and Materials Science and Engineering departments in the College of Engineering as well as several departments in the College of Mines and Mineral Industries.

College Computing

While still housed primarily in Merrill Engineering building, the **Computer Center,** directed by **Ed Sharp,** became a University-wide service center providing a variety of instructional and research computing services to most colleges and departments. Equipment included a Univac 1100/72 with 32K bytes of cache memory, sixteen megabytes of main memory, sixteen billion bytes of disc memory for program and data files, four tape drives, and other devices such as printers and card-readers. In addition, a campus-wide network of 400 terminals was available for student and faculty use, including major centers in Marriott Library, the college of Business and Merrill Engineering building. The center also provided optical scanning capabilities for test scoring and data collection. Graphics capability included a fast drum plotter and several terminals suited for image display. Short courses were provided each quarter covering the use of statistical software, text processing and computer languages. Consultants were available to users having problems using the computer.

The Computer Center also operated the Microcomputer Research Center with Apple Macintosh and IBM P.C.'s mainly for engineering students.

The Computer Science department had separate computing facilities centered around a DEC 2060, a DEC VAX 11/780, 3 DEC VAX 11/750's and several PDP-11's with 24 Apollo work stations.

Other departments in the College were beginning to establish smaller and more specialized computing facilities specially suited to their teaching and research needs.

Faculty Listing, 1984-85 School Year

College of Engineering:
Joseph D. Andrade, Dean, Prof. of Bioengineering
R. E. Stephenson, Assoc. Dean, Prof. of EE
Harold R. Jacobs, Assoc. Dean for Research, Prof. of Mechanical and Industrial Engineering

Bioengineering:
Jiri Janata, Prof. and Chair
Professors: **J. D. Andrade**, **D. Christensen**, **D. Lyman**
Associate Professor: **R. A. Normann**
Assistant Professor: **J. Wood**
Research Professors: **C. Durney**, **S. Jacobsen**, **W. Kolff**
Res. Assoc. Professors: **J. D'Andrea**, **D. Gregonis**, **S. Johnson**, **J. Peters**, **C. Rappaport**, **D. Westenskow**
Res. Asst. Professors: **M. Berggren**, **A. Daniels**, **D. Eddington**, **W. Reichert**, **L. Smith**, **R. VanWagenen**

Chemical Engineering:
A. Lamont Tyler, Chair
Professors: **A. Baer**, **R. Boyd**, **E. B. Christiansen**, **G. R. Hill**, Envirotech Prof., **N. H. deNevers**, **N. W. Ryan**, **D. L. Salt**, **J. D. Seader**

	A. L.Tyler
Associate Professors:	**R. C. Aiken**
	D. W. Pershing

Civil Engineering:	**George J. Dvorak**, Professor and Chair
Professors:	**C. G. Bryner**
	E. S. Folias
	N. Mostaghel
	J. Yu
Associate Professors:	**M. S. Kesler**
	E. C. Nordquist
	J. Olsen
	D. Schamber
	R. K. Vyas
Assistant Professors:	**R. Chaudhuri**
	A. Hernried
	U. Lall
	J. Schultz

Computer Science:	**Lee A. Hollaar**, Associate Professor and Chair
Professors:	**R. E. Barnhill**
	R. Keller
	E. I. Organic
	R. Riesenfeld
	W. J. Viavant
Associate Professors:	**L. Hollaar**
	G. E. Lindstrom
	K. F. Smith
Assistant Professors:	**T. C. Henderson**
	R. Fujimoto
	P. A. Subrahmanyam
	S. Thomas
Instructors:	**P. Panangaden**
	W. Salmon
Res. Assoc. Profs:	**R. Brandt**
	E. Cohen
	E. Ferretti
Res. Asst. Profs:	**B. Baxter**
	R. Kessler
	L. Knapp

Electrical Engineering:	**Craig K. Rushforth**, Professor and Chair
	Dietrich K. Gehmlich, Professor and Assoc. Chair.
Professors:	**J. Brophy**
	D. Christensen
	C. Durney

O. P. Gandhi
D. K. Gehmlich
R. W. Grow
R. J. Huber
C. K. Rushforth
R. E. Stephenson
T. S. Stockham, Jr.
G. Stringfellow
C. D. Westlund

Associate Professors: **M. F. Iskander**
L. K. Timothy

Assistant Professors: **R. Benner**
T. Chao
R. Frost

Research Professor: **J. Baird**

Research Assoc. Profs.: **J. D'Andrea**
H. Massoudi
K. F. Smith
F. Staffanson

Research Asst. Prof.: **L. Barnett**

Material Science and Engineering: **Gerald B. Stringfellow**, Prof. and Chair

Professors: **J. D. Andrade**
R. Boyd
J. G. Byrne
R. Gordon
D. J. Lyman
P. J. Phillips
G. B. Stringfellow

Associate Professors: **I. Curelaru**
A. Virkar
H. Yamada

Assistant Professor: **M. R. Plichta**

Research Professors: **R. Huber**
H. Meuzelaar

Research Assoc. Prof.: **D. Gregonis**

Research Asst. Profs: **R. Benson**
K. Knutson

Mechanical and Industrial Engineering**: Robert F. Boehm**, Prof. and Chair

Professors: **S. Baum**
R. F. Boehm
W. S. Brown
L. K. DeVries
G. A. Flandro

L. K. Isaacson
H. R. Jacobs
S. C. Jacobsen
W. J. Kennedy
G. Sandquist
R. E. Turley

Associate Professors: **S. R. Swanson**
W. K. Van Moorhem

Assistant Professors: **M. Q. Brewster**
K. Chen
S. Drake
F. R. Glickman

- In the spring of 1985, **Michael Kay** replaced **Briant Smith** as Accounting Supervisor in the College of Engineering
- On May 1, 1985, **David Hoeppner** replaced **Robert F. Boehm** as chair of the department of Mechanical and Industrial Engineering.
- New faculty added that year included:

  Andrew A. Schoenberg, Ph.D., Research Associate Professor, Bioeng.
  James N. Herron, Ph.D., Assistant Professor, Bioengineering
  Timothy Oolman, Ph.D., Assistant Professor, Chemical Engineering
  Richard M. Cohen, Ph.D., Research Assistant Professor, Mat. Sci. & Eng.
  David Hoeppner, Ph.D., Professor, Mechanical and Industrial Engineering
  Sambunath Ghosh, Ph.D., Professor, Civil Engineering
  Chris Sikorski, Ph.D., Associate Professor, Computer Science
  V. John Matthews, Ph.D., Assistant Professor, Electrical Engineering
  Joel B. DuBow, Ph.D., Professor, Materials Science & Engineering
  Dinesh Shetty, Ph.D., Associate Professor, Materials Science & Engrg.
  Tung Hsu, Ph.D., Assistant Professor, Materials Science & Engineering
  Gang L. Chang, Ph.D., Assistant Professor, Civil Engineering
  Elaine Cohen, Ph.D., Associate Professor, Computer Science
  John J. Van Rosendale, Ph.D., Assistant Professor, Computer Science.
- By the beginning of the fall term of 1985, four more new department chairs had been installed by Dean Andrade:

  Douglas A Christensen replaced **Jiri Janata** as chair of Bioengineering.
  New hire **Sambhunath Ghosh** replaced acting chair **E. S. (Tim) Folias** in Civil Engineering after **George J. Dvorak** left the campus.
  Thomas G. Stockham became chair of Electrical Engineering replacing **Craig K. Rushforth**.
  Joel B. DuBow, a new faculty hire, replaced **Gerald B. Stringfellow** as chair of Material Science and Engineering.

- The Electrical Engineering department began an off-campus Masters of Engineering program by teaching courses at the Sperry Corporation's North Salt Lake plant during early morning hours and after work. Sperry employees had the opportunity to complete most of a Master of Engineering degree in Electrical Engineering with out having to

leave the plant, by taking one or two courses each quarter. The program was open to any Sperry employee with a bachelor's degree and who was qualified to take graduate classes.

- The Utah Alpha chapter of Tau Beta Pi, the national engineering honor society, joined in the celebration of the organization's centennial year in October of 1985. Tau Beta Pi was founded in 1885 at Lehigh University in Bethlehem, Pa. with the goal of honoring students who "bring distinguished scholarship and exemplary character" to their alma maters. The U of U was the first university in the state to be granted a chapter of Tau Beta Pi. The Utah Alpha chapter was founded December 8, 1933. The current chapter consisted of 66 juniors and seniors chosen from the top one-eighth of students in all branches of engineering. Officers for the 1985-86 school year were: **Suzanne Tuttle Heninger**, president**, Vicki Hunt**, vice-president, **Clay Warner**, recording secretary, **Eun Chung**, corresponding secretary and **Todd Lambert**, cataloger.

- Fifteen years after the University Research park was endorsed by Gov. Calvin Rampton and set in motion by the University, it had grown to include 18 completed buildings – a total of 1.25 million square feet – and one under construction. There were 44 tenants employing some 3000 persons. The level of activity of their combined local functions was over $220 million. **Charles Evans**, director of the park was aggressively pursuing a 200-room hotel and convention center, a place where symposiums and academic-related conferences of a maximum of 400-500 participants could be accommodated.

- Early in 1984, the College of Engineering began a project to help minority students prepare for and enter engineering programs, and to keep them in school once they've enrolled. Interim director for the **Minority Engineering Program** (MEP) was Dr**. Robert S. Benson,** assisted by Dr. **Edward M. Trujillo** who had experience with a similar program in Colorado high schools. One of the first activities of the MEP was sponsorship of a one-day orientation program designed to help students select their first schedule of classes, and inform them of careers available in engineering. The program received a $15,000 services grant from the National Action Council for Minorities in Engineering (NACME), as well as scholarship support from several local industries.

- In July 1984, Dean **Joseph Andrade** was forced to impose an enrollment ban on the Industrial Engineering program because "too many programs were competing for too few engineering dollars." Enrollment had increased to the point that there were too few faculty and facilities to handle the large numbers of students interested in the program. After receiving a positive recommendation from a student-faculty task force late in 1985, **Dr. Irwin Altman**, vice president for academic affairs, lifted the ban and instructed Dean Andrade to re-evaluate the Industrial Engineering program in one year and submit a progress report by the end of winter quarter, 1986. Dean Andrade voiced fears that without a major increase in the funding for the program, the Industrial Engineering program might not be accredited in 1986.

A PAT ON THE BACK

"A dean of engineering, in addition to defining objectives and long-range plans, is involved in the day-to-day operations of a college. In retrospect, the day-to-day details disappear and the college as an entity may be viewed. Just over a year after leaving the University of Utah's College of Engineering, I look back with respect and affection. I realize that the College is an extremely good college of engineering and, frankly, almost impervious to what a dean can do to it. The interactions among the departments are extremely strong and cooperative, even though at close range one hears a great deal of competition and noise. The College is responsive to new ideas, enthusiastic about maintaining quality and genuinely concerned about the education of engineers. Looking back, I realize that I was extremely fortunate to be associated with a first rate school like the U of U's College of Engineering. Even at this distance, I see nothing that can prevent that College from achieving a higher and higher degree of excellence."

Laurence Lattman, President, New Mexico Institute of Mining and Technology

- The "Centers for Excellence" program was created by the Legislature in June 1985. Main areas of focus were space engineering, biomedical and computer technologies, natural resources, communications, engineering and biotechnology. State funds were to be matched by private industry or the federal government, 2-to-1. It was expected that the bulk of the state funds would be shared by the University of Utah, BYU, Utah State University and Weber State College. **Lynn H. Blake**, center director, stressed that the awards would be based on merit, not which school was submitting the proposal. In the ensuing three years, the state awarded $5.5 million to establish 21 centers at the four schools listed above.

- The first of two robotic hands produced by the U of U Center for Biomedical Design (CBD), and MIT's Artificial Intelligence Laboratory were finished and went into the test phase. The actual hand and the lower-level control systems were designed and built by CBD while the MIT researchers worked on the more abstract issues of control theory. Vision and touch sensors were implanted into the three fingers and thumb and palm of the dexterous hand. The 19 joints in the hand were controlled by Kevlon-Dacron tendons operated by compressed air cylinders. **Stephen C. Jacobsen,** director of CBD, noted that this was just the beginning of their work, which should in the future produce life-like full-size human robots.

- The department of Computer Science was newly accredited by the Computing Science Accreditation Board.

Stockham Wins Award

The 1985 Alexander M. Poniatoff Gold Medal for Technical Excellence was awarded to **Professor Thomas G. Stockham, Jr**., in recognition for his outstanding work in pioneering digital sound recording for professional mastering. The award was established in 1982 by the Society of Motion Picture and Television Engineers to recognize outstanding technical excellence for contributions in research and development of equipment that contributes to the advancement of audio of television magnetic recording and reproduction.

The medal honored Dr. Stockham for his work and the work of his former company Soundstream Inc. in the development of the first public commercial equipment for the digital mastering of sound. Their research contributed significantly to the development of the compact disc, a new sound reproduction system with exceptional clarity and dynamic range.

Pre-Engineering and Articulation

Faculty members from ten colleges and universities in Utah participated in the first "Pre-Engineering Education in Utah" workshop held on the University of Utah campus Feb. 22, 1985. The event was hosted by **Dean Joseph Andrade** and co-sponsored by the state Board of Regents, the U. of U., Utah State University and Brigham Young University. Dean Andrade, **Dr. Dee H. Barker**, Associate Dean of the College of Engineering and Technology at BYU, and **Dean A. Bruce Bishop**, College of Engineering at USU, presented a review of state-accredited engineering programs and entrance requirements. This was followed by representatives of the three engineering schools who addressed the question, "How well do transfer students do?" Afternoon sessions featured discussions on statics, dynamics, materials strengths, chemistry, mathematics, computer science and physics.

Encouraged by the success of the workshop and the desire of all who attended to find ways to ease the transfer of students from pre-engineering programs into the four-year programs at the three engineering schools, attendees formed a Pre-Engineering committee whose assignment was to establish a yearly workshop where faculties of all the schools with pre-engineering curricula could meet together annually to review course content, and articulate pre-engineering curricula. The first meeting was held early in 1986 at the U of U with subsequent annual meetings held at other schools around the state. The interactions between the schools and the results of the articulation agreements between schools made transfers between schools better understood to the benefit of the students affected.

Noting the success of the engineering schools in articulating most of the courses in the freshman and sophomore years, other disciplines began efforts to reach articulation agreements with the schools in the State System and most included BYU as well.

- On July 1, 1986, **Dietrich K. Gehmlich** replaced **R. E. Stephenson** as Associate Dean for Academic Affairs in the College of Engineering, **Clifford G. Bryner** was appointed by Dean Andrade as Associate Dean for Facilities, and **Peter F. Gerity** was named Assistant Dean for External and Community Relations.

- New faculty added in 1986 included:
  Niel A. Cotter, Ph.D., Assistant Professor, Electrical Engineering
  Terry A. Ring, Ph.D., Associate Professor, Chemical Engineering
  Warren Burton, Ph.D., Professor in Computer Science
  Ganish G. Gopalakrishnan, Ph.D., Assistant Professor, Computer Science
  John A. Nairn, Ph.D., Assistant Professor, Materials Science & Engineering
  Donald S. Bloswick, Ph.D., Assistant Professor, Mechanical and Industrial Engineering

Yoichi Matsumoto, Ph.D., Assistant Professor, Mechanical and Industrial Engr'g.
J. Willard Bascom, Ph.D., Research Professor, Materials Science & Engineering
Celia W. Blackburn, Ph.D., Research Assistant Professor, Electrical Engineering

- In December 1985, **Dr Willem J. Kolff** received the David M. Hume Memorial award at the National Kidney Association's annual meeting in New Orleans. It was the Association's highest honor for contributions in kidney research. "Today, more than 80,000 end-stage renal disease patients in the United States receiving dialysis treatments are being kept alive because of Dr. Kolff's brilliant work," said Dr**. Robert Schrier,** National Kidney Foundation president.

- Late in 1986, renovation was completed on the five buildings formally belonging to the U. S. Bureau of Mines located south of the Energy and Minerals Research Laboratory (EMRL) building. The complex, renamed the Energy and Minerals Research Office (EMRO) building, provided over 108,000 square feet of research and office space for the College of Engineering and the College of Mines and Mineral Industries. Initially, the department of Materials Science and Engineering occupied one floor of the main office building.
- Gov. **Norman H. Bangerter** ordered a 6% cut in the budget for Higher Education in the state for the 1987-88 school year. This amounted to a reduction of $15.4 million in the funds available to the seven colleges and two universities in the state system. President **Chase N. Peterson** announced that the University of Utah would loose $9.5 million, which meant the dropping of 24 academic programs, 95 faculty members and 124 staff by the 1990-91 school year. Dropped entirely would be such programs as the foods and nutrition departments, graduate programs in sociology, secretarial training, and evening programs for the masters degree in social work. Engineering would lose no significant programs but would be forced into much larger classes with fewer alternatives for students, and faculty salaries would fall further behind those of 13 peer institutions. Dean **Joseph Andrade** warned that unless there was a real improvement in the funding for the College of Engineering, faculty would begin to "vote with their feet" and look for employment elsewhere. Heavy pressure was exerted on the Governor and the Legislature to approve a large tax increase to negate the proposed budget cuts.

  Final action by the Legislature was completed by the end of February 1987. The state-supported schools were forced to make the cuts as ordered by the Governor, then a very large tax increase made it possible to return the school budgets to the pre-cut level with the proviso that the cut programs not be restored but the new budget increases be used to bolster faculty salaries and build up the remaining units in the system.

RESEARCH CENTERS AND AGENCIES

Research in the College of Engineering continued to increase almost exponentially, with many of the faculty forming groups designed to further the research work and provide strong bases for attracting more graduate students and grant money. By the 1987-88 school year, at least 10 such centers were recognized by the University and listed in the Bulletin.

Many others were being formed or had not been recognized by the Administration. The diversity of the research groups listed below attested to the breadth and magnitude of the research effort in the College.

Advanced Combustion Engineering Research Center (ACERC), Colleges of Engineering, University of Utah and Brigham Young University, **David Pershing,** Assoc. Director. Principle objective: the development and implementation of advanced computer-aided combustion system design methods in industry.

Biomaterials Profiling Center, College of Engineering, **Henk L. C. Meuzelaar**, Director. Principle objective: to provide analytical instrumentation and expertise for the characterization of polymeric and other complex organic materials in energy (coal), polymers and medical research.

Biomedical Engineering Center for Polymer Implants, Materials Science and Engineering, **Donald B. Lyman**, Director. Research on new polymer developments, working with membranes, vascular implants, nerve implants, ostomy implants and sutures.

Center of Communications Research, Electrical Engineering, **Craig Rushforth**, Director. Formed to develop new communications systems for military and commercial use, to analyze their performance and to implement them in hardware using modern VLSI technology.

Center for Engineering Design, Mechanical Engineering, **Steven C. Jacobsen**, Director. Projects included artificial limb design, dialysis systems, drug delivery systems, microfield devices, insulin control systems, and design and control of robots.

Center for Microelectronics, Materials Science and Engineering, Electrical Engineering, Computer Science, Physics, **Gerald B. Stringfellow**, Director. Research in Silicon and III/V semiconductors.

Center for Sensor Technology, Bioengineering, **Jiri Janata**, Director. Application and commercialization of advanced chemical and biological sensors.

Institute for Biomedical Engineering, Colleges of Medicine and Engineering, **Don B. Olsen**, Director. Interdisciplinary study of artificial organs.

Microwave devices and Physical Electronics Laboratory, Electrical Engineering, **Richard W. Grow**, Director. Investigation of active devices, microwave tubes, plasmas, and quantum electronics. Research involved gyrotrons, millimeter wave tubes and electron guns.

Nuclear Engineering Laboratory, Mechanical Engineering**, Gary M. Sandquist,** Director. Research and training opportunities for students using the TRIGA nuclear research reactor and the AGN-201 nuclear training reactor.

Utah Engineering Experiment Station, Colleges of Engineering and Mines and Mineral Industries, **Gordon Jensen**, Director. Established in 1909 by the State Legislature to interface between the campus technical resources and the public.

- In the spring of 1987, the Department of Energy announced its plans to build a Superconducting SuperCollider at an estimated cost of $6 billion. The collider, the largest ever built by a factor 20, would accelerate protons around a 52-mile oval "racetrack" all built underground. Bids were to presented to the DOE by August 3, with a preferred site to be chosen by July, 1988. Utah formed a task force, funded by a million dollars from the Legislature, to propose a 10,000 acre site near Delle, 60 miles west of Salt Lake City. The Utah proposal did not make the first cut, prompting some to claim that the selection would be based more on "back-room politics" rather than on technical or economic merits.

- During the summer of 1987, MEB finally got a new and sensible room numbering system. Sponsored by **Cliff Bryner**, Associate Dean for Facilities, the new system was set up similar to the Salt Lake City street numbering system, with "avenues" running east and west and "streets" running north and south. In MEB, the corridors running north and south were odd numbered and the east-west corridors were even numbered with 2 at the south and 4 at the north. The new door numbers consisted of brass plates mounted at eye level, engraved with a four-digit number. The first digit indicated the floor and the second digit indicated the hall. The last two digits were assigned to the particular room with an attempt to keep them in sequence along a particular hall. Unfortunately, the room assignments in the fall class schedule used the old numbering system resulting in considerable confusion at the beginning of the quarter.

- Four new faculty joined the college in 1987:
  Andrew P. Hong, Ph.D., Assistant Professor, Civil Engineering
  Robert R. Johnson, Ph.D., Professor, Computer Science
  Gary J. Ridsdale, Ph.D., Assistant Professor, Computer Science
  Joseph L. Zachary, Ph.D., Assistant Professor, Mechanical and Industrial Engr'g

Limiting Enrollments

By 1988, essentially all the departments in the College of Engineering had put into place methods for limiting or restricting enrollments in the sophomore year and in the Upper Division (Junior and Senior years). Students admitted to the University were, upon request, admitted to the College of Engineering as "Pre-Engineering" students in the department of their choice. Upon satisfactorily completing prescribed freshman-level courses at a department-specified minimum level of academic performance, students were allowed to apply for "Intermediate" status, allowing them to take the sophomore courses in their chosen major. Students were allowed to apply for "Major" status after completing the Sophomore-level courses, again at prescribed minimal grades. Some departments, because of overcrowding and limited faculty, were forced to limit admissions to Major status with selection based on the academic performance of students in specific course work.

