NCEES ENGINEERING EDUCATION STANDARD

Effective April 1, 2015

NCEES

NCEES Engineering Education Standard

Applicants having engineering degrees from programs that are not accredited by the Engineering Accreditation Commission (EAC) of ABET must demonstrate the following:

A. 32 college semester credit hours of higher mathematics and basic sciences

1. Credits in mathematics must be beyond algebra and trigonometry and must emphasize mathematical concepts and principles rather than computation. Courses in differential and integral calculus are required. Additional courses may include differential equations, linear algebra, numerical analysis, probability and statistics, and advanced calculus.
2. Credits in basic sciences must include at least two courses. These courses must be in general chemistry, general calculus-based physics, or general biological sciences; the two courses may not be in the same area. Additional basic sciences courses may include earth sciences (geology, ecology), advanced biology, advanced chemistry, and advanced physics. Computer skills and/or programming courses may not be used to satisfy mathematics or basic science requirements. Basic engineering science courses or sequence of courses in this area are acceptable for credit but may not be counted twice.

B. 16 college semester credit hours in general education that complements the technical content of the curriculum

1. Examples of traditional humanities/social sciences courses in this area are philosophy, religion, history, literature, fine arts, sociology, psychology, political science, anthropology, economics (micro and macro), professional ethics, and social responsibility. Examples of other general education courses deemed acceptable include management (such as organizational behavior), accounting, written and oral communications, business, and law.
2. No more than 6 credit hours may come from courses in management, accounting, business, or law. Courses in engineering economics, engineering management, systems engineering/analysis, production, and industrial engineering/management will not be counted. Language courses in the applicant's native language are not acceptable for credit; no more than 6 credit hours of foreign language courses are acceptable for credit. Native language courses in literature and civilization may be considered in this area. Courses that instill cultural values are acceptable, while routine exercises of personal craft are not.

C. 48 college semester credit hours of engineering science and/or engineering design courses

1. Courses in engineering science must be taught within the college/faculty of engineering and must have their roots in mathematics and basic sciences but carry knowledge further toward creative application of engineering principles. Examples of approved engineering science courses are mechanics, thermodynamics, heat transfer, electrical and electronic circuits, materials science, transport phenomena, engineering economics, and computer science (other than computer programming skills).
2. Courses in engineering design must stress the establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation. Graduate-level engineering courses may be included to fulfill curricular requirements in this area.

Engineering technology courses cannot be considered to meet engineering topic requirements.

NCEES Credentials Evaluations Policies

NCEES Credentials Evaluations will adhere to the following in conducting evaluations:

- Evaluations will be conducted on the following:
  1. Bachelor's degree in engineering from a non-U.S.-based program
  2. Non-EAC/ABET-accredited degree programs in engineering, engineering technology, related science, or mathematics only when coupled with a master's degree or doctorate in engineering

  Evaluations may be conducted on programs that do not meet these criteria if specifically requested by an NCEES member board. Such requests must come directly from the member board to the NCEES Manager of Credentials Evaluations.
- NCEES will evaluate all programs against the NCEES Engineering Education Standard. NCEES does not determine substantial equivalence to an EAC/ABET-accredited program.
- For the evaluation, the bachelor's degree coursework, master's degree coursework, and doctorate coursework will be considered in determining satisfaction of the NCEES standard.
- NCEES will provide credit for any advanced coursework earned prior to college enrollment that is deemed appropriate for college-level academic credit.
- A maximum of six hours' credit will be granted for thesis, special topics, and independent study at any level.
- Cooperative training, practicums, internships, and continuing education activities will not receive educational credits to satisfy the NCEES standard.
- NCEES will note any deficiencies in the applicant's educational history compared to the NCEES standard.

For applicants whose educational record indicates satisfaction of the NCEES standard, NCEES will report that the applicant possesses the education required in order to be considered by a member board for entry into the professional practice of engineering. For applicants whose education record indicates deficiencies relative to the NCEES standard, NCEES will note those deficiencies for any action deemed appropriate by a member board. NCEES will also provide any relevant information concerning the educational requirements and/or any prerequisites for entry into engineering programs in the applicant's country for consideration and overall qualification by a member board.

B. Examination Fees

1. Examination fees are determined from time to time by the board in accordance with the provisions of *[insert applicable jurisdiction law].*
2. The current fees in effect may be obtained from the board.
3. Fees for manual verification of exam results are the same as those charged by NCEES.
4. The examination fees will not be returned to an applicant.

