

A brief history of the Department of Biological and Agricultural Engineering at the University of California, Davis.

Prelude: 1862 – 1914

The Department of Biological and Agricultural Engineering at the University of California, Davis owes its origin to federal and state legislation that enabled the establishment of the University of California shortly after the end of the American Civil War and the development of a University Farm School four decades later to support a growing agricultural sector in California. The Agricultural Colleges Land Grant Act (Morrill Act) was passed by Congress in 1862 to provide equal access to higher education and employment in agriculture and industry. Introduced by Congressman Justin Morrill from Vermont, the act provided 30,000 acres of federal land for each senator and representative in a state's congressional delegation [1]. Proceeds from the sale of the land were to be "inviolably appropriated...to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts...in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." These grants funded the establishment of sixty-nine colleges across the U.S., including the University of California in 1868 with the first campus at Berkeley. In 1905, the California University Farm Bill authorized the UC Regents to purchase land for the establishment of a University Farm School to provide practical experience and training in agriculture [2]. Davisville, situated in the Great Central Valley and within the principal agricultural region of the state, was selected in 1906 as the site for the University Farm. The city was renamed Davis in 1907 and the University Farm School opened in 1909. Classes were developed in farm shop, forge, and drafting, and following a national trend, planning began for a more comprehensive program in engineering applied to agriculture. The first academic appointment in agricultural engineering at Davis was likely that in 1914 of Frank L. Peterson, Assistant Professor in Farm Mechanics, who taught courses in farm tractors and mechanics just prior to the establishment of a Division of Agricultural Engineering [3, 4]. 1914 also saw the enactment of the federal Smith-Lever Act that created Cooperative Extension services as partnerships between the land-grant colleges and the United States Department of Agriculture (USDA) [5].

The Division/Department of Agricultural Engineering in the College of Agriculture: 1915 – 1961

The Division of Agricultural Engineering at the University Farm in Davis was formally established in 1915. John Brownlee Davidson, one of 38 appointments to the Department of Agriculture made by the UC Regents during the 1914-1915 fiscal year, was recruited from Iowa State University and arrived as Professor of Agricultural Engineering to build a department at Davis comparable to what had recently been developed in Iowa as the first agricultural engineering program in the nation [6-7]. Davidson was appointed the founding head of the division. Davidson had also been instrumental in organizing the American Society of Agricultural Engineers (ASAE) in 1907 and served as the society's first president. Davidson laid the foundation of the division at Davis and saw it move into its new headquarters in the Agricultural Engineering Building in 1917 before returning to Iowa in 1919. Davidson had recruited Leonard J. Fletcher as an Instructor in Agricultural Engineering who took over as head to continue to build the division and its faculty. Fletcher was also instrumental in recruiting the first agricultural extension engineers, Edward J. Stirniman and then Jim Fairbank when Stirniman moved to the division. After Fletcher, Stirniman served a year as acting head and was succeeded by Harry B. Walker in 1928.

Walker remained as head through the Great Depression and World War II until resigning the position in favor of Roy Bainer in 1947. The division also occupied new quarters in 1928 in a building later (1959) named Harry B. Walker Hall in honor of his long and distinguished tenure at Davis. Bainer, who had been a student of Walker's at Kansas State University before Walker moved to Davis, had joined the division in 1929 shortly after Walker arrived.

During this period the division engaged in a wide range of research including work in air filtration for tractor engines, frost protection, heat and mass transfer in plant and animal environments, bio-meteorology and microclimatology, pest control, farm power, irrigation, farm structures, construction materials, waste management, sanitation, soil compaction, bulk handling and processing of fruits and vegetables, crop harvesting, and other agricultural innovations. University manuals and bulletins, such as the extensive work on adobe construction for farm and other structures by J. Dewey Long in 1929 [8] (revised by Loren W. Neubauer in 1946), ASAE papers and other publications and patents rapidly built the reputation of the faculty. The division undertook major projects in sugar beet mechanization during World War II to avoid the same sugar shortages that had plagued the country during World War I, and later in the development of mechanized tomato harvesting and rollover protection structures (ROPS) for tractors and other mobile equipment among many others. The rollover protection structure was designated a historical landmark by the ASAE in 1986. The tomato harvester was similarly honored in 2005 by the newly named American Society of Agricultural and Biological Engineers (ASABE).