Transfer students from ABET-accredited schools were evaluated for intermediate or major status on the same basis as students who did their work at the U. of U. All other transfer students were admitted on probationary status while their academic performance was being evaluated.

- In 1987, the Engineering and Mines Classroom Building (EMCB), south of MEB was completed and put into service by the Colleges of Engineering and Mines and Mineral Industries. It provided 5 large lecture halls, 6 classrooms, several computer terminal rooms managed by the Computer Center, and the Computer Science department, and several other laboratories used by the college of Mines and Mineral Industries. All-weather access to the building from MEB was provided by an underground tunnel. In contrast to the all-glass exterior of MEB, most rooms in EMCB were underground with a central atrium providing light to the hallways connecting all rooms.

- The Mechanical Engineering department began to phase out the Industrial Engineering and Engineering Administration programs by dropping the Masters of Engineering Administration degree and the Bachelors, Master of Engineering and Master of Science degrees in Industrial Engineering. The departmental name also reverted to Mechanical Engineering.

- The Electrical Engineering departments "Clinic" program expanded to three teams in the fall of 1987 sponsored by Unisys, BSD Medical Corp. of Salt Lake City, and Hewlett-Packard. The program, organized by Dr**. Magdy F. Iskander**, professor of Electrical Engineering a year earlier, placed senior students in specially-equipped university laboratories in five-member teams to do research for sponsoring companies. Participating companies contributed $25,000 to sponsor a research project performed under faculty and corporate supervision. The real-life experiences replaced the usual senior project and senior thesis normally executed by senior electrical engineering students. Professor Iskander's goal was to eventually include students from all engineering disciplines in the clinic teams.

  Sponsorship fees went directly to upgrading undergraduate laboratories and purchasing new equipment. Neither students nor faculty drew any pay. Sponsors received product prototypes, comprehensive final reports and exclusive licensing rights to any resulting patents.

- **David W. Pershing** was appointed as the Dean of the College of Engineering effective October 1, 1987, replacing **Joseph Andrade**. Dean Pershing retained **Dietrich K. Gehmlich** as Associate Dean for Academic Affairs, **Clifford G. Bryner** as Associate Dean for Facilities, **K. L. DeVries** as Associate Dean for Research, and **Peter F. Gerity** as Assistant Dean for External and Community Affairs.

David W. Pershing
Dean, College of Engineering
1987 - 1998

- The faculty of the College of Mines and Mineral Industries, under Dean **Milton R. Wadsworth,** voted to change their name to the **College of Mines and Earth Sciences**.
- **Christine Reyes** became the full-time director of the Minority Engineering Program (MEP) in the College of Engineering. MEP was established to provide ethnic minority and female Engineering students with academic support at the college level.
- New faculty added in 1988 included **:**

  Jules J. Magda, Ph.D., Assistant Professor, Chemical Engineering
  JoAnn S. Lighty, Ph.D., Assistant Professor, Chemical Engineering
  Beat Bruderlin, Ph.D., Assistant Professor, Computer Science
  Scott S. Kimbrough, Ph.D., Assistant Professor, Mechanical Engineering
  Patrick A. McMurtry, Ph.D., Assistant Professor, Mechanical Engineering
- **Joseph Andrade** replaced **Douglas A Christensen** as chair of the department of Bioengineering.

- Early in 1988, the University of Utah received approval of funding from the U.S. Congress sufficient to build a $20 million research building devoted to the study of biopolymers and their uses in medicine. The Polymer Research Facility would be built at the University of Utah Health Science Center and house researchers from the colleges of medicine, pharmacy and engineering. Vice President for Research **James Brophy** announced the receipt of the first $4 million and expected the rest would arrive within the year, making it possible to begin the design of the building and a possible ground-breaking in 1989.

Wayne S. Brown

Former Dean **Wayne S. Brown** and four members of his family were killed Tuesday, May 17, 1988 in a single-engine airplane crash near Albuquerque, New Mexico. Professor Brown, 60, his wife Joyce, 58, of Salt Lake City, their son Gary, 31, Albuquerque N.M., his wife Melissa, 26, and their daughter Lindsay, 2, were killed when the pilot apparently tried to land at the Coronado Airport, north of Albuquerque. The plane was attempting to land at the small private airport in a thunderstorm when the engine appeared to stall on the second approach, and it plunged nose-first into the ground.

Professor Brown, a native of Provo, received his Bachelor's degree in Mechanical Engineering at the University of Utah in 1951, a Master of Science degree from the University of Tennessee in 1953 and the Ph.D. degree in 1960 from Stanford University. He came to the University of Utah from the University of Tennessee in 1953 and was appointed Assistant Professor in Mechanical Engineering. He left the U in 1957 to work on the Ph.D. degree at Stanford. Returning to Utah in 1959, he became Assistant General Manager and Director of Engineering at Utah Research and Development Company (started by **William S Partridge**, former Vice-President for Research at the University of Utah).

In 1964, he was appointed Professor and Chair of the Mechanical Engineering Department at the U., succeeding **Ralph D. Baker**. In 1970, **Larry DeVries** became chair and Professor Brown returned to teaching and research, and became co-director, with **Willem J. Kolff**, of the Institute for Biomedical Engineering. In 1973, he was appointed Dean of the College of Engineering, serving in that position until 1978.

Professor Brown was co-founder of Kenway Inc., a supplier of driverless machines and automated material handling, storage and retrieval systems. In 1978, it merged with

Cleveland-based Eaton Corp. and became Eaton-Kenway. He also helped start two other firms, Native Plants Inc., and Terra Tek, a diversified geoscience company. He was founder and president of the Utah Innovation Center Inc., a program set up through a National Science Foundation grant to market technical innovations.

President **Chase Peterson** paid tribute to Professor Brown as follows

"**Wayne Brown** was the epitome of a great teacher, a great dean and a great entrepreneur. Through his vision, energy and application, he helped foster the concept of technology transfer. Today we are seeing the fruits of his work in the movement of ideas and inventions from the academic arena into the marketplace. His loss is a great one, to the U., the state and indeed to the flowering of free enterprise."

- Dr. **Thomas G. Stockham Jr**. received a 1988 Emmy Award from the National Academy of Television Arts and Sciences for pioneering the development of digital sound recording. In 1975, he founded Soundstream Inc., which developed digital commercial sound recording and led to its establishment as an industry-wide practice, leading to the development of the compact disc.

- In 1989, **Sam Ghosh** resigned as chair of the Civil Engineering department, and Dean **Pershing** appointed Assoc. Dean **Dietrich K. Gehmlich** as interim chair of the department. Faced with the choice of either phasing out the department or rebuilding it, Dean Pershing requested special funds from the Legislature through the Engineering Initiative. Supported by a strong "downtown" lobby headed by **Hal Clyde, Larry Reaveley, Paul Jara, Tom Shimizu**, and other Civil Engineers, the Initiative passed the Legislature and funds were available by mid-year to start the rebuilding process, which would take the better part of the next decade to accomplish.

- In 1989**, Richard H. Boyd** replaced **Joel B. Dubow** as the chair of Materials Science and Engineering.

From the ***Daily Utah Chronicle,*** Tuesday, January 17, 1989:

University presidents discuss onset of new era of engineering

The presidents of three universities met for a ceremony at the University Park Hotel Thursday to usher in "a new era of Utah engineering."

***Chase Peterson** of the University of Utah, **Stanford Cazier** of Utah State University and **Jeffery Holland** of Brigham Young University joined Lt. Gov. **Val Oveson** for the announcement of the "Utah Engineering Network," (UEN).*

The network, which was prompted by requests from private industry in Utah, is designed to aid the states economic development through the identification of a pool of engineering alumni from the state's three engineering schools. Questionnaires will be sent out to the estimated 16,000 engineering alumni of the three universities, with the resulting data being organized and entered on the computer. Companies participating in the program will then be "matched" to applicants having similar qualities to those needed in an open position. Exact fees for the service have not yet been determined.

***Lynn Blake**, the director of business creation at the U., said identical computer facilities would be located at all three institutions to be used by both private industry and governmental agencies.*

The UEN's first-year budget is projected at approximately $100,000, of which the state is providing $35,000, Blake said. In subsequent years, UEN will be expected to sustain itself solely from user fees. The network is actually modeled after the successful Stanford University program, which has operated for several years, Blake added.

President Peterson emphasized the importance of pooling resources, calling Utah an "island surrounded by large areas with very little population." Like England and Japan, the island of Utah has to succeed through a trained workforce, he said. "There are a lot of things that are too big to do alone that we can do together (as universities)," Peterson added

- Early in 1989, Dr **Sam Ghosh**, Civil Engineering department, announced that his two-stage bio-reactor was being implemented in a $1.02 million water pollution control plant in DuPage County, Ill. Dr Ghosh developed the two-step process in which certain microbes converted the cellulose in plants and industrial and municipal waste into methane and other gasses that could be used as fuel. The DuPage plant was the first in the United States to use Ghosh's concept, and was expected to digest pollution and wastes rapidly and efficiently while producing gaseous fuels and electrical energy.

- National Engineers Week was observed on the campus February 19-25. University engineering students and high school and middle school students from around the area participated in events that were meant to celebrate engineering spirit and ingenuity. Two of the most popular events were the paper airplane contest and the egg drop contest. Other events included the sailboat race, toothpick bridge, mining and mucking, pinewood derby, and cloud shoot. On-campus seminars were given by **Kathleen Harer**, head of the NASA Kennedy Space Center's quality and reliability division, and **by Glen Tuttle** from Litton Guidance and Control.

- The University of Utah Engineering Clinic program in the Electrical Engineering department expanded to 10 projects involving 50 engineering students sponsored by four national engineering companies. Hewlett-Packard, Hughes Aircraft Co., Texas Instruments and Motorola each contracted with the Clinic to provide research projects for the students and fund them at $25,000 for each project during the 1988-89 school year. Student teams performed the research under the supervision of faculty and industry advisors. The teams were required to generate research plans and carry them out, meeting schedules, deliverables and specifications. **Magdy Iskander**, clinic director, praised the clinic concept, saying, "This program provides the practical experience undergraduate students need to make the transition from student to professional engineer."

- In February 1989, the Center for Engineering Design (CED) unveiled one of its entries in the race to develop micro-electromechanical systems (MEMS). Dr**. Steve Jacobsen**, Director of the Center, demonstrated the "wobble" motor, which consists of a tiny rod (rotor) turning inside a segmented shaft (stator). Rotation occurred as the rotor rolled around the inner surface of the stator, being moved by electrostatic forces as voltages were applied sequentially to the segments of the stator. The rolling action reduced the friction of the rotor and eliminated the need for bearings. Overall diameter of the motor

was 560 microns, or about seven times the size of a hair which is about 80 microns in diameter. The group was also working on a smaller motor having a diameter of near 200 microns.

Previous MEMS projects had produced small, flat 2-dimensional motors. The CED wobble motor moved the research into three dimensions. The U of U research began in 1983, funded by grants from the Defense Advanced Research Projects Agency (DARPA) and the Systems Development Foundation.

- Following several years of development, the Computer Engineering Bachelor of Science degree was officially approved and students were accepted in to the program. A joint offering by the Computer Science and Electrical Engineering departments, the new major combined computer science and electrical engineering as they relate to the design, implementation and operation of digital computers. The primary emphasis was on the engineering design of computers and computer-controlled electronic hardware. The discipline drew on the aspects of electrical engineering relating to digital computers and on the elements of computer science relating to computer architecture and hardware design. Students entered the program only after gaining major status in either the Computer Science or the Electrical Engineering department. Announcement of the Computer Engineering major first appeared in the 1990-91 University of Utah Bulletin.

- Thirteen new faculty joined the College of Engineering ranks in 1989:
  Ayyoob D. Abbassadeh, Ph.D., Research Assistant Professor, Electrical Engineering
  Donald Reed Brown, Ph.D., Assistant Professor, Mechanical Engineering
  Rand Decker, Ph.D., Assistant Professor, Civil Engineering
  Samuel Drake, Ph.D., Research Associate Professor, Mechanical Engineering
  Michael G. Mladejovski, Ph.D., Research Associate Professor, Mechanical Engineering
  James Painter, Ph.D., Assistant Professor, Computer Science
  Laurence P. Sadwick, Ph.D., Assistant Professor, Electrical Engineering
  M. Keith Sharp, Ph.D., Research Assistant Professor, Civil Engineering
  Robert T. Short, Ph.D., Assistant Professor, Electrical Engineering
  David M. Slaughter, Ph.D., Research Assistant Professor, Mechanical Engineering
  Janice J. Trautner, Ph.D., Assistant Professor, Civil Engineering
  Fritz G. Will, Ph.D., Research Professor, Chemical Engineering

COLD FUSION

On March 23, 1989, the University of Utah startled the scientific world by announcing that a U chemist and his British colleague had achieved a nuclear fusion reaction at room temperature in their laboratory in the basement of the Henry B. Eyring building. B. Stanley Pons, chairman of the U. Chemistry department, and **Martin Fleishmann**, an electrochemistry professor at the University of Southampton, claimed they had produced a sustained nuclear fusion reaction for 100 hours in a simple electrode.

The announcement brought worldwide interest and the hope for a clean and virtually inexhaustible source of energy. It was also met with extreme skepticism on the part of many

physicists and scientists. Researchers around the world immediately attempted to duplicate Pons and Fleischmann's experiments.

"Stan and I thought this experiment was so stupid that we financed it ourselves," Fleischmann said during the press conference. The two first performed the experiment for the fun of it and to satisfy their scientific curiosity, Pons said. However, there were immediate indications that it worked, so they continually tested it in their basement laboratory at the U for five and a half years. The experiment consisted of a simple electrode with a cylindrical palladium core surrounded by a hollow platinum cylinder. Heavy water, which contains deuterium (a form of hydrogen that is about twice as heavy as ordinary hydrogen) and occurs naturally in seawater, circulated between the two metals. Electricity was applied to the electrode, driving the deuterium through a lattice.

"Deuterium is driven into the metal rod to such an extent that fusion between these components, these deuteriums in heavy water, are fused upon a single new atom," Pons said. "With this process, there is a considerable release of energy and we've demonstrated that this can be sustained on its own. Much more energy is coming out than we put in," he said.

Within days of the announcement, a movement to prove and replicate the experiments and prepare plans to develop and exploit this "new energy source" began in earnest.

- Gov. **Norm Bangerter**, citing the possibility of "hundreds of millions of dollars coming to the state" if the energy source can be developed, asked the Legislature for $5 million to aid scientists and engineers in proving and harnessing cold fusion.
- The College of Engineering offered to act as a bridge between the experiments and such commercial applications as the nuclear-driven automobile envisioned by U. Vice-President for Research **James Brophy**.
- The University began national and international patent applications for cold fusion.
- President Peterson announced that **James Fletcher**, the outgoing NASA director and former U president, might lead the U's efforts to harness cold fusion. (Dr. Fletcher later declined the offer.)
- Edward Teller was invited to visit the campus to see the experiments.
- Physics professor **Steven Jones** at BYU reported that he had created a fusion reaction in an experiment similar to the U's. He used a neutron counter to detect neutrons in his experiment, indicating that fusion had taken place. He did not get the amounts of energy reported by Pons, however.
- Pons announced that Los Alamos had apparently been able to reproduce his experiments successfully.
- Both Pons and Jones submitted their research papers to ***Nature*** magazine within days of each other.
- President Peterson committed the U to repay the $100,000 that Pons and Fleischmann had invested of their own funds during the 5.5 years that they worked on the experiments.
- U physics professor **Owen W. Johnson**, and many others worldwide proclaimed that "it was bad science and there is no such thing" as cold fusion.
- In 1989, the National Cold Fusion Institute was established to carry out research and development on electrochemically induced cold fusion. **Fritz G. Will** was brought in as the director and housed in the University of Utah Research Park.

- The U of U team including engineering and nuclear engineering professors began attempts to prove the experiments and develop cold fusion, spending the $5 million dollars over the course of the next several years

Within 10 years, nearly all the worldwide scientific establishment had rejected cold fusion claims, as did the U team. The following are some significant events that followed the claims of Pons and Fleischmann:

- In 1990, President Peterson announced his resignation, partly because of a furor over his contributing $500,000 in discretionary research funds as an "anonymous donation" to cold fusion. He was apparently trying to prime the pump for other contributions.
- Worldwide, laboratories trying to repeat the cold fusion experiments apparently met with no success. One person was killed in 1992 in a chemical explosion in Menlo Park, CA.
- In 1992, Pons' contract was not renewed by the University of Utah, so he and Fleischmann went to France to continue their work, financed by Japanese interests.
- In 1993, the U of U sold its rights to seek patents to a Research Park company called ENECO. Four years later, citing prohibitive costs in the patent search, ENECO abandoned its effort and returned the rights to the U. By 1998, the U announced it would no longer pursue patents for cold fusion.
- The Japanese dropped the funding for Pons and Fleischmann in 1997 whereupon Fleischmann retired to Tilsbury, England and Pons remained in France in seclusion.
- On the tenth anniversary of the cold fusion announcement, few believers in the possibility of cold fusion existed. One of the few was **Hal Fox**, who, with his associates, maintained the Fusion Information Center in Southeast Salt Lake City. Fox claimed that six hundred of the 3000 papers he had reviewed reported either a replication or an extension of Pons' and Fleischmann's work. The reason that the energy was not available in usable quantities was that "so far they have not been able to find a sufficiently robust method of cold fusion to make a commercially acceptable device," said Fox.
- U Vice President for Research **Richard Koehn** stated the U's position on cold fusion. "The cold fusion story was a significant embarrassment to the University of Utah, as things turned out," he said. "We handled, I think, the matter in as responsible way as we could, in the sense that we gave the technological claims every opportunity to be checked out and to be verified. There is nothing wrong with being wrong," he added, "but making claims in the absence of the peer-review process…it really violates the scientific culture."

Fee increases in the Decade 1979-89

Fees rose steadily throughout the decade. Also, beginning with the fall quarter 1987, a separate fee structure was instituted for graduate students, and a computing fee of $5.00 plus $2.00 per credit hour for 100-499 level classes and $3.00 per credit hour for 500-798 level courses was added for all students. The computing fee was highly unpopular and within a year was incorporated into the general fee structure becoming invisible.

Tuition and fees for resident undergraduate students increased 176% during the 10-year period between 1979 and 1989, while non-resident undergraduate fees jumped by 199%.

Graduate residents' fees increased by 200% and non-resident graduate students paid 228% higher fees at the end of the decade. The steady growth in fees is shown in the table below.

TUITION AND FEES FOR 15 HOURS OF CREDIT, 1979-89

Year	Undergrad, resident	Undergrad. non-resident	Graduate, resident	Graduate, non-resident
1979	$213,50	$554.00	$213.50	$554.00
1980	262.00	678.00	262.00	678.00
1981	292.00	776.00	292.00	776.00
1982	322.00	911.00	322.00	911.00
1983	350.00	991.00	350.00	991.00
1984	389.00	1,110.00	389.00	1,110.00
1985	425,00	1,211.00	425.00	1,211.00
1986	442.00	1,263.00	442.00	1,263.00
1987	479.00	1,382.00	494.00	1,426.00
1988	548.00	1,525.00	582.00	1,628.00
1989	589.00	1,657.00	640.50	1,817.00

The fee for parking a vehicle on campus for a year increased from $12.50 in 1979 to $15.00 in 1980 where it remained for the rest of the decade.

