Accrediting US Surveying Programs

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SUMMARY

ABET is an international organization originating in the US which accredits most US surveying education programs. ABET consists of several commissions with most US and international surveying programs being accredited under the Applied Science Accrediting Commission (ASAC). ASAC considers eight factors when reviewing educational programs: students, educational objectives, student learning outcomes, continuous improvement, curriculum, faculty, facilities and institutional support. General discussion of the ABET process for accrediting surveying programs is reviewed.

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1. INTRODUCTION

ABET is an international accreditation organization for computing, applied science, engineering and engineering technology programs. Originating in the United States, it accredits 3,100 programs at more than 660 colleges and universities. Of these programs, 268 programs are at 55 institutions in 22 countries outside of the United States (ABET). Currently there are 20 US four year surveying and/or geomatics programs accredited under three different ABET commissions.

ABET criteria for accreditation are meant to ensure that students at the accredited programs receive a solid education that enables students to acquire knowledge and skills making them capable of leading the way in innovation and emerging technologies. The specific criteria for any given discipline are created by professional societies who also contribute volunteers who participate in the review of programs under their discipline.

2. THE ABET ACCREDITATION PROCESS

ABET accredits individual programs, not institutions. Programs which cross boundaries between professions must meet the criteria of each profession. The process takes eighteen months to complete. Institutions must submit a "Request for Accreditation" and must meet certain eligibility requirements before the process can begin. Requests for accreditation are submitted in January of the year. A request must be submitted for each program desiring accreditation. Once the request is accepted, each program must complete a self-study in which they describe how they meet the accreditation general and program criteria. General criteria are the same for all programs under an ABET commission while program criteria are specific to the discipline. The self-study is sent to ABET by July 1 following the request for accreditation.

The self-studies are then assigned to teams which consist of a Team Chair and one or more Program Evaluators. All Team Chairs and Program Evaluators are unpaid volunteers. Their travel expenses are paid by ABET through fees charged to accredit each program. A Team Chair is assigned for each institution and a Program Evaluator is assigned for each program. If more than one ABET commission is involved, each commission will have its own Team Chair and Program Evaluators. The Team Chair and Program Evaluator read the self study and prepare for on onsite visit normally during the months of October and November. The Team Chair reviews the institution while the Program Evaluators look at student material, teaching facilities and teaching equipment. Both interview relevant people ranging from faculty to students to administrators. The Team Chair and Program Evaluators then prepare a statement declaring their findings. The onsite review is typically a 3 day process.

At the end of the onsite visit, the Team Chair and Programs Evaluators present their findings to the program chair, dean and president or chancellor of the university. The findings are not subject to discussion. A sheet with the site visit evaluation findings is left at the institution with the president.

The institution has 7 days to correct any findings. Then a draft statement is prepared by the Team Chair, reviewed by ABET editors and sent to the institution. The institution can have started making changes from the time of the site visit to fix any problems. The institution can report on the changes that were made after the site visit and the Team Chair will review the institution report and draft a final report for presentation to the ABET commission for consideration of accrediting action to be taken by the commission.

Site visit findings are of three levels: deficiency, weakness, or concern. A finding of a deficiency means that the institution is not in compliance with one of the criteria. A finding of a weakness means that the compliance to the criteria is such that it barely meets the level needed and is in danger of becoming a deficiency. A finding of concern means that the criteria are being met but there exist conditions that may lead to the criteria not being met in the future.

3. ABET CRITERIA

The ABET criteria cover eight areas: students, educational objectives, student learning outcomes, continuous improvement, curriculum, faculty, facilities, and institutional support.

3.1. Students

The criterion requires that student progress be monitored and that students receive advising on curricular and career issues. There must be policies in place for accepting new and transfer students as well as accepting courses from other institutions. There must be written policies in effect that ensure that all students meet all of the curriculum requirements.

The institution must show how they are assisting students in achieving student learning outcomes and educational objectives. Written evidence is supplied by the institution in the self study or at the time of the site visit to support the achievement of this criterion.