Agricultural Engineering also handled the University farm plan service, developing detailed plans for farm labor housing, dairy buildings, beef, swine, and poultry facilities, fruit dryers, and others. The department administered the California Committee on the Relation of Electricity to Agriculture (CREA) when it was formed in 1924, a function the department continued (after 1975 as the Committee on the Relation of Energy to Agriculture) until 1996 when the electricity sector in California was restructured under legislative deregulation (Assembly Bill 1890) of the state's utilities. The division's work on atmospheric processes, meteorology and climatology would later lead to the establishment of a separate atmospheric science program.

Formal degree programs were organized by the division beginning in 1926. The first academic program in Agricultural Engineering was created as an option in Mechanical Engineering at UC Berkeley and consisted of three years at Berkeley followed by a six week intensive project-based summer course of instruction and the fourth year at Davis [7]. Second year students attended an orientation course taught by Walker and Bainer who commuted to Berkeley for this purpose until 1956 when the course was taught entirely at Davis. The division also taught students in a two year non-degree program.

Teaching was suspended during World War II when the U.S. Army Signal Corps took over the campus, and the intensive summer course was discontinued when the program resumed under a revised curriculum after the war. The College of Letters and Science was established at Davis in 1951 and began offering majors in mathematics, physics, and chemistry. With basic courses in these subjects now available at Davis, the division moved the first two years of the agricultural engineering curriculum from Berkeley to Davis, sent students to Berkeley or UC Los Angeles (or in some cases Stanford) for the third year, and then had the students return to finish the program at Davis during the fourth year. The division also had responsibility for teaching in vocational agriculture until these programs were sufficiently developed at the community colleges and at a number of California State University campuses.

A conspicuous lack of adequate texts to use in teaching the growing field of agricultural engineering led the Ferguson Foundation to finance an Agricultural Engineering Series of textbooks that were published by Wiley beginning in 1950. Faculty from Davis authored three of the seven texts including *Tractors and Their Power Units* in 1952, *Principles of Farm Machinery* in 1955, and *Agricultural Process Engineering* also in 1955 [9-11]. Soon to follow were other works from Davis such as those by Neubauer and Bainer on farm building design, Norman B. Akesson and Wesley E. Yates on the use of aircraft in agriculture, and John C. Harper on elements of food engineering [12-14].

The first Bachelor of Science degree in Agricultural Engineering at Davis was awarded to James R. Tavernetti in 1927, with Eugene G. McKibben earning the first Masters of Science degree in the same year. The first PhD was awarded in 1960 to David van Rest, working with Prof. Clarence Kelly, after the division had been restructured as a department within the College of Agriculture following the College's becoming independent of UC Berkeley in 1952.

UC Davis was designated an independent campus of the University of California system in 1959. That same year, UC President Clark Kerr formed a state-wide committee to consider the future of engineering education across the University. Kenneth Pitzer, Dean of Chemistry and Chemical Engineering at UC Berkeley and chair of the committee, felt that Davis was the logical campus at which to start a new engineering college because Davis already had an established engineering program. At Pitzer's request, Roy Bainer, who was the Davis representative to the committee, together with other members of the Davis faculty organized a proposal for a department of engineering at UC Davis. Following the proposal's adoption by the committee, Bainer wrote an amendment to the standing orders of the UC Regents to extend the College of Engineering at UC Berkeley to UC Davis. However, the Regents did not act on this amendment and instead approved in 1962 a separate College of Engineering to be established at UC Davis with Roy Bainer appointed the founding dean.