Faculty Listing, 1989-90 School Year

College of Engineering:
David W. Pershing, Dean, Prof. of Chem. Engrg.
Dietrich K. Gehmlich, Assoc. Dean, Prof. of E.E
Clifford G, Bryner, Assoc., Dean for Facilities, Professor of Civil Engineering
K. L. DeVries, Assoc. Dean for Research, Prof. of Mechanical Engineering

Bioengineering: **Joseph D. Andrade**, Prof. and Chair

Professors:
J. D. Andrade
D. Christensen
C. Durney
J. Janata
J. Kopecek
D. Lyman
R. Norman

Associate Professors:
A. Daniels
K. Horch
J. Wood

Assistant Professor:
N. Cotter

Research Professors:
S. Jacobsen
S. Johnson
W. Kolff
D. Olsen

J. Peters
D. Westenskow

Res. Assoc. Professors: **M. J. Berggren**
K. Caldwell
P. Kopeckova
C. Rappaport
A. Schoenberg

Res. Asst. Professors: **J. Herron**
K. Knutson
S. Meek
G. Pantalos

Chemical Engineering: **A. Lamont Tyler**, Professor and Chair

Professors: **A. Baer**
R. Boyd
N. H. deNevers
D. W. Pershing
J. D. Seader
A. L. Tyler

Associate Professor: **E. M. Trujillo**

Assistant Professors **J. S. Lighty**
J. J. Magda
T. Oolman

Research Professor: **D. A. Dahlstrom**

Research Assistant Professor: **G. D. Silcox**

Civil Engineering: **Dietrich K. Gehmlich**, Chair, Associate Dean

Professors: **S. Ghosh**
N. Mostaghel
J. Yu

Assistant Professors: **R. Chaudhuri**
B. Hernried
A. Hong

Computer Science: **Robert R. Johnson**, Professor and Chair

Professors: **T. Henderson**
L. Hollaar
R. R. Johnson
R. Riesenfeld
K. Smith

Associate Professors: **E. Cohen**
R. Kessler
K. Sikorski

Assistant Professors: **B. Bruderlin**

T. Carter
R. Fujimoto
G. Gopalakrishnan
G. Ridsdale
J. Zachary

Res. Assoc. Profs: **R. Brandt**
E. Ferretti

Res. Asst. Prof: **J. Gu**

Electrical Engineering: **Craig K. Rushforth**, Professor and Chair
Robert E. Benner, Associate Chair

Professors: **J. Brophy**
D. Christensen
C. Durney
O. P. Gandhi
D. K. Gehmlich
R. W. Grow
R. J. Huber
M. F. Iskander
C. K. Rushforth
K. F. Smith
T. S. Stockham, Jr.
G. Stringfellow

Associate Professor: **R. Benner**

Assistant Professors: **N. Cotter**
J. Matthews

Research Professors: **J. Baird**
J. DuBow
L. Hollaar

Research Assoc. Prof.: **L. Barnett**

Research Asst. Profs.: **C. Blackburn**
T. Carter
P. Conwell
K. D. Smith

Material Science and Engineering: **Richard H. Boyd**, Prof. and Chair

Professors: **J. D. Andrade**
R. Boyd
J. DuBow
R. Gordon
J. Janata
D. Lyman
H. Meuzelaar
D. Shetty
G. B. Stringfellow

A. Virkar
Assistant Professors: **R. Cohen**
T. Hsu
J. Nairn
Research Professors: **W. Bascom**
J. Byrne
R. Huber
M. Iskander
R. Pugmire
H. Wilhelm
Research Assoc. Prof.: **K. Caldwell**

Mechanical Engineering: **David W. Hoeppner**, Prof. and Chair
Professors: **R. F. Boehm**
K. L. DeVries
E. S. Folias
D. W. Hoeppner
L. K. Isaacson
S. C. Jacobsen
G. Sandquist
S. R. Swanson
Associate Professors: **K. Chen**
A. C. Hansen
W. K. Van Moorhem
Assistant Professors: **D. S. Bloswick**
S. S. Kimbrough
Y. Matsumoto
P. A. McMurtry
S. G. Meek
Research Professors: **G. A. Flandro**
J. K. Strozier
Research Assoc. Profs: **R. W. Shorthill**
J. J. Woemeck
Research Asst. Prof.: **K. Crawford**

STATISTICS

Autumn Quarter Enrollments, Full-time, Residence

	Undergraduate		Graduate		Total Engrg		University		Total SCH
Year	Men	Women	Men	Women	UG	Grad.	UG	Grad	Incl. summers
1980-81	1,750	213	276	28	1,963	304	18,348	4,622	44,617
1981-82	2,151	287	327	26	2,438	353	19,618	3,755	48,391
1982-83	2,575	388	364	42	2,963	406	20,511	3,853	54,949
1983-84	2,707	416	412	44	3,123	456	20,890	4,021	58,172
1984-85	2,476	353	403	39	2,829	442	20,495	4,073	49,045
1985-86	2,170	300	433	45	2,470	478	20,617	4,153	47,304
1986-87	1,982	245	465	42	2,227	507	20,386	4,335	41,878
1987-88	1,820	223	456	48	2,043	504	19,828	4,296	39,966
1988-89	1,696	204	423	42	1,900	465	19,373	4,253	37,692
1989-90	1,625	215	405	47	1,840	452	19,205	4,338	38,508

BACHELOR OF SCIENCE DEGREES AWARDED

(Sum of degrees awarded in June Commencement)

Year	ChE	CE	CS	EE	IE	MSE	ME	Total
1981	25	55	38	64	5	13	57	257
1982	40	45	44	53	4	10	59	255
1983	34	44	42	84	8	8	79	299
1984	30	42	44	99	12	5	75	307
1985	29	39	71	91	12	5	93	340
1986	30	44	51	115	16	9	79	344
1987	27	35	47	80	17	8	71	285
1988	24	31	37	80	21	16	72	281
1989	16	43	38	80	16	17	72	282
1990	15	26	32	69	6	9	67	225

MASTERS DEGREES AWARDED*

(Sum of degrees awarded in June Commencement)

Year	Bio	ChE	CE	CS	EE	EA	MSE	ME	Nucl.	Misc**	Total
1981	6	8	7	19	5	15	7	4	0	2	73
1982	10	7	13	11	11	4	3	7	2	0	68
1983	6	12	6	11	16	13	4	10	2	3	83
1984	6	16	7	8	23	7	3	13	3	1	87
1985	18	8	12	15	41	5	6	21	1	13	140
1986	7	8	9	15	22	12	8	17	2	10	110
1987	5	5	10	7	38	17	2	14	1	17	116
1988	16	6	13	19	37	10	7	19	0	17	144
1989	12	4	6	14	37	9	5	19	1	8	115
1990	6	9	6	7	26	3	30	10	0	5	102

*Includes Masters of Science, Philosophy, Engineering Administration, Engineering

**Includes Engineering, Engineering Science, Applied Mechanics, Industrial Engineering

DOCTOR OF PHILOSOPHY DEGREES AWARDED

(Sum of degrees awarded in June Commencement)

Year	Bio	ChE	CE	CS	EE	MSE	ME	Nucl	Total
1981	2	2	1	2	1	2	2	0	12
1982	3	5	1	4	2	1	2	1	19
1983	4	4	1	6	1	5	1	1	23
1984	2	2	1	9	2	5	1	0	22
1985	4	1	2	5	4	5	5	0	26
1986	0	2	2	5	8	2	0	0	19
1987	1	4	2	3	3	6	4	0	23
1988	2	2	1	4	6	2	5	1	23
1989	1	8	0	4	8	8	4	0	33
1990	4	3	1	3	11	6	9	0	37

8. Decade of the 90's

Enrollment in the College of Engineering at the beginning of the decade of the 90's was the lowest of the previous 10 years. A total of 2,292 students (graduate and undergraduate) had registered for the 1989-90 school year, roughly 10%of the University registration (23,500). Regular and research faculty numbered about 135. The College offered seven undergraduate degrees and 30 graduate degrees, most of which were supervised by the Graduate School. Following the banner hiring year of 1989, only three new faculty members were brought into the College of Engineering in 1990:

Erik Brunvand, Ph.D., Assistant Professor, Computer Science
Paul McArthur, Ph.D., Research Assistant Professor, Electrical Engineering
Philip J. Smith, Ph.D., Professor, Chemical Engineering

Index-based Admission for U of U

Beginning with the Fall quarter, 1991, students applying to the University of Utah were admitted according to their Admission Index (AI) which was determined both by their high school grade-point average (GPA) and either their ACT or SAT test scores. The Admissions Index chart with GPA along the horizontal axis and the ACT/SAT scores on the vertical axis. Examples of points on the AI table:

High school GPA	ACT/SAT Scores	Admission Index
4.0	36/1600	142
3.0	14/595	85
2.0	23/1020	85
1.1	4/400	35

Guidelines for determining the likely admission status of 1991 applicants were:

- With an AI above 85, applicants had an excellent chance of being admitted.
- With an AI between 74 and 84, applicants were likely to be admitted.
- With an AI below 74, students might not be admitted.

(Statistics and guidelines from 1990-91 Bulletin of the University of Utah)

Special provisions were made for minority applicants, non-high-school graduates, non-traditional applicants (7 years past high school), and transfer students. It was fully expected that the AI cutoff levels could change to meet the recommended numbers of students to be accepted and as the performance of the admitted students was verified.

Events and changes in 1991:

- **Edward M. Trujillo** was appointed to the new position of Assistant Dean for Minority Affairs. He would supervise the Minority Engineering Program (MEP) and carry out other activities for underrepresented students in Engineering.

- **Arthur K. Smith** succeeded **Chase Peterson** as President of the University.

- **James Brophy** resigned as Vice-President for Research. **Ronald J. Pugmire** became acting Vice-President for Research while a national search was mounted for a successor to Dr. Brophy.

- At the direction of **Dean Pershing**, a major reorganization of the machine shops in the College took place under the supervision of the Dean's Office shop committee, **Associate Deans Gehmlich** and **Bryner**, and **Anne Grossenbach**, Assistant to the Dean. All of the major metal and wood working equipment and the welding shop were placed in the college pool out of which were formed two separate shops. Complex and precision tools and equipment were placed in the Professional Shop with trained technicians who alone were qualified to use the equipment. Plans and requests for work were brought to them and the service paid for. Other simpler and basic equipment was placed in the Student Shop under the supervision of a teaching technician. Laboratories to train students in shop techniques were scheduled and both graduate and undergraduate students were encouraged to use the shop for projects or research. It was expected that the Professional Shop would be self-supporting and the funding for the Student Shop would come from the Dean's Office.

Chemical and Fuels Engineering Department

In 1992, the Fuels Engineering Department moved from the College of Mines and Earth Sciences to the College of Engineering, merging with Chemical Engineering to form the Department of Chemical and Fuels Engineering (CHFEN). Fuels Engineering had been strictly a graduate program, offering the M.E., M.S., and Ph.D. degrees in the areas of fossil fuels, fuel conversion processes, solid, liquid and gaseous fuel preparation, catalysis, combustion, and liquid and solid fuel characterization and upgrading. The new department continued to offer the undergraduate B.S. degree in Chemical Engineering as well as the M.E., M.S., M.Phil., and Ph.D. in Chemical Engineering and the M.E., M.S., M.Phil., and Ph.D. in Chemical and Fuels Engineering. By 1997, the department had also added the M.E., M.S., and Ph.D. in Environmental Engineering. Faculty who made the move were:

Professors: **L. L. Anderson**
D. Bodily
F. V. Hanson
F. Massoth
A. Oblad
R. Pugmire
J. Shabtai
W. Wiser

Assistant Professor: **M. Deo**

Research Assistant Professor: **J. Bunger**

A. Lamont Tyler continued to serve as chair of the new department and **Francis V. Hanson** became Associate chair.

- In 1992, **K. Larry DeVries** replaced **Dietrich K. Gehmlich** as chair of Civil Engineering.

College of Engineering and University of Utah Profiles
1992-93 School Year

	U of U	Engineering	Engineering % of U of U

No. of undergraduates enrolled	21,135	1976	9.3
No. of graduates enrolled	4,733	630	13.3
Total	25,868	2,606	10.1
Research expenditures	$126 million	$20 million	15.9
Bachelor of Science degrees	2,288	261	11.4
Masters degrees	918	94	10.2
Ph.D. degrees	217	42	19.4
Total degrees	3,137	397	12.7

- In 1993, **Dr. Lawrence D. Reaveley** came from industry to replace **K. Larry DeVries** as Chair of the Civil Engineering department and was charged with the opportunity to continue the building of the department, at which he proved to be most successful.
- Beginning in 1993, all students of the University of Utah were required to show proof of immunity to measles, mumps, and rubella.
- The administration also began a three-year phase-in of required health insurance coverage. Beginning in Autumn Quarter of 1994, all graduate students were required to show proof of health insurance coverage. This could be accomplished by either buying into the University of Utah Student Health Insurance Plan, or by proving coverage through an off-campus health care plan. The following year, all new and transfer students were required to have health care coverage
- By 1994, computing had enveloped the campus. The University was home to the Supercomputing Institute and had one of the 15 gateways nationally to the National Science Foundation NSFNET. The campus boasted one supercomputer, over 2000 workstation computers, and 8500 PC's, of which 900 were available free to the students.
- The Admission Index (AI) cutoff levels were increased to the following:

  Students with an AI of 100 or better (up from 85 in 1991) "*had an excellent chance of being admitted*"

  Those with AI's between 88 and 100 "*may be admitted*"

  Students with AI's below 88 "*were likely to be denied admission*"

  As before, some minorities and non-traditional students were allowed to petition for special consideration.

  Quotes from the 1994-95 University General Catalog, p.13
- By 1994, **David M. Slaughter** replaced **Gary M. Sandquist** as the Director of the Nuclear Engineering Laboratory. The following year, Slaughter incorporated the Laboratory into the new Center for Excellence in Nuclear Technology, Engineering and Research (C.E.N.T.E.R.), which continued to provide research and training support for students. The new center supported the TRIGA nuclear research reactor, alpha-gamma and alpha spectroscopy systems, a neutron irradiation facility, the scanning electron microscope, a nuclear chemistry laboratory, and the radiation measurement laboratory. In 1997, Slaughter moved the nuclear engineering program from the Mechanical Engineering department to Civil and Environmental Engineering, where the M.E., M.S., and Ph.D. graduate degrees continued to be offered.

Faculty Listing, 1994-95 School Year

College of Engineering: **David W. Pershing**, Dean, Prof. of Chem. Engrg.
Dietrich K. Gehmlich, Assoc. Dean, Prof. of E.E.
Clifford G, Bryner, Assoc. Dean for Facilities, Professor Emeritus of Civil Engineering
K. L. DeVries, Assoc. Dean for Research, Prof. of Mechanical Engineering
Peter F. Gerity, Assoc. Dean for External and Community Relations
Edward M. Trujillo, Asst. Dean for Minority Affairs, Assoc. Prof., Chemical and Fuels Engineering

Bioengineering: **Richard A. Normann**, Prof. and Chair

Professors: **J. D. Andrade**
D. Christensen
C. Durney
K. Horch
J. Kopecek
R. Norman

Associate Professors: **K. Caldwell**
V. Hlady
R. Rabbitt

Assistant Professor: **P. Tresco**

Research Professors: **A. Daniels**
S. Jacobsen
J. Janata
S. Johnson
W. Kolff
D. Olsen
J. Peters
D. Westenskow
J. Wood

Res. Assoc. Professors**: M. Berggren**
R. Bloebaum
G. Burns
T. East
G. Gullberg
J. Herron
J. Janatova
K. Knutson
P. Kopeckova
G. Pantalos
C. Rappaport
A. Schoenberg

Res. Asst. Professors: **P. France**
S. Meek

Chemical & Fuels Engrg: **A. Lamont Tyler**, Professor and Chair
Francis V. Hanson, Professor and Associate Chair
Distinguished Professors: **R. H. Boyd**
A. G. Oblad
Professors: **L. L. Anderson**
A. D. Baer
D. M. Bodily
N. H. deNevers
F. V. Hanson
F. E. Massoth
H. L. C. Meuzelaar
D. W. Pershing
R. J. Pugmire
T. A. Ring
J. D. Seader
J. S. Shabtai
P. J. Smith
A. L. Tyler
W. H. Wiser
Associate Professor: **E. M. Trujillo**
Assistant Professors **M. D. Deo**
J. S. Lighty
J. J. Magda
Research Professor: **D. J. Caldwell**
D. A. Dahlstrom
F. G. Will
Research Associate Professor: **G. D. Silcox**
Research Assistant Professors: **J. Bunger**
J. Fletcher
W. McClennen
C. H. Tsai
K. Yang

Civil Engineering: **L. D. Reaveley**, Professor and Chair
Professors: **S. Ghosh**
L. D. Reaveley
Associate Professor: **R. Chaudhuri**
Assistant Professors: **R. Decker**
A. Hong
E. Lawton
H. Lee
C. Pantelides
K. Sharp
J. Trautner
Research Associate Professor**: R. Okey**

Computer Science:	**Thomas C. Henderson**, Professor and Chair	
Professors:	**E. Cohen**	
	A. Davis	
	T. Henderson	
	L. Hollaar	
	G. Lindstrom	
	R. Riesenfeld	
	K. Smith	
	F. Stenger	
	W. Thompson	
Associate Professors:	**G. Gopalakrishnan**	
	R. Kessler	
	K. Sikorski	
Assistant Professors:	**B. Bruderlin**	
	E. Brunvand	
	J. Carter	
	C. Johnson	
	J. Painter	
Professor (Clinical):	**D. Hanscom**	
Associate Professor (Clinical):	**J. Zachary**	
Research Professor:	**S. Jacobson**	
Res. Assoc. Profs:	**G. Barbour**	
	T. Carter	
	S. Drake	
	E. Ferretti	
Res. Asst. Prof.:	**R. Elens**	
	M. Swanson	
	R. Mecklenburg	
	T. Sobh	
Electrical Engineering:	**Om P. Gandhi**, Professor and Chair	
	Robert E. Benner, Associate Chair	
Professors:	**D. Christensen**	
	C. Durney	
	O. P. Gandhi	
	D. K. Gehmlich	
	R. W. Grow	
	R. J. Huber	
	M. F. Iskander	
	C. K. Rushforth	
	T. S. Stockham, Jr.	
	G. Stringfellow	
Associate Professors:	**R. Benner**	
	M. Bodson	
	J. Mathews	

Assistant Professors: **S. Douglas**
G. Gray
J. Hwu-Sadwick
L. Sadwick
R. Short
Research Professors: **M. J. Baird**
K. Smith
Z. Vardeny
J. Warlock
Research Assoc. Prof.: **L. Barnett**
Research Asst. Profs.: **A. Abbaszadeh**
K. Bunch
J. Chen
P. Conwell
N. Cotter

Material Science and Engineering: **Richard H. Boyd**, Prof. and Chair
Distinguished Professor: **R. H. Boyd**
Professors: **J. D. Andrade**
J. DuBow
D. Shetty
G. B. Stringfellow
A. Virkar
Associate Professors: **R. Cohen**
J. Nairn
Assistant Professors: **J. Magda**
J. Shield
R. Xu
Research Professors: **J. Janata**
J. D. E. McIntyre
H. L. C. Meuzelaar
N. Rapoport
Research Assoc. Prof.: **K. Caldwell**
Research Instructor: **D. G. Petelenz**

Mechanical Engineering: **Robert B. Roemer**, Professor and Chair
Professors: **L. K. DeVries**
E. S. Folias
D. W. Hoeppner
L. K. Isaacson
S. C. Jacobsen
R. Roemer
G. Sandquist
S. R. Swanson
W. Van Moorhem

Associate Professors:	**D. Bloswick**
	K. Chen
	S. Lantz
	P. Ligrani
	P. McMurtry
Assistant Professors:	**D. Brown**
	S. S. Kimbrough
	J. Klewicki
	S. G. Meek
	C. Thomas
Research Professors:	**R. Shorthill**
	J. K. Strozier
Research Assoc. Profs.:	**S. Drake**
	A. C. Hansen
	M. Mladejovsky
Research Asst. Prof.:	**J. Brouwer**
	A. Dutton
	C. Elliot
	T. Goswami
	D. Slaughter
Research Instructor:	**M. Knutson**

- In 1995, under the leadership of **Larry Reaveley**, the Civil Engineering department officially became the department of **Civil and Environmental Engineering (CEE)**. The name was changed to better characterize the changing nature of the department as increased emphasis was being placed on environmental studies and research not only in Civil Engineering but in the Mechanical Engineering and Chemical and Fuels Engineering departments as well. Graduate degrees (M.E., M.S., and Ph.D.) in Environmental Engineering were offered in all three departments.
- **Terry A. Ring** replaced **A. Lamont Tyler** as chair of Chemical and Fuels Engineering (CHFEN), and **Francis Hanson** stepped down as associate department chair. CHFEN offered the standard undergraduate Chemical Engineering option plus specialty options in Environmental and Waste Engineering, and Fuels and combustion. Graduate degrees were offered in both Chemical Engineering and Chemical and Fuels Engineering.
- The University added a new diversity requirement for all undergraduate students in 1995: "*All undergraduate students graduating from the University beginning spring quarter 1999 and thereafter will be required to successfully complete one course approved by the University Diversity Committee as satisfying the Diversity Requirement. Students who entered the University before the academic year 1995/96 will be exempt from the Diversity Requirement. The course must be at least three credit hours and have as its central focus: (1) the study of one or more cultures of peoples of the United States different from the majority or dominant cultures, and (2) the critical examination of relations between non-dominant and dominant cultural groups or between various non-dominant cultural groups in the United States. For a list of approved courses see the quarterly Class Schedule.*"

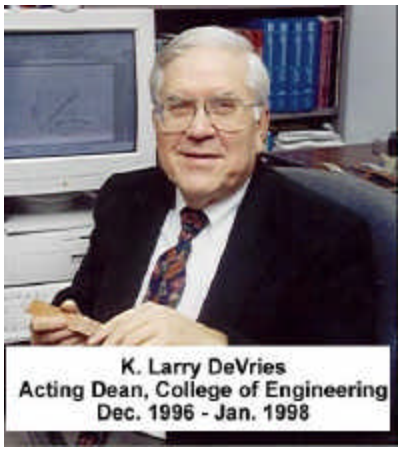
  Quoted from the University of Utah General Catalog, 1995/96, p20

- In June of 1995**, Clifford G. Bryner** retired as Associate Dean for Construction Management, and the management of the facilities of the College was incorporated into a new staff position, Assistant Dean for Budget and Facilities, filled by **Michael G. Kay**. Also, **Peter F. Gerity** who was Associate Dean for External and Community Relations resigned to take a position at Utah State University. **Marilyn K. Davies** then accepted the new staff position of Director of Development and External Relations. Then **Edward M. Trujillo** resigned as Assistant Dean for Minority affairs and Associate Dean **Dietrich K. Gehmlich** temporarily took on Minority and Woman's Affairs.
- **Dietrich K. Gehmlich** retired as Associate Dean for Academic Affairs in June of 1996, at which time significant restructuring of the Dean's office took place. By the beginning of the autumn quarter, 1996, the organization of the Dean's office of the College of Engineering was the following:

Dean of the College:	**David W. Pershing**
Senior Associate Dean:	**K. L. DeVries**
Associate Dean for Academic Affairs:	**Craig K. Rushforth**
Associate Dean for Outreach:	**JoAnn Lighty**
Assistant Dean for Budget and Facilities:	**Michael G. Kay**
Administrative Assistant to the Dean:	**Anne D. Grossenbach**
Director, Development and External Relations:	**Marilyn K. Davies**
Assistant Dean for Diversity:	**John A. Zamora**

The Minority Engineering Program was incorporated into the new Program for Diversity in Engineering (PDE). This program, under the direction of Associate Dean **JoAnn Lighty**, continued to provide ethnic minority and female engineering students with academic support at the University. Services and activities designed to enrich their regular educational programs included recruiting and admission, freshman year transition, counseling, supplemental instruction, career development, summer jobs, financial aid, scholarships and employment.

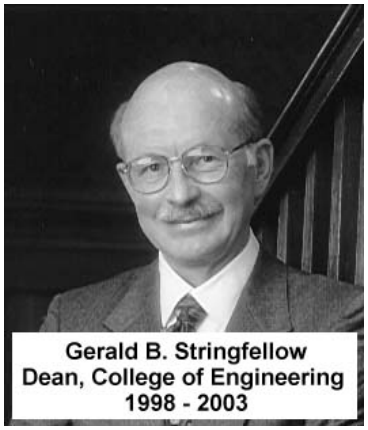
- The Engineering Clinic program continued to provide students with research experience while helping high-tech companies develop new products. Clinic sponsors in 1996 included: Geneva Steel, Hewlett-Packard, Hughes Aircraft, IBM, Motorola, Oak Ridge National Laboratories, Novell, E-Systems, Kennecott Utah Copper, and Sonic Star International.
- In 1996, University President **Arthur K. Smith** resigned and left the state and Vice President **Jerilyn S. McIntyre** became interim president. She appointed Dean **David W. Pershing** as acting Vice President for Academic Affairs. He in turn appointed **K. Larry DeVries** as acting Dean of the College of Engineering in December of 1996.
- For admissions to the autumn quarter, 1997, the admission index (AI) was lowered about 5 points, students with an AI of 95 and above had an excellent chance of being admitted. Those with an AI between 86 and 95 may be admitted, and those with an AI less than


K. Larry DeVries
Acting Dean, College of Engineering
Dec. 1996 - Jan. 1998

86 were likely to be denied admission. As before, there were possible exceptions for minorities, non-high school graduates, early admission, and non-traditional students.