C. Roster

The fee for a copy of the annual *[biennial or other]* roster shall be determined by the board based on costs for its publication.

D. Renewal Fees

1. Renewal fees are payable before the last day of the month of *[insert month]* each year *[or other intervals].*
2. Each licensee and firm holding a certificate of authorization will be notified by the board of the expiration date of his or her certificate of licensure or authorization and the amount of the renewal fee at least 1 month before the expiration date.
3. Amount of Renewal Fee—The renewal fee is set by regulation of the board in accordance with the provisions of *[insert applicable jurisdiction law].*
4. Penalties for Late Renewal—Renewal fees in arrears are subject to a penalty for late renewal in accordance with jurisdiction law. After 6 months, a new application may be required to be filed to continue to practice engineering or surveying in this jurisdiction.
   (*In part from Section 140.20, Expirations, Renewals, and Reinstatement to Active Practice, NCEES* Model Law *and Section 160.50, Expirations and Renewals, NCEES* Model Law)

E. Duplicate Certificate Fees

The fee for the issuance of a duplicate certificate or enrollment document to a licensee, firm, or intern is determined by regulation of the board in accordance with the provision of *[insert applicable jurisdiction law]. (Section 140.30, Issuance of Duplicate Certificates, NCEES* Model Law *and Section 160.60, Issuance of Duplicate Certificates, NCEES* Model Law)

230 CANDIDATES FOR LICENSURE

230.10 Education Requirements Approved by the Board

A. Undergraduate Engineering Program

The term "an engineering program of 4 years or more" used in Section 130.10 A of the NCEES *Model Law* is interpreted by this board to mean the following:

1. A bachelor's degree in an engineering program accredited by the Engineering Accreditation Commission of ABET (EAC/ABET) at the time of the awarding of the degree. The board may accept the degree if accreditation is received within *[insert the prescribed period of time].*
2. A bachelor's degree in an engineering program not accredited by EAC/ABET but deemed by the board to be substantially equivalent to those programs that have been accredited by EAC/ABET

B. Surveying Program

The following shall be considered as minimum evidence to the board that the applicant is qualified in terms of education for certification as a surveyor intern:

1. Graduation from "a surveying program of 4 years or more accredited by EAC/ABET, ETAC/ABET, ASAC/ABET, or the equivalent" as described in Section 130.10 C.1 in NCEES *Model Law*, and accredited at the time of awarding of the bachelor's degree The board may accept the degree if accreditation is received within *[insert the prescribed period of time].*

POSITION STATEMENTS

PS 1 Licensure

In the interest of safeguarding the public, NCEES strongly promotes the concept that all qualified individuals who practice or desire to practice engineering or surveying seek licensure, whether exempted by statute or regulation or not. NCEES supports the premise that an applicant seeking original licensure seek such licensure in the jurisdiction in which he or she resides or practices. NCEES also supports the premise that a licensee maintain licensure in the jurisdiction of the business address of practice and in jurisdictions in which the licensee exercises responsible charge of engineering and surveying work.

PS 2 Certification of Engineers and Surveyors

NCEES does not oppose those programs wherein professional organizations and societies recognize or certify their members for any purpose, provided such certification does not imply legal licensure. NCEES opposes certification by any organization or society wherein the purpose of such certification is to substitute for legal licensure as established by the statutes of the various jurisdictions.

PS 3 Engineering Curricula Accreditation

NCEES recommends that engineering programs be accredited only by the Engineering Accreditation Commission of ABET (EAC/ABET).

PS 4 Applicants with Non-Accredited Baccalaureate Degrees

Individuals with the following qualifications may apply for the licensure process.

- Graduates of non-EAC/ABET-accredited baccalaureate programs in engineering or graduates of nonengineering baccalaureate programs who have earned a master's degree or doctoral degree in engineering. In both of these cases, the official degree program transcripts of applicants must be evaluated through a board-approved process, and any deficiencies found as a result of the evaluation must be corrected. Deficiencies in engineering courses, including engineering design, must be remediated by taking courses offered by an EAC/ABET-accredited engineering degree program.
- Graduates of EAC/ABET-accredited master's programs in engineering. In this case, no remedial work is needed; a criterion for EAC/ABET accreditation of master's-level programs is fulfillment of the EAC/ABET baccalaureate-level general criteria.