A Tale of Two Colleges—Development of the College of Engineering: 1962 – 1991

The College of Engineering was extended to include the Livermore Branch of the University of California Radiation Laboratory, then named the Lawrence Radiation Laboratory at Livermore and now the Lawrence Livermore National Laboratory. Bainer and the other faculty initially retained the single department structure for the College. The accompanying organization of the Department of Applied Science in 1963 with branches at Livermore and Davis was, however, considered beyond what the College operating as a single department could accommodate and that same year the College formed into separate departments. The Department of Agricultural Engineering now had two homes: the College of Agriculture which was renamed the College of Agricultural and Environmental Sciences in 1967, and the College of Engineering. The original faculty among the other four departments—Chemical, Civil, Electrical, and Mechanical Engineering—in the college were drawn from Agricultural Engineering and retained twenty percent time in department. Bainer recruited another sixty-five faculty to the engineering college between 1962 and his retirement in 1969. Planning for a new engineering building culminated in the occupancy of Roy Bainer Hall in 1967. The building was named in 1969 in honor of Bainer's service as the College's first dean.

The Agricultural Engineering major was administered by the department through the College of Engineering and was now taught entirely at UC Davis. The department continued teaching in the College of Agricultural and Environmental Sciences with programs in Agricultural Practices, Agricultural Engineering Technology, and Consumer Technology. Three years after its founding and with only a

complement of transfer students having graduated so far to demonstrate the success of the teaching programs, the College successfully applied for accreditation by the Engineering Council for Professional Development (ECPD), what is now the Accreditation Board for Engineering and Technology (ABET). Agricultural Engineering at Davis had earlier been accredited by ECPD and was reaccredited in 1965 with a new curriculum within the College of Engineering.

During this period the department expanded into a number of new areas of research while continuing significant developments in agricultural mechanization, farm power, farm structures, irrigation, and plant and animal environments. The earlier work on climatology and biometeorology led to the development in 1970 of the Division of Atmospheric Science within the department, and subsequently the formation in 1975 of the Atmospheric Science program that is now part of the UC Davis Department of Land, Air and Water Resources. Members of the Division of Atmospheric Science were instrumental in advising the newly formed California Air Resources Board in establishing some of the state's early air pollution standards. In 1984, R. Paul Singh together with Dennis Heldman published the first edition of what has become one of the standard texts in food engineering [15]. This text is now in its 5th edition and has been translated into six different languages. Significant effort also went into the development of digital records and online information. The computerized Agricultural Engineering Index developed by William J. Chancellor at Davis was first made available to ASAE members via the "floppy-disc-copying session" at the 1986 ASAE annual meeting. At that time it contained citations of all ASAE published articles and many papers since 1950 as well as citations from several long-standing international journals. By 2000 the database included a total of about 41,000 items available through internet download and was maintained until ASAE released that same year a full publications database to members.

Over this same time, national and global events and changes in social attitudes affecting energy supplies, resource management, and food production were also affecting agricultural engineering education. While in the U.S. the total number of people employed in the agricultural and food system remained nearly constant at close to 35 million from 1900 to 1990, a rapid decline occurred after World War II in employment in production agriculture so that by the year 2000 only about 5 million were working in this sector [16]. The first oil shock of 1973-74 highlighted vulnerabilities in the energy supply for agriculture and other industries and raised large concerns with continued heavy reliance on petroleum, particularly imported oil. Social influences emerging after 1960 were adding new emphasis on policies to improve environmental protection and resource use and management. In 1979, the University of California was sued by California Rural Legal Assistance on behalf of farmworkers, accusing the University of unlawfully spending public funds on mechanization research that displaced farmworkers and small family farmers [17, 18]. Although the suit lost on appeal, it reflected an uncertainty at that time over the net social benefits accruing from public research into agricultural mechanization. Nationally, student enrollments in agricultural engineering programs that had grown rapidly between 1940 and 1960 began to decline after 1980. While throughout this period the department was initiating new programs in food engineering, forest engineering, aquacultural engineering, bioenergy conversion, bioinstrumentation and control, biotechnology, automation, farm safety and related areas, and also expanding professional involvement in organizations such as the Institute of Biological Engineering (IBE) and the Institute of Food Technologists (IFT), student enrollments, especially at the undergraduate level, did not reflect the growing emphasis in biological engineering. The increase in the breadth of the program and a desire to enhance the education and

professional training of students in these areas stimulated a fundamental reassessment of the department's scope and mission that led to a renaming of the department in 1992 and a restructuring of its curricula.

