ABET and the Accreditation of Applied Sciences Programs

By

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Introduction

ASEE members are quite familiar with ABET accreditation of engineering and engineering technology programs. A vast quantity of information about the accreditation of all ABET programs is available at the ABET website\(^1\). This paper discusses the ABET accreditation of programs in applied sciences through the Applied Sciences Accreditation Commission (ASAC). There are mutually beneficial opportunities for ABET and ASEE to work together to promote the profession through this relatively new ABET commission. First, it is useful to review a sketch of ABET’s history.

ABET was founded in 1932 as the Engineers Council for Professional Development (ECPD). The first date for the accreditation of engineering programs is 1936. In just a couple of years, a good number of engineering programs will celebrate 70 years of continuous accreditation. Shortly after WW II, ECPD began accrediting associate degree programs. In the late 1960’s ECPD began accrediting BS programs in engineering technology. In the present ABET organization, engineering programs are accredited under the aegis of the Engineering Accreditation Commission (EAC) and those in engineering technology are accredited by the Technology Accreditation Commission (TAC). With the recent merger of ABET and the Computer Science Accreditation Board (CSAB), the Computing Accreditation Commission (CAC) was created, which deals with the accreditation of programs in computer science.

Soon after the reorganization from ECPD to ABET, it was recognized that there was a need for the accreditation of programs that are related to but different from either engineering or engineering technology. This led to the formation of the Related Accreditation Commission (RAC), which began to function during 1984-1985. The RAC name was changed to the Applied Sciences Accreditation Commission (ASAC) at the time of the merger of ABET and CSAB. With almost two decades of operational experience with the RAC and ASAC, it is mutually beneficial for ABET and ASEE to bring an update of the features of this organization to the attention of ASEE members because there are definitely opportunities to work together to bring new program areas involving the applied sciences.

As this paper is being prepared, the four commissions are working on updated definitions of engineering, technology, applied science, and computer science that will be recommended for adoption by the ABET Board. The definitions will guide new programs in determining which commission will be most effective in evaluating the program. Issues that are common to the several commissions, such as definitions, are discussed by the Accreditation Council. The Accreditation Council has been in existence since 2001, and it is comprised of representatives from each commission. The commissions work together through the Accreditation Council to develop policy for recommendation to the ABET Board and improve consistency of accreditation processes.
Commensurate with the criteria transformations in the EAC and the TAC, the ASAC criteria are also becoming outcomes based. This paper will consider only the newer form of the ASAC criteria, even though institutions had the choice of being evaluated using conventional criteria or the newer ASAC 2001 criteria during the 2003-2004 accreditation cycle. Only the newer ASAC 2001 criteria will be used after the 2003-2004 accreditation cycle.

**ASAC Mission**

The mission of the ASAC is to accredit, based on a voluntary request by the institution, engineering-related applied science programs. These programs may be at the associate, baccalaureate or the master’s level. They include a range of disciplines but have their roots in engineering-related matters and they are guided by established professional/technical societies. The ASAC does not accredit programs meeting only the general criteria. Only programs meeting one of the approved program criteria as developed by an ABET participating professional/technical society will be considered for accreditation.

Comprehensive information about all aspects of ASAC/ABET accreditation is available at the ABET website.

**ASAC Programs**

The 2002 ABET Accreditation Yearbook lists 47 institutions with ASAC/ABET accredited programs. A number of these institutions also have either EAC/ABET or TAC/ABET accredited programs and there are institutions having both EAC/ABET and TAC/ABET accredited programs as well as ones that are ASAC/ABET accredited. There is also the possibility of having CAC/ABET accredited programs with any of the preceding combinations.

Of the 62 ASAC/ABET accredited programs, two are associate degree programs, 19 are baccalaureate degree programs, and 41 are at the master’s level. The programs fall into several categories: Safety with two AS, four BS and three MS programs; Industrial Hygiene with five BS and 38 MS programs; Industrial Management with only one BS program; and Surveying with nine BS programs. The most recent list of programs accredited through each of the four commissions is updated annually by ABET following the fall meeting of the ABET Board of Directors; the list of accredited programs can be found on the ABET web site.