- By 1997, the College of Engineering had expanded into several buildings on the north end of the campus. The Dean's Office moved into the Kennecott Research Center (KRC), south-west of Merrill Engineering Building (MEB). The administrative offices of the departments of Chemical and Fuels Engineering, Computer Science, Electrical Engineering, and Mechanical Engineering were housed in Merrill Engineering Building (MEB). The building also contained faculty offices, teaching and research laboratories, computer labs, student study rooms and several classrooms. South of MEB was the Engineering and Mines Classroom Building (EMCB). In addition to the six classrooms and five lecture halls, the building housed the Computer Aided Design and Engineering (CADE) computer workstation laboratories and the Computer Center PC-Mac Lab. South of EMCB was the Energy and Minerals Research Laboratories (EMRL) building that housed research and instructional labs of the departments of Chemical and Fuels Engineering, Materials Science and Engineering, and several departments of the College of Mines and Earth Sciences. Some faculty and student offices were also in the building. Immediately south of EMRL was the HEDCO high-bay laboratory building, housing research and instructional labs of Civil and Environmental Engineering and Material Science and Engineering. Faculty offices, student rooms and administrative offices for the departments of Civil and Environmental Engineering and Materials Science and Engineering were located in the Energy and Minerals Research Office building (EMRO), which was attached to the west side of the HEDCO labs. The administrative offices of the department of Bioengineering were located in the Biopolymers Building, situated east of MEB and south of the University Hospital complex. In addition to the state-of-the-art research and teaching laboratories in the Biopolymers building, a satellite administrative office, and additional faculty offices were maintained in MEB. Several research groups maintained research labs in Research Park, including the Center for Engineering Design (CED) and the Energy Geophysics Institute (EGI). Other groups were situated off campus, including the Combustion Research Center (CRC) and the North Salt Lake Research Center (NSLRC).
- In January , 1998, **J. Bernard Machen** was appointed the new President of the University of Utah, so **Jerilyn McIntyre** and **David Pershing** returned to their previous positions as Academic Vice President and Dean of the College of Engineering, respectively. These moves were temporary because before the year was out, **Jerilyn McIntyre** went back to teaching and research and **David Pershing** was appointed Senior Vice President for Academic Affairs (August, 1998). **JoAnn Lighty** was appointed Acting Dean of the College of Engineering until the end of November, 1998 when **Gerald B. Stringfellow** was appointed the new Dean of the College of Engineering.


JoAnn S. Lighty
Acting Dean, Col. of Engr'g
Aug. 1998 - Nov. 1998


Gerald B. Stringfellow
Dean, College of Engineering
1998 - 2003

Switch to the Semester System

After years of discussion, the State Board of Regents finally decreed that beginning in the Fall of 1998, all schools in the state system of higher education would change from the quarter system to the semester system. The transition to the semester system had been debated often during the previous two decades with many arguments pro and con. One school in the system (Utah Valley State College) had already converted, following, it was said, the example of BYU, that school having changed to the semester system in the previous decade. Funds were provided by the state to aid in the planing and execution of the switch. Engineering faculty took advantage of the opportunity to re-examine all curricula to adjust and upgrade in many areas. In many cases, the change made it easier to find and use appropriate textbooks that were for the most part written with the semester system in mind. The University also decided to upgrade the course numbering system, assigning a four-digit number to each course. The first digit (left-most) referred to the year that the course would normally be taken, 1xxx = freshman, 2xxx = sophomore, 3xxx = junior, 4xxx = senior, and 5xxx, 6xxx, and 7xxx refer to first, second and third year graduate courses. The next three digits designated courses within the given year and somewhat in the order in which they were to be taken in the given year.

Of course, schedules were completely overhauled, the following being the schedule for the 1998-99 school year:

June 1, 1998 – Admission application deadline for Fall semester
August 27 – Fall semester classes began
October 8-9 – Fall break
November 26-27 – Thanksgiving break
December 11 – Classes ended
December 15-18 – Examination period

December 19 – January 10, 1999 – Holiday recess
January 11 – Spring semester classes began
March 15-19 – Spring break
April 19 – Classes ended
May 3-6 – Final examination period

May 17 – Summer term classes began
August 4 – Classes ended
August 5-6 – Final examinations

REVISED GENERAL EDUCATION REQUIREMENTS

Effective Fall Semester, 1998

Every candidate for graduation must complete the following:

1. Intellectual Explorations (eight three-semester-hour courses). *To ensure foundation and integrative learning within this requirement, students must take two courses from each of the four subject areas, which may cut across all college boundaries:*

- *Fine arts*
- *Humanities*
- *Physical and life sciences*
- *Social sciences*

Courses for these requirements must be completed with a minimum D- grade and may not be taken on a credit/no credit basis. Six of the 24 hours can be double counted in the student's major area.

2. Writing. *Writing 112, 210, or 2010; ESL 106 or 1060 (for students who speak English as a second language). This requirement must be completed with a minimum grade of C-. Students will be placed in Writing 1010 or 2010 depending on their Admissions Index.*

3. American Institutions. *This requirement must be fulfilled by completing one of the following courses with a minimum grade of D- or credit:*

- *History 170 or 1700*
- *Economics 274 or 1740*
- *Political Science 110 or 1100*
- *An upper-division course certified as equivalent by the chair of one of the departments above.*

4. Quantitative Reasoning Requirement. *Both A and B parts of the requirement must be completed with a minimum grade of D- or credit:*

A. Quantitative reasoning A (Math): Mathematics 103 or 1030 (or an approved higher-level mathematics course)

B. Quantitative Reasoning B (Statistics or Logic): Mathematics 107, 1040, 1070, or a statistics or logic course from an approved list. (Not required for students receiving a B.F.A. or B.Mus. degree)

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Engineering students automatically satisfied the requirement of two courses in Physical Sciences in Part 1 above. Of the remaining six courses, all engineering students (except Computer Science) were expected to meet the Breadth and Depth requirements specified by the Accreditation Board for Engineering and Technology (ABET) by including in the six courses: one 3000 level course and two sequences of two courses each, or, two 3000 level courses and one sequence of two courses. All engineering students automatically fulfilled the Quantitative Reasoning requirement, Part 4 above. Also, because of the ABET requirements, students transferring into engineering with an Associate degree no longer automatically satisfied the General Education requirements of the College.

Faculty Listing, 1999-2000 School Year

College of Engineering: **Gerald B. Stringfellow,** Dean, Distinguished Prof. of EE & MSE
Thomas C. Henderson, Assoc. Dean, Prof. of C.S.
JoAnn Lighty, Assoc. Dean, Academic Affairs, Assoc. Prof., CHFEN

Bioengineering: **Joseph D. Andrade & Kenneth W. Horch**, Co-Chairs and Professors.

Professors: **J. D. Andrade**
D. Christensen
V. Hlady
K. Horch
J. Kopecek
R. Norman

Associate Professors: **S. Bock**
G. Clark
R. Rabbitt
P. Tresco

Assistant Professors: **B. Frazier**
R. MacLeod
R. Stewart

Research Professors: **R. Bloebaum**
K. Caldwell
G. Gullberg
J. Hollerbach
S. Jacobsen
S. A. Johnson
W. Kolff
D. Olsen
N. Rapoport
D. Westenskow

Res. Assoc. Professors**: M. Berggren**
G. Burns
T. East
J. Herron
J. Janatova
C. Johnson
K. Knutson
P. Kopeckova
G. Pantalos

Res. Asst. Professors: **H. Swerdlow**
J. Weiss

J. Wiskin

Research Instructors**:** **D. Borup**
R. Eidens
A. Pungor
D. Wells

Chemical & Fuels Engrg: **Terry A. Ring**, Professor and Chair

Distinguished Professors: **R. H. Boyd**
D. W. Pershing

Professors: **D. M Bodily**
N. H. deNevers
F. V. Hanson
F. E. Massoth
H. L. C. Meuzelaar
R. J. Pugmire
T. A. Ring
J. D. Seader
P. J. Smith

Associate Professor: **M. D. Deo**
J. J. Magda
E. M. Trujillo

Assistant Professors **M. Skliar**

Research Professors: **A. F. Sarofim**
J. S. Shabtai

Research Associate Professor: **G. D. Silcox**

Research Assistant Professors: **J. Bunger**
J. A. Dirksen
J. Fletcher
C. H. Tsai
K. Yang

Civil Engineering: **L. D. Reaveley**, Professor and Chair

Professors: **S. Ghosh**
L. D. Reaveley

Associate Professor: **R. Decker**
B. Hong
E. Lawton
P. Martin
C. Pantelides
J. Trautner

Assistant Professor: **D. Hayes**

Research Professors: **R. Ehrlich**
D. Hobday
W. Kanes
J. Moore
D. Neilson

R. Ressetar
M. Ridd
H. Ross
S. Shamel
P. Wannamaker
P. Wright

Research Associate Professors**: D. Alford**
R. Okey
R. Peters
D. Schelling
D. Slaughter
J. Stott
C. Waverek

Research Assistant Professors: **J. Adams**
M. Adams
R. Adams
D. Apperson
J. Collister
W. Cotrell
C. Elliot
R. James
W. Jarman
G. Nash
M. Nemcok
P. Rose
M. Segall

Computer Science: **Robert R. Kessler**, Professor and Chair

Professors: **E. Cohen**
A. Davis
D. Hanscom
T. Henderson
L. Hollaar
J. Hollerbach
G. Lindstrom
R. R. Kessler
R. Riesenfeld
K. Smith
F. Stenger
W. Thompson

Associate Professors: **E. Brunvand**
G. Gopalakrishnan
C. Hansen
C. Johnson
K. Sikorski

J. Zachary
Assistant Professors: **J. Carter**
W. Hsieh
E. Riloff
P. Shirley
Research Professor: **S. Jacobson**
Research Associate Professors: **T. Carter**
S. Drake
C. Hansen
Research Assistant Professors: **J. Lepreau**
C. Myers
M. Swanson

Electrical Engineering: **Om P. Gandhi**, Professor and Chair
Professors: **M. Bodson**
D. Christensen
O. P. Gandhi
R. W. Grow
M. F. Iskander
J. Mathews
G. Stringfellow
Associate Professors: **R. Benner**
J. Hwu
L. Sadwick
G. Schlegel
Assistant Professors: **S. Blair**
B. Frazier
Y. Kim
C. Myers
Research Professors: **M. J. Baird**
B. Cox
K. Smith
Z. Vardeny
J. Warlock
Research Assoc. Prof.: **S. Douglas**
Research Asst. Profs.: **A. Abbaszadeh**
K. Bunch
N. Cotter
G. Lazzi
R. Short

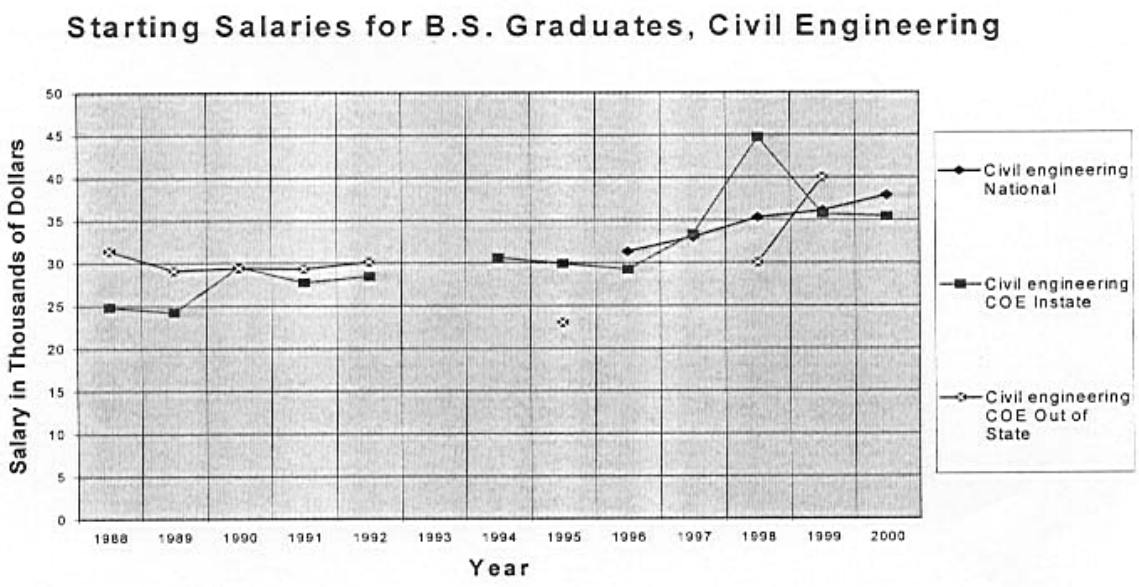
Material Science and Engineering: **Anil V. Virkar**, Prof. and Chair
Distinguished Professors: **R. H. Boyd**
G. Stringfellow

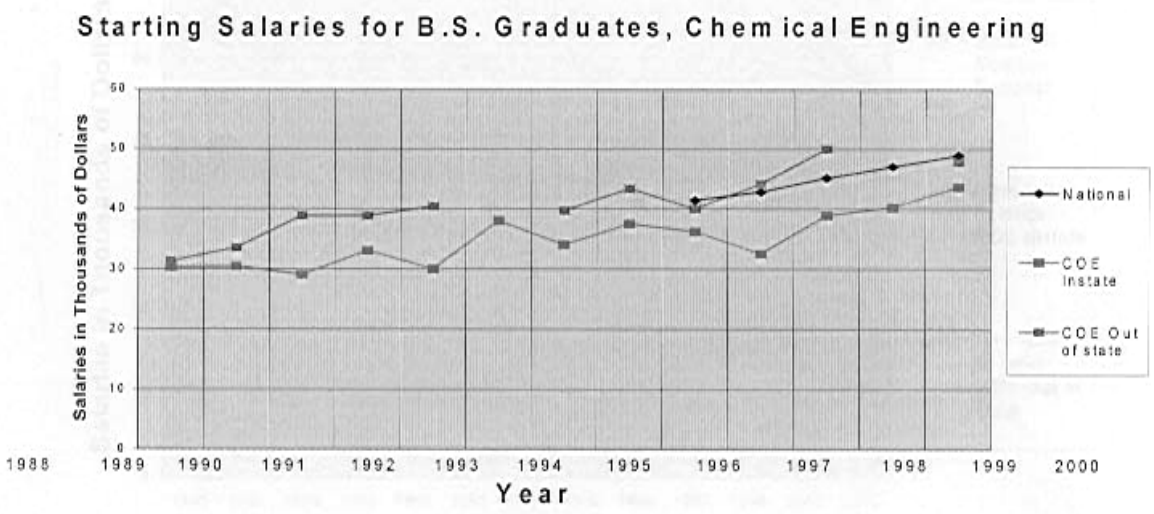
Professors: **J. D. Andrade**
R. Cohen
J. DuBow
J. Nairn
D. Shetty
G. B. Stringfellow
A. Virkar
Associate Professors: **R. Chaudhuri**
J. Magda
Assistant Professors: **J. Shield**
G. Smith
Research Professors: **H. L. C. Meuzelaar**
N. Rapoport
Research Assoc. Prof.: **V. Hlady**

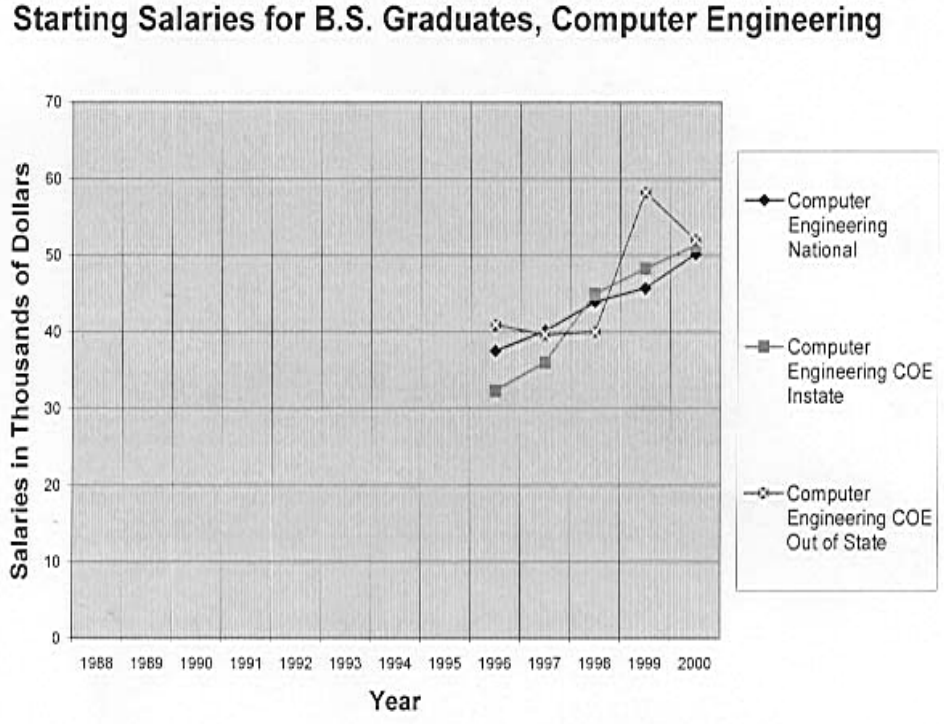
Mechanical Engineering: **Robert B. Roemer**, Professor and Chair
Distinguished Professors: **L. K. DeVries**
S. C. Jacobsen
Professors: **E. S. Folias**
David W. Hoeppner
P. Ligrani
R. Roemer
G. Sandquist
S. R. Swanson
W. Van Moorhem
Associate Professors: **D. Bloswick**
D. Brown
K. Chen
J. Klewicki
P. McMurtry
E. Scott
Assistant Professors: **D. Adams**
T. Ameel
S. Devasia
S. G. Meek
C. Pistor
C. Thomas
Research Professors: **J. Hollerbach**
R. Shorthill
J. K. Strozier
Research Assoc. Profs: **S. Drake**
A. C. Hansen
M. Mladejovsky
Research Asst. Prof.: **C. Elliot**
J. Guilkey
T. Harmon

S. Kimbrough
D. Laino
M. Mattingly
D. Slaughter
C. Vankatesan

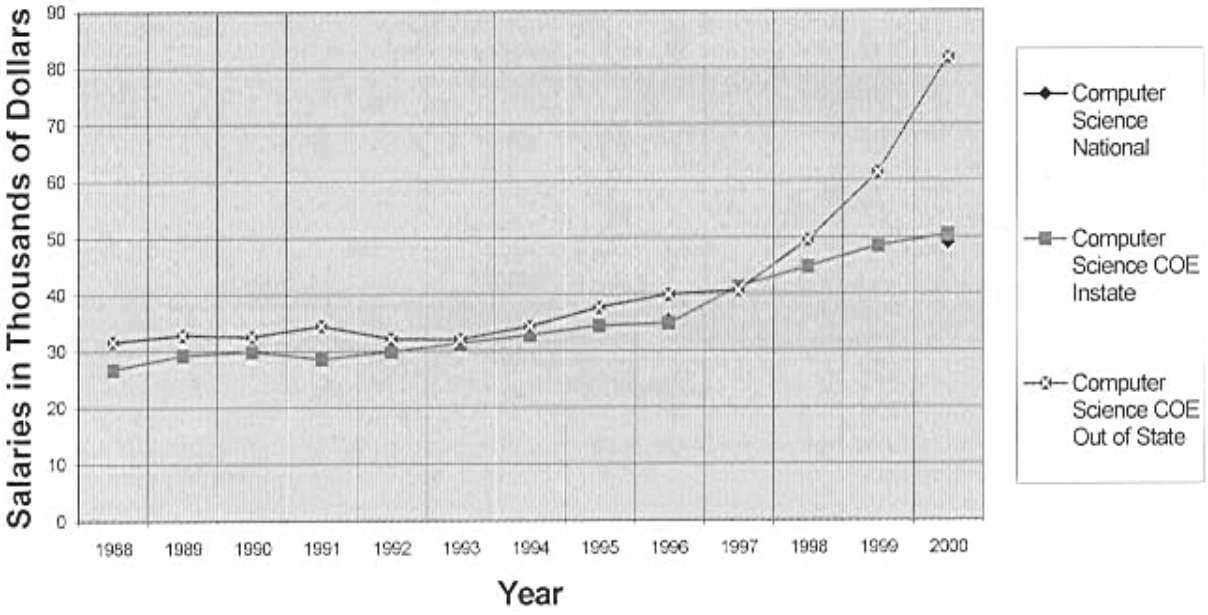
Research Instructor: **M. Knutson**



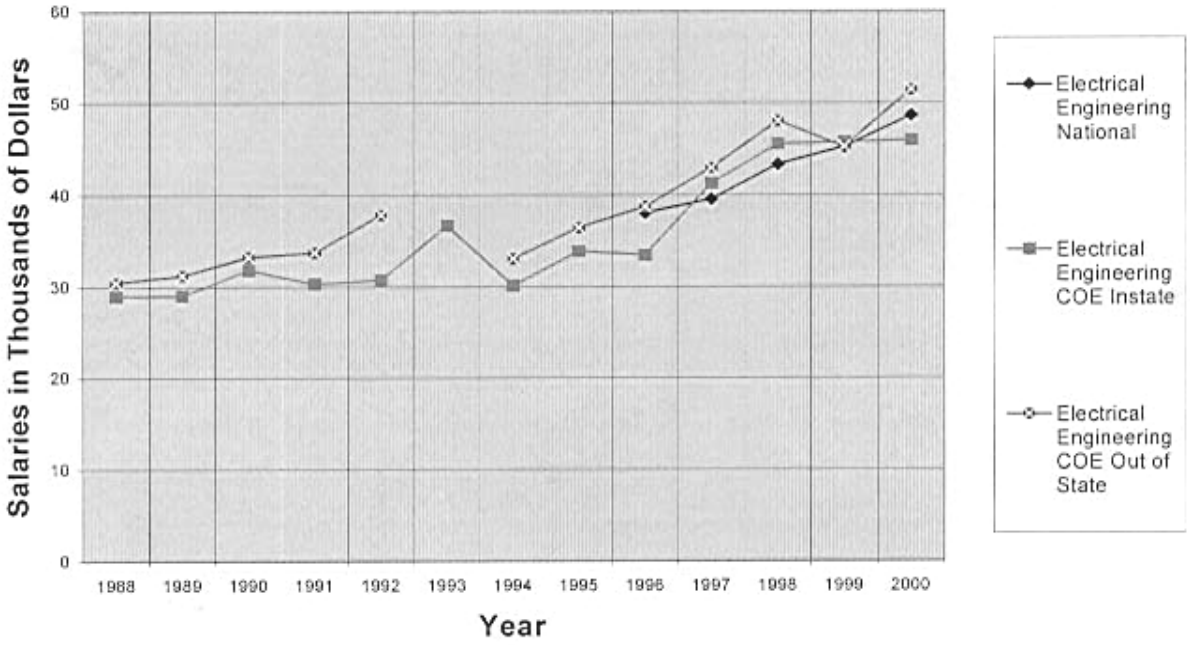

Starting Salaries for B.S. Graduates, Chemical Engineering
Salaries in Thousands of Dollars
0
10
20
30
40
50
60
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Year
National
COE Instate
COE Out of state


