ABET Systems Engineering Accreditation

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ABET

- Systems engineering programs at universities in the United States are currently being evaluated using ABET’s general engineering program criteria
- A lead society for systems engineering accreditation has not been appointed.

ABET SE Accreditation Task Force

- A Task Force must be formed to accomplish the following goals:
  - Help build relationships with other engineering societies, university engineering departments and industry
  - Identify the key university faculty and administrators who have responsibility for the systems engineering programs at their universities and engage them in our application process.
  - Identify the key member leaders and staff at our “sister societies” involved in ABET systems engineering program evaluation and engage them in the application process.
  - Identify the key officials and managers at the leading industries using systems engineering and engage them in our application process.
  - Form a “Bridge” Executive Council to facilitate the synchronization efforts
The Participation of Other Engineering Societies

- INCOSE cannot handle the evaluation of systems engineering programs entirely with its own members.

- Systems engineering is such a broad ranging discipline that the correct and fair assessment of the various programs can only be done by members of different engineering societies each with specific areas of expertise.

Effect on Accredited Universities

- ABET’s general engineering program criteria must be used for the evaluation of systems engineering programs.

- Any changes to the systems engineering accreditation criteria in the future would take place only if driven by both industry and universities with the affected programs.

Systems Engineering Degree Programs in the United States

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Abstract:
- The authors have observed a widespread need for general information regarding the availability and characteristics of Systems Engineering (SE) academic degree programs.
- This paper provides a compilation of SE degree programs in the United States, giving insight regarding:
  - Academic content, administrative structure, accreditation status, and
  - Establishes a benchmark for the continued advancement of these degree programs.

Introduction:
- Systems Engineering degree programs are probably the most tangible and visible connection between academic institutions and the private and public domains comprising industry and government.
- B.S.- Programs of study leading to basic and advanced degrees provide opportunities for individuals to prepare themselves for professional practice.
- M.S.- Programs of advanced study within academia are promulgated concurrently with creative scholarship and research projects, with the benefits awaiting recognition within industry and government.
- Ph.D.- Further, at the doctoral level, degree programs and research prepare individuals for the professorial ranks.

Role of INCOSE
- It is encouraging to note that most schools and colleges of engineering are continually evolving their course offerings and degree requirements.
- Faculty members and administrators from these institutions meet periodically with corporate and governmental leaders to discover and consider changing needs.
- This same propensity compels most to seek formal peer approval in the form of programmatic accreditation through the Accreditation Board for Engineering and Technology (ABET).
- The Systems Engineering "voice" of government, industry, and even academia will grow increasingly stronger as the International Council on Systems Engineering (INCOSE) continues to emerge as the lead society for the SE body of systematic knowledge.
Categories of Systems Engineering Degree Programs

- Seventy three (75) institutions in the United States offer 130 undergraduate and graduate degree programs in Systems Engineering (SE). To facilitate analysis, we partition these programs into two broad categories:
  - SEC- Systems Engineering Centric Programs and
  - DCSE- Domain Centric Systems Engineering Programs.

Systems Engineering Centric (SEC) Programs.

- Basic and advanced level programs leading to a bachelors or higher degree in Systems Engineering comprise a distinct category with a discipline-like focus.
- Included herein are only those degree programs where the concentration is designated as Systems Engineering; where SE is the intended major area of study.

SEC Programs

- There are currently 31 institutions offering 48 degree programs in the SE Centric category. The count by degree program level is given in Table 1:

<table>
<thead>
<tr>
<th>Level</th>
<th>BS</th>
<th>MS</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>11</td>
<td>27</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Systems Engineering Centric Programs (Appendix A)
Table 2. Domain Centric Systems Engineering Programs (from Appendix A)
Table 8. Systems Engineering Programs Accredited Under the ABET "Other" Category

- Air Force Institute of Technology; M.S. in Systems Engineering—DCSE
- Case Western Reserve University; B.S. in Systems and Control Engineering—SEC
- George Mason University; B.S. in Systems Engineering—SEC
- Oakland University; B.S. in Systems Engineering—SEC
- Ohio State University; B.S. in Industrial and Systems Engineering—DCSE
- Rensselaer Polytechnic Institute; B.S. in Computer and Systems Engineering—DCSE
- San Jose State University; B.S. in Industrial and Systems Engineering—DCSE
- State University of NY at Binghamton; B.S. in Systems and Industrial Engineering—DCSE
- United States Military Academy; B.S. in Systems Engineering—SEC
- University of Arizona; B.S. in Systems Engineering—SEC
- University of Arkansas at Little Rock; B.S. in Systems Engineering—DCSE
- University of Delaware; B.S. in Systems Engineering—DCSE
- University of Florida; B.S. in Systems Science and Engineering—SEC
- University of Pennsylvania; B.S. in Systems Science and Engineering—SEC
- Virginia Tech; B.S. in Industrial and Systems Engineering—DCSE
- Washington State University; B.S. in Industrial and Systems Engineering—DCSE
- Youngstown State University; B.S. in Industrial and Systems Engineering—DCSE
## Anticipated INCOSE Role Within ABET

- INCOSE aspires to become the lead professional society for accrediting Systems Engineering programs through ABET.
- Program criteria, now being established at the basic and advanced levels for these programs, will emphasize the process and means embraced by the INCOSE definition of Systems Engineering, as well as the need for systems thinking within the profession of engineering.
- INCOSE has a unique dual role to fulfill within ABET. Systems Engineering Centric (SEC) programs provide one academic population and Domain Centric SE Programs (DCSE) provide another. The latter must be pursued in cooperation with the participating bodies representing the domains of engineering.

## Why INCOSE for SE ABET?

- INCOSE was founded in 1990 and is now solidly established and rapidly expanding domestically and internationally.
- Its activities are focused to develop, nurture, and enhance the interdisciplinary approach in the realization of successful systems via its strong and enduring ties with industry, academia, and government. In this symbiotic relationship, INCOSE will continue to:
  - Provide a focal point for dissemination of Systems Engineering knowledge.
  - Promote collaboration in Systems Engineering education and research.
  - Assure the establishment of professional standards for integrity in the practice of Systems Engineering.
  - Improve the professional status of persons engaged in the practice of Systems Engineering.
  - Encourage governmental and industrial support for research and educational programs that will improve the Systems Engineering process and its practice.

## Conclusion

- INCOSE has an opportunity and obligation to advance its interest in the quality of Systems Engineering education by offering to support the mission of ABET.
- The ABET opportunity is viewed by INCOSE to be critical to the advancement of SE in its own right as well as essential to the infusion of SE thinking within the domain manifestations of engineering.
- INCOSE desires to lead in the category of SE Centric programs and collaborate with the professional bodies now participating in ABET for Domain Centric SE programs.