As with the EAC and the TAC, the ASAC structure is composed of commission members from eight professional/technical societies that are ABET participating or affiliate bodies: the American Academy of Environmental Engineers (AAEE), the American Congress of Surveying Engineers (ACSM), the American Industrial Hygiene Association (AIHA), the American Society of Civil Engineers (ASCE), the American Society of Safety Engineers (ASSE), the Institute of Industrial Engineers (IIE), the National Council of Examiners of Engineers and Surveyors (NCEES), and the Society of Manufacturing Engineers (SME). The composition of the ASAC and the other ABET commissions are listed in the 2004 ABET General Directory.

**ASAC Accreditation Criteria**
The ASAC accreditation criteria are in transition from conventional criteria to ones aligned with the outcomes-based EAC EC 2000 criteria and the ET2K Engineering Technology Criteria 2000. Only the new criteria will be discussed since they will soon be applied to all programs.

The ASAC Accreditation Criteria 2001 were optional for the 2001-2002 accreditation cycle. Like the EAC and the TAC, there are ASAC General Criteria plus Program Criteria. Although the descriptions differ, the title nomenclature for the ASAC General Criteria is identical to the eight EAC EC 2000 criteria, namely:

- Criterion 1. Students
- Criterion 2. Program Educational Objectives
- Criterion 3. Program Outcomes Assessment
- Criterion 4. Professional Component
- Criterion 5. Faculty
- Criterion 6. Facilities
- Criterion 7. Institutional Support and Financial Resources
- Criterion 8. Program Criteria

There are differences for the three levels of programs. The main thrust of the criteria is oriented towards the baccalaureate programs. The criteria for the master’s level programs include those for the baccalaureate level programs with the addition of one year of study beyond the baccalaureate level plus a project or research activity culminating in a report demonstrating mastery of the subject at a higher level and with commensurate communication skills. The Criteria 2001 for associate degree programs restate the eight criteria, reflecting lesser expectations than for the baccalaureate level programs.

Some of the criteria are quite similar to those for EC 2000 and ET2K. For example, Criterion 3 for the ASAC baccalaureate programs has items (a) through (k) that are similar to those in EC 2000 with the word engineering being replaced with engineering-related.

Criterion 4, Professional Component, is less specific than is Criterion 4 for engineering programs or the corresponding Criterion 2 for engineering technology programs. This reflects the broad range of applied science programs so Criterion 4 places substantially greater responsibility on the institution to define the professional component requirements of the applied science, engineering-related program. The ASAC 2001 Criterion 4 requires:

(a) a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline
(b) engineering-related topics appropriate to the program
(c) a general education component that complements the technical content of the curriculum and is consistent with program objectives.

Consequently, Program Criteria (Criterion 8) tend to be more specific than is the case in engineering and some are more detailed. This is logical since some of the programs in areas such as Industrial Hygiene must prepare graduates to fulfill rather specific practice regulations. As a result, the requirements for mathematics, science, and the engineering-related courses are rather specific.

Seeking ASAC/ABET Accreditation
As for all other ABET accredited programs, ASAC/ABET accreditation occurs only after ABET receives an invitation from the institution. The forms for requesting an ASAC/ABET accreditation visit are identical to those for requesting ABET accreditation through the other commissions. Forms are available from the ASAC/ABET web site through the link Request for Evaluation. The normal schedule for engineering and engineering technology visits is followed for the ASAC visits. Thus, the request for evaluation is expected by January 31st and the self-study volumes are due on July 1st. The visits normally occur during the ensuing fall.

**Opportunities with Currently Accredited ASAC/ABET Program Areas**

The 2004-2005 ASAC/ABET Program Criteria indicate a considerable range of opportunities for the accreditation of attractive programs. The current programs, their lead and cooperating societies, and the levels of the programs for which there are published criteria include: (Note: all programs include the term “and Similarly Named Applied Science Programs.)