Starting Salaries for B.S. Graduates, Computer Engineering
Salaries in Thousands of Dollars
0
10
20
30
40
50
60
70
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Year
Computer Engineering National
Computer Engineering COE Instate
Computer Engineering COE Out of State

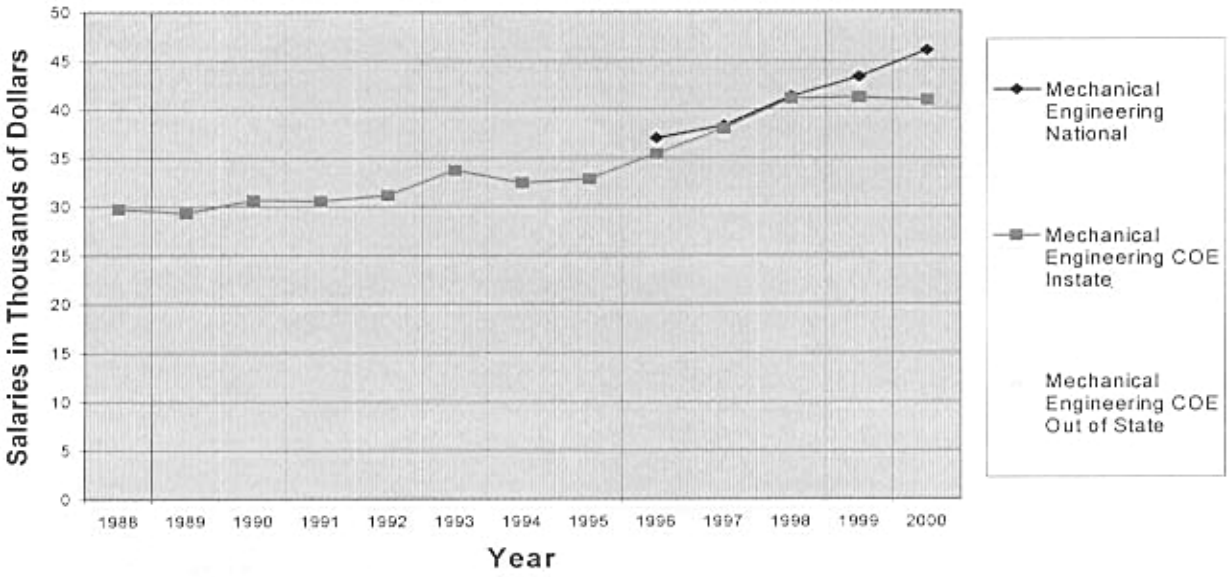
Starting Salaries for B.S. Graduates, Computer Science



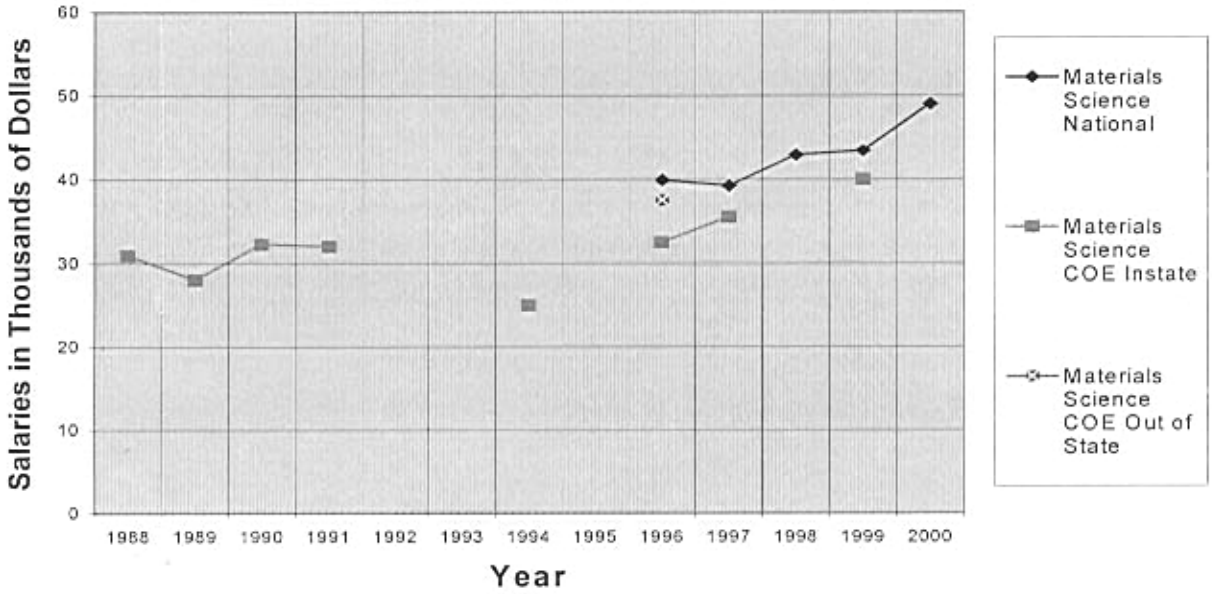
Starting Salaries for B.S. Graduates, Electrical Engineering



Starting Salaries for B.S. Graduates, Mechanical Engineering



Starting Salaries for B.S. Graduates, Material Science and Engineering



Name Index

ERE ENGINEERING EDUCATION HAPPENED

Physical Facilities that supported the teaching of Engineering at the University of Utah

Dietrich K. Gehmlich, Professor Emeritus

A. "Pre-engineering"

Class-work at the newly incorporated University of Deseret began in the fall of 1850, the first term being held in the home of Mrs**. John Pack** located near the corner of West Temple and First North streets.[1] The second term commencing in February of 1851 convened in the newly constructed **Pioneer Council House** on the southwest corner of Main and South Temple Streets. Emphasis was given to mathematics, English, grammar, geography, and other subjects necessary for the training of teachers. Only two more terms were completed before the school was temporarily discontinued due to lack of funding from the territorial legislature. The chancellor, Dr. **John R. Park**, and the board of regents appointed by the legislature in 1850 continued to meet and plan for a full-scale University.

Plate 1 Pioneer Council House

The University finally reopened in 1869 with an expanded curriculum including basic science courses at the Freshman and Sophomore levels. Courses considered pre-engineering were: physics, chemistry, mathematics, geography, geology, and architectural and mechanical drawing. Classes were held in the **Pioneer Council House** (Plate 1) until 1874 when a move was made to the old **Union Academy** (Plate 2) on the northeast corner of First North and Second West Streets. Shortly thereafter, the city of Salt Lake gave to the University the square block of ground directly north of Union Academy known as Union Square. The ten-acre plot had been a watering and resting spot for pioneer wagon trains as they entered the valley. In 1879, the legislature gave the University $20,000 to begin planning and building the campus, and construction began on the first building to be called the **Main Building** (Plate 3).

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[1] The numbers on all North and West streets were recently changed to conform to the house numbering system. Thus today, the then First North Street is Second North Street and Second West became Third West. All addresses in this document use the old numbering system for North and West streets.

In August 1884, the University moved into the not-yet-completed **Main Building** on the new ten acre campus located between First and Second North and Second and Third West (see map 1). The story is told that some of the mechanical drawing courses were taught in the attic of the main building accessible only by a vertical ladder. In 1888 the legislature finally appropriated sufficient funds to complete the building and to pay off loans that had been incurred to continue its construction. By 1889, the building was completed and twelve faculty were serving under **President John R. Park**. Park taught arithmetic, **Joseph B. Toronto** taught mathematics and surveying, **Joseph T. Kingsbury** taught physics, chemistry, mineralogy, geology, and geography, and **Don Carlos Young** taught civil, mechanical, and architectural drawing and some architecture. These courses were all taught under the Department of Science, Literature, and the Arts. The teaching of "the basic chemistry, physics, mathematics, and mechanical and architectural drawing were intended to prepare students in the practice and elements leading to engineering and architecture."[2] Essentially all of these courses were taught in the University's Main Building. The building was made of stone and brick, 100 feet by 130 feet and four stories in height plus some attic space.

Plate 2 Union Academy

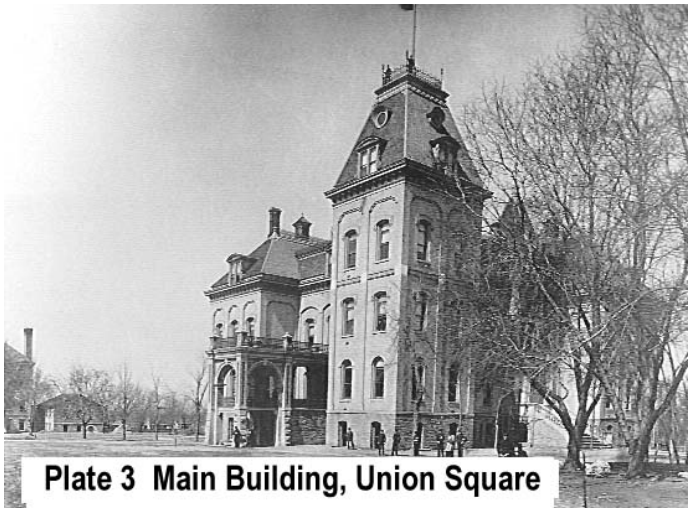


Plate 3 Main Building, Union Square

B. Department of Mines

[2] 1888 University of Deseret Bulletin.

In the process of an 1891 reorganization, a new **Department of Mining and Mining Engineering** was created. A three-year course in mining and mining engineering was added to the curriculum. With the expanding curricula came a need for more space at the University so that by 1892, a second building, the **West Building** was completed on the ten acre campus (see map 1). This building housed primarily the Normal School and the School for the Deaf, leaving the Main Building mostly for science and mining and engineering courses.

The space crunch for science, engineering, and mining was further alleviated when in April 1894, the University became the recipient of a handsome endowment, the first of its kind in the history of the institution to come from private sources. The **Salt Lake Literary and Scientific Association**, an education organization of Utah, endowed a chair of geology in the amount of $60,000. This fund was to be kept intact and the proceeds to be used for the support of the chair named. Included in this grant was land and property specifically known as the **Deseret Museum**, located one-half block east of the main campus on First North Street (Plate 4). The Deseret Museum Building, complete with a museum, lecture rooms, and laboratories became the home for most of the science, mining and engineering class-work.

Plate 4 Deseret Museum

In September of 1900, the University of Utah moved to its new site on the east bench where three buildings were completed at the upper half of a circle (see Map 2). These buildings were as follows: The Library Building which in addition to containing library materials, housed the University administration, classes in mathematics, language, philosophy psychology, and other miscellaneous coursework. The Normal Building housed mainly the Normal Training School. The **Engineering and Physical Science Building (1)**[3] (later shortened to **Physical Sciences**) (Plate 5) was used primarily for physical science and engineering classes and laboratories.

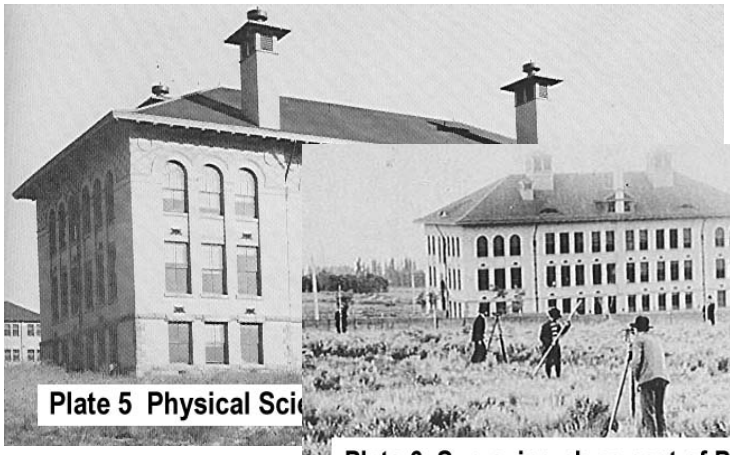


Plate 5 Physical Sci

By September of 1901, the fourth building on the circle,

Plate 6 Surveying class east of Physical Science and Museum Building

the **Museum Building** (Plate 6), was occupied and became the permanent home of the general museum and was also used for studies in geology, mineralogy, botany, zoology, and physiology. It became immediately obvious that the **Physical Sciences Building** would not be able to contain the burgeoning Mines and Engineering enrollments. New construction for engineering began that year, with the first of several shop buildings soon completed. **The Mechanical Building (2)** (Plate 7) housed a machine shop, carpentry and wood turning shop, steam and hydraulic laboratories. Also finished was the **Mechanical Shops building (3),** which housed the blacksmith shop, and a molding and casting laboratory (see also Map 3). The four buildings on the circle are still in use today, each having undergone some internal remodeling.

All mining and engineering students were required to take three courses in shop work comprising six hours per week for a period of two years. These courses consisted of carpentry, joinery, pattern-making, molding, casting, machine tool, vise and forge work and hand tools. All work was based on blue print drawings and students were expected to read and understand mechanical drawings. Students built a variety of tools and other pieces to demonstrate their understanding of the processes.


Plate 7 Mechanical Bldg. looking north

"The aim is not to turn out skilled mechanics, but to make the student acquainted with how the pieces should be made, and place him on a foundation built of proper principles involved in every day practical work, which is of great advantage to any student preparing for either a mechanical, electrical, or civil career. In fact it is of untold value to students in any occupation of life."

George J. Silver, Instructor in Shop Work "The Utah Engineer", Vol. 1, No. 4, June 1893

In 1903, the new **Metallurgy Building (4)** (Plate 8) was completed (see also Map 3). It was used exclusively for the work of ore dressing, metallurgy, and assaying. There were two large rooms for concentrating machinery and smelting

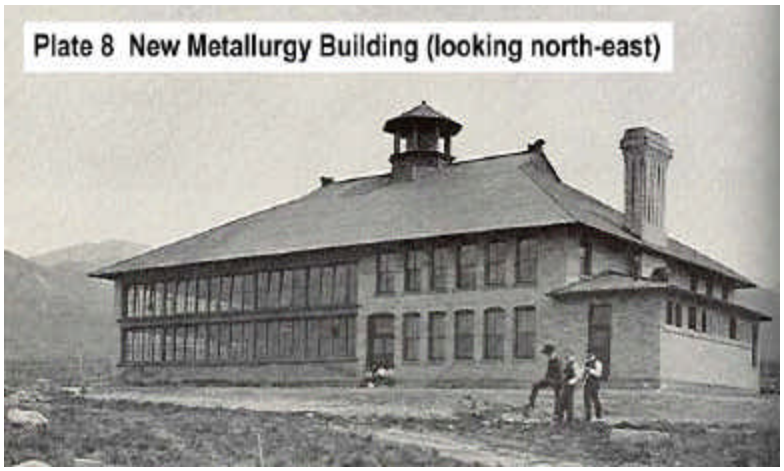
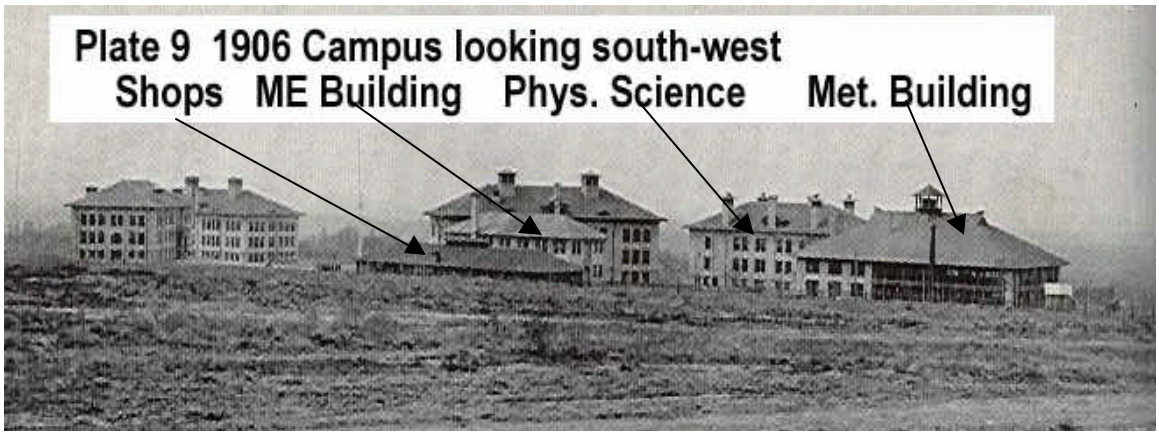


Plate 8 New Metallurgy Building (looking north-east)

furnaces, two laboratories for wet assaying and metallurgical analysis, two furnace rooms for assaying, a balance room, a dispensary, and a store room, along with a photographic dark room and other miscellaneous laboratories. This building was located directly north of the Mechanical Building complex.



The first **Hydraulics Laboratory (5)**, completed in 1906, consisted of two fifty- foot canals, eight feet deep and six and a half feet wide with inter-changeable weirs and volumetric measuring basins, and other water measuring equipment. This building, built west of University Street on city property next to the 13th East City reservoir, was meant to use water from Red Butte Canyon Creek as its supply source. An additional 100 by 27-ft. structure was added in 1911.

In 1913, the new **Heating Plant (6)** (Plate 10) was constructed east of the Mechanical Building (see map 4). Attached to this heating plant were a steam engine and other thermal equipment used by students in mechanical engineering.

By 1916, the State School of Mines had enrolled 87 undergraduates and 13 graduate students, accounting for about 10% of the total number of students at the University. Also in that year the **John R. Park Building** was completed to house the administration, registration, bookstore, and other service functions of the University (see map 4).

C. The State School of Mines and Engineering

In 1917, the legislature approved a name change by adding Engineering to the State School of Mines. Such a change was long overdue, since most of the graduates of the school were awarded Bachelor of Science degrees in engineering disciplines.

The 46th Annual Commencement (1915) listed the following numbers of graduates in the six undergraduate programs:

Bachelor of Science in Chemical Engineering	3
Bachelor of Science in Civil Engineering	5
Bachelor of Science in Electrical Engineering	1
Bachelor of Science in General Engineering	3
Bachelor of Science in Mechanical Engineering	1
Bachelor of Science in Mining	2

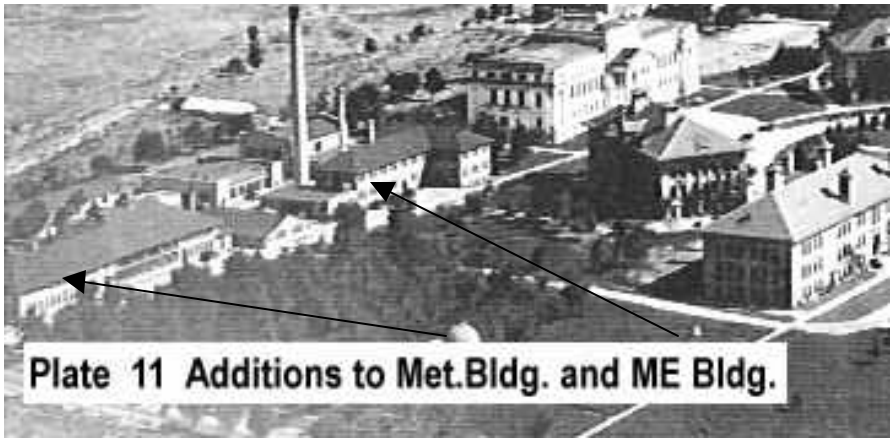


Plate 11 Additions to Met.Bldg. and ME Bldg.

An **addition to the Mechanical Building (7)** was completed sometime in 1917 or 1918 and became the machines training laboratory (see Plate 11). In 1918, the legislature approved a change from the semester to the quarter system and approved $16,000 for an **Addition to the Metallurgy Building (8)**, provided a like sum could be raised from industry. This was readily done and a classroom and laboratory addition was completed by 1920 (Plate 11). Classes in civil engineering, metallurgy, and surveying were taught in the new wing. In the late 1930's, the original Metallurgy building burned down but the addition was saved, refurbished and became the **Civil Engineering Building (8)** (Plate 12 and can also be seen in the left center of Plate 17).


Plate 12 Old Civil Engineering Building

The first **Ore Dressing Laboratory (9)** (see Plate 16 top, left, and Map 4) was constructed around 1920 in the area east of the Metallurgy Building. No other buildings were

erected in the northeast quadrant of the campus until the original **Union Building** (now David P. Gardner Hall) was started in 1925. The funding for this building was to be from student fees and other donations. Construction continued as funds became available so the building was not completed until 1931. During this time, work began on the new assembly building (**Kingsbury Hall**) which was dedicated in May of 1930.

New buildings for Engineering also began during this period. The Legislature voted $45,000 for construction of the **Mines Building (10)** north and east of the Metallurgy Building. Begun in 1927, it was finished in 1928 and housed the departments of Mining and Metallurgy as well as the research functions of the U.S. Bureau of Mines.

