ABET accreditation

About ABET

Accreditation Board for Engineering and Technology (ABET), is a non-governmental organization that accredits post-secondary education programs in applied and natural science, "computing, engineering, and engineering technology".

From ABET.org, 3,709 programs are accredited, distributed over 752 universities and colleges in 30 countries.

ABET Value (from ABET.org)

ABET accreditation is proof that a collegiate program has met standards essential to produce graduates ready to enter the critical fields of applied science, computing, engineering, and engineering technology. Graduates from an ABET-accredited program have a solid educational foundation and are capable of leading the way in innovation, emerging technologies, and in anticipating the welfare and safety needs of the public.

Getting Accredited

ABET accreditation is the culmination of a practice of ongoing self-assessment and continuous improvement, which assures confidence that ABET-accredited programs are meeting the needs of their students, preparing graduates to enter their careers, and responsive to the needs of the professions and the world. This process has to be initiated by the institution.

Department Updates

Department Support

In October 2018, the CS/IT/EMEC faculty voted unanimously to adopt ABET Student Learning Outcomes (SLO), which correspond to program educational objectives. (There were 21 “Yes” votes out of 21 who voted - everyone teaching at the time, plus the Lab Technician Ricky Medrano.) The next steps will be to align these SLOs with select CS/IT/EMEC courses.

About this Document

This document aims to track CS/IT/EMEC progress through the accreditation process. The document may be shared with key stakeholders including CI administration and the CS Advisory

Board. Stakeholders will be notified to document changes periodically. Departmental votes will be required to address significant changes to the ABET accreditation process and or requirements.

ABET Requirements

1. ESTABLISH PURPOSE (MISSION STATEMENT) AND SET GOALS (TIMELINE)

Assessment planning begins with the **institutional mission statement**, which describes the communities that are served and the institutional purposes and other characteristics that define your institution. At the same time, your institution's assessment leader should work with an appropriate mix of faculty and administrators to develop a plan of action and **timeline** to ensure departmental assessment goals and deadlines are met.

2. DEFINE/REFINE PROGRAM EDUCATIONAL OBJECTIVES AND STUDENT OUTCOMES

Program educational objectives are based on the needs of the program's constituencies and are expressed in broad statements that describe what graduates are expected to attain within a few years of graduation. **Student outcomes** relate to the knowledge, skills, and behaviors that students acquire as they progress through the program and describe what students are expected to know and be able to do by the time of graduation. Defining educational objectives and student outcomes provides faculty with a common understanding of the expectations for student learning and supports consistency across the curriculum, as measured by performance indicators. **Performance indicators** represent the knowledge, skills, attitudes or behavior students should be able to demonstrate by the time of graduation that indicate competence related to the outcome.

3. DESIGN AND CONDUCT ASSESSMENTS

Assessments offer a framework through which you can identify, collect, and prepare data to evaluate the attainment of student outcomes and program educational objectives. Effective assessments use relevant direct, indirect, quantitative, and qualitative measures appropriate to the outcome or objective being measured. Appropriate sampling methods may be used as part of an assessment process.

Efficient and effective assessment strategies require an understanding of the alignment between **educational practices and strategies**. This can be accomplished by mapping educational strategies (which could include co-curricular activities) to learning outcomes. Strategies for **data collection and analysis** need to be systematic and consistent, and focus on assessment related to the performance indicators.

4. EVALUATE ASSESSMENT FINDINGS

Evaluation processes interpret the data and evidence accumulated through the assessment process and determine the extent to which student outcomes and program educational objectives are being attained. Thoughtful evaluation of findings is essential to ensure that decisions and actions taken as a result of the assessment process will lead to program improvement.

5. USE RESULTS FOR DECISION MAKING

Assessment provides a framework for a meaningful feedback process, which is critical to **strategic decision-making**. Creating and maintaining an ongoing quality assurance system helps to keep your program relevant to the professions it serves, supports the highest quality student experience, and confirms that your graduates are well prepared for their careers.