The validation of the educational achievement by any of these methods cannot be applied for experience credit toward licensure.

PS 5 Member Board Representatives on ABET Visitations

NCEES supports and endorses the role of a member of a board of licensure as an observer on an ABET program evaluation. NCEES will publish the *ABET Guide for Observers on Accreditation Visits* on its website to assist ABET and the board member in this endeavor.

PS 6 Examination of Engineering Students

NCEES recommends that all schools with EAC/ABET-accredited engineering programs require students in such programs to take and make a good-faith effort to pass the NCEES Fundamentals of Engineering examination prior to their anticipated date of graduation. Deans, department heads, and faculty members are encouraged to provide FE exam review sessions to assist students in preparing for the exam. NCEES and its member boards should provide resources for the reviews and assist these programs in determining whether students made a good-faith effort to pass the exam.

PS 7 Evaluation of Applicants with Degrees in Technology

NCEES recommends that all member boards of licensure, whose statutes do not otherwise prohibit, be encouraged to observe and adhere to the following criteria for the examination of educational qualifications of applicants for licensure, or license, as professional engineers and surveyors:

A. Graduates of Engineering Technology Accreditation Commission of ABET (ETAC/ABET)-accredited, four-year baccalaureate programs in engineering technology may be granted a maximum of two years of educational credit toward professional engineering licensure and four years of educational credit toward professional surveying licensure if the board determines that the degree contains prescribed surveying courses.

B. Applicants who entered ETAC/ABET-accredited, four-year baccalaureate programs in engineering technology but did not complete requirements for the four-year baccalaureate degree may be given consideration for educational credit on a prorated basis of one-half year for each year satisfactorily completed, up to a maximum of two years' credit.

C. Graduates of non-ETAC/ABET-accredited, four-year baccalaureate programs in engineering technology may be granted a maximum of one year of educational credit.

PS 8 Bachelor of Science Degree in Engineering

NCEES recommends that the boards of licensure require any applicant who applies for engineering licensure in any jurisdiction of the United States and who has not previously been licensed to practice by one of the boards of licensure be required first to demonstrate that he or she possesses at least a four-year bachelor of science degree in engineering, acquired through the successful completion of an EAC/ABET-accredited program or through a board-approved equivalent program.

Recognizing that newly EAC/ABET-accredited programs must spend several years in development before attaining accredited status, NCEES recommends that all applicants be considered as having graduated from an EAC/ABET-accredited program if their program is/was accredited within three years after their graduation.

PS 9 Bachelor of Science Degrees in Surveying Engineering, Surveying and Mapping, and Geodesy

NCEES recommends that the boards of licensure require any applicant who applies for licensure to practice surveying in any jurisdiction of the United States and who has not previously been licensed to practice by one of the boards of licensure for professional surveyors be required to first demonstrate that in the cases of four-year surveying degrees, such applicant possesses a four-year bachelor of science degree acquired through the successful completion of program for said degree accredited by the Engineering Accreditation Commission of ABET (EAC/ABET), the Applied Science Accreditation Commission of ABET (ASAC/ABET), Engineering Technology Accreditation Commission of ABET (ETAC/ABET), or a board-approved substantially equivalent program.*

NCEES expects all of its examination preparation to follow current *Model Law* and *Model Rules*. Model Law Surveyors should be utilized to prepare FS examinations, and Model Law Surveyors should be utilized to establish cut scores for FS examinations.

The content of the FS examination shall test the knowledge obtained in a baccalaureate surveying degree that will enable the individual to protect the public.

Recognizing that newly accredited EAC/ABET, ASAC/ABET, or ETAC/ABET programs must spend several years in development before attaining accredited status, NCEES recommends that all applicants be considered as having graduated from an EAC/ABET-, ASAC/ABET-, or ETAC/ABET-accredited program if their program is/was accredited within three years after their graduation.

* Refer to the NCEES position paper "Benefits of a Four-Year Degree Requirement for Surveying Licensure" (2011), available as a PDF on ncees.org under MyNCEES.