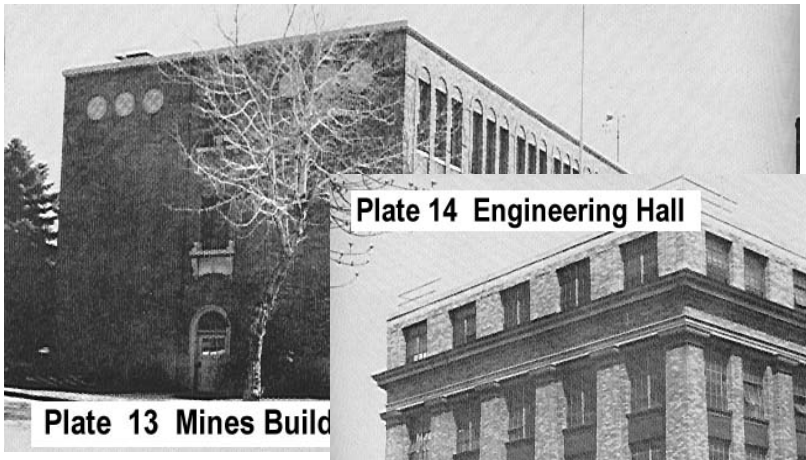


Plate 13 Mines Build

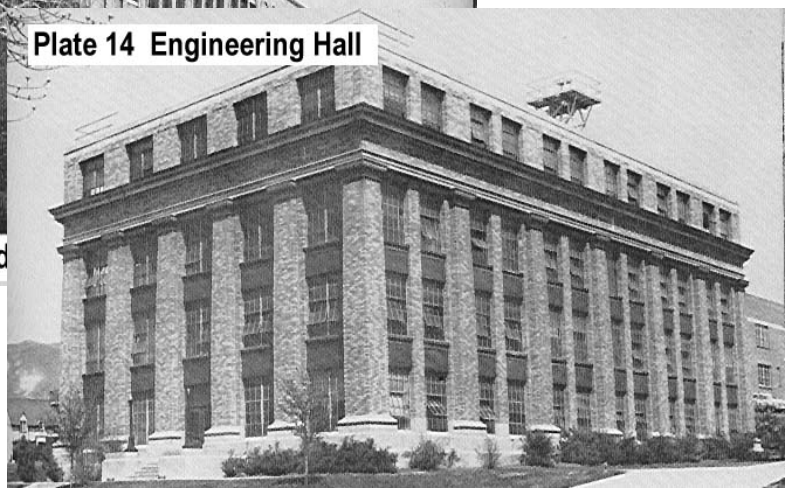


Plate 14 Engineering Hall

The 1929 Legislature, some of whom had toured the Physical Science Building and found it to be severely over crowded, announced plans for a large new engineering building to ultimately cost $500,000. That year they voted $100,000 to build the first of the proposed three wings of the structure, and ground was broken in March of 1930. The wing was completed by December of 1930 and **Engineering Hall (11)** (Plate 14) was immediately occupied by the Electrical and Mechanical Engineering departments. Sadly, the other two wings were never funded, despite the pleas of Dean **Richard B. Ketchum** and later Dean **A. Leroy Taylor.** The original building had no elevator nor stairs, but ramps connecting all floors to facilitate movement of large pieces of equipment.

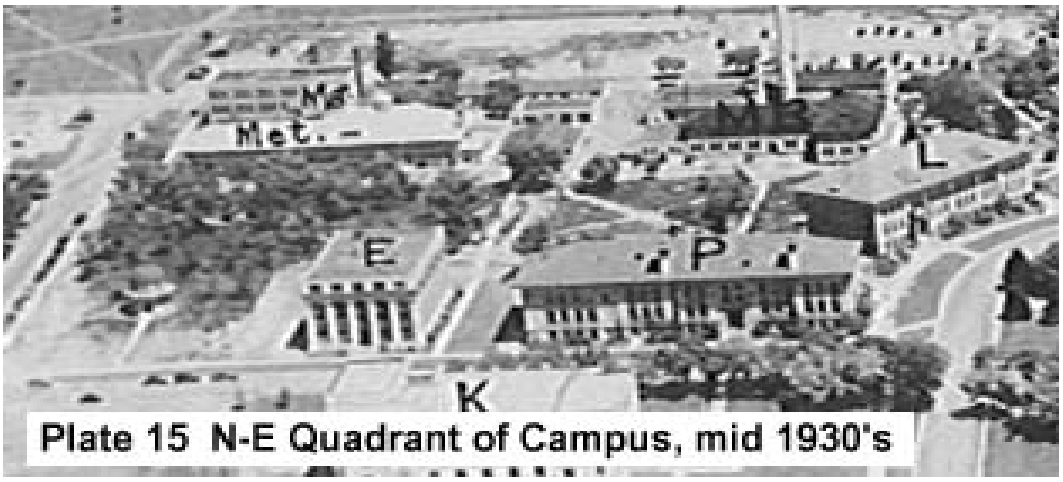
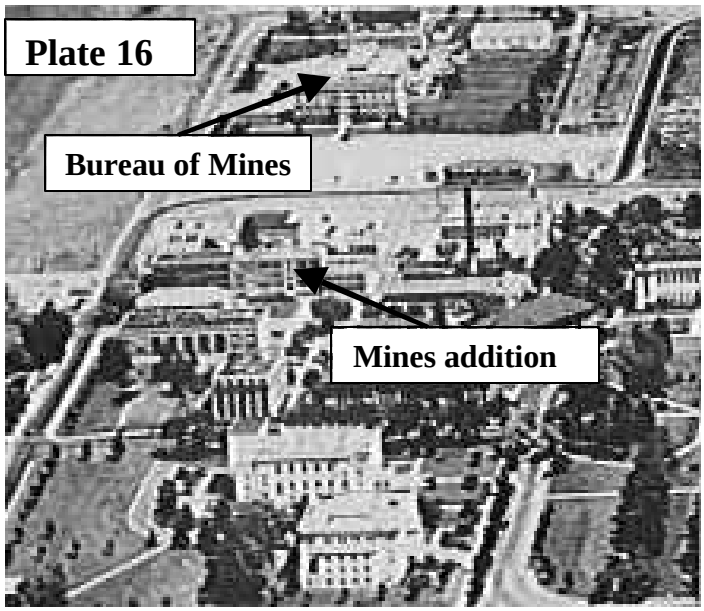


Plate 15 N-E Quadrant of Campus, mid 1930's

Plate 15 is an aerial view of the northeast quadrant of the campus taken in the middle 1930's. **Mg** is the **Mines Bldg**., **Me** indicates the **Mechanical Engineering** Bldg. and the **Metallurgy** building is labeled **Met**. **Engineering Hall** is labeled **E**, **P** is the **Physical Sciences** building and **Kingsbury Hall** is the lower building shown as **K**. A new **Stores and Receiving building (12),** partly financed by Bookstore profits was built in 1937 and is shown between the Mines and Mechanical Engineering buildings. The building labeled **L** was the original **Library** until replaced by the new **George Thomas Library** on the south side of the Circle.



Meanwhile, the Federal Government agreed to place the Western Central Branch of the U. S. Bureau of Mines on campus if land was made available. Consequently, the Board of Regents conveyed 5 acres of ground in the northeast quadrant to the Government. Construction on the **Bureau of Mines Building (13)** began in 1938 and was completed in November of 1939. An **addition to the Mines**

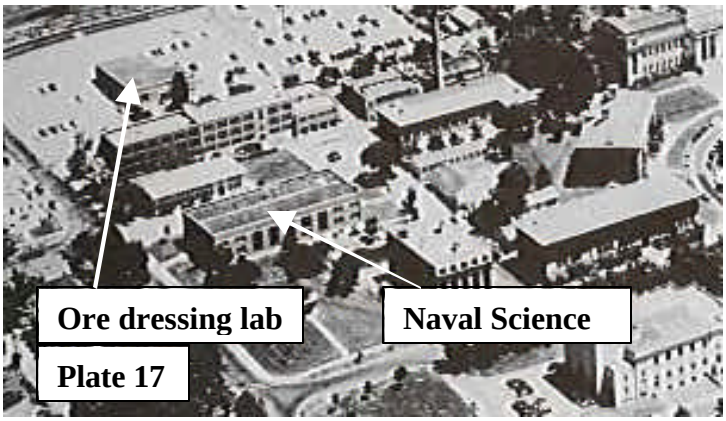
building (14) in 1941 filled the space between the original Mines Building and the Store and Receiving/Garage complex. Both the Bureau of Mines and the Mines addition are shown in Plate 16, a photograph taken in the mid-fifties.

At the beginning of World War II, the departments in the State School of Mines and Engineering were:

Department	**Location**
Department of Chemistry	Physical Science Building
Department of Civil Engineering	Engineering Building
Department of Electrical Engineering	Engineering Building
Department of Geology	Geology Building
Department of Mechanical Engineering	Engineering Building
Department of Metallurgy	Mines Building
Department of Mining	Mines Building
Utah Engineering Experiment Station	Mines Building
Deans Office	Engineering Building

Teaching and research laboratories were in Engineering Hall, Mechanical Laboratory, Shops Buildings, Mines building, Ore Dressing Laboratory, Physical Science Building, Geology Building and the Hydraulic Laboratory on Finch Lane.

Little change took place during the war. Regular enrollments dropped but training programs for the Armed Services increased. Shortly after the War ended, the **Naval Science** building was erected east of the Engineering Building and in 1947 a new **Ore Dressing Laboratory (9)** was built to replace the original wooden one. Plate 17 shows these two structures and gives another view of the Mines addition.



D. The College of Engineering.

In 1947, President **A. Ray Olpin** separated the engineering departments from Mines, Metallurgy and Geology by creating the **School of Engineering** and the **School of Mines and Mineral Industries.** The new School of Engineering was headed by **A. LeRoy Taylor** and consisted of the departments of **Electrical Engineering**, **Civil Engineering**, **Mechanical**

Engineering and newly formed **Chemical Engineering.** In 1948 the name was changed to the **State College of Engineering** and the following year changed again to the **College of Engineering**.

In 1947, part of the Fort Douglas complex was declared surplus and 59 buildings on site were given to the University. Building 105, later called the **Annex (15),** was converted into classrooms and laboratories into some of which Civil Engineering moved their drawing and

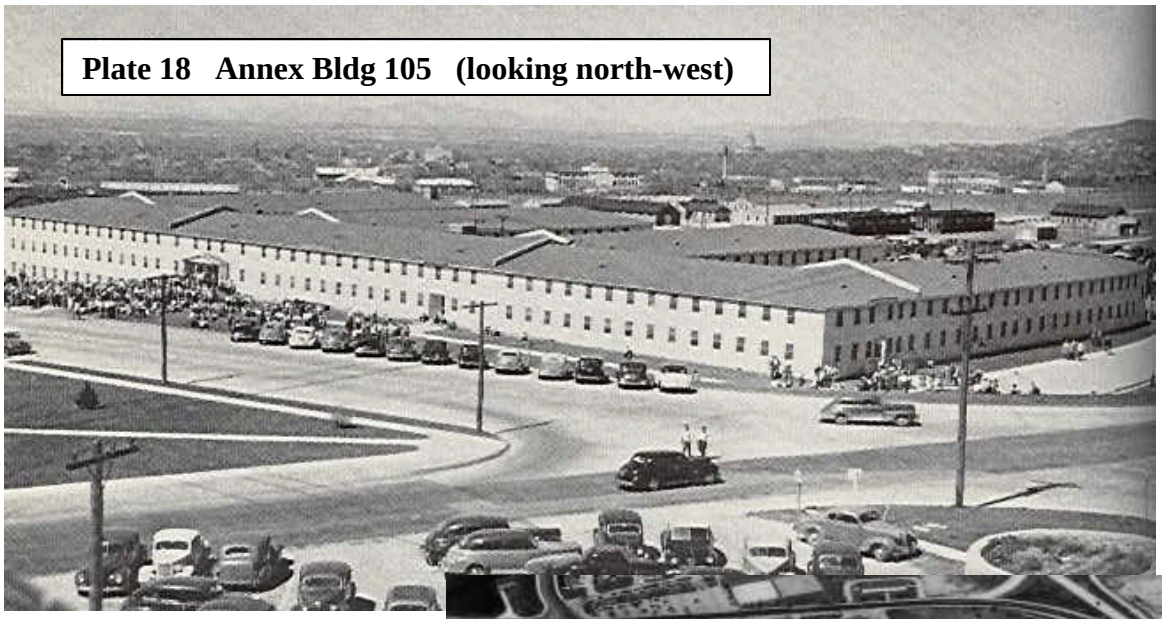
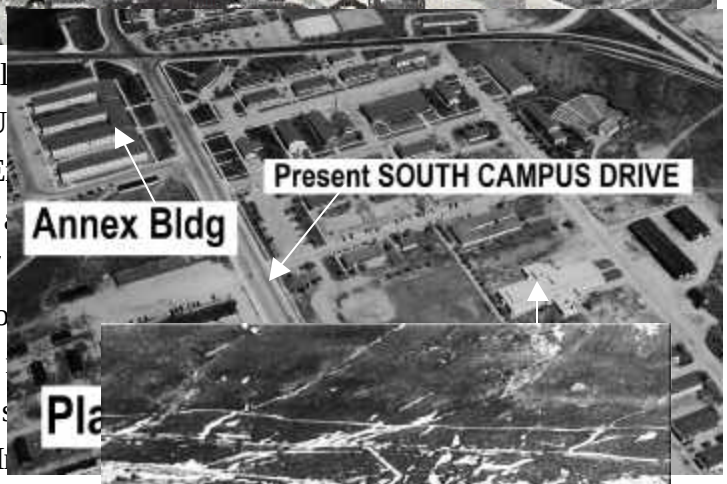


Plate 18 Annex Bldg 105 (looking north-west)

surveying laboratories and some facul
to serve as temporary space for the U
in use! Two years later, Chemical E
surplus units, **Building 437 (16).** An
(Plate 19) shows where Building 437
remodeled to accept the department o
Chemical Engineering moved into the
became the repository for University
make room for more parking for the I
day saints. Other surplus buildings**, Building**
by Electrical and Mechanical Engineering as
aerial view of Fort Douglas (see Plate 19a).



In the 1945-46 school year, Kennecott Copper Corp. gave the College of Mines and Engineering a $200,000 gift for research and study in the field of metal mining. Soon thereafter they indicated an interest in building a research laboratory near the University. The University offered Kennecott a 40-year lease on a building site on the northwest corner of 1st South Street and 15th East street with the proviso that at the end of the lease period, any buildings on the property would revert to the University. By early 1953, agreement was reached and the original **Kennecott Research Laboratory (17)** was begun (see Plate 20). The Lab began operation in 1955 and two additions were made to the building, the last being the North Tower in the late 1970's. When the lease expired in 1994, Kennecott began to phase out of the building and the University began using parts of the building to house some departments while their spaces were being remodeled or built. In 1997 the College of Engineering took permanent possession of the **North Tower (18)** (Plate 21) into which the Deans Office and several research functions were moved. The College of Mines and Earth Sciences took over the High Bay research laboratory space on the west side of the building.

Plate 20 Kennecott Research Lab.

By 2002, the College of Engineering had taken over the entire building with the Mechanical Engineering Department occupying the south end, and the high-bay area was remodeled to accommodate the Automated Machining Laboratory (AML)

E. Merrill Engineering Building

During the late 1940's and the early 1950's Deans Taylor and Kistler pressed the Administration and the Legislature for more space for the College of Engineering, specifically asking for the construction of Phase Two of Engineering Hall. The need for more space intensified as the enrollment burgeoned from 683 regular full-time students in the 1952-53 school year to nearly double that (1,230) in the 1956-57 school year, and engineering departments and laboratories were scattered into six different locations as much as a mile apart. The 1955-56 University of Utah Bulletin listed the following laboratories associated with the four departments in the College:

CHEMICAL ENGINEERING:

General Laboratory	Building 437
Physical Measurements Laboratory	Building 437

CIVIL ENGINEERING:

Surveying Laboratory	Annex
Structures Laboratory	CE Building
Hydraulics Laboratory	13th East Reservoir
Concrete Materials Laboratory	CE Building
Bituminous Materials Laboratory	CE Building
Sanitation Laboratory	CE Building
Soil Mechanics Laboratory	CE Building
Highway Materials Laboratory	CE Building

ELECTRICAL ENGINEERING:

General Machines Laboratory		EH
Standards Laboratory		EH
Electronics Laboratory	EH	
Servomechanisms Laboratory		EH
Electronics Measurements Laboratory	EH	

MECHANICAL ENGINEERING

Aeronautical Laboratory	ME Building
Heat Power Laboratory	ME Building
Materials Testing Laboratory	ME Building
Photo Elasticity Laboratory	ME Building
Shop Laboratories	ME Building

Finally, the push for the second phase of Engineering Hall was dropped and a whole new engineering complex was designed. The plans called for a three-floor laboratory and research building and an adjoining 7-story office and classroom building which would house all the functions of the four engineering departments together. A picture of the model of the complex is shown in Plate 22.

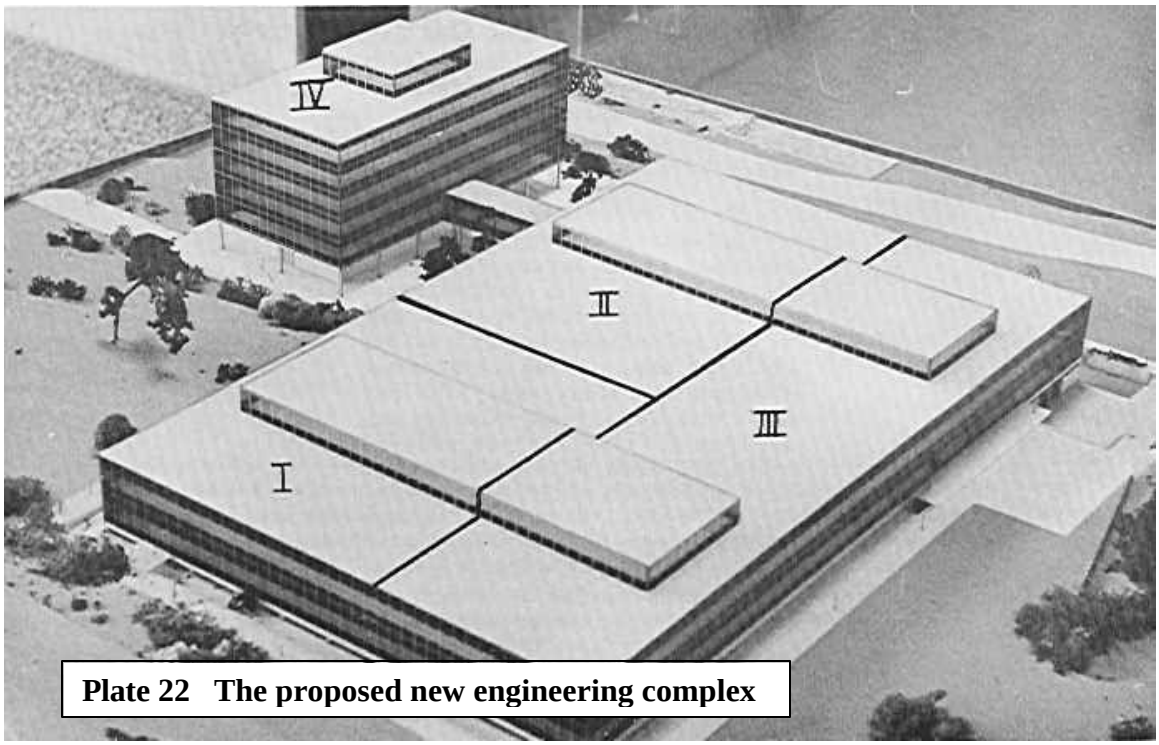


Plate 22 The proposed new engineering complex

The estimated cost of the complex was well over $4 million and it was obvious that the Legislature couldn't fund it all at once, especially since the administration was also proposing construction of an education building, a medical center, the Salt Lake Theatre replica and additions to the central heating plant. The legislature decided to break the laboratory and research building into three phases and rejected the office and classroom building (Phase IV in Plate 22). This brought about a redesign of the new building to include "temporary" classrooms and offices for faculty and staff. The funding for Phase I of the Engineering Center, $1,300,000, was awarded in the appropriations bill passed on February 27, 1957 and construction began soon after July 1st of that year.

The plan was for each of the four departments to have a "slice" of the completed building, and each slice was designed specifically for the occupying department. The Chemical and Electrical Engineering departments were to have the eastern half of the building and so they were the first to begin moving into the nearly completed 66,000 square foot structure during the summer of 1959 (see Plate 23).

The design of the exterior of the building was the first of its kind in the area, the all glass walls using more glass by weight than any other structure in the Mountain West area. The glass was specially tinted to reduce the heat load generated by the sun. The site for the building was selected by the administration north of the Bureau of Mines complex on the very northern edge

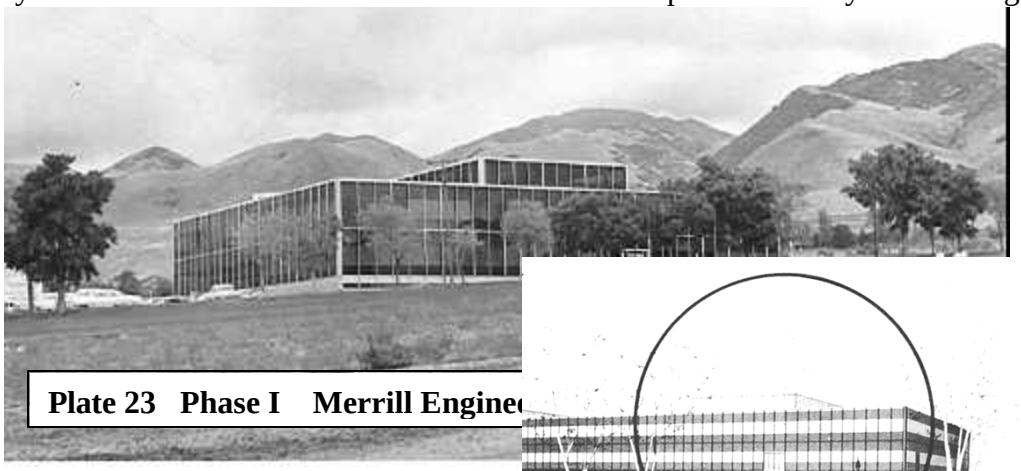


Plate 23 Phase I Merrill Engine

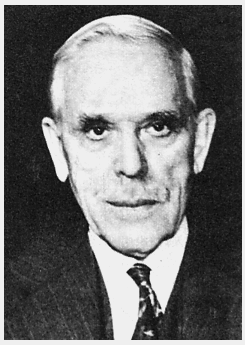
of the campus, which meant major expenses in extending the utilities and infrastructure. The chosen site was unpopular with some at first but has been shown to be a good one, allowing for significant expansion of the engineering and mines colleges.