CI Programs

University Mission Statement

Placing students at the center of the educational experience, California State University Channel Islands provides undergraduate and graduate education that facilitates learning within and across disciplines through integrative approaches, emphasizes experiential and service learning, and graduates students with multicultural and international perspectives.

Institutional Mission-Based Learning Outcomes

CI graduates will possess an education of sufficient breadth and depth to appreciate and interpret the natural, social and aesthetic worlds and to address the highly complex issues facing societies. Graduates will be able to:

- Identify and describe the modern world and issues facing societies from multiple perspectives including those within and across disciplines, cultures and nations (when appropriate).
- Analyze issues, and develop and convey to others solutions to problems using the methodologies, tools and techniques of an academic discipline.

Department Mission

Computer Science permeates every aspect of human endeavor, and thus it is a truly interdisciplinary field. CS is fast growing, and its graduates are in demand in our community and nation-wide. We respond to this demand by teaching our students with a “hands-on” and

“problem-solving” approach, and we strive to give our students a strong grounding in the fundamental science of computing, as well as the necessary technical knowledge to succeed in the job market. As the field is fast growing, we realize that we serve our students best by being top experts in our respective research fields. Thus we aim to embody the teacher-scholar model in our academic lives.

Vision Statement

The Computer Science Department at CI wants to become a world-class department, as well as a local hub of expertise in Computer Science, IT and Mechatronics.

Computer Science

Lead Society: CSAB

These program criteria apply to computing programs using computer science or similar terms in their titles.

Program Educational Objectives (PEOs)

PEO 1: Depth and breadth
Computer Science graduates will have a strong understanding of the field of computer science including scientific principles, analysis techniques, design methodologies, several programming languages and an understanding of systems in order to:

- Be successfully employed
- Pursue a graduate degree or professional certification

PEO 2: Human formation
Computer Science graduates will have a human formation enabling them to:

- Demonstrate leadership, e.g., take a leadership role in a team
- Growth: being promoted or moving up to a better job
- Possess an understanding of the broader impacts of technology by identifying ethical, economic, cultural, legal or environmental issues related to work projects.

PEO3: Professionalism
Computer Science graduates will be prepared for modern work environments, where they will:

- Apply their skills in clear communication, responsible teamwork, and time management by, for example, managing a team or project, working on multidisciplinary project teams, or communicating with external stakeholders.
- Demonstrate professional attitudes and ethics by, for example, assisting colleagues in professional development (e.g. mentoring), engaging in continuing education or training, participating in professional societies, engaging in service to the community, or contributing to an employer’s efforts to comply with software licensing or compliance, protect privacy, or assure quality and safety.

Student Learning Outcomes

The program must enable students to attain, by the time of graduation:

SLO	Notes	Course Assessment
(1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	CSULA conducts surveys against students, faculty, alumni, and industry partners on their satisfaction with SLOs. The feedback indicates how well we achieve each learning outcome. These surveys can be used to broadly assess multiple SLOs.	MATH354 (Michael), COMP232 (Anna / AJ)
(2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.		COMP151 (Anna) COMP499 (Capstone Advisors)
(3) Communicate effectively in a variety of professional contexts.	Both sections of capstone can help capture / measure aspects of oral and written communication.	COMP491 / COMP499 (Capstone Advisors)
(4) Recognize professional responsibilities and make informed judgments in computing practice and legal and ethical principles.	If we are somehow able to require Societal Issues as our GE requirement for (Area D), we could satisfy this requirement and possibly SLO 3. We can also include constituency surveys. An exit survey may also be a good way to assess this. Michael's Comment: I would also like to add COMP 347 for strategic reasons (it is approved in several GE	COMP350 (Jason Isaacs)

	categories, and I'd like it to eventually replace or at least complement COMP 447).	
(5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	I'm not sure which courses require team projects (quick run through syllabi could help). In addition to SE and constituency surveys, another course can help to better assess this.	COMP350 (Jason Isaacs)
(6) Apply computer science theory and software development fundamentals to produce computing-based solutions.		COMP150 (Kevin / Sami) COMP151 (Anna) COMP454 (Joel) COMP354 (Michael)

