EDUCATIONAL FACILITIES

Kroon Hall, the ultra-green home of F&ES, expresses in physical form the School’s best traditions, values, and aspirations. The building, which opened in January 2009, achieves its remarkable energy savings from a host of design elements and technical strategies molded to fit the weather and climate of its New England location. Situated in the area of the University known as Science Hill, Kroon Hall is named for the family of benefactor and Yale College alumnus Richard Kroon, B.A. 1964. With its high barrel-vaulted gable ends, simple lines, and curved rooftop, Kroon Hall is a modernist blend of cathedral nave and Connecticut barn.

Kroon Hall provides office space for fifty faculty and staff members and has three classrooms. The 175-seat Burke Auditorium is used for lectures and classes, and commands beautiful views of West Rock and the David S. Ingalls Rink across the street. The Knobloch Environment Center is meant for socializing, but students have also embraced it as a study space. The Ordway Learning Center on the ground floor also has ample space for quiet study. The $43.5 million building was designed by Hopkins Architects of Great Britain in partnership with Connecticut-based Centerbrook Architects and Planners and holds the highest rating—platinum—in the green-building certification program, Leadership in Energy and Environmental Design (LEED). Kroon Hall provides 56,467 square feet and is designed to use 67 percent less energy than a typical building of its size. Its tall, thin shape and east-west orientation play a big role in heating and cooling. The lowest floor is set into a hillside, with only its south side exposed, providing thermal insulation, minimizing northern exposure, and increasing the amount of natural light that enters the building from adjacent courtyards. The long south facade maximizes solar gain during the winter, and Douglas fir louvers covering glass facades on the east and west ends keep out unwanted heat and glare. The building’s shape, combined with the glass facades, enables daylight to provide much of the interior’s illumination. Light and occupancy sensors dim artificial lighting when it is not needed.

A 100-kilowatt rooftop array of photovoltaic panels provides 25 percent of the building’s electricity. Four 1,500-foot-deep wells use the relatively constant 55-degree (F) temperature of underground water for heating and cooling, replacing the need for conventional boilers and air conditioning. Four solar panels embedded in the southern facade provide hot water. Exposed concrete walls and ceilings provide thermal stability by retaining heat in winter and cold in summer. Instead of air being forced through overhead ducts, an energy-saving displacement ventilation system moves warm and cool air through an air plenum and multiple diffusers in elevated floors. Low-velocity fans in the basement keep the air circulating throughout the building. In winter, the ventilation system also transfers the heat from exhaust to incoming fresh air, and in summer, air handling units spray water on incoming fresh air, reducing its temperature by up to 18° through evaporation.

In mild weather, Kroon’s occupants assist in the energy savings by opening windows in response to an electronic, color-coded prompt system. A pair of green and amber lights in each hallway indicate whether it’s a “Green Day”: i.e., when the green indicator light is on, the ventilation and cooling/heating systems shut down, and the windows should be opened for natural ventilation.

A rainwater-harvesting system channels water from the roof and grounds to a garden in the south courtyard, where aquatic plants filter out sediment and contaminants. The gray water, held in underground storage tanks, is used for irrigation and pumped back into Kroon for flushing toilets. The system is designed to save 300,000 gallons of potable city water annually and to reduce the burden on city sewers by lessening the amount of storm runoff. Half of Kroon Hall’s red oak paneling—15,000 board feet—came from the 7,840-acre Yale Myers Forest in northern Connecticut, which is managed by the School. The building’s pale yellow exterior, composed of sandstone from Ohio, echoes other Yale buildings. The north and south courtyards were constructed to create a community among disparate buildings on Science Hill. The south courtyard, landscaped by Olin Studio of Philadelphia, is a raised platform, with a green roof of soil one-foot deep and surrounded by twenty-five varieties of native plantings. Underneath the courtyard is a service node, centralizing all trash and recycling pickups as well as deliveries for the southwest corner of Science Hill and accessible by a single driveway off Sachem Street.