The first classes were held in the new building in the Fall of 1959 but the dedication and

DEDICATION
OF THE
JOSEPH F. MERRILL
ENGINEERING
BUILDING
State College of Engineering
University of Utah
A. Ray Olpin, *President*
FRIDAY, FEBRUARY 26, 1960

naming of the structure were delayed until the week of the celebration of the University of Utah's 110th birthday the following year. On February 26, 1960, the building was officially named the **Joseph F. Merrill Engineering Building (MEB) (20)** and dedicated under the direction of **President A. Ray Olpin**. Among the 250 persons attending the ceremonies were **Gov. George D. Clyde, Dr. Olpin, Royden Derrick**, **Richard L. Evans, Dr. Rowland Merrill** representing the Merrill family, and President **Henry D. Moyle**, who offered the dedicatory prayer.

He granted that the center would grow until "it shall become a great engineering center of which the state and nation will be proud". Gov. Clyde commended the work of engineers and called the new building a good investment in the future. Dr. Olpin gave some of the history



JOSEPH F. MERRILL

PROGRAM

Introductory Remarks
President A. Ray Olpin
Remarks
Governor George Dewey Clyde
Response
Dr. Rowland H. Merrill
Representing the Merrill Family
Music
University of Utah Men's Chorus
John Marlowe Nielson, Director
Dedicatory Prayer
President Henry D. Moyle
Church of Jesus Christ of Latter-day Saints

•

Joseph F. Merrill was dean of the University of Utah's School of Mines and Engineering for more than a quarter of a century.

He was born August 24, 1868, on a farm near Richmond, Cache County, to Marriner Wood, and Maria L. Kingsbury Merrill.

In 1889, he received a normal certificate from the University of Deseret (now the University of Utah) and four years later received a Bachelor of Science degree from the University of Michigan, Ann Arbor, Mich.

He was assistant professor of chemistry at the University of Utah from 1893 to 1897. After graduate studies at the University of Chicago and Cornell University, he received a Doctor of Philosophy degree in 1899 from John Hopkins, being the first native Utahn to earn a Ph.D. degree. At Johns Hopkins he as elected to Phi Beta Kappa, honorary scholastic fraternity.

From 1897 to 1899 he was professor in physics and physical chemistry and from 1899 to 1928 was professor of physics and electrical engineering. He was director and dean of the Utah State School of Mines and Engineering from 1897 to 1928. The University of Utah awarded him an honorary Doctor of Science degree in 1920.

In 1928, Dr. Merrill became commissioner of education for the Church of Jesus Christ of Latter-day Saints. He was a member of the Church's Council of Twelve Apostles from 1931 until his death on Feb. 3, 1952. From 1933 to 1936 he was president of the European Mission with headquarters in London.

From 1909 to 1912, Dr. Merrill was a member and secretary of the Utah State Conservation Commission. He was an advisory member of the Democratic State Central Committee for the campaigns of 1910, 1912, 1914, and 1916.

He was a fellow of the American Institute of Electrical Engineers, American Association for the Advancement of Science, American Physical Society and Utah Academy of Science. He was a member of the Society for Promotion of Engineering and the National Education Association. He also was a member of the Utah Society of Engineers (president, 1907-10), Utah Teachers Association (president, 1911) and member of the governing board of engineers, Council of Utah, 1921-27 (president, 1923-24).

of Dr. Joseph F. Merrill calling him a man "whose services to his state, his University and his generation were exceedingly broad". Dr. Rowland Merrill spoke about the characteristics of the early dean for whom the building was named and exhorted the students who would study in the new building to search for increased light and knowledge for the blessing of themselves and mankind. Following the dedication, an open house was held in the new University of Utah Union building for students, former graduates and friends of the school.

Dean L. Gustavson Associates was the architectural firm for the project and Howard Construction Company built the first phase under the supervision of the Utah State Building Board.

Even before the first phase of MEB was completed, application was made to the Legislature for funding for **Phase II (21)** construction. The 1960 Legislature approved $800,000 for the construction of a portion of the building to the west of Phase I to house Mechanical Engineering and Civil Engineering. Unfortunately, the funds appropriated were

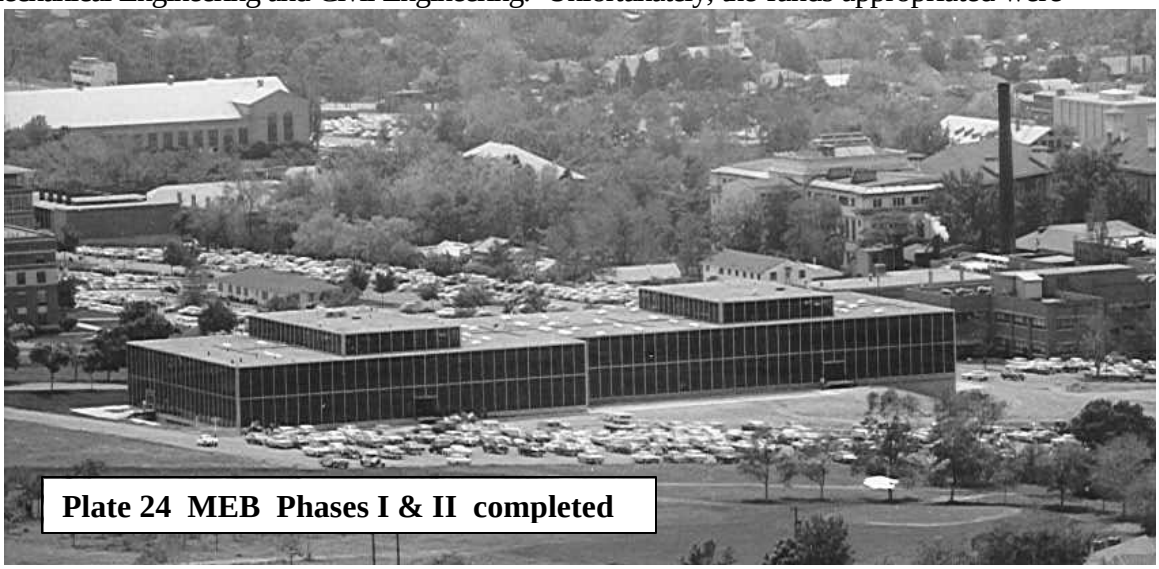


Plate 24 MEB Phases I & II completed

insufficient to completely finish the planned construction. The shell was completed around 65,525 square feet but only 26,227 square feet were usable. Another 21,000 square feet either had no floor or had incomplete partitions, heating, plumbing and illumination. Construction ended in 1961, and the Mechanical and Civil Engineering departments partially moved in. The Dean of the College of Engineering and his staff also moved into a suit on the second floor in the southwest corner of Phase II. A view of Phases I and II is shown in Plate 24.

As enrollments in the College of Engineering and the University grew, the need for space increased in the rest of the campus as well as Engineering. In the list of requests for buildings submitted to the 1963 Legislature by the University Administration, Phase III of MEB was number 13 on the list behind such needed buildings as Physics, Chemistry, Biological Science, Pharmacy, Library, Business, Physical Education, and Mines and Mineral Industries. Great pressure was put on the Legislature to pass a bonding bill for over $42 million supported by a ½ % sales tax increase. This would allow the University and other schools in the state system to borrow the funds to fill the pressing needs for space on campuses. The bill was passed on the last day of the 1963 Legislature, but was vetoed by Gov. George D. Clyde.

The Legislature was called into special session in May 1963 to resolve the desperate need for funds for capital improvements not only on the University of Utah campus but also for

the entire state system of higher education. After much wrangling, about $10 million ($5.8 million for the U of U) was approved for architectural planning only. The University immediately hired architects to begin plans for Business (Phase III), Physics, Chemistry, Pharmacy, Biological Science, MEB (Phase III), Library, Heating plant and a master plan for the campus. This master plan called for the Library to be the academic center of the campus with all other major academic buildings within 7.5 minutes walk from the library. Motor traffic was to be excluded from the center of the campus and restricted to peripheral roads and parking lots. Also proposed was a major planting program of trees, shrubs and flowers.

By December 1964, space needs in the College of Engineering were becoming critical. The college was still widely spread over the campus, with components of the engineering in MEB, Hydraulics lab, Civil Engineering building, Mechanical Engineering Building, Annex, Building 437, and Buildings 514, 515. Two new departments, Biophysics and Computer Science, and the Computer Center were added to the College of Engineering. Sponsored Engineering Research was growing rapidly; the annual income from this research was predicted to reach $4,500,000 by 1972 which amount was approximately equal to the total cost of MEB I, II and III. Still no funds were earmarked for Phase III construction.

Calvin L Rampton was elected governor in November 1964 and in his budget message to the Legislature in early 1965, he requested a bill allowing bonding for $67 million for capital improvements in the state system of higher education. Of this, $27,835,240 was earmarked for the University of Utah for 18 major projects, one of which was Phase III of MEB at a cost of $2.17 million. Finally, in 1966, the contract was let to finish Phases I and II and construct **Phase III (22),** which would add 109,032 sq. ft. to the building, bringing the gross total floor space to just over 240,000 sq. ft. Construction was completed in 1968 and most of the scattered functions of the college were moved into MEB, releasing 32,000 sq. ft. of space back to the University. Plate 25 is a view of the finished building taken several years after construction was completed.

Plate 25 Finished Merrill Engineering Bldg

Actually, MEB remained in a continual mode of construction of one kind or another. The final building had only one small women's rest room and as more women joined the departmental staffs and more female students entered engineering, several more women's restrooms had to be built. Minor changes occurred regularly as departments shifted labs and office spaces and research activities required increasingly larger and more specialized spaces. The large Civil Engineering hydrology laboratory space went unused for several years and was eventually remodeled into research and shop space. Several of the "temporary" classrooms became research space. Bottled gasses were stored at the rear (north side) of the building and were piped to the laboratories located mostly in the southeast quadrant. Painters working in one of the basement rooms accidentally pressed one of the EE laboratory power lines against a copper gas pipe; the resulting short circuit blew a hole in the copper line and a fire in the room resulted. Fortunately, no one was in the area and the fire was confined to one room. Shortly thereafter a bunker was built on the south side of the building to house bottled gas. When the classroom building was completed, most of the remaining classrooms were converted to research space. A major disruption in the use of the building occurred in 2001 when most of the floor and ceiling tiles were discovered to contain asbestos and had to be removed, and more remodeling occurred.

F. The Building Boom of the 80's

The increased enrollments and major growth of research in the College put great stress on the manpower and space available in MEB. The **Energy and Minerals Research Laboratory (EMRL)(23)** was the first of several building projects in the 1980's designed to help relieve some of the pressure for space. It was completed in 1984 and was jointly occupied by the College of Engineering and the College of Mines and Mineral Industries. It provided research space and laboratories for Chemical Engineering, Bioengineering, and Material Science and Engineering departments in the College of Engineering as well as several departments in the College of Mines and Mineral Industries. It was built south of MEB and adjacent to the U.S. Bureau of Mines complex with the understanding that the Bureau of Mines would soon move and Engineering would have first claim on the complex. One view of the EMRL building looking northeast is shown in Plate 26.

Plate 26 Engineering Mines Research Lab. (EMRL)

In 1985, the new buildings for the **U.S. Bureau of Mines** were completed in the south end of the University of Utah Research Park and the Bureau moved, leaving a somewhat run-down complex of 5 buildings to the University. Renovation of the main building, shown in Plate 27, was completed late in 1986. This structure, renamed the **Energy and Minerals Research Office (EMRO)(24)** building, and the surrounding ancillary buildings provided over 108,000 square feet of research and office space for the College of engineering and College of Mines and Mineral Industries. Initially, the department of Materials Science and Engineering took over one floor of EMRO. Later, the Civil Engineering department moved to EMRO taking over a floor for faculty and department offices, and much of the high bay laboratory space **(HEDCO Bldg. (25))** for research. Two of the smaller buildings to the east

Plate 27 Engineering Mines Research Offices (EMRO)

of HEDCO (Bldgs. 58 and 59) became the **Mining Processing (26)** and **Mining System Research (27)** labs for the college of Mines and Mineral Industries. The fifth unit, **Bldg. 60 (28)** was initially used for College of Engineering storage. Later part of it was remodeled for use by Electrical Engineering.

In the face of increasing numbers of students opting for Engineering and Computer Science with no classrooms for them, some departments in the College began enrollment limitations. Phase IV of the Merrill Engineering Complex was never funded by the Legislature but after much lobbying of the Administration and the Legislature, it was finally agreed that a classroom building for Engineering and Mines was vital. In contrast to the all-glass construction used for MEB, the architects proposed a building with most of the rooms under ground, with a central atrium providing light to the hallways connecting all the rooms. An underground tunnel provided all-weather access to the building from MEB. **The Engineering and Mines Classroom Building (EMCB) (29)** was completed in 1987 south of MEB and put into service that fall. It provided 5 large lecture halls, 6 classrooms, several large computer terminal rooms managed by the Computer Center, computing facilities managed by the Computer Science department and several other laboratories managed by the College of Mines and Mineral Industries. Plate 28 is a view showing the atrium of EMCB

Plate 28 Engineering and Mines Classroom Bldg.

During the year 1985, the **Dumke Biomedical Engineering building (30)** was completed. While it was originally expected that the building would house some aspects of Bioengineering, only Dr. Willem J. Kolff, who headed the artificial organs division at the University of Utah, was given space there for his dialysis center. The Kolff Dialysis Center brought the gamut of therapies for kidney failure under one roof, from the treatment of mild conditions to transplantation for irreversible disease. The center also housed the Home Dialysis Training Center, a pilot project to promote and advance home dialysis. No engineering

functions were moved to the building so the name was soon changed to simply the Dumke Building.

In December 1987, Congress approved $4 million for the construction of a research building on the University of Utah campus and approved another $16 million for the project as part of the national defense stockpile fund. The money is to be used for research to replace strategic materials now imported from other nations. Construction of the **Biomedical Polymers Research Building** (**BPRB**) **(31)** began in the spring of 1989 on a site southeast of the College of Nursing building. Several World War II buildings and barracks, including bldgs. 513 and 514, were torn down to provide the space needed for the building and a parking lot. The University of Utah Institutional Council also approved $5 million for the construction of two smaller buildings for health sciences to replace some of the space lost by the destruction of the WW II barracks buildings. The new **Biomedical Polymers Research Building**, shown in Plate 29, was the first building on campus devoted entirely to research, and it involved faculty from the colleges of Medicine, Pharmacy and Engineering. The administrative offices of the Department of Bioengineering are also located in BPRB.


Plate 29 Biomedical Polymers Research Building

Spearheaded by Professors Frank Brown and Eugene Loh and Vice President for Research Richard J. Koehn and others from departments involved in scientific computing, a proposal was presented to the Federal Government for a building specifically designed and used for high level computing. Funds in the amount of $19 million were finally made available for the construction of the building in 1994. After much deliberation, it was decided to raze the old Mechanical Engineering Building to make room for the new structure, making it somewhat central to the departments such as Mathematics and Physics that would probably make use of the facility. The **Intermountain Network Scientific Computational Center (32) (see Plate 30)** was finished in 1996. The computer science department elected not to move into it and so


Plate 30 INSC Center

the only user in the Engineering College was Professor Philip J. Smith, Professor of Chemical and Fuels Engineering. Other users of the facility are faculty and researchers from the colleges of Mines and Earth Sciences and Science.

G. John E. and Marva M. Warnock Engineering Building.

On March 21, 2003, Dean **Gerry Stringfellow** announced that **John E.** and **Marva M. Warnock** had donated 200,000 shares of Adobe stock, valued at over $5.7M, to the University of Utah as the cornerstone gift in their $13M engineering building campaign. In 2001, the State of Utah granted $15M in bonding authority for a new engineering building at the U predicated on a $13M match from private donors. The building bonds, along with $4.6M in remodeling funds for Merrill Engineering Building were part of a statewide initiative to double the number of engineering graduates in Utah. **David Pershing**, Senior Vice President and former Dean of the College of Engineering said that it would be completely fitting that the new building bear the Warnock name because of their overall support of the College. Detailed planning for the building was to commence immediately with the expected ground breaking in 2005.

H. Off-Campus Research Centers

The **Center for Engineering Design (CED)** is located at 360 Wakara Way in Research Park. This center is under the direction of Professor Stephen C. Jacobsen, Distinguished Professor of Mechanical Engineering. Their research involves robotics, automation, and automatic drug delivery systems. (See *Plate 31).*

Another research operation that is located in Research Park is the **Energy and Geoscience Institute** (**EGI**) located at 423 Wakara Way. This center, under the direction of **Raymond Levey**, Research Professor of Civil and Environmental Engineering, is involved in geothermal and fossil energy research and environmental studies.

Plate 32 EGI Research

The **Combustion Research Center** is located at 870 South 500 West and is managed by Eric Eddings, Research Assistant Professor of Chemical and Fuels Engineering. The mission of the Center is to conduct fundamental and applied research that provides insight into combustion related processes and associated environmental, health, efficiency, and operating issues.

Plate 33 Combustion Research

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Plate 1. LDS Church archives
Plate 2. Ibid.
Plate 3. University of Utah Annual Bulletin
Plate 4. Ibid.
Plate 5. Ibid.
Plate 6. Ibid.
Plate 7. Ibid.
Plate 8. Ibid.
Plate 9. Ibid.
Plate 10. Ibid.
Plate 11. Ibid.
Plate 12. Photo by D. K. Gehmlich
Plate 13. Ibid.
Plate 14. University of Utah Annual Bulletin
Plate 15. Ibid.
Plate 16. Ibid.
Plate 17. Ibid.
Plate 18. Ibid.
Plate 19. U, of U. Marriott Library- Special Collections
Plate 19a. Ibid.
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Plate 23. Ibid.
Plate 24. Ibid.
Plate 25. Ibid.
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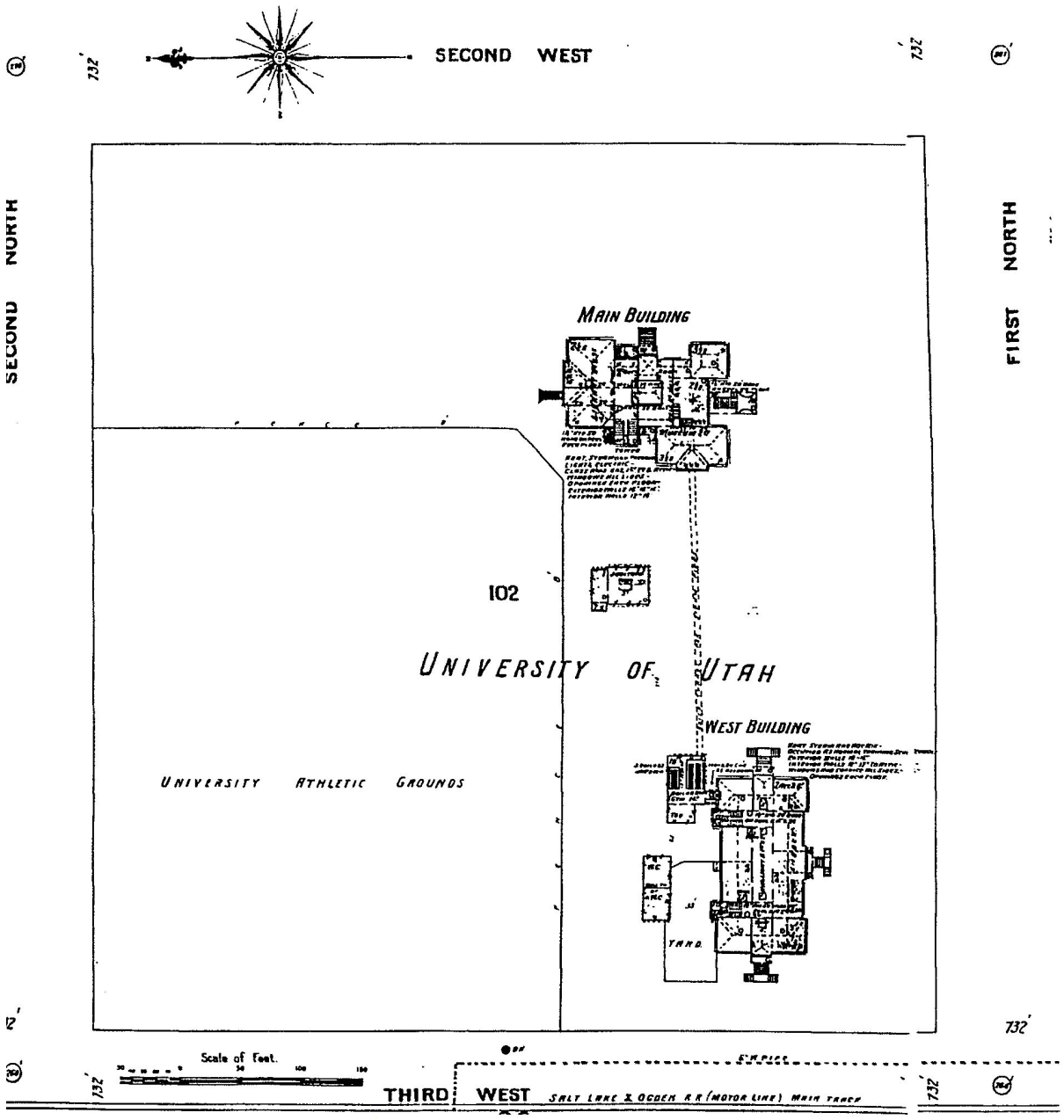
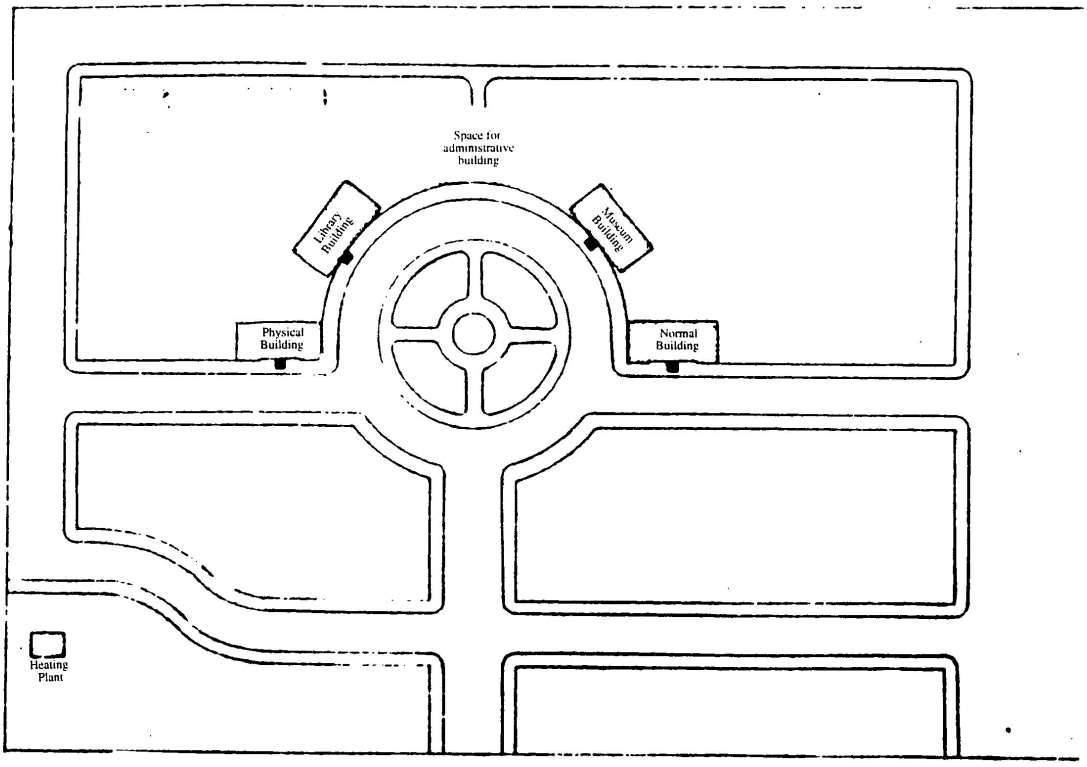
Plate 28. Ibid.
Plate 29. Ibid.
Plate 30. Ibid.
Plate 31. Ibid.
Plate 32. Ibid.
Plate 33. Ibid.



