

## Women's colleges provide new paths to the engineering profession

The latest statistics concerning female engineering graduates don't give the profession much cause for celebration.

The American Society for Engineering Education recently reported that only 19 percent of engineering graduates receiving a bachelor's degree in 2006 were women. This comes despite efforts to encourage more women to study engineering, according to ASEE, which says that women engineering students are also more likely to leave engineering programs after enrolling.

To address this trend, several women's colleges throughout the United States have introduced degree programs in engineering.

Smith College in Northampton, Massachusetts, the nation's largest liberal arts college for women, began the first engineering program at a U.S. women's college in 1999. Students in its Picker Engineering Program can earn a B.S. in engineering science. The program has attracted support from some big names, including Boeing, Cisco Systems, and Ford, which recently gave \$10 million to help build state-of-the-art facilities there.

Converse College in Spartanburg, South Carolina, is one of a growing number of women's colleges to offer a dual-degree engineering program. Students in the five-year program complete 90 credit hours of liberal arts and general education requirements at Converse and then relocate to Clemson University—an hour away—to complete the nearly 60 additional credits for an engineering degree. Graduates earn bachelor's degrees from both schools—the Clemson degree in one of the school's nine engineering disciplines.

At Sweet Briar College near Lynchburg, Virginia, students can complete a B.S. in

engineering science, a B.A. in engineering management, or a five-year, dual-degree program with one of four partner institutions, including the University of Virginia and Virginia Tech. Sweet Briar has focused its recruiting efforts on its engineering science degree, currently the program's most popular.

While each has its own distinct program, these colleges have pinpointed common areas they feel meet the needs of female engineering students in ways that traditional co-ed programs do not.



Sweet Briar College engineering students put their design skills to the test racing their creations in the Cardboard Boat Regatta. Part of Sweet Briar's Introduction to Engineering Design class, the project incorporates hands-on learning and teamwork.

### A sense of community

All three schools point to their sense of community as a source of support that many women say they find lacking at co-ed institutions.

"Traditionally, large co-ed programs are very competitive, and women often don't feel welcome or included and therefore don't think that the profession will be welcoming and inclusive," said Betty Shanahan, the executive director of the Society of Women Engineers.

At Smith College, students "feel that they belong. They see people who look like them," said Linda Jones, Ph.D., director of the Picker Engineering Program.

(continued on page 12)

# Texas Board reaches out to the next generation of engineers

The Texas Board Chairman, Govind Nadkarni, P.E., challenged us last year to focus more resources on engineering outreach in Texas.

My staff and I, as well as our board and emeritus members, do lots of outreach across the state to various engineering associations and groups.

Last year, we made more than 100 presentations to more than 6,000 people. But to add to these numbers, he requested a new special emphasis to reach out to K–12 and university students. These students are our hope for becoming the engineers of the future.

We started our K–12 outreach efforts with an Engineering Week kickoff event. We learned about the various activities that can be brought to youngsters, including the Van de Graaf electrostatic generator—a truly hair-raising event for those familiar with it.

We then partnered with Jose Guerra, P.E., an emeritus member of the Texas Board whose engineering firm is in the area, and arranged for some classroom visits. The bunny copter was a big hit with the little ones. For the older kids, we experimented with the spaghetti bridge competition, teaching teamwork and encouraging creative solutions. We also got them to think about the ways engineers touch their lives by examining their own actions throughout the course of a typical day.

It's easy to forget all the modern conveniences that surround us that wouldn't be here if not for engineers. Whether it's clean water running from the faucet, indoor lighting, refrigeration and heating, or transportation to school, all of these things involve engineers. It also occurred to us that EWeek doesn't have to be just one week in February—it can be a year-round event.

Another great opportunity here in Austin was the University of Texas-sponsored Introduce a Girl to Engineering event, sometimes called “Girl Day.”

This all-day event presents hands-on activities and allows youngsters to meet engineering students, professors, and practicing engineers. As a female engineer, it's rewarding on a personal level to share in this event. Some of the fun included the egg bungee jump, making structurally sound chairs out of only newspaper and tape, and the puff mobile competition in which custom-designed race cars (constructed from candy, paper clips, straws, paper, and tape) are propelled by one breath to achieve the greatest distance.



“Mathletes” from throughout the country compete in MATHCOUNTS, drawing many talented middle school-age children.

For the first time in Austin, we got to participate in Maker Faire. This event started in California and features inventions of all kinds together with design activities for kids and adults. One invention was a 32,000-pound mouse trap, complete with all the bells and whistles and a 4,000-pound block at the end that flatly surprises the unassuming (fake) mouse.

In the same spirit of promoting designers, we also contacted our Texas Public Broadcasting networks to ask them to support the broadcasting of *Design Squad*, which NCEES sponsored last year (the second season of *Design Squad* is set to begin in February and is also sponsored by NCEES). This is a great reality show that encourages kids to use teamwork to design and think with a creative spark.

MATHCOUNTS is a competition for middle school-age children. It brings out the mathematically gifted to solve math

problems while competing for a championship and is similar to a spelling bee with math. More than 500,000 kids participate across the country.

This year's chapter competitions start in February, the state competitions begin in March, and the national finals are in May. If you haven't witnessed this event, the mental gymnastics can be humbling, even for a seasoned engineer.