Sage Hall, a four-story building located at 205 Prospect Street and a gift of William H. Sage, B.A. 1865, in memory of his son, DeWitt Linn Sage, B.A. 1897, was completed in 1923. Administrative, development, alumni, and program offices of the School are housed in Sage Hall, along with four classrooms. Sage Hall is home to a computer cluster with twenty-four computers for student use. Sage also houses a 490-square-foot student lounge, appointed with a large table and comfortable couches, which students use for studying, special events, and weekly social events. Bowers Auditorium is designed to handle large lectures and seminars as well as small group projects. Bowers, which has a seating capacity of one hundred with tables and chairs, was built onto Sage Hall in 1931 with funds provided by the bequest of Edward A. Bowers, B.A. 1879. In 2011 the original Bowers floor was replaced using beautiful red oak flooring harvested from Yale Myers Forest, and in 2016 energy-efficient LED lights were installed.

Facilities for research and instruction in silviculture, natural resource and forest economics, forest policy, and biometry are in Marsh Hall at 360 Prospect Street in the Marsh Botanical Garden. A classroom, meeting space, kitchen, and accessible bathroom are available on the first floor. This large, four-story mansion was originally the residence of Professor Othniel C. Marsh, B.A. 1860, a distinguished paleontologist and Western explorer of the nineteenth century. He bequeathed the building to the University in 1899, and for twenty-five years it housed the entire Forest School. Marsh Hall was designated a National Historic Landmark by the United States Department of the Interior in 1965.

The William B. Greeley Memorial Laboratory at 370 Prospect Street, named in honor of William Buckhout Greeley, M.F. 1904, houses a recently renovated social space in the main lobby; laboratories for research into the ecology and management of landscapes and ecosystems, urban sustainability, the biology of trees, and environmental chemistry; and doctoral program spaces. The wood shop is
available for students—after receiving tool and safety training—to work on projects that require the use of power tools. The building was designed by renowned architect Paul Rudolph and is a classic example of "Brutalist" architecture. Adjacent to the Greeley lab is a 3,800-square-foot greenhouse, which is used for hands-on learning and research. Greeley Laboratory and its greenhouse were built in 1959 with funds from the forest industries, the John A. Hartford Foundation, and other benefactors.

The Class of 1954 Environmental Science Center at 21 Sachem Street is dedicated to the Class of 1954 in honor of the $70 million the class donated in 2000 to support new science buildings and other major University priorities. It is an interdisciplinary facility built by the University with the aim of further fostering leadership in teaching and research of science and engineering. The building was designed to encourage collaboration among faculty and students pursuing environmental studies. Four natural science faculty members from F&ES have their laboratories in the Environmental Science Center, which also houses research laboratories for the Yale Science Departments of Ecology and Evolutionary Biology, Geology and Geophysics, and Anthropology as well as the Yale Institute for Biospheric Studies.

The restored former residences at 301 Prospect Street and 380 Edwards Street house the offices of many of the School's programs, as well as doctoral student offices; each building has a classroom.

LIBRARY COLLECTION

The Center for Science and Social Science Information (CSSSI), located in Kline Biology Tower, provides resources and support for students, faculty, and researchers in F&ES (http://csssi.yale.edu). The CSSSI provides a variety of individual and group study spaces; collections in the sciences, social sciences, and interdisciplinary fields; assistance with research data, statistical analysis, and geospatial analysis; and workshops, events, and lectures.

The Henry S. Graves Memorial Library Collection for the School of Forestry & Environmental Studies, one of the oldest and largest collections of forestry publications in the United States, is located in the CSSSI, with older materials available for request from the Library Shelving Facility. The collection is named in honor of the School's first dean, Henry S. Graves, who purchased the initial collection of German forestry books and continued to support a strong library serving the School's graduate forestry program. Current holdings in the Graves Collection consist of more than 100,000 books, documents, technical reports, and serial publications dealing with forestry, forest science, natural resource management, and environmental sciences and management. The collection receives many print monographic, periodical, and other serial titles, in addition to providing access to electronic titles. Students and faculty may contact the librarian for environmental studies to request the purchase of books, journals, and datasets needed for the School's teaching and research activities. All materials are accessible through the Yale Library electronic catalog, ORBIS.