Map 1.

Original Union Square
Main and West buildings as of 1895



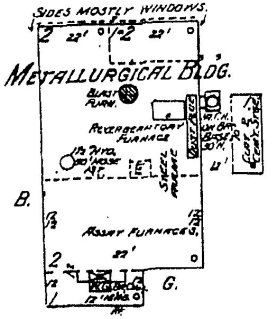
PLAT OF THE UNIVERSITY GROUNDS
From Tracing by H. Groesbeck, Engineering Class, '03.

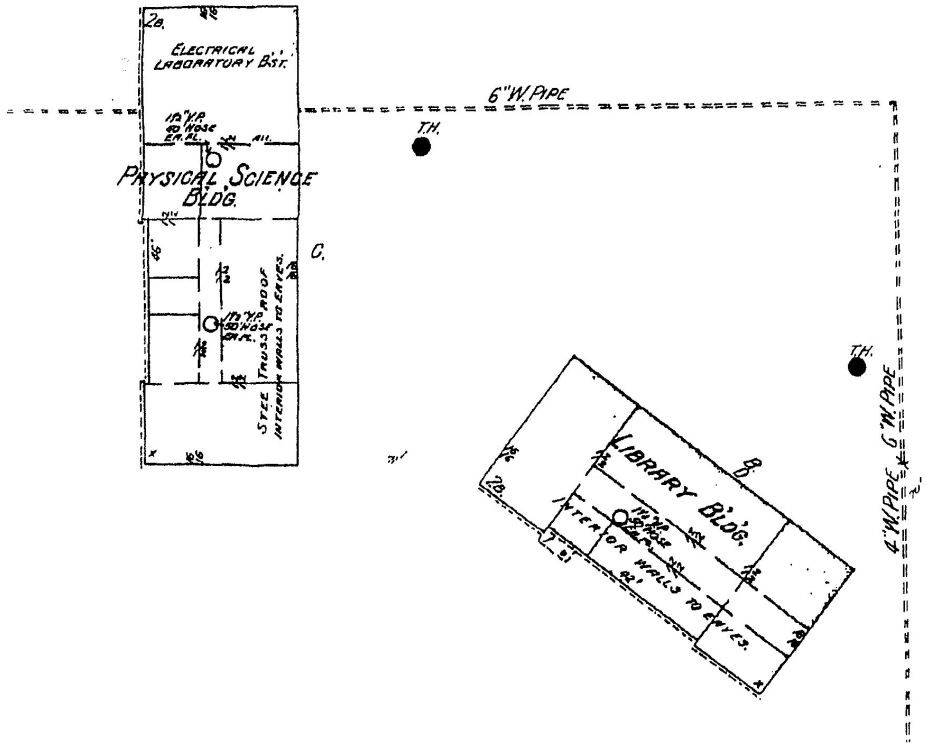
Map 2

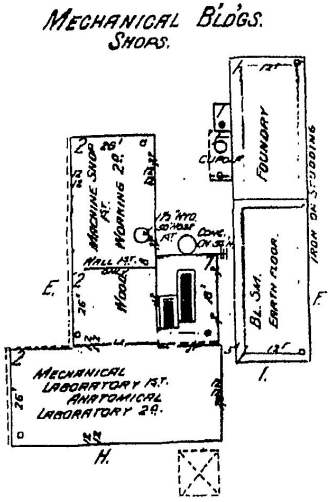
First Four Buildings Built and Occupied 1900

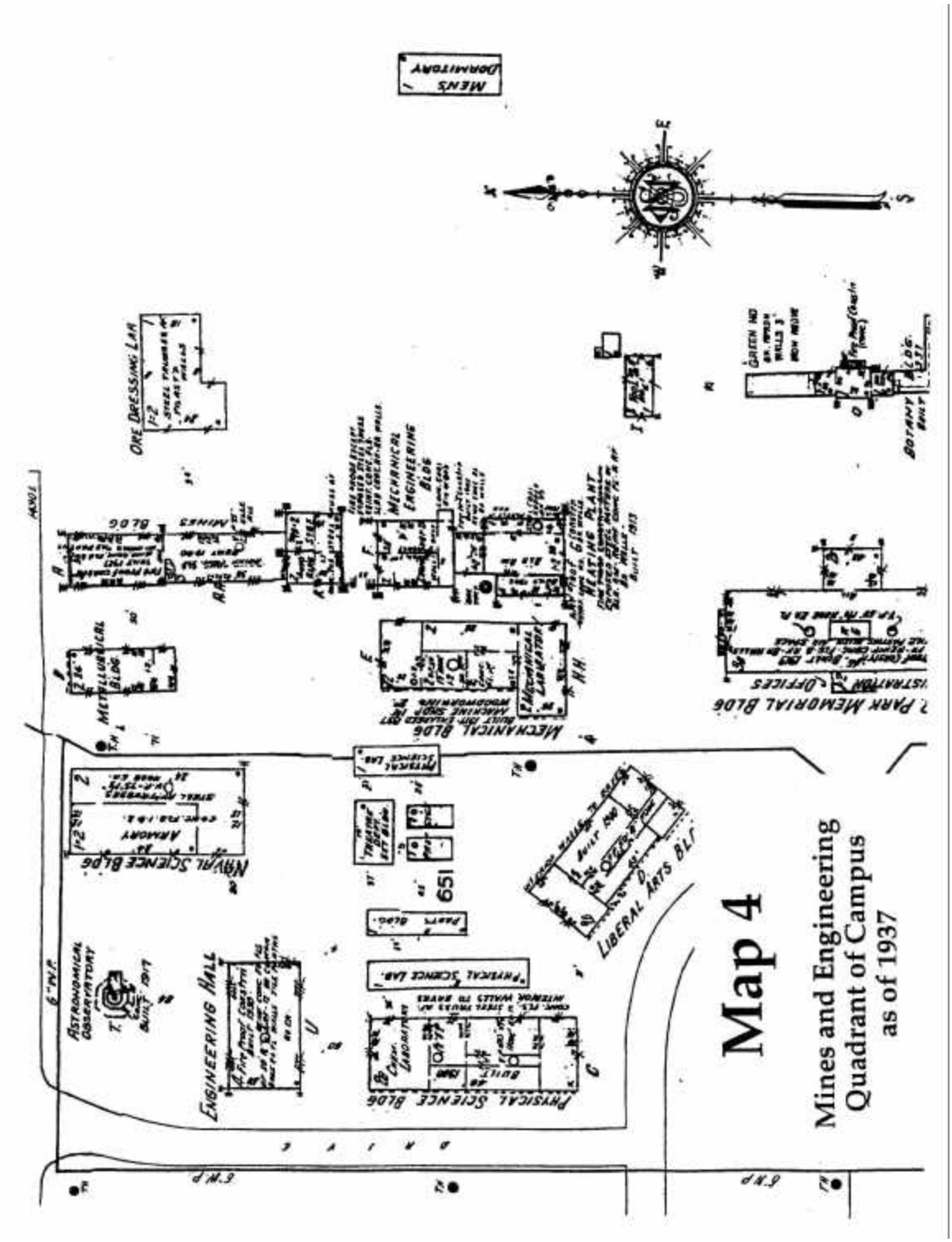
Map 3

Mechanical Building and Shops-1901 Metallurgical Building (phase 1)-1903





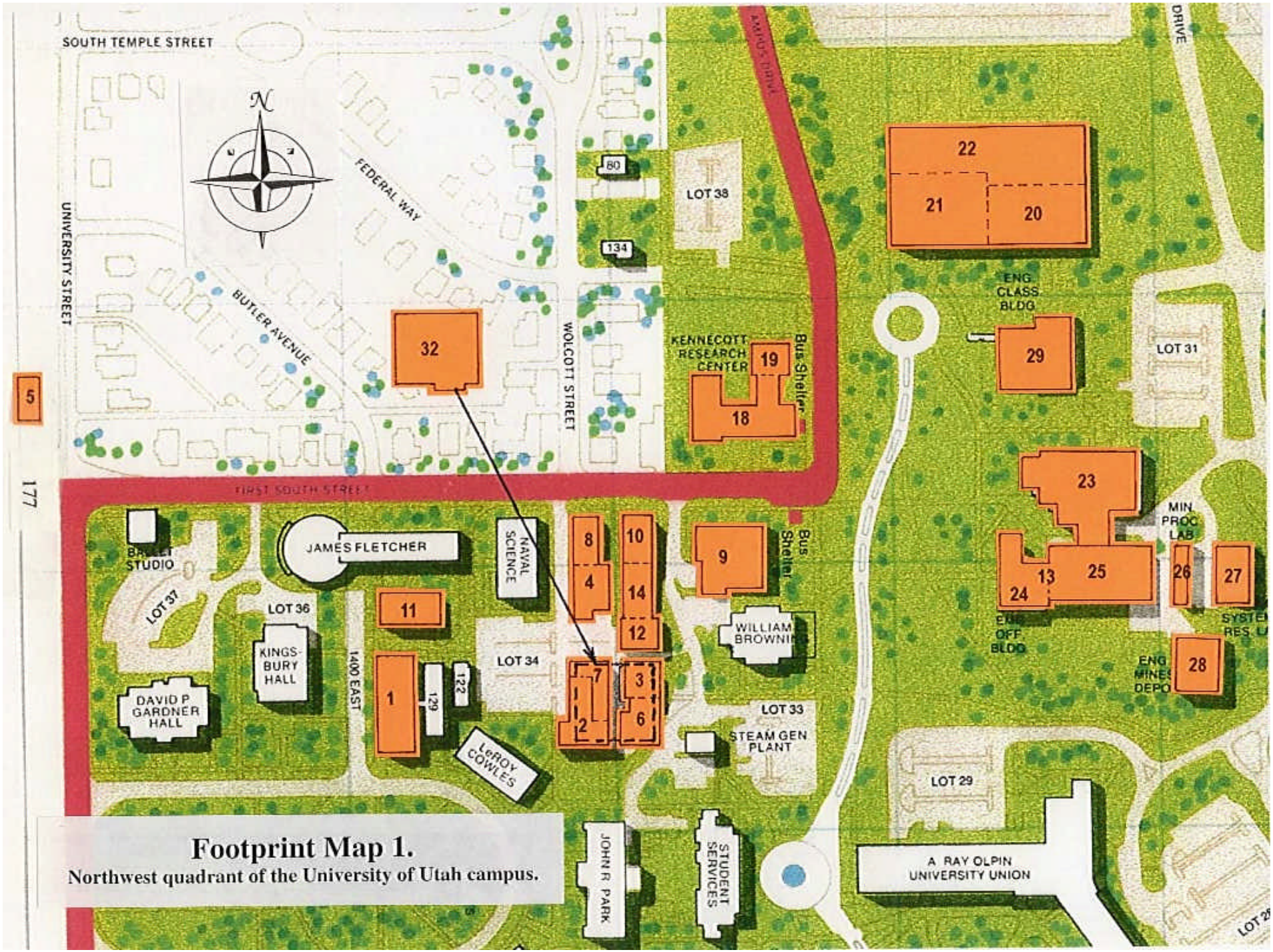



Map 4
Mines and Engineering
Quadrant of Campus
as of 1937
MEN'S DORMITORY
ORE DRESSING LAB
MECHANICAL ENGINEERING BLDG
MINES BLDG
METALLURGICAL BLDG
MECHANICAL LABORATORY
MECHANICAL BLDG
PARK MEMORIAL BLDG
OFFICES
NAVAL SCIENCE BLDG
ARMORY
ENGINEERING HALL
ASTRONOMICAL OBSERVATORY
PHYSICAL SCIENCE BLDG
LIBERAL ARTS BLD
651
BOTANY BLDG.

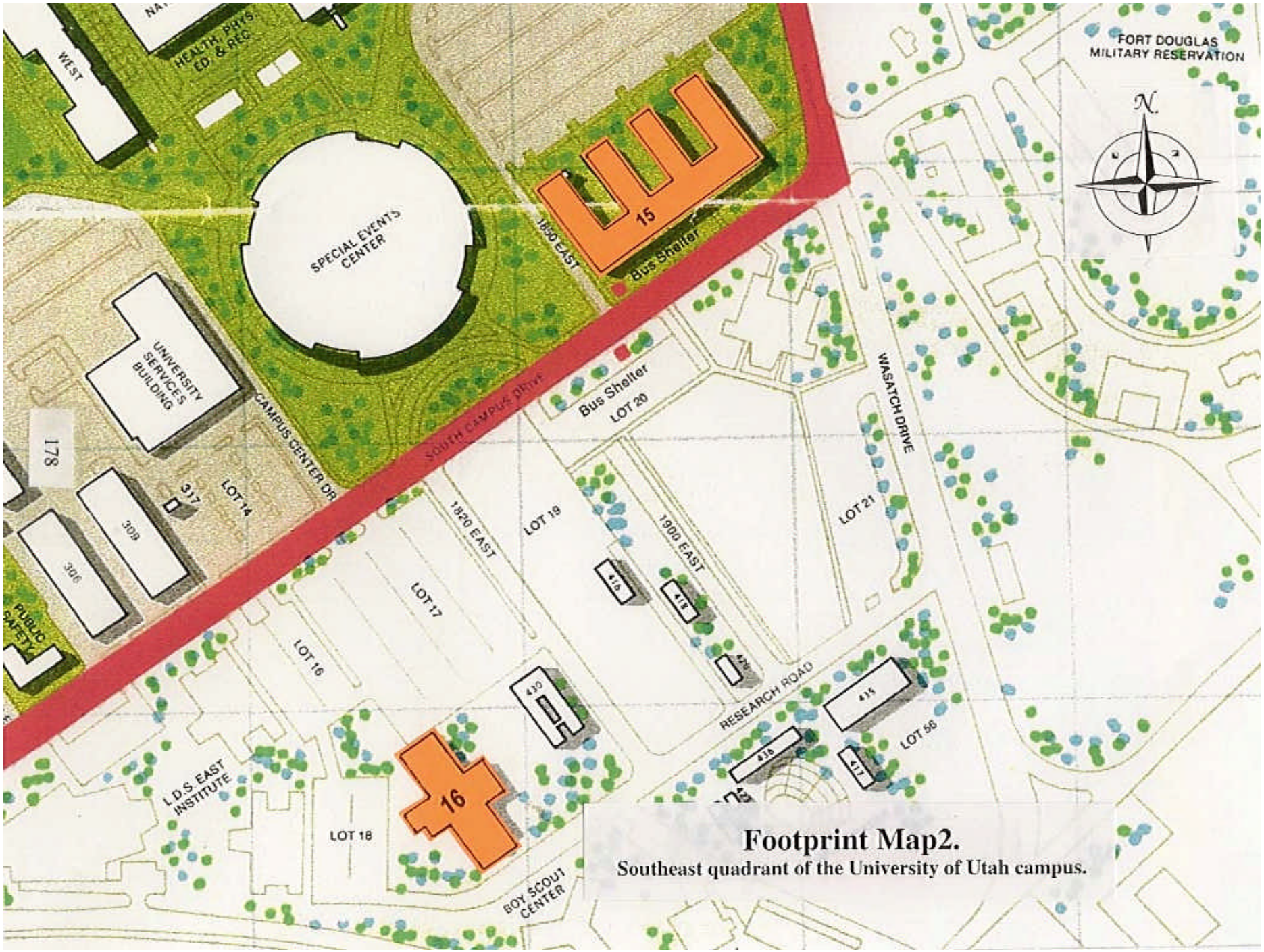
Footprints

(The numbers refer to the orange building outlines on Footprint Maps 1, 2, and 3 that follow)

1. Physical Science Building
2. Mechanical Building
3. Mechanical Shops
4. Metallurgy Building
5. Hydraulics Laboratory
6. Heating Plant
7. Addition to Mechanical Building
8. Addition to Metallurgy Building
9. Ore Dressing Laboratory
10. Mines Building
11. Engineering Hall
12. Stores and Receiving
13. U. S. Bureau of Mines complex
14. Addition to the Mines Building
15. Annex, Building 105
16. Building 437, Chemical Engineering
17. Buildings 513, 514
18. Kennecott Building
19. North Tower of Kennecott Building
20. Phase I, Merrill Engineering Building
21. Phase II, Merrill Engineering Building
22. Phase III, Merrill Engineering Building
23. Engineering and Mines Research Laboratory
24. Engineering and Mines Research Office Building
25. HEDCO Building
26. Mining Processing Laboratory
27. Mining Systems Research Laboratory
28. Building 60
29. Engineering and Mines Classroom Building
30. Dumke Building
31. Biomedical Polymers Research Building
32. Intermountain Network Scientific Computing Center

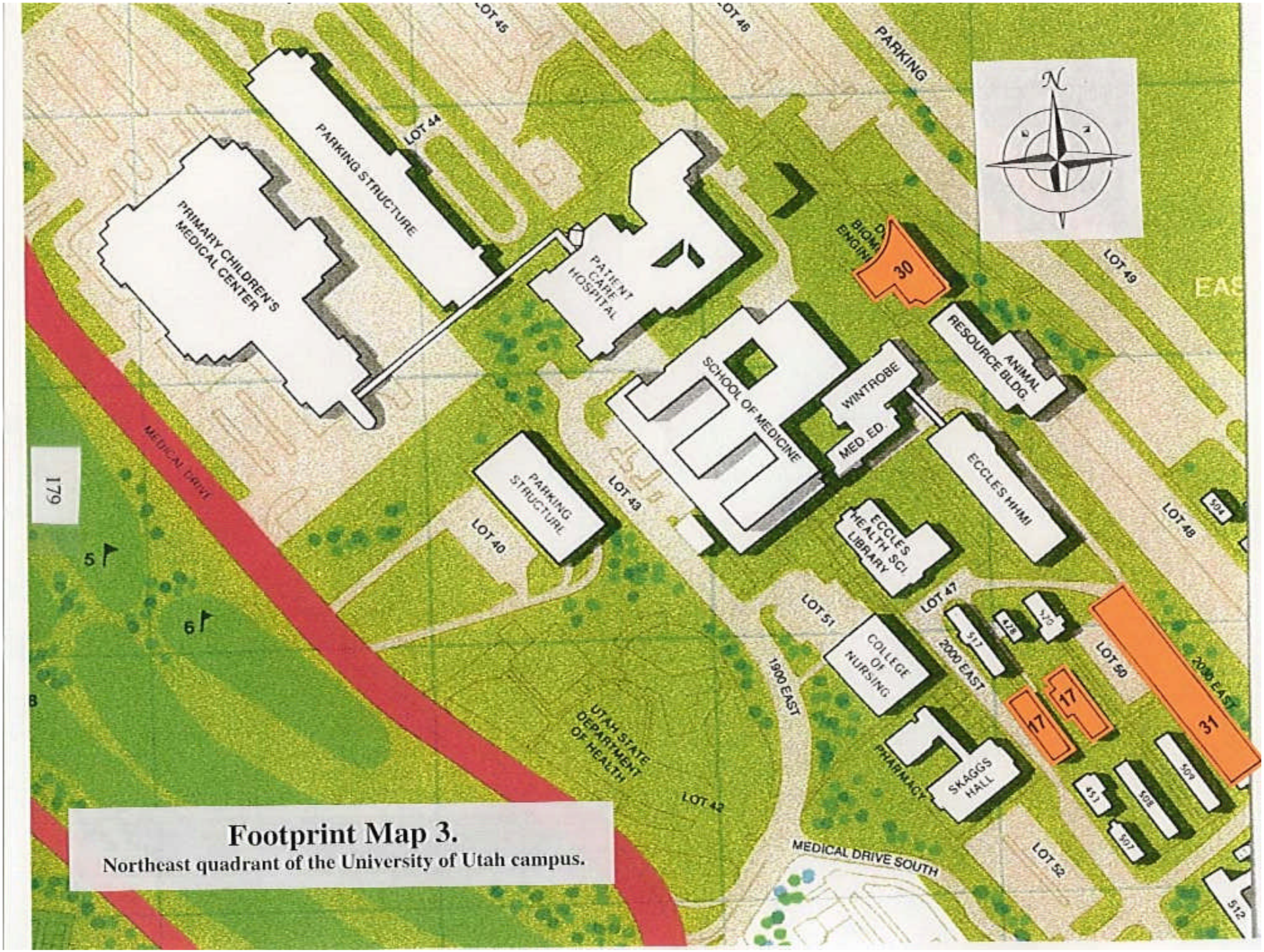


Footprint Map 1.
Northwest quadrant of the University of Utah campus.



Footprint Map2.

Southeast quadrant of the University of Utah campus.



Footprint Map 3.
Northeast quadrant of the University of Utah campus.