The Department of Biological and Agricultural Engineering: 1992 – present

The expanding effort in other areas of biological engineering led to a proposal by the department that was approved in 1992 to change its name to the Department of Biological and Agricultural Engineering. The department was not alone in this transition—virtually all departments of agricultural engineering nationwide underwent similar adjustments to their identities although not all adopted the same name. The trend was also reflected in changes to ABET accreditation standards. In the same year the department implemented new engineering curricula in Biological Systems Engineering through the College of Engineering at both the undergraduate and graduate levels to replace the Agricultural Engineering major, and realized an immediate response through an increase in the number and diversity of student applications and enrollments. Subsequent faculty and staff recruitments similarly reflected the increasing diversity of the department's programs. In 1993 the department consolidated its Agricultural Practices, Agricultural Engineering Technology, and Consumer Technology courses into the Applied Biological Systems Technology curriculum offered through the College of Agricultural and Environmental Sciences, and added a minor by the same name and other minors in Geographic Information Systems and Precision Agriculture. Due to the long history of work on energy, in 2012 the department helped organize and took responsibility for administering minor programs in the College of Engineering in Energy Science and Technology, Energy Efficiency, and Energy Policy. To aid in planning and operations, the department established a Board of Advisors comprised of representatives from a range of industry and government organizations who provide primary consultation and guidance on curricula, internships, and other professional aspects of student training to ensure career success. The department programs are now structured along three primary lines of excellence in biotechnology engineering, agricultural and natural resources engineering, and food engineering.

From the beginning, the department maintained and continues to maintain extensive fabrication facilities in support of its research and education programs. The department also developed and administers several special facilities providing critical support within the areas of excellence. Led by then department chair David J. Hills, in 2001 the department completed the Joe A. Heidrick, Sr. Western Center for Agricultural Equipment. Dedicated in 2005, the center was built through donations from the Heidrick family and others and was named in honor of the longtime Yolo County farmer and agricultural equipment innovator. The center supports research, education, outreach and industry training in machine systems, automation and robotics, and farm safety and ergonomics. Courses in Applied Biological Systems Technology are also taught at the center and on the adjacent lands to provide practice in agricultural equipment operations and maintenance, continuing a hundred year tradition in practical student training and education. The department also administers the Fish Conservation and Culture Laboratory at Byron, California. This laboratory now maintains the refuge population of the endangered Delta smelt, a species that has played a significant role in state water policy.

As the department looks back over a century of accomplishment, we also look forward to continuing to train the coming generations of biological and agricultural engineers and to discovering and developing innovative solutions to the critical needs and challenges that are now before us and those that are sure to emerge over the coming century.

References and Further Reading

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Chairs of the Department:

Service Dates

1.	1915-1919	John B. Davidson
2.	1919-1927	Leonard J. Fletcher
3.	1927-1928	Edward J. Stirniman (acting)
4.	1928-1947	Harry B. Walker
5.	1947-1961	Roy Bainer
6.	1961-1963	Clarence F. Kelly
7.	1963-1968	Coby Lorenzen
8.	1968-1973	John R. Goss
9.	1973-1976	Robert B. Fridley
10.	1977-1986	Roger E. Garrett
11.	1986-1991	Henry E. Studer
12.	1991-2001	David J. Hills
13.	2001-2006	Bruce R. Hartsough
14.	2006-2010	Michael J. Delwiche
15.	2010-2014	Raul H. Piedrahita
16.	2014-	Bryan M. Jenkins

Department Members Elected President of the ASAE/ASABE

Service Dates

1.	1908	John B. Davidson*
2.	1931-1932	Leonard J. Fletcher
3.	1942-1943	Harry B. Walker
4.	1945-1946	J. Dewey Long
5.	1956-1957	Roy Bainer
6.	1958-1959	Eugene G. McKibben*
7.	1962-1963	Arthur W. Farrall*
8.	1966-1967	Orval C. French*
9.	1972-1973	Clarence F. Kelly
10.	1997-1998	Robert B. Fridley