We know many state boards make an effort to connect with the universities and promote a path to licensure. Still, it is surprising to learn how often engineering students are not told about the Fundamentals of Engineering (FE) exam or exposed to what it takes to be a professional engineer.

In our outreach to universities, we tell the students that career paths can often change in life and, if they end up some day needing to be licensed as a professional engineer, they'll be in much better shape having the FE exam under their belts. We have also established an Education Advisory Committee made up of deans from 18 major universities in Texas. Through this committee, we emphasize the importance of licensure in an effort to get support from the top down and to keep channels of communication open with our educators.

I hope you will join us in 2008 in continuing to open up the world of engineering to our youth. It just might be your presentation, activity or story that inspires a student to become an engineer.

*Dale Beebe-Farrow, P.E.  
Executive Director  
Texas Board of Professional Engineers*

## NCEES to unveil new Engineering Award for college programs

Engineering programs from across the country will soon have the opportunity to compete for a \$25,000 award sponsored by NCEES.

The NCEES Engineering Award for Connecting Professional Practice and Education will be given to the EAC/ABET-accredited program that best demonstrates a commitment to incorporating professional practices into its curriculum.

Accredited programs are encouraged to submit any collaborative projects and/or activities demonstrating a commitment to teaching engineering students real-world applicable skills. Examples of such submissions could include field opportunities for students, practice-oriented course design, and collaborative partnerships between students and local engineering firms.

NCEES will spend 2008 promoting awareness of the new award, which calls for entries detailing activities that are in progress or complete by December 31, 2008.

Entries will be judged by a jury of engineering deans from four geographic regions of the United States, four members of the Council,

and representatives from the National Society of Professional Engineers, the American Society for Engineering Education, the National Academy of Engineering, and ABET, Inc.

In addition to the top award, there will be five other awards of \$7,500 dollars each.

The NCEES Engineering Award represents another step in the Council's efforts to promote engineering licensure to students enrolled in undergraduate programs.

"We're excited about introducing the NCEES Engineering Award and expect it will be well-received by the engineering schools," said NCEES Executive Director Jerry T. Carter.

"By funding this award, the Council is sending the message that it wants to partner with academia in getting more students started on the path toward professional licensure."

NCEES will mail a brochure promoting the award to EAC/ABET-accredited programs. It will also create a Web site providing detailed information about the award, including a downloadable entry form.

# MESSAGE

## Council moves forward with bachelor's plus 30 implementation



W. Gene Corley, Ph.D., P.E., S.E.  
NCEES President

For the past few years, one of the defining issues within the profession has been the issue of engineering education. In 2006, the Council voted to require an additional 30 credits of acceptable coursework beyond a bachelor's degree. That vote was reinforced by last year's decision by the Council to uphold the requirement.

There have been compelling arguments made by both sides, but nearly everyone agrees that undergraduate engineering education needs to be strengthened—both for the good of the profession and for the public health, safety, and welfare.

For many years, course requirements that were once devoted to developing an understanding of the concepts and skills necessary to practice engineering are being replaced by course requirements in nontechnical areas. At the same time, the base of knowledge required of engineers is expanding as new technologies are embraced. These trends are explained in the National Academy of Engineering's *Engineer of 2020* report.

The motion made by the Committee on Uniform Procedures and Legislative Guidelines in 2006 to require the additional credits had a long history of careful research that took into account many factors that were and still are affecting the engineering profession.

Since 2001, the Engineering Licensure Qualifications Task Force and later the Licensure Qualifications Oversight Group investigated the state of undergraduate engineering education, concluding that the amount of academic coursework devoted to teaching future engineers science, mathematics and design is declining even while the base of knowledge required of competent professionals is expanding.

NCEES faced a call to action: if licensure is to continue to protect the public by ensuring that adequate standards of professional knowledge

are met, then more coursework is needed. Furthermore, it was not simply that more coursework should be required as a prerequisite to licensure, but that added coursework needs to address a base of knowledge that is continually growing as engineering becomes more complex.

The bachelor's plus 30 requirement is the Council's response to this issue. However, there is much work left to be done. Now that the additional education requirement is in the *Model Law*, it is the Council's responsibility to ensure that it exists in a form that can be implemented by the Member Boards. That is the job of the Bachelor's + 30 Task Force, which met first in December and will meet again in February as it works to address its charges. The most important charge the task force faces is to develop definitions for approved credits and approved course providers that will fulfill the additional education requirement.

The adoption of additional education requirements for licensure was an important step to take in the face of the prevalent trends in engineering education and practice. The next natural step is to make the requirement a reality by hammering out the specifics.

I encourage all Council members to pay close attention in the coming months to the work done by all our committees and task forces—especially that of the Bachelor's + 30 Task Force. I encourage you to keep up-to-date by reading this newsletter and by attending your zone's interim meeting this spring. The committees and task forces, including the Bachelor's + 30 Task Force, will have representatives in attendance to present their findings. Your informed feedback will be very important as they go forward in finalizing their motions and recommendations ahead of the Annual Meeting.