In addition to the resources at the CSSSI and within the Graves Collection, F&ES affiliates have access to the enormous holdings and extensive services of the Yale University Library, which comprises fifteen million print and electronic volumes in more than a dozen different libraries and locations. Yale is a participant in interlibrary loan services and in the Borrow Direct group, which consists of the libraries of other Ivy League and peer institutions who provide rapid delivery service for requested books. Access to electronic databases covering the wide range of subjects of interest within the School (e.g., ProQuest Environmental Science Collection, CAB Abstracts, BIOSIS, and Web of Science) is provided through the library's website at http://web.library.yale.edu. These research tools and others, on such subjects as international affairs, water, soils, fish, wildlife, policy affairs, and law, are accessible throughout the campus, as well as off-campus through the VPN (https://web.library.yale.edu/help/off-campus-access-vpn).

Reference, research support, and information services are provided by the librarian for environmental studies and other subject-specialist librarians from the CSSSI and the Yale University Library. As the liaison to F&ES, the librarian for environmental studies maintains a permanent office in the CSSSI and offers consultation hours in Sage and Kroon Halls. F&ES students are welcome to attend workshops and events at the CSSSI and in all of Yale's libraries.

COMPUTER RESOURCES

The mission of the F&ES Information Technology Department (FES-IT) is to support all aspects of computing for every member of the Yale School of Forestry & Environmental Studies community. We use and support multiple platforms, including Windows and Macintosh operating systems. Students are strongly encouraged, but not required, to bring their own computers. Admitted students may contact the FES-IT Helpdesk by e-mailing feshelpdesk@yale.edu for advice on the selection of appropriate hardware and software. We strongly encourage the purchase of Apple Macintosh or Lenovo ThinkPad T, W, and X series laptop computers. A robust campus network provides wireless access within all F&ES buildings and throughout the Yale campus.

FES-IT, along with trained student technicians from Yale's Student Technology Collaborative, provides drop-in technical support for students to assist with any academic or research computer needs they may have while on campus. After-hours student support is also available at Bass Library, within easy walking distance of the School. FES-IT provides secure, centralized backup services for all F&ES faculty, staff, and students, as well as an FES-provisioned Dropbox account.

FES-IT maintains a computing cluster in Sage Hall, Room 39, with twenty-four computers that feature a mixture of 21.5-inch and 27-inch displays, 2.7 GHz Intel i5 and 3.2 GHz quad-core processors, and at least 8 GB of RAM that were replaced in January 2015. The FES Cluster iMacs also dual-boot into both MacOS 10.10 and Windows 10x64 for maximum flexibility. Three 27-inch high-definition monitors are provided for students who would like to utilize their own laptops.
The computing cluster houses multifunction copy/scan/fax/print devices. Additional wireless student printing is available in each F&ES building and throughout the Yale campus via the Blueprint Printing System. Three-dimensional and wide-formatting printing is also available at the Yale Center for Engineering Innovation & Design (CEID) and the Yale School of Architecture.

FES-IT maintains an inventory of equipment that students may borrow for short periods of time through an online equipment checkout system (http://environment.yale.edu/myfes/computing/equipment). Equipment may be borrowed at no charge (late and replacement fees apply if equipment is returned late, lost, or damaged). Included are iPads, GPS units, digital cameras, walkie-talkies, compact audio recorders, and other equipment.

The Yale University Library is also very active in the integration of information resources in digital format. Students and faculty have online access to an extensive variety of journals and databases as well as innovative research resources such as the Digital Humanities Lab (http://dhlab.yale.edu).

The Center for Science and Social Science Information (http://csssi.yale.edu) offers an array of digital media technologies and operates several important digital resources, including the Statistical Classroom (“StatLab”), featuring thirty machines with dual monitors, and a variety of software and databases, such as a Bloomberg Terminal. The CSSSI is also home to a full-time GIS librarian who assists students in obtaining and working with GIS datasets to support their work in any part of the globe, and to a data librarian who is available for questions or consultation about finding, using, and managing research data in the sciences and social sciences.

Faculty members have also developed many special computer applications for their projects, and some of these are available for student use in the Sage Hall computing cluster.

