

TUNING ENGINEERING PROGRAMS IN THE CONTEXT OF ABET ACCREDITATION

Tuning is the faculty-led process of defining a body of knowledge and skills for an engineering discipline in terms of outcomes and levels of achievement of its graduates. Further, Tuning provides an expected level of achievement at each step along the process of becoming a professional: expectations at the beginning of pre-professional study, at the beginning of professional study, and at the transition to practice. Tuning can also define the competencies achieved through experience after formal education. Through Tuning, students have a clear “picture” of what is expected and can efficiently plan their educational experience to achieve those expectations.

Criterion 2 and Criterion 3 of the ABET criteria for accrediting engineering programs provide the foundation as well as the motivation for “tuning” engineering programs. Criterion 2 requires that each accredited program develop program educational objectives (PEO’s), the career and professional accomplishments that the program is preparing its graduates to achieve, at some point after graduation (typically five years after graduation). The PEO’s are crafted by each program for its particular and unique mission. Criterion 3 provides for program outcomes, describing what students are expected to know and be able to do by the time of graduation. Some disciplines specify additional outcomes that are expected of their graduates. For example, the American Society of Civil Engineers (ASCE) expects civil engineering baccalaureate graduates to have breadth as well as depth in multiple fields of civil engineering. For advanced programs (graduate programs) very little is specified in regard to program outcomes.

The Tuning process does not seek to supplant these criteria of ABET with different or expanded criteria. Rather, Tuning is complementary to ABET in that it seeks to define in specific and assessable terms the elements of the PEO’s and the program outcomes with corresponding levels of achievement at critical milestones in the education of an engineer. The Tuning process also calls upon disciplines to write Degree Profiles in terms of general and discipline-specific competencies their students will achieve, at specified levels. Tuning thus facilitates demonstrating achievement of the program outcomes as students move through the educational process. It also provides a framework for demonstrating the degree to which program objectives are attained. Tuning produces assessable learning outcomes that can be used for assessment at multiple levels. Further, through defined surveys of employer and stakeholder needs, Tuning establishes priorities in the program’s PEO’s. Tuning also develops an employability map showing students the variety of employment options to which their degree can lead. All of these tools provided by the Tuning process help students, parents, and policy makers understand clearly the academic preparation necessary to seek employment in the field.

In addition to these complementary activities that directly support EAC/ABET accreditation, Tuning emphasizes transparency in learning outcomes and degree definitions so that prospective students and parents, interested observers from other disciplines, employers, and policy makers can see clearly what students are expected to know, understand, and be able to do when they graduate from a program, (i.e., the knowledge, skills, and attitudes they are to have developed at program milestones). They can also see what kind of employment opportunities a graduate might reasonably expect. This transparency allows students and parents to make better informed choices at the outset of a program, potentially making it possible to plan a more efficient and cost-effective educational path. Tuning also helps make the case for the value of graduates to employers and policy makers.

A distinct aspect of Tuning is that students are included in all the deliberations about program outcomes and possible levels of achievement. They provide feedback based on their actual experience in the program, thereby providing a reality check on the learning outcomes and other products of the Tuning process. Although this has already been done at the department level in most cases, the role of students is especially critical to Tuning because levels of competency are being defined at critical milestones and agreed upon across diverse institutions.

Tuning is a faculty-driven process that aims to define what students are expected to know, understand, and be able to do when they graduate from a program; to align these expectations with the needs of employers and society; to keep the expectations realistic and consistent with students' actual experience; and to make these expectations clear and transparent to a wide audience. Tuning does not dictate to the faculty how to achieve these aims. This approach is consistent with the EAC/ABET Criterion 5, Curriculum, that explicitly avoids prescribing specific courses or other curricular details. Both ABET and Tuning explicitly recognize that different institutions and different programs have different missions, different student populations, and different employer groups. Thus, the details of individual programs must continue to be developed as appropriate for the individual institutions – all degrees in a given engineering discipline provide the same fundamental competencies, but how these are achieved will vary from institution to institution. Further, institutions and programs will likely develop additional PEO's and outcomes and associated competencies to support their unique missions.

Finally, the next ABET accreditation cycle need not duplicate effort expended on Tuning. Tuning can be carried out in a format suitable for ABET accreditation reviews. To minimize duplication, all the products of Tuning should be prepared so they can also be used for accreditation, and they should be prepared in a form that makes program improvement most efficient and accessible.