** not at UC Davis at the time of election.*

Department Members Elected to the National Academy of Engineering

Election Date

1.	1965	Roy Bainer
2.	1968	Clarence F. Kelly
3.	1985	Robert B. Fridley
4.	2005	William J. Chancellor
5.	2008	R. Paul Singh

Major ASAE/ASABE Awards to Departmentally Affiliated Recipients

Date	Awardee
<i>Cyrus Hall McCormick-Jerome Increase Case Gold Medal</i>	
1933	John B. Davidson
1944	Leonard J. Fletcher
1948	Roy Bainer
1949	Eugene G. McKibben
1960	Fred A. Brooks
1963	Clarence F. Kelly
1975	Orval C. French
1981	Coby Lorenzen, Jr.
2015	D. Ken Giles
<i>John Deere Gold Medal</i>	
1939	Harry B. Walker
2004	William J. Chancellor
2013	Shrinivasa K. Upadhyaya
<i>Massey-Ferguson Educational Gold Medal</i>	
1977	S. Milton Henderson
1988	Michael O'Brien
2013	R. Paul Singh
<i>Henry Giese Structures and Environment Award</i>	
1959	Theodore E. Bond
1984	Loren W. Neubauer
1994	Louis D. Albright
<i>ADS/Hancor Soil and Water Engineering Award</i>	
1969	James N. Luthin
2013	Wesley W. Wallender
<i>G.B. Gunlogson Countryside Engineering Award</i>	
1985	James A. Moore
<i>Kishida International Award</i>	
1984	William J. Chancellor
2007	R. Paul Singh
<i>A.W. Farrall Young Educator Award</i>	
1986	R. Paul Singh
2005	Jean S. VanderGheynst
<i>New Holland Young Researcher Award</i>	
1972	Robert B. Fridley
1990	David E. Brune
2003	Ruihong Zhang
<i>Rain Bird Engineering Concept of the Year Award</i>	
1976	Robert B. Fridley
1982	Awatif E. Hassan
1999	Graeme W. Henderson and D. Ken Giles
<i>Award for the Advancement of Surface Irrigation</i>	
2001	Theodor S. Strelkoff
<i>International Food Engineering Award</i>	
1972	Arthur W. Farrall
1997	R. Paul Singh

Major IFT Awards to Departmentally Affiliated Recipients

Date	Awardee
<i>Nicholas Appert Award in food technology</i>	
2010	R. Paul Singh
<i>Bor S. Luh International Award</i>	
1988	R. Paul Singh
<i>Samuel Cate Prescott Award for research</i>	
1982	R. Paul Singh
1991	Michael J. McCarthy
1996	Kathryn L. McCarthy
2013	Nitin Nitin

Historical Timeline for the Department of Biological and Agricultural Engineering at the University of California, Davis