W. Gene Corley, Ph.D., P.E., S.E.  
NCEES President

# UPDATE

## Center continues to improve Member Board services with new evaluators, office space

From January 1 to December 1, 2007, the Center for Professional Engineering Education Services received almost 1,300 applications, far more than expected. In January, the Center passed a milestone, releasing evaluation number 1,000. This is an impressive achievement and a testament to the hard work of our staff in Miami.

While we're pleased with the Center's success, one result of the high demand for evaluations was a backlog of pending applications. In the past few months, we worked to address this concern by adding additional credential evaluators with the skills and language abilities to help the Center maintain its commitment to producing thorough, accurate evaluations of foreign degree credentials for licensure candidates.

The Center will relocate to a larger office space in February. Besides creating more space, this move will allow for an improved phone system that will make it possible for NCEES staff in Clemson to assist the Center with customer service at particularly busy times. The new location and phone system will help the Center better serve applicants and Member Boards.

### **NCEES pursues standards development**

As I reported at last year's Annual Meeting in Philadelphia, in August the Council received notification that it had been granted status as an accredited standards developer with the American National Standards Institute.

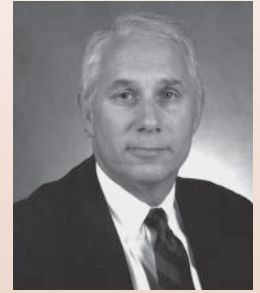
Since then, President Corley has appointed a special task force responsible for determining the standards to be developed and submitted to ANSI. The ANSI Task Force held its first meeting in Clemson in December and is in the process of learning about how the Council can use its new accredited standards developer status to further the NCEES mission. It has already begun to identify and formulate the standards that will be submitted for ANSI approval.

The Council's involvement with ANSI represents an important step forward in fulfilling the Council's strategic plan. ANSI, as the American representative to the International Organization for Standardization (ISO), oversees the creation and acceptance of thousands of standards that form the framework for the industrialized world. By formalizing ANSI-approved standards, the Council can have its standards for professional licensure recognized by a variety of related professional societies and adopted into regulatory language. It will also lead toward raising awareness of licensure's value within industry and academia. This could lead to greater numbers of candidates deciding to pursue licensure.

### **Task force merging Constitution and Bylaws**

In response to the resolution to merge the NCEES Constitution and Bylaws passed at the 2007 Annual Meeting, the Special Task Force on Governance met January 11–12 to discuss its charge to combine the two documents. The task force is working with NCEES legal counsel in fulfilling this charge, which will remove any potential conflicts resulting from language differences between the two documents. The Constitution and Bylaws are not being rewritten; they are simply being combined to remove redundancy.

A draft of the NCEES Bylaws, as it will be known when approved by the Council, was prepared ahead of the task force's meeting. The Bylaws draft will be sent to Member Boards in early February for review and comment. The task force will give a presentation about the merger at each of the zone interim meetings. These presentations will give Member Board members an opportunity to discuss the task force's recommendations and provide their input in advance of the Annual Meeting in August.



*Jerry T. Carter*  
NCEES Executive Director

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NCEES Executive Director

# Exam reminders for 2008

Several examination changes will take place with the 2008 administrations.

- ◆ This year, the spring exam administration will be relatively early: April 11–12. Member Boards should submit all exam orders by **March 3**.
- ◆ The list of approved calculators for 2008 now includes several additional models. The list can be found at [www.ncees.org/exams/calculators](http://www.ncees.org/exams/calculators).
- ◆ The Civil PE exam will feature new specifications and a new depth module in construction engineering. It also will feature a newly combined water resources and environmental depth module.
- ◆ Also in April, the 8th edition of the *Fundamentals of Engineering Supplied-Reference Handbook* will be supplied to FE examinees at testing centers. FE exam candidates are encouraged to familiarize themselves with this new edition prior to sitting the exam.

## New item replacement costs, scoring prices in effect

New exam item replacement costs are in effect for 2007–08. The new amounts were approved by the Board of Directors at their August 21, 2007, meeting. They reflect the financial costs of individual items in the event that they have to be replaced due to a breach.

Exam	Item replacement cost
FE	\$ 2,109
PE Group I	\$ 3,068
PE Group II	\$ 2,504
FS/PS	\$ 2,254
Structural II	\$41,357

Beginning with the October administration, new scoring prices approved at the 2006 Annual Meeting will be in effect for most exams. They are as follows:

Exam	Scoring price per exam (effective October 2008)
FE	No change
PE	\$155
Structural I	\$155
Structural II	\$645
FS	\$ 90
PS	\$155

# October 2007 exam pass rates

## Fundamentals of Engineering

FE exam pass rates reflect students/graduates of EAC/ABET-accredited engineering programs.