3.2. Educational Objectives

The criterion states that programs must have published educational outcomes that meet the needs of the program constituencies, including the profession and those hiring graduates of the program. The educational objectives must be in compliance with the institutional mission. Normally, educational objectives are achievements that graduates of the program should attain within 3 to 5 years after graduation. The program must demonstrate that these objectives are reviewed and that measures are taken to see if the objectives are being met. The educational objectives should be revised as necessary to meet any changes in the marketplace. A written process of how the educational objectives are reviewed and revised

must be in place.

3.3. Student Learning Outcomes

Student learning outcomes are the knowledge and abilities that students acquire during their time of education at the institution. They must relate directly to a set of criteria established by ABET to include:

- an ability to apply knowledge of mathematics, science, and applied sciences
- an ability to design and conduct experiments, as well as to analyze and interpret data
- an ability to formulate or design a system, process, or program to meet desired needs
- an ability to function on multidisciplinary teams
- an ability to identify and solve applied science problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of solutions in a global and societal context
- a recognition of the need for and an ability to engage in life-long learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.

The program must provide learning instances, such as projects or exam questions, that demonstrate that the students have achieved the stated understanding or skill noted. Written evidence of student learning outcome achievement must be available at the time of the site visit.

3.4. Continuous Improvement

The program must demonstrate that it is improving the program through the use and monitoring of student outcomes. Changes should be made where student outcomes are being poorly achieved or are not being achieved at all. There should be a documented process for monitoring the student outcomes and making necessary changes. The process should be systematic and written evidence, such as faculty meeting minutes and advisory committee minutes, must be available for review at the time of the site visit.

3.5. Curriculum

The program must demonstrate how the curriculum devotes time to mathematics, science, professional topics and general education topics. The mathematics and science must be appropriate to the profession and the program must demonstrate that appropriate attention is being made to each area. The program must also demonstrate how courses build into the knowledge and skills needed for graduates to be able to achieve the educational objectives.

In addition to ABET general criteria, certain professions may require specific mathematics or

science or other coursework be in place in the curriculum. These are general found under program specific criteria.

3.6. Faculty

The criterion requires that all faculty members be qualified by appropriate education and experience. Faculty member competence must be demonstrated by professional certification or licensure, work experience, ongoing professional development and teaching effectiveness. The number of faculty must be sufficient to teach the breadth of the program and maintain program oversight, student advising, and ensure the continuity of the program. Faculty must also have the authority to revise courses and the curriculum to achieve student learning outcomes and educational objectives.

Again, program specific criteria may require special competence, such as professional licensing, for the teaching of certain topics.

3.7. Facilities

Classroom, faculty offices, laboratories, and associated equipment must be adequate to achieve student learning outcomes and provide a setting that promotes learning. Equipment must be maintained and in good working order. Equipment must also be appropriate to the teaching of modern professional methods. Students must have access to computers, libraries, and other necessary facilities. Students must be provided guidance and oversight on the use of equipment and facilities. Libraries must be of sufficient quality to promote student and faculty scholarly activities. During the site visit the Program Evaluator will inspect equipment and rooms as well as support facilities such as the library to ascertain their adequacy.

3.8. Institutional Support

The final criterion requires that the institution demonstrate its support for the program being evaluated. Leadership and financial support for the program must be adequate to ensure continuity and quality in the program. Resources must be sufficient to attract and retain qualified faculty and technical support. Resources must also be adequate to maintain facilities and equipment and provide for a setting in which student learning outcomes may be achieved.

4. ACCREDTATION ACTIONS

A program which is seeking accreditation for the first time and receiving one or more deficiencies will not receive ABET accreditation. If they already have accreditation from a previous commission site visit, it will be given a two year span to remove the deficiencies or face losing their accreditation. Programs no deficiencies but having one or more weaknesses will have to either submit an interim report detailing measures used to address the weaknesses or, if the weaknesses are serious, submit to an interim visit in two years to prove that the weaknesses have been dealt with. Normally an interim visit is given only if there is a concern

from the commission that an interim report will not be sufficient. Programs having no deficiencies and no weaknesses are normally given a 6 year accreditation.