1862	Agricultural Colleges Land Grant Act (Morrill Act) provides land grants to the states for establishing institutions of higher education.
1868	University of California established with first campus at Berkeley.
1905	California University Farm Bill authorizes UC Regents to purchase land for the establishment of a University Farm School.
1906	Davisville selected as site for the University Farm.
1907	University Farm dedicated. Davisville renamed Davis. American Society of Agricultural Engineers (ASAE) founded.
1909	University Farm School opens at Davis.
1914	Federal Smith-Lever Act creates Cooperative Extension services as partnerships between the land-grant colleges and the United States Department of Agriculture (USDA).
1915	Division of Agricultural Engineering established at Davis. J. B. Davidson recruited to organize and staff the Division and appointed founding head of the Division. J. Koeber, R.C. Ingram and H.L. Belton instruct courses in two-year program for non-degree students.
1916	Construction started on first Agricultural Engineering building at Davis. Five acres also dedicated for farm machinery instruction.
1917	Division of Agricultural Engineering occupies newly completed Agricultural Engineering Building.
1921	E. J. Stirniman appointed first agricultural extension engineer at Davis. A.J. Hoffman initiates research on air cleaners for tractor engines and develops what becomes standard engine air filtration for mobile and stationary engines.
1922	University Farm becomes the Northern Branch of the College of Agriculture. Division starts service courses for four-year agriculture students.
1924	Formation of the California Committee on the Relation of Electricity to Agriculture (CREA). CREA administered through Agricultural Engineering (L.J. Fletcher founding chair, B.D. Moses founding secretary).
1926	Agricultural Engineering organized as an option within Mechanical Engineering at UC Berkeley. First three years of degree program at UC Berkeley with final year at Davis.
1927	J.R. Tavernetti awarded first Bachelor of Science degree in Agricultural Engineering. First Masters of Science degree awarded to E.G. McKibben.
1928	Agricultural Engineering moves to the newly constructed Walker Hall (named 1959). First Farm Machinery Conference and first Farm Building Conference held.
1929	First Rural Electrification Conference (later Rural Energy Conference).
1937	A. Leonard develops return stack orchard heater for frost protection, significantly reducing air pollution and improving efficiency.
1938	Northern Branch of the College of Agriculture renamed the College of Agriculture at Davis.
1951	College of Letters and Science established, provides instruction in math, physics and chemistry for Agricultural Engineering students. First two years of Agricultural Engineering instruction offered at Davis, third year remains at UC Berkeley or UC Los Angeles with fourth year at Davis.
1952	College of Agriculture becomes independent from UC Berkeley. Second textbook in

	Ferguson Agricultural Engineering series published by E.L. Barger, W.M. Carleton, E.G. McKibben and R. Bainer on <i>Tractors and Their Power Units</i> (1 st Edition, John Wiley & Sons, New York).
1955	Third and fifth texts in the Ferguson Agricultural Engineering series published by Wiley: <i>Principles of Farm Machinery</i> by R. Bainer, R.A. Kepner and E.L. Barger and <i>Agricultural Process Engineering</i> by S.M. Henderson and R.L. Perry.
1956	L. H. Lamouria, R. R. Parks, and C. Lorenzen design the first rollover protection structure (ROPS) for tractors. ROPS later adopted for other vehicles.
1959	UC Davis designated an independent campus of the University of California. Agricultural Engineering becomes a department within the UC Davis College of Agriculture. Prototype UC Davis mechanical tomato harvester successfully tested at Clarksburg, California. N.B. Akesson and W.E. Yates first to quantify pesticide spray drift and develop predictive drift models.
1960	D. van Rest awarded first PhD in Agricultural Engineering at UC Davis. C. Lorenzen, I.J. Szluka (Steven Sluka) and F.L. Hill file for a patent on the tomato harvester (Patent No. 3199604, 1965). Two-year non-degree program of instruction terminated. A. Leonard outlines reentry prediction technique for use on Satellite 1958 $\delta 2$, successfully applied by Moonwatch program on Sputnik IV reentry.
1961	Graduate Division established at UC Davis. L.W. Neubauer and H.B. Walker publish <i>Farm Building Design</i> (Prentice-Hall, Englewood Cliffs, New Jersey).
1962	College of Engineering established at UC Davis. R. Bainer, head of Agricultural Engineering, appointed founding dean of the college and recruits initial college faculty. Agricultural Engineering becomes a department within the College of Engineering in addition to the College of Agriculture.
1963	C.F. Kelly becomes Assistant Director of the Agricultural Experiment Station and transfers to Berkeley (appointed Director in 1965).
1967	Quarter system replaces semesters at the University of California. College of Agriculture renamed College of Agricultural and Environmental Sciences. Agricultural Engineering moves from Walker Hall to its current location in the newly constructed Bainer Hall (named in 1969).
1970	Division of Atmospheric Science formed as part of the department.
1974	V. Cervinka, W. J. Chancellor, et al., publish landmark study of energy use in agriculture (Cervinka, V., W.J. Chancellor, R.J. Coffelt, R.G. Curley and J.B. Dobie. 1974. Energy requirements for agriculture in California. California Department of Food and Agriculture, Sacramento, California). B.C. Horsfield and J.R. Goss initiate research into biomass thermochemical gasification. D.J. Hills initiates research into anaerobic digestion of agricultural wastes and residues. W.J. Chancellor investigates biodiesel and other alternative engine fuels. N.B. Akesson and W.E. Yates publish <i>The Use of Aircraft in Agriculture</i> (UN FAO Book 94).
1975	CREA renamed the California Committee on the Relation of Energy to Agriculture in recognition of global events affecting overall energy supply for agriculture and other sectors. Administration of CREA continues through Agricultural Engineering at UC Davis. Department of Land, Air and Water Resources formed at UC Davis with transfer of Division of Atmospheric Science faculty and creation of joint appointments in both departments.
1976	J.C. Harper publishes <i>Elements of Food Engineering</i> (AVI, Westport, Connecticut).
1981	R.P. Singh and D. Brown awarded U.S. Patent US 4,285,099A for a squid processing machine that is later licensed and commercialized.