*All modules*

Examination Module	First-time takers (%)	Repeat takers (%)
Chemical	84	55
Civil	73	28
Electrical	68	28
Environmental	79	44
Industrial	68	30
Mechanical	81	41
General	72	26

*General exam only*

Examinee degree discipline	First-time takers (%)	Repeat takers (%)
Aeronautical	82	44
Agricultural	70	55
Architectural	70	28
Biological	83	46
Biomedical	75	0
Chemical	79	45
Civil	68	22
Computer	45	12
Electrical	51	21
Engineering Mechanics	56	18
Environmental	78	22
General Engineering	81	13
Industrial	46	12
Mechanical	79	32
Mining and Mineral	58	25
Nuclear	75	n/a
Petroleum	57	50
Structural	64	56

## Principles and Practice of Engineering

Examination	First-time takers (%)	Repeat takers (%)
Agricultural	72	33
Architectural*	66	26
Chemical	74	23
Civil	64	29
Control Systems	74	56
Electrical and Computer	70	27
Environmental	78	43
Fire Protection	54	27
Industrial	69	22
Mechanical	63	28
Metallurgical	52	45
Mining and Mineral	67	42
Naval Arch./Marine*	89	100
Nuclear	Pending	
Petroleum	Pending	
Structural I	46	26
Structural II	59	23

*\*These PE exams are offered only in the spring. Rates are shown for the April 2007 administration.*

## Surveying

Examination	First-time takers (%)	Repeat takers (%)
Fundamentals of Surveying	56	26
Principles and Practice of Surveying	70	37

## MISSION

- ◆ Assist Member Boards in the promotion and promulgation of regulatory processes for engineering and surveying licensure which demonstrate high standards of knowledge, competence, professional development, and ethics.
- ◆ Provide to Member Boards services that promote uniform licensing procedures which emphasize quality education, examination, progressive qualifying experience, and continuing professional competency.
- ◆ Coordinate with domestic and international organizations to promote licensure of all engineers and surveyors.

NCEES Strategic Plan

# South Carolina, Colonial States Boards debut licensure exams for emerging surveying disciplines



Gene L. Dinkins, P.E., P.L.S.  
Southern Zone Vice President

In recent years, many in the land surveying profession have started to address the need to develop licensure processes for the emerging disciplines of photogrammetry and geographic information systems (GIS).

Beginning this spring, a new licensure examination in photogrammetry developed by the Colonial States Boards of Surveyor Registration (CSBSR) will be available. Also, the South Carolina Board of Registration for Professional Engineers and Surveyors will administer a GIS examination featuring items taken from the CSBSR item bank. The South Carolina GIS examination is believed to be the first GIS test administered in the country for the purpose of GIS surveying licensure.

Some states have been proactive in addressing the issue and now include photogrammetry and GIS in their definitions of surveying practice. In some of these states, the licensure requirements for practitioners of photogrammetry and GIS differ from those of land surveyors. In other states, photogrammetric and GIS surveyors follow the same path to licensure as other surveyors.

Photogrammetry is the practice of determining physical locations of objects based on photographic or remote sensing techniques. In its certification guidelines, the American Society for Photogrammetry and Remote Sensing ([www.asprs.org](http://www.asprs.org)) says that a photogrammetrist “is responsible for all phases of mapping and other mensuration requirements, which include planning and supervising survey activities for control, specifying photography or other imagery requirements, managing projects for mapping, or other mensuration requirements and interpretation.”

GIS, also known as land information systems (LIS), works with the design and/or application of databases or computer programs that can be used to gather information about spatial positioning. GIS professionals often compile information from different sources in creating interactive digital maps with many layers of information.

In South Carolina, the law divides surveying into three separate disciplines: land surveying, photogrammetric surveying, and GIS surveying. Although a surveyor can be licensed in any of the three disciplines in South Carolina, practice is restricted to only those disciplines in which the surveyor is licensed. Therefore, a land boundary surveyor cannot practice photogrammetric or GIS surveying without first being licensed in those disciplines.

When determining whether or not registration is required for a particular kind of work, the South Carolina Board suggests the following test:

- ♦ Is it a representation of accurate land data with an accuracy certification?
- ♦ Does it affect the health, safety, and welfare of citizens?
- ♦ Could it restrict the use of or adversely affect the value of property?

If the surveyor answers “yes” to any of the three questions, the work in question would require professional licensure in the appropriate discipline.

When South Carolina adopted language requiring licensure to practice photogrammetric or GIS surveying, a grandfather clause was included to allow experienced individuals meeting the other requirements to forgo the examination requirement. That clause expired June 30, 2004, and as of now an applicant for licensure as a photogrammetric or GIS surveyor must pass an examination before becoming licensed to practice in South Carolina.

Because they are still emerging disciplines in many respects, the number of people seeking licensure in photogrammetry or GIS is very small. In many states, grandfather clauses have yet to expire. Regardless, the South Carolina Board was presented with the challenge of preparing the GIS exam that will be administered for the first time during the April 2008 exam administration. In doing so, it turned to the Colonial States Boards for assistance.



Although other states have already adopted language requiring licensure for photogrammetric surveying, South Carolina is believed to be the only state that treats GIS surveying as a separate discipline. The South Carolina Board, therefore, decided to adapt the CSBSR exam to create a GIS-specific exam. To accomplish this, it hired David Gibson, Ph.D., P.S., as a consultant. Gibson was heavily involved in the creation of the CSBSR exam and is a professor at the University of Florida specializing in geomatics and mapping sciences. With the help of Gibson, the South Carolina Board created a GIS-specific exam by identifying and selecting items from the CSBSR item bank that tested GIS concepts.