5. SURVEYING AND GEOMATICS PROGRAM ACCREDITATION

As stated earlier, programs are accredited in ABET under one of four commissions. All of the surveying programs are currently accredited under the Engineering Accreditation Commission (EAC), the Applied Science Accreditation Commission (ASAC) or the Engineering Technology Accreditation Commission (ETAC).

Program accreditation standings can be found on the ABET website (http://main.abet.org/aps/Accreditedprogramsearch.aspx). There are currently six surveying or geomatics programs accredited under EAC:

- California State Polytechnic University, Pomona (California)
- California State University, Fresno (California)
- Ferris State University (Michigan)
- Florida Atlantic University (Florida)
- New Mexico State University (New Mexico)
- Penn State University, Wilkes-Barre Campus (Pennsylvania)

Most US surveying and geomatics 4 year programs are accredited under the ASAC. They are:

- East Tennessee State University (Tennessee)
- Nicholls State University (Louisiana)
- Oregon Institute of Technology
- Southern Polytechnic University (Georgia)
- St. Cloud University (Minnesota)
- Texas A&M University, Corpus Christi Campus (Texas)
- The University of Akron – Summit College (Ohio)
- Troy State University (Alabama)
- University of Alaska, Anchorage (Alaska)
- University of Florida (Florida)

Finally, the remaining 4 year surveying and geomatics programs are accredited under ETAC:

- Alfred State College (New York)
- Idaho State University (Idaho)
- New Jersey Institute of Technology (New Jersey)
- University of Maine (Maine)

There are at present no ABET accredited surveying or geomatics programs outside the United States. However, many other disciplines have ABET accredited program in 22 countries outside the US.

6. ADVANTAGES OF ABET ACCREDITATION

The advantages of ABET accreditation for US surveying and geomatics programs is related to survey licensing matters. Surveyors must obtain a separate surveying license in every state where they plan to practice surveying. Survey license applicants and licensed surveyors who are graduates of an ABET accredited surveying or geomatics program find that their credentials are much more easily accepted by the state licensing boards.
Surveyors in the US are not normally given reciprocity (a surveyor licensed in state A can automatically become licensed in state B) but have to rely on comity. Under comity, the applicant's credentials are accepted but the applicant must still meet other criteria. States which currently require a 4 year university degree the applicant must have a 4 year degree but often require an applicant to take and pass a written or oral exam on state surveying laws and regulations.

Surveying and geomatics graduates receiving an ABET accredited degree are not limited to practice surveying in the state in which they received their degree. They are free to travel and to become licensed in several states should they wish to do so.

7. CONCLUSIONS

There are 20 surveying and geomatics four year programs in the US that are accredited under ABET. ABET requires that programs demonstrate the students are being monitored and advised, the there are educational objectives that are re-evaluated on a regular basis, that student learning outcomes are developed, measured and results examined, that there is a continuous improvement process that uses student learning outcomes and other measures to improve the quality of the program, that the curriculum used to teach the students is appropriate, that the faculty are qualified and proficient, that the facilities and equipment used to teach students are appropriate for a good learning environment, and that the institution adequately supports the program through faculty, technical staff, equipment and facilities.

ABET accreditation assists surveying and/or geomatics graduates with becoming licensed surveyors through educational requirements and allows surveyors to become licensed in several states.

REFERENCES

ABET: www.abet.org

BIOGRAPHICAL NOTES

Dr. Steven M. Frank is a Professor in the Surveying Engineering program at New Mexico State University where he has taught surveying for more than 18 years. He is currently the Chair of FIG Commission 2. He is also currently the chair-elect of the ABET ASAC commission and has more than 12 years experience working as an ABET volunteer. He has been a president of the New Mexico Professional Surveyors and the American Association for Geodetic Surveying. He was selected as the New Mexico Surveyor of the Year in 2007.

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