**Yale School Forests and the Quiet Corner Initiative**

The Yale School of Forestry & Environmental Studies owns 10,852 acres of forestland in Connecticut, New Hampshire, and Vermont that are managed by the Yale School Forests Program. The program manages seven discrete forests that were donated to the School between 1913 and 1986 that range in size and geography from the 75-acre Crowell Ravine in Vermont to the 7,860-acre Yale Myers Forest in Connecticut. The composition of the Yale Forests reflects a latitudinal gradient ranging from a central hardwood cover type in Connecticut to a northern hardwood cover type in New Hampshire and Vermont. Extensive stands of pine and hemlock exist in both regions. The area encompassed by the forests includes almost all of the topographical and soil conditions, site classifications, and cover types found in New England.

The management of the Yale School Forests comprises four goals: (1) provide opportunities for research; (2) provide educational and professional opportunities for the faculty and students; (3) create an asset to the School’s investment portfolio that demonstrates financial sustainability; and (4) maintain the forests’ ecological resiliency through increasing their structural and compositional diversity. Faculty and students use the Yale Forests as a laboratory for teaching, management, demonstration, and research. A member of the faculty serves as director and a recent F&ES graduate serves as the manager and School Forest Fellow. Graduate professional students working as apprentices or coordinators carry out the bulk of the on-the-ground management and administration. The forests are maintained as working forests, and thus the tasks include selling timber and nontimber forest products from the land. The Yale Myers Forest is the largest and most heavily utilized parcel managed by the Yale School Forests Program and is certified by the Forest Stewardship Council.

Students working on the Yale Forests receive training that covers aspects of hydrology and soils, taxonomy, forest and community ecology, silviculture, forest operations, forest finance and policy, and sociology in order to prepare them for careers as foresters and land managers. Every summer ten to twelve students are chosen for the apprentice forester program at the Yale Forests, which includes hands-on training in maintenance of infrastructure, property boundary research and delineation, geographic information systems (GIS), mapping and classification, sampling and inventory, and the design and implementation of silvicultural prescriptions. Several students from the apprentice program are selected to work for the School Forests Program the following academic year, where they receive additional training in forest administration and management.

Research performed at the Yale Forests is conducted under the supervision of any faculty member of the School and encompasses forest ecology, silviculture, aquatic and wildlife community ecology, hydrology, and economic, legal, and social studies. The forest is used for both doctoral and master’s student research, the latter performed either as an independent project or in conjunction with student involvement with existing forest management.

The Yale Forests are used for both academic field trips and workshops held for professional or community organizations. Field trip and workshop topics include forest certification, wildlife habitat manipulation, ecosystem restoration, prescribed fire management, timber harvesting operations, silvicultural research, and pathways of forest stand development. Lastly, the Quiet Corner Initiative (QCI) has been developed as a method of engaging with the surrounding working landscape around Yale Myers Forest. QCI works by developing programs that connect master’s-level courses and University research to real environmental assessment and management challenges on private lands surrounding the forest. Current programs focus on forest and open space conservation and management; watersheds and rivers; renewable energy; and sustainable agriculture. In designing each QCI program, the initiative seeks to advance three separate but related sets of goals: (1) to enrich the applied curriculum for professional students at the School of Forestry & Environmental Studies, providing reliable and consistent opportunities to bring learned skills to tangible problems that are in easy reach of the classroom; (2) to provide and cultivate a high-quality natural and social science research environment for students and faculty to investigate and analyze...
the drivers of environmental change and adaptive management at a landscape scale; and (3) to leverage the traditional strengths of Yale University in research, education, and leadership in working toward landscape-scale sustainability goals in our own backyard.

In addition to the forestland owned and managed by the School, close working relationships exist with other forests that are also used for education and research by faculty and students: the 6,800-acre Great Mountain Forest in northwestern Connecticut is available to the School through the courtesy of Edward C. Childs, B.A. ’28, M.F. ’32, and his family; and the 20,000-acre forestland owned and managed by the South Central Connecticut Regional Water Authority in New Haven County is one of the oldest managed forests in the western hemisphere. The University also owns approximately 370 acres of ecological preserves that are available to faculty and students.