The CSBSR has been involved with the creation of a nationally applicable mapping sciences exam for several years. It is made up of representatives from land surveying boards primarily in the eastern states. In its annual item writing workshops starting in 2001, the CSBSR began to focus more on writing items testing candidates' knowledge of mapping sciences, and by 2003 the annual item writing workshops were devoted exclusively to creating items that test candidate knowledge of mapping sciences, including photogrammetry and GIS. By 2005, the goal became to develop an item bank of at least 300 such items for use in licensure exams.

In 2006, the CSBSR conducted a professional activities and knowledge survey during a meeting of the American Society of Photogrammetry and Remote Sensing. The following year, a cut score workshop was

held and a psychometric report created for the CSBSR exam. Late last year, the CSBSR reached its goal of developing an item bank with 300 exam items testing knowledge of mapping sciences. It can now support a state-specific, 6-hour mapping sciences examination with full psychometric support.

In developing the mapping sciences item bank, the CSBSR has received partial funding from the ASPRS and NCEES as well as the Management Association for Private Photogrammetric Surveyors, a national association of firms in surveying, spatial data, and geographic information systems. The state boards of Kentucky, North Carolina, South Carolina, and Virginia have also contributed funding to cover psychometric costs and travel for item writers. NCEES houses the item bank and will provide scoring services.

Photogrammetric and GIS surveying represent a larger issue that is prominent in the NCEES strategic plan: that of splintering among disciplines. Perhaps the case of South Carolina and the Colonial States mapping sciences item bank can serve as a model and reference point for dealing with new and emerging professional applications of engineering and surveying knowledge.

*Gene L. Dinkins, P.E., P.L.S.  
Southern Zone Vice President*

# Centuries-old maps go online in Vermont, Minnesota

## Pioneering maps aid licensed surveyors

In the mid-18th century, teams of men spread out across Vermont to map the tractless wilderness.

Measuring with long chains and other primitive equipment, they climbed mountains, forded rivers, and slogged through swamps, dividing Vermont up into 251 towns and then dividing the towns into lots.

Two-and-a-half centuries later, those maps and their lotting plans remain valuable frames of reference for 21st century real estate deals. But many have disappeared or been hidden away in dusty vaults in town clerks' offices from Massachusetts to Quebec.

Now, the Vermont State Archives is using modern digital technology to give people access to those old maps from their offices or homes, putting them online to help lawyers, surveyors, landowners, and historians to analyze ancient roads, boundary lines, and titles.

It's a process that's being repeated across the country, in Minnesota and elsewhere.

"It's fairly new, at some level, over the last 15 years," said Curt Sumner, executive director of the American Congress on Surveying and Mapping, in Gaithersburg, Md. "The original ones were pretty rudimentary. A lot of that has changed."

"It's heaven on earth," said Montpelier attorney Paul Gillies, who does a lot of land work. "This kind of information is usually only found with truly diligent research," Gillies said.

But the diligent research is being done by the Vermont State Archives.

State Archivist Gregory Sanford and his staff are working to make the documents that make up Vermont's history as widely available as possible. In some cases, it's just for the historical value, but with the maps it's practical.

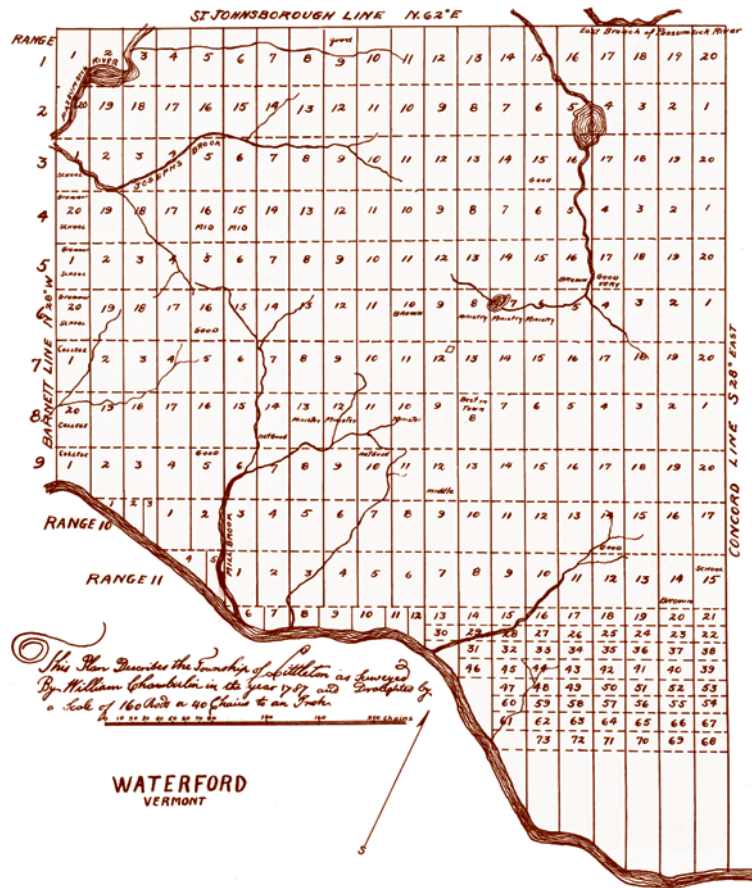
"Some of these records may be based on surveys and maps done 200

years ago, but they continue to have value, legal value and an informational value that has survived the centuries," Sanford said.