- **Health Physics**
  - Levels: BS, MS
  - Lead Society: Health Physics Society
  - Cooperating Society: American Nuclear Society

- **Industrial Hygiene**
  - Levels: BS, MS
  - Lead Society: American Industrial Hygiene Association
  - Cooperating Society: American Academy of Environmental Engineers

- **Industrial Management or Quality Management**
  - Levels: BS, MS
  - Lead Society: Institute of Industrial Engineers
  - Cooperating Society: Society of Manufacturing Engineers

- **Safety**
  - Levels: AS, BS, MS
  - Lead Society: American Society of Safety Engineers

- **Surveying and Mapping**
  - Level: BS only
  - Lead Society: American Congress on Surveying & Mapping
  - Cooperating Society: American Society of Civil Engineers

There is definite activity in the applied sciences area as indicated by the number of proposed new program criteria. The list of proposed program criteria and the levels of the programs includes:

- **Surveying, Geomatics**
  - Level: BS only
  - Lead Society: American Congress on Surveying & Mapping
  - Cooperating Society: American Society of Civil Engineers

- **Environmental, Health and Safety**
  - Levels: BS, MS
  - Lead Society: American Industrial Hygiene Association
  - Cooperating Society: American Society of Safety Engineers

- **Safety, Health, and Environmental**
  - Levels: BS, MS
Given the explosion of satellite-based positioning and navigational systems and the increasing need for spatially related information, there appear to be extensive opportunities for programs related to surveying and mapping. Surveying and mapping programs have traditionally been related to civil engineering or civil engineering technology departments; however, new programs emphasizing geographic information systems (GIS), resource mapping, or spatial information databases may be based in geography or computer science departments or in agriculture or forestry departments.

The safety-related applied science programs definitely encompass areas of industrial engineering and manufacturing engineering, but they also apply to nuclear engineering and others, such as chemical engineering and mining engineering.

The environmental applied sciences programs are often affiliated with departments of civil and environmental engineering, but they can also be related to programs in chemical engineering, meteorology, and atmospheric sciences.

There are undoubtedly ways for biomedical engineering programs to interface with some of the environmental health programs and there are certainly environmental health and safety implications for medical instrumentation programs.

**Potential for New Programs**

The advantages of ABET accreditation should present opportunities in yet-unexplored affiliations. There are safety issues related to the control of robots that aren’t limited to the application of robots in manufacturing. Manipulators are being used in surgical applications that may afford opportunities for integrating programs in control systems with biomedical engineering and related engineering disciplines.

Any discipline that requires registration for practice may benefit from accreditation of the academic programs that prepare graduates to enter the registration process. Geologists and landscape architects may find a natural affiliation with related engineering disciplines and other sciences through the ASAC.

Other potential opportunities might also be beneficial. There is much concern about the quality of pre-college mathematics and science teaching. Perhaps there are alliances with colleges of education that might couple with organizations such as the American Association of Physics Teachers to generate options that are geared to produce superior teachers of pre-college applied science courses or stronger applied science courses in community and junior colleges.

**Additional Guidance**

Whether it is beginning the accreditation of an applied science program in a discipline already available through ASAC/ABET or exploring an interest in laying the groundwork for developing
an accreditation route for a new discipline under the ASAC, the first step is to communicate with ABET headquarters or the chair of the ASAC. Two primary ABET contacts are Ms. Ellen Stokes, Accreditation Manager, and Dr. Dan Hodge, Director of Accreditation. They can be reached through ABET’s main telephone number (410) 347-7700 or by e-mail at accreditation@abet.org. The mailing address for ABET is:

ABET, Inc  
111 Market Place, Suite 1050  
Baltimore, MD 21202

There are also contacts within the ASAC. Steven Johnson, co-author of this paper is the chair-elect of the ASAC and the other co-author, John Weese is the liaison to the ASAC from the ABET Board of Directors; Weese is ASEE’s representative to the ABET Board. Their contact information is listed at the end of this paper. The chair of the ASAC is Dr. Robert A. Herrick, President of Herrick Engineering, Inc., and his e-mail address is rherrick@mindspring.com.

There is a strong emphasis on cross-disciplinary programs as well as creativity and innovation within ABET. It is a propitious time to explore new avenues.

References

1. ABET website, http://www.abet.org
4. 2004 ABET General Directory; ABET Inc., 111 Market Pl Suite 1050, Baltimore, MD 21202

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