Curriculum

Students must have the following amounts of course work or equivalent educational experience:
a. Computer science: One and one-third years that must include:
1. Coverage of the fundamentals of algorithms, data structures, software design, concepts of programming languages and computer organization and architecture. [CS]
2. An exposure to a variety of programming languages and systems. [CS]
3. Proficiency in at least one higher-level language. [CS]
4. Advanced course work that builds on the fundamental course work to provide depth. [CS]
b. One year of science and mathematics:
1. Mathematics: At least one half year that must include discrete mathematics. The additional mathematics might consist of courses in areas such as calculus, linear algebra, numerical methods, probability, statistics, number theory, geometry, or symbolic logic. [CS]
2. Science: A science component that develops an understanding of the scientific method and provides students with an opportunity to experience this mode of inquiry in courses for science or engineering majors that provide some exposure to laboratory work. [CS]

CI Curriculum Mapping

The following spreadsheet will help tie SLOs to CS courses. Not every course needs to tie to every SLO and many courses can map to many SLOs.

- CS Curriculum / ABET Mapping

Faculty

Some full time faculty members must have a Ph.D. in computer science.

Information Technology

Lead Society: CSAB

These program criteria apply to computing programs using information technology or similar terms in their titles.

Program Educational Objectives (PEOs)

The Information Technology program at CSU Channel Islands will prepare its students:

- **PEO 1**: To be successfully employed in the field of information technology and / or related interdisciplinary fields.
- **PEO 2**: To demonstrate leadership and growth within the IT field that reflects collaborative, communicative decision-making and considers ethical, socioeconomic, legal and environmental ramifications.
- **PEO 3**: To continue lifelong professional development through the pursuit of graduate study or professional certifications that contribute to individual and societal growth.

Student Learning Outcomes (SLOs)

SLO	Notes	Course Assessment
(1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	CSULA conducts surveys against students, faculty, alumni, and industry partners on their satisfaction with SLOs. The feedback indicates how well we achieve each learning outcome. These surveys can be used to broadly assess multiple SLOs.	COMP105 (Sami) IT151 (Hassine) IT429 (Kevin)
(2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.		IT151 (Hassine) IT424 (Sami) IT429 (Kevin) IT499 (Capstone Advisors)

(3) Communicate effectively in a variety of professional contexts.	Both sections of capstone can help capture / measure aspects of oral and written communication.	IT499 (Capstone Advisors)
(4) Recognize professional responsibilities and make informed judgments in computing practice and legal and ethical principles.	If we are somehow able to require Societal Issues as our GE requirement for (Area D), we could satisfy this requirement and possibly SLO 3. Or, we can break this up across Security and Databases. We can also include constituency surveys. An exit survey may also be a good way to assess this. Michael's Comment: I would also like to add COMP 347 for strategic reasons (it is approved in several GE categories, and I'd like it to eventually replace or at least complement COMP 447).	IT424 (Sami) COMP447 (Christopher)
(5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	I'm not sure which courses require team projects (quick run through syllabi could help). In addition to SE and constituency surveys, another course can help to better assess this.	IT420 (Brian) IT429 (Kevin)
(6) Identify and analyze user needs and to take them into account in the selection, creation, integration, evaluation, and administration of computing-based systems.		IT429 (Kevin)

The program must enable students to attain, by the time of graduation:

Curriculum

Students must have course work or an equivalent educational experience that includes:
a. Coverage of the fundamentals of
1. the core information technologies of human computer interaction, information management, programming, networking, web systems and technologies. [IT]
2. information assurance and security. [IT]
3. system administration and maintenance. [IT]
4. system integration and system architecture. [IT]
b. Advanced course work that builds on the fundamental course work to provide depth. [IT]

CI Curriculum Mapping

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IT Curriculum / ABET Mapping

Mechatronics Engineering

Lead Society: Institute of Electrical and Electronics Engineers

Cooperating Society for Computer Engineering Programs: CSAB

Program Educational Objectives (PEOs)