The work of a land surveyor is part detective work, puzzle solving and mind reader, said Sumner.

That's especially true in states like Vermont, where early surveys used trees, streams, or other features as landmarks only to see them lost over time.

"The big thing that surveyors hang their hat on is to find the right information and then portray that information in reality," said Sumner.



Original maps can provide clues.

“We’re in the old stuff all the time,” said surveyor Leonard Amblo, treasurer of the Vermont Society of Land Surveyors.

“We have to go back to when that lot was created.”

He said the digital images would be valuable tools. “If they have a general schematic already digitized, we could take that and overlay it over our survey data,” said Amblo, who works for Button Professional Land Surveyors, of South Burlington.

Minnesota is one of the states doing something with old maps.

The Minnesota Historical Society has put old maps online, as tools for surveyors and other land professionals, said Bob Horton, the society’s director of Library Publications and Collections.

But Minnesota has also expanded the use of maps so they can be used by school children and eventually family historians as well as for other practical uses.

“I think it’s the way states should be going,” Horton said. “There’s a lot of confusion about how to deal with technology. Here’s one that I think works, the tools exist, the content exists, then you can deliver real value to people. You just have to put it together.”

Sumner said a downside of putting maps on the Internet was that table top-sized maps were frequently scaled down to an 8½ × 11 inch document.

Sanford said the maps are tools.

“It comes with the warning that it’s only a starting point, it’s not the ultimate legal document,” Sanford said. “You would have to go to your town clerk’s office and confirm, but at least it’s a point, where you can sit at home and start.”

The maps are being posted for their practical value, but they also offer a glimpse into the past.

Bennington, for example, is laid out with 64, 360-acre square lots with straight roads running through the town. In what Sanford called an early example of land-use planning, the map includes a 64-acre, diamond-shaped parcel in the middle intended as the town center.

A 1778 map of Royalton includes notations that birch trees mark the four corners of the town. Some of the 54 lots have the names of the original European owners, while others describe the property as “good upland” or “level and very good.”

The map project was driven by demand.

“We were getting lots of calls from surveyors who wanted to look at lotting plans,” Sanford said. “We just felt there was a clear demand, a state interest in making those records available.”

So, last year, Sanford and the four people who work in his office set out to get as many of those maps as possible online. They worked with a private business owner who used a special document scanner. By the end of October, they had about 235 maps available.

The maps aren’t scans of the maps drawn in the 1700s. Rather, they’re copies—sometimes copies of copies, in fact—that have been made over the centuries and collected in the state archives.

Most of the originals remain in town clerks’ offices.

The project isn’t finished. The archives are continuing to add maps in the possession of the state. And they could reach out and start scanning the original maps held at town offices across Vermont.

“My interest here has always been putting history in harness to take things that aren’t just historically interesting, but actually may have some legal or administrative or other need that persists today,” Sanford said.

*Wilson Ring, The Associated Press  
November 25, 2007*

## Surveying maps on the Web

### Minnesota Historical Society:

<http://www.mnhs.org/collections/digitalmaps/index.htm>

### Vermont State Archives:

<http://vermont-archives.org/lottingplans.asp>

Women's colleges (continued from page 1)

That includes both students and faculty—70 percent of Smith's engineering faculty are women.

Sweet Briar College's small size (approximately 660 students) creates "a very supportive environment, something that all students, not just female, would find beneficial," said engineering program director Hank Yochum, Ph.D.

### Hands-on learning in a team environment

Sweet Briar also offers a mentor program that pairs students with local women engineers to

offer encouragement and share their experiences in the profession.

Converse's 9 to 1 student-to-faculty ratio allows for a high level of one-on-one interaction, including opportunities for undergraduate students to assist faculty members with research projects.

system and devised a plan to get supplies to the site in Guatemala. The project generated a lot of interest from both current and prospective students.

Jones says that using engineering skills to improve society is a concern for Smith students, noting that besides SWE, the two most popular engineering societies on campus are Engineering for World Health and Engineers for a Sustainable World. "We strive to engage students to see the purpose of their degree, to see engineering not just as a subject but in the context of the world around us," she said.

SWE director Shanahan says that showing women engineering students early on how their skills can be applied is important for attracting and retaining them. "They tend to want to work with people and make a difference in society," she said. "Traditionally, engineering programs are heavy on early theoretical work without promoting an understanding of how this technology can make a difference and what this theoretical knowledge will allow them to do. We're not talking about making the content easier, but about making the end result more visible."