PS 13 NCEES-Recommended Education/Experience Guidelines for P.E. Licensing

4-Year or More Degree	Years of Experience Required	Comments
EAC/ABET Accredited	4	NCEES PS 8
Canada (CEAB) Accredited	4	
Other Countries	4 or more	Education should be evaluated for EAC/ABET equivalence.
Recommendations below are only for member boards that must evaluate applicants who do not meet the minimum education of an EAC/ABET or equivalent degree as specified in PS 8.		
Unaccredited Engineering Program	6	Needed by some boards
ETAC/ABET Accredited	6	Needed by some boards
Related Science*	8	Needed by some boards
No Degree	20	Needed by some boards

*A related science curriculum from a school or college approved by the board is defined as a four-year curriculum leading to a bachelor of science degree in chemistry, physics, mathematics, or similar science curriculum.

PS 14 Computer-Based Testing

The NCEES vision of computer-based testing (CBT) is as follows:

A. Conversion of the NCEES examinations to CBT should eventually include all exams.

B. The content areas, delivery methods, types, and processes associated with the CBT examination are expected to evolve and develop in order to remain current with the progress of professional practices as well as future technological advances to CBT.

PS 15 FE Examination as an Outcomes Assessment Tool

A. Engineering programs should strongly consider using the FE exam topic-level performance data as part of their program assessment, with proper regard for the caveats described.*

B. Programs that will gain the most from using the FE exam as an assessment tool are those programs in which all students are required to take the FE exam, all students are required to take the discipline-specific exam, the faculty establish specific goals for their program, and comparisons are made with peer institutions that have similar requirements.

C. Member boards (state boards) should become proactive in working with academic programs to stress the use and value of the FE exam as an assessment tool.

D. Institutions must remember that the primary purpose of the FE is to assess minimal technical competencies. Other assessment tools need to be used to assess higher-level theories or critical thought that might be the focus of some portion of their program.

E. The results of each FE exam should be sent directly to institutions for their use.

*Refer to: *Using the Fundamentals of Engineering (FE) Examination to Assess Academic Programs*, National Council of Examiners for Engineering and Surveying, March 2014.

PS 35 Future Education Requirements for Engineering Licensure

One of the goals of NCEES is to advance licensure standards for all professional engineers. Those standards describe the technical and professional competency needed to safeguard the health, safety, and welfare of the public. The Council recognizes that future demands for increasing technical and professional skills have resulted in the need for additional education beyond the bachelor's degree for those entering the engineering profession.

NCEES has identified several future pathways by which a candidate for licensure as a professional engineer might obtain the body of knowledge needed to meet these educational requirements, including the following:

A. A bachelor's degree in engineering from a program accredited by EAC/ABET and a master's or earned doctoral degree in engineering in the same technical area from an institution that offers EAC/ABET-accredited programs, or the equivalent

B. A bachelor's degree and a master's degree in engineering from a program accredited by EAC/ABET

C. A bachelor's degree from a program accredited by EAC/ABET that has a minimum of 150 semester credit hours, of which at least 115 semester credit hours are in mathematics, science, or engineering combined and at least 75 of these semester credit hours are in engineering

D. A bachelor's degree in engineering from a program accredited by EAC/ABET and at least 30 additional semester credit hours of upper-level undergraduate or graduate-level coursework in engineering on topics relevant to the practice of engineering (e.g., engineering-related science, mathematics, or professional practice topics such as business, communications, contract law, management, ethics, public policy, and quality control) from approved course providers (e.g., institutions that have EAC/ABET-accredited programs, or institutions or organizations accredited by an NCEES-approved accrediting body)

NCEES will continue to explore alternative educational pathways for candidates for licensure as professional engineers to develop the body of knowledge needed for entry into the profession. These alternatives will be developed through collaboration with technical engineering societies and other stakeholders engaged with the engineering profession.

C. Retirement of Licensure Option

When a professional engineer or professional surveyor in good standing desires to retire his or her license, he or she may do so upon application to the board. Upon meeting the requirements established by the board, a permanent identification card may be issued and the retired licensee shall receive all rights and benefits as established by the board. Upon retirement of said license, the retiree shall not practice the profession. (*Section 110.20 A.3 and B.2, Definitions, NCEES* Model Law)

D. Reissuance of Certificate

When a certificate of licensure, certificate of authorization, or enrollment card is lost, destroyed, or mutilated, it will be replaced upon request by a licensee, firm, or intern in good standing who has paid a fee established by the jurisdiction. (*Section 140.30, Issuance of Duplicate Certificates, NCEES Model Law and Section 160.60, Issuance of Duplicate Certificates, NCEES* Model Law)

240.15 Rules of Professional Conduct

To safeguard the health, safety, and welfare of the public and to maintain integrity and high standards of skill and practice in the engineering and surveying professions, the rules of professional conduct provided in this section shall be binding upon every licensee and on all firms authorized to offer or perform engineering or surveying services in this jurisdiction.