In accordance with the mission of the California State University Channel Islands, alumni of the mechatronics engineering program will be prepared for the following achievements within five years of graduation:

1. Exceed the expectations of their employers as professional engineers.
2. Excel in pursuit of graduate level degree programs or professional certifications.
3. Apply a foundation of engineering problem solving and fact-based decision making in their professional endeavors.
4. Approach complex engineering problems facing the world from multiple perspectives including cross-disciplinary, cross-cultural, and international.
5. Recognize their role in serving local and professional communities.
6. Demonstrate leadership, communication skills, and an understanding of ethical and societal implications of their decisions and engineering designs.

Student Learning Outcomes (SLOs)

The program must have documented student outcomes that prepare graduates to attain the program educational objectives.
(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Curriculum

The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.
The curriculum must include probability and statistics, including applications appropriate to the program name; mathematics through differential and integral calculus; sciences (defined as biological, chemical, or physical science); and engineering topics (including computing science) necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components.
The curriculum for programs containing the modifier “electrical,” “electronic(s),” “communication(s),” or “telecommunication(s)” in the title must include advanced mathematics, such as differential equations, linear algebra, complex variables, and discrete mathematics.
The curriculum for programs containing the modifier “computer” in the title must include discrete mathematics.
The curriculum for programs containing the modifier “communication(s)” or “telecommunication(s)” in the title must include topics in communication theory and systems.
The curriculum for programs containing the modifier “telecommunication(s)” must include design and operation of telecommunication networks for services such as voice, data, image, and video transport.

CI Curriculum Mapping

The following spreadsheet will help tie SLOs to CS courses. Not every course needs to tie to every SLO and many courses can map to many SLOs.

EMEC Curriculum / ABET Mapping

Assessment

Performance Indicators

Performance indicators represent the knowledge, skills, attitudes or behavior students should be able to demonstrate by the time of graduation that indicate competence related to the outcome.

Performance indicators are a means to focus on specific expectations of a program. They facilitate the curriculum delivery strategies, and assessment procedures. There is an important first step that must come before the development of performance indicators, and that is deciding on student outcomes. These are usually communicated to students in the program description, and are stated in terms that inform the students about the general purpose of the program and expectations of the faculty. The primary difference between student outcomes and performance indicators is that student outcomes are intended to provide general information about the focus of student learning and are broadly stated of the outcome, not measurable, while performance indicators are concrete measurable performances students must meet as indicators of achievement. Performance indicators are developed from program outcomes.

Performance indicators indicate what concrete actions the student should be able to perform as a result of participation in the program. Once program outcomes have been identified, the knowledge and skills necessary for the mastery of these outcomes should be listed. This will allow the desired behavior of the students to be described, and will eliminate ambiguity concerning demonstration of expected competencies. Performance indicators are made up of at least two main elements; action verb and content (referent). The expected behavior must be specified by name, using an observable action verb such as demonstrate, interpret, discriminate, or define.

Performance Indicators should link to SLOs.

Sample performance indicators:

- Students will know a professional code of ethics. (knowledge)
- Students will be able to describe the problem solving process. (comprehension)
- Students will solve research problems through the application of scientific methods. (application)

Rubrics

A rubric is a scoring guide used to evaluate performance, a product, or a project. It has three parts: 1) performance criteria; 2) rating scale; and 3) performance indicators.

Rubrics should measure specific performance indicators.

Performance Indicator	Unsatisfactory	Developing	Satisfactory	Exemplary
Indicator 1	Criteria			
Indicator 2		Criteria		
Indicator 3			Criteria	
Indicator 4				Criteria

Note: Not all assignments require this level of assessment. Instead, it is important to select those assignments that meet specific student learning outcomes (ABET SLOs). These can be signature assignments, exams or projects.