### A multidisciplinary approach

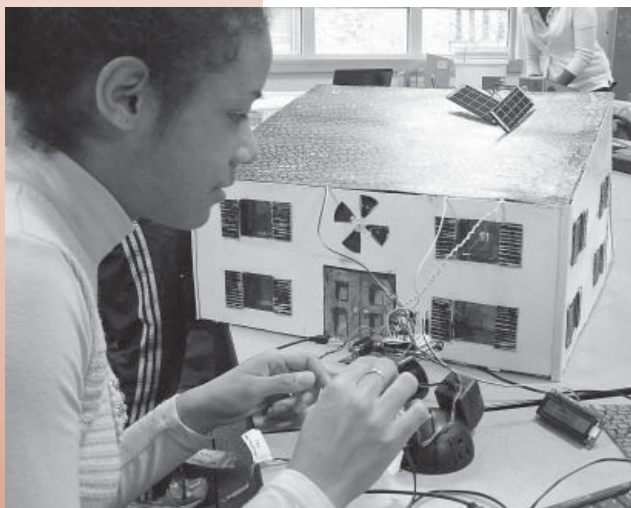
Leaders at Smith College and Sweet Briar agree that their multidisciplinary engineering science programs provide a broad-based approach to engineering that meets the needs of a new generation of engineers.

Jones is confident that Smith's engineering science degree opens doors for its graduates.

"We have core engineering classes that include electrical, chemical, and mechanical engineering, so students have to master concepts of all three," she said. "Their elective work is in an area of technical interest, and that could be a hybrid of subjects. We have graduates in areas from electrical to environmental to aerospace engineering, and I think that speaks highly of the technical preparedness of the degree."

At Sweet Briar, the engineering science degree focuses on mechanical engineering, but Yochum says they still emphasize a multidisciplinary approach, including the interplay between electrical and mechanical systems.

Shanahan explained that this approach is an important one for the future of the profession. "Independent of gender, the Engineer of 2020 report (issued by the National Academy



An engineering student measures heating efficiency in a model home in one of Smith College's laboratories addressing sustainability. Smith's Picker Engineering Program promotes engineering as a profession serving humanity.

"We encourage students not to simply listen to lectures but to engage early on in hands-on problem solving," said Converse President Elizabeth Fleming, Ph.D.

Sweet Briar guarantees paid internships for its engineering students, and team projects also give students opportunities to apply theories they learn. The program's Cardboard Boat Regatta has become a staple of Sweet Briar's homecoming festivities. Now in its fourth year, the regatta is a product of a first-year Introduction to Engineering Design course.

### Merging engineering with service

Presenting engineering in a wider context works in tandem with team activities and hands-on applications. Last summer, Sweet Briar's international design class traveled to Guatemala to build a water-supply system for a school, a project that Yochum said required plenty of teamwork as students designed the

of Engineering) stresses the multidisciplinary aspect of the profession,” she said. “Academic institutions of all types are responding by focusing not on specific technologies but on how they work together.”

### Measuring success

While these colleges may try alternative approaches, they also ensure that the degrees they offer will be recognized nationwide. Smith’s engineering program has been EAC/ABET-accredited since 2005, and Sweet Briar’s program, which has not yet graduated its first cohort, is on track to become accredited.

Both Smith and Sweet Briar use the Fundamentals of Engineering exam as an outcomes assessment tool, with Sweet Briar requiring students to take it before graduating. Smith has required the exam in the past but recently made it optional.

Jones said that all recent Smith graduates have taken it anyway, explaining that “it’s just become part of the culture.”

These schools are also actively encouraging future generations of engineers. From reaching out to middle school and high school students and educators to introduce engineering to providing innovative residential summer camps for girls, all three schools are working to spread positive messages about what engineers do.

One such effort is the Smith College Summer Science and Engineering Program, a month-long residential program started in 1990. Of

the nearly 1,300 girls who have participated in the program, 67 percent have gone on to major in science, engineering, or technology in college.

While these engineering programs are still young, their administrations are pleased with the results so far. The Picker Engineering Program at Smith has awarded degrees to 103 graduates, with another 24 in its current graduating class. Jones says the retention rate for declared engineering majors exceeds 90 percent. Yochum is pleased with Sweet Briar’s retention rate. Sweet Briar currently has 30

engineering students.

Shanahan says that one of the best outcomes of engineering programs at women’s colleges is that they offer another avenue. “There is no one answer for everyone,” she said. “Some people want a large school, some small; some want a traditional co-

ed engineering university—these schools offer another environment.”

Jones says she is excited to see what these programs can teach about how to attract and keep women in engineering. “The biggest piece here is the focus on what engages women, and this could be extracted by larger institutions,” she said. “I hope that what we learn can be useful to them.”

*Jennifer Minchin*  
NCEES Associate Editor



*Professor Susan Voss guides a Smith College undergraduate in an acoustic analysis of the human ear. Smith credits its engineering faculty, 70 percent of which are women, with providing an inclusive environment for female students.*

Send letters to *Licensure Exchange* editor at NCEES, PO Box 1686, Clemson, SC 29633 or [dmcgvirt@ncees.org](mailto:dmcgvirt@ncees.org).

Please include your name and state of residence on the letter. Letters may be edited for clarity, brevity, and readability.

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Member Board

# NEWS

- Alaska**
- California**
- Oregon**

- ◆ Terry Gorlick is no longer on the board.
- ◆ Kim Blackseth, Ray Satorre, and Michael Trujillo are new appointees to the board. The terms of Millicent Safran, Cindy Tuttle, and Edward Yu have expired.
- ◆ Samantha Bianco, P.L.S., is a new appointee to the board. The terms of George F. Gross, P.E., and Robert V. Neathamer, P.L.S., have expired.