A. Licensee's Obligation to the Public

1. Licensees shall be cognizant that their first and foremost responsibility is to safeguard the health, safety, and welfare of the public when performing services for clients and employers.
2. Licensees shall sign and seal only those plans, surveys, and other documents that conform to accepted engineering and surveying standards and that safeguard the health, safety, and welfare of the public.
3. Licensees shall notify their employer or client and such other authority as may be appropriate when their professional judgment is overruled under circumstances in which the health, safety, or welfare of the public is endangered.
4. Licensees shall, to the best of their knowledge, include all relevant and pertinent information in an objective and truthful manner within all professional documents, statements, and testimony.
5. Licensees shall express a professional opinion publicly only when it is founded upon an adequate knowledge of the facts and a competent evaluation of the subject matter.
6. Licensees shall issue no statements, criticisms, or arguments on engineering and surveying matters that are inspired or paid for by interested parties, unless they explicitly identify the interested parties on whose behalf they are speaking and reveal any interest they have in the matters.
7. Licensees shall not partner, practice, or offer to practice with any person or firm that they know is engaged in fraudulent or dishonest business or professional practices.
8. Licensees who have knowledge or reason to believe that any person or firm has violated any rules or laws applying to the practice of engineering or surveying shall report it to the board, may report it to appropriate legal authorities, and shall cooperate with the board and those authorities as may be requested. (*Section 150, Disciplinary Action, NCEES* Model Law)
9. Licensees shall not knowingly provide false or incomplete information regarding an applicant in obtaining licensure.
10. Licensees shall comply with the licensing laws and rules governing their professional practice in each of the jurisdictions in which they practice.

B. Licensee's Obligation to Employer and Clients

1. Licensees shall undertake assignments only when qualified by education or experience in the specific technical fields of engineering or surveying involved.
2. Licensees shall not affix their signatures or seals to any plans or documents dealing with subject matter in which they lack competence, nor to any such plan or document not prepared under their responsible charge.
3. Licensees may accept assignments and assume responsibility for coordination of an entire project, provided that each technical segment is signed and sealed by the licensee responsible for preparation of that technical segment.
4. Licensees shall not reveal facts, data, or information obtained in a professional capacity without the prior consent of the client, employer, or public body on which they serve except as authorized or required by law or rules.
5. Licensees shall not solicit or accept gratuities, directly or indirectly, from contractors, their agents, or other parties in connection with work for employers or clients.
6. Licensees shall disclose to their employers or clients all known or potential conflicts of interest or other circumstances that could influence or appear to influence their judgment or the quality of their professional service or engagement.
7. Licensees shall not accept compensation, financial or otherwise, from more than one party for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to in writing by all interested parties.
8. Licensees shall not solicit or accept a professional contract from a governmental body on which a principal or officer of their organization serves as a member. Conversely, licensees serving as members, advisors, or employees of a government body or department, who are the principals or employees of a private concern, shall not participate in decisions with respect to professional services offered or provided by said concern to the governmental body that they serve.
9. Licensees shall not use confidential information received in the course of their assignments as a means of making personal profit without the consent of the party from whom the information was obtained.

C. Licensee's Obligation to Other Licensees

1. Licensees shall not falsify or permit misrepresentation of their, or their associates', academic or professional qualifications. They shall not misrepresent or exaggerate their degree of responsibility in prior assignments nor the complexity of said assignments. Presentations incidental to the solicitation of employment or business shall not misrepresent pertinent facts concerning employers, employees, associates, joint ventures, or past accomplishments.
2. Licensees shall not offer, give, solicit, or receive, either directly or indirectly, any commission, or gift, or other valuable consideration in order to secure work, and shall not make any political contribution with the intent to influence the award of a contract by public authority.
3. Licensees shall not injure or attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other licensees, nor indiscriminately criticize other licensees' work.
4. Licensees shall make a reasonable effort to inform another licensee whose work is believed to contain a material discrepancy, error, or omission that may impact the health, safety, or welfare of the public, unless such reporting is legally prohibited.