SLO1: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

Course: COMP354 Algorithms				
SLO1: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.				
Performance Indicator (PI)	**1=Unsatisfactory**	**2=Developing**	**3=Satisfactory**	**4=Exemplary**
***PI**: Algorithmic design: principle of computing.*	no understanding of problem, no solution	problem understood, but solution wrong	problem understood and a solution given	problem understood and best solution given
Assessment:				
***PI**: Performance analysis: computational complexity*	no understanding of what is requested	understanding of worst-case but no Big-O estimate	worst-case analysis and a Big-O estimate given	worst-case analysis resulting in tight Big-O estimate
Assessment:				
***PI**: Proof of correctness: Mathematics as other discipline that helps identify solution*	no understanding of how to approach the proof	providing general direction but no details	an outline of the proof given and aspects of framework	a complete proof, with framework of pre/post- condition and invariants
Assessment:				

Assessment Evaluation

Assessment evaluations are the metric by which we measure success. For example, using an 80% Threshold expects that 80% of students must meet the “satisfactory” or “exemplary” level. All three rows will be measured by the corresponding question on the final exam:

- A Design Question: A problem is posed, and the students must choose one of the three basic algorithm design techniques to solve it, and present the solution in clear and correct pseudo-code.
- A Performance Question: An algorithm is posed, and the student must evaluate its time and/or space complexity in terms of worst-case performance expressed in Big-O notation, and tradeoffs, e.g., optimization versus speed, or time resources versus space resources.

- Proof of correctness Question: The student will be given a problem, and an algorithmic solution will be requested, together with the proof of correctness of the algorithm; the student will be required to tie the algorithmic solution to the problem, and to show that the algorithm solves that problem.

SLO2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

Course: COMP499 Capstone Project				
SLO2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.				
Performance Indicator	**1=Unsatisfactory**	**2=Developing**	**3=Satisfactory**	**4=Exemplary**
***PI**: Initiative, planning and resource utilization involving time, scope and equipment.*	Project appears to have involved minimal planning, missed intermediate milestones, or failed to reach its potential due to underutilized resource	Project demonstrates some initiative and leverages an available resource; an intermediate milestone may have been missed slightly	Project demonstrates initiative and thoughtful planning to leverage available resources; intermediate milestones were met	Project demonstrates extraordinary initiative, planning and incorporation of available resources. Project met and exceeded all milestones
Assignment Assessment				
Final capstone project.				
***PI**: Synthesis of computing concepts in familiar and unfamiliar situations*	Project is a rehash of basic concepts covered within major courses with little extension of knowledge beyond.	Project synthesizes core concepts and makes an earnest attempt to discover and integrate external computing concepts.	Project synthesizes multiple concepts from within the major.	Project synthesizes multiple concepts from within the major and concepts requiring research across concepts not covered within the major.
Assignment Assessment				
Final capstone project.				

SLO3: Communicate effectively in a variety of professional contexts.

Course: COMP499 Capstone Project				
SLO3: Communicate effectively in a variety of professional contexts.				
Performance Indicator	1=Unsatisfactory	2=Developing	3=Satisfactory	4=Exemplary
PI: *Written communication and information delivery*	Presentation of project goals, methods and solutions lack clarity or are difficult to follow; most technical terms not used appropriately.	Presentation of project goals, methods and solutions are not clear or are difficult to follow; some technical terms not used appropriately.	Presentation of project goals, methods and solutions were presented clearly; most technical terms used appropriately.	Presentation of goals, methods and solutions are presented clearly; all technical terms used appropriately
Assignment Assessment				
Project summary presentation in a comprehensive 36"x 48"poster.				
PI: *Oral communication and information delivery.*	Presenters lack enthusiasm and fail to cover key project topics; Engagement with audience members is minimal and little to no eye contact is made.	Presenters show some enthusiasm and cover minimal project topics; Engagement with audience members exists and some eye contact is made.	Presenters are enthusiastic about their project and cover key project topics; Engagement with audience members is evident and frequent eye contact is made.	Presenters are fully engaged with the audience, cover key project topics, and discuss their work within a real-world context; Engagement with audience members if evident and frequent eye contact
Assignment Assessment				
*Project presentation and / or demonstration during Capstone Showcase.**:***				

SLO5: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

Course: COMP420 Database Systems				
SLO5