Upcoming

# EVENTS

<b>DATE</b>	<b>EVENT</b>	<b>LOCATION</b>
February 22–23 . . . . .	Board of Directors' Meeting . . . . .	Naples, Florida
April 3–5 . . . . .	Northeast Zone Interim Meeting. . . . .	Boston, Massachusetts
April 11–12 . . . . .	Exam Administrations	
May 1–3 . . . . .	Southern Zone Interim Meeting. . . . .	San Juan, Puerto Rico
May 15–17 . . . . .	Central/Western Zone Joint Interim Meeting. . .	Bismarck, North Dakota
August 13–16 . . . . .	NCEES Annual Meeting. . . . .	Minneapolis, Minnesota

### Newly licensed engineer relates importance of taking the FE in college

I support Dr. Whitman's article ("Two birds, one stone: Western VP makes the case for the FE exam") in the June 2007 issue of *Licensure Exchange* regarding engineering undergraduates taking the FE exam. My personal experience is a testimony to the importance of the doors it kept open for me.

Fortunately, when I graduated in 1988 the program at the university I attended was working on creating assessment tools so they could improve their program. Though the Metallurgical Engineering graduates rarely pursued engineering licensure at that time, our department requested that our graduating class take the FE exam. They explained that the purpose was to compare how the department's students fared in various areas compared to other programs at the university so they could modify the course curriculum if it appeared deficient in a certain basic engineering skill.

We were the first class at our university in the metallurgy program requested to do so. Many of my co-graduates did not take the exam. I did, clearly not really caring how well I did, but I passed. I had the E.I.T. designation that I never imagined I would use.

Fast-forward to 1998, when I relocated to Florida. Unable to get a job in metallurgical engineering, I struggled with what to do for several years. Finally, I determined that I wanted to return to engineering but needed a different field of expertise.

The city in Florida where I lived was expanding rapidly, so I decided upon civil engineering. Now, we all know that for a civil engineer not to pursue a P.E. license is career suicide. Had I not taken the FE exam in 1988, I certainly would not have considered doing so 14 years out of school. In 2002, I entered a graduate program in civil engineering and received a Master of Science degree in 2004.

I have been happily employed in the civil engineering field since April 2004 and just earned the P.E. designation. Had I not taken the recommendation of my professors back in

1988, I would never have the career that I love today.

Dr. Whitman is absolutely correct when he says, "you never know the path your career might take." Back in 1988, I would never have considered that one day I would be a professional civil engineer.

The metallurgical and materials engineering program where I earned my undergraduate degree now requires all students to take the FE exam before graduating. They use the results precisely as described in Dr. Whitman's article. Because of the improvements they have been able to make, the program has won many national awards, including a Malcolm Baldrige Award. At my graduate school, I discussed this with the civil department chair because I was concerned that many of their program's graduates do not sit for the FE. There was a fear among university administrators that students wouldn't take the test seriously and it would hurt their ranking. Unfortunately, this fear keeps many universities from requiring the FE as part of their program.

Please continue on your quest to get education professionals to encourage all engineering students to take this exam. The culmination of any engineering degree should be taking this examination, because it assures that the graduate will have all the options their degree would allow in the future.

When we pass exams, we improve our flexibility in our careers and this is always a good thing. Wisdom can only be passed on by the wise, and this comes through life experience. I hope our professors are wise enough to share their experiences—and those of people like me—with their students so that students can make informed decisions about their futures.

Thank you for your efforts in spreading this message. Whether or not it leads to becoming a professional engineer, the FE exam is a valuable tool for everyone involved in the process of educating our future engineers. To be a world leader, we have to have world class education, and this only occurs through improving the programs that are now in place.

*Linda J. Madigan, P.E.*

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# NCEES to hold exam administration forum in February

This month, NCEES will hold an exam administration forum at its Clemson headquarters. It will take place February 20–21.

The voluntary forum is designed for Member Board administrators and staff as well as testing services vendors who work with Member Boards to administer NCEES exams. The forum will be led by Security and Compliance Manager Bob Whorton, P.E.

The agenda will cover all aspects of the exam administration process, including

- ◆ A review of NCEES exam manuals, including the Security and Administrative Procedures Manual, the Chief Proctor Manual, exam scripts, and the Council's guidelines for disabilities and religious accommodations for exam candidates
- ◆ Information on the candidate agreement and admission authorization forms
- ◆ Guidelines for ordering exam materials
- ◆ Guidelines for identifying, hiring, and training qualified proctors

- ◆ A review of seating arrangements for the exam administration
- ◆ Requirements for admitting candidates to the exam site
- ◆ Procedures for identifying prohibited items at the testing site and filing exam irregularity reports
- ◆ An outline of the exam scoring process, along with a tour of NCEES headquarters

"The integrity of the examination and licensing process depends on consistent and secure practices," said Whorton. "The goal is to keep everybody informed of the procedures that make the exam administration process run smoothly."

For more information about the exam administration forum, contact Bob Whorton at [bwhorton@ncees.org](mailto:bwhorton@ncees.org).

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Jerry T. Carter, Executive Director  
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Doug McGuirt, Editor

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Fax (864) 654-6033  
[www.ncees.org](http://www.ncees.org)

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