1984	R.P. Singh and D.R. Heldman publish first edition of <i>Introduction to Food Engineering</i> (Academic Press, Elsevier, London; now in 5 th Edition and six languages).
1986	UC Davis rollover protection structure (ROPS) designated a historical landmark by ASAE.
1988	D.K. Giles develops first pulse-width modulated spray control system for agricultural applications. Later refined in 1997 to provide dynamic droplet size control.
1992	Department of Agricultural Engineering becomes the Department of Biological and Agricultural Engineering with new undergraduate and graduate degrees in Biological Systems Engineering (EBS).
1993	Applied Biological Systems Technology (ABT) program established by the department through consolidation of Agricultural Practices, Agricultural Engineering Technology and Consumer Technology curricula with addition of new courses of instruction. Undergraduate minors created in Applied Biological Systems Technology, Geographic Information Systems, and Precision Agriculture.
1995	First volume of <i>Advances in Soil Dynamics</i> published by ASAE (S.K. Upadhyaya, W.J. Chancellor, et al., editors). D.K. Giles develops first global positioning system (GPS) controlled spray drift reduction system.
1996	CREA suspended following legislative deregulation of the electricity sector in California under Assembly Bill 1890.
1999	R.P. Singh and F. Courtois implement one of the first remotely-operated laboratory teaching experiments in food engineering engaging students from multiple countries in operating equipment in Bainer Hall at UC Davis.
2001	Western Center for Agricultural Equipment completed at UC Davis culminating a decade-long donor campaign led by department chair D.J. Hills.
2002	Vol. II of <i>Advances in Soil Mechanics</i> published by ASAE (S.K. Upadhyaya, W.J. Chancellor, et al., editors). R. Zhang and Z. Zhang obtain U.S. Patent No. 6,342,378 for an anaerobic phased-solids biogasification system for agricultural residues, food wastes and other organic materials with subsequent commercial development.
2003	California Biomass Collaborative established with support of the California Energy Commission (B.M. Jenkins founding director).
2005	ASAE renamed the American Society of Agricultural and Biological Engineers (ASABE). UC Davis tomato harvester designated a historical landmark by ASABE. Joe A. Heidrick Western Center for Agricultural Equipment dedicated at UC Davis.
2006	Prototype fruit and vegetable processor developed for NASA by R.P. Singh, D. Voit and M. Santos as part of planning for manned missions to Mars.
2009	Vol. III of <i>Advances in Soil Mechanics</i> published by ASABE (S.K. Upadhyaya, W.J. Chancellor, et al., editors). Hills Drive leading to the Western Center for Agricultural Equipment designated an official street of the UC Davis campus in honor of former chair D.J. Hills.
2012	D.C. Slaughter develops first GPS controlled weeding system. Department administration partially clustered with Departments of Food Science and Technology, Textiles and Clothing, and Viticulture and Enology (BFTV Cluster). Department administers new engineering minors in Energy Science and Technology, Energy Efficiency, and Energy Policy.
2013	D.K. Giles conducts first chemical applications in the U.S. using an unmanned aerial vehicle (UAV).
2015	J. VanderGheynst from Biological and Agricultural Engineering appointed interim dean of the College of Engineering. Department celebrates 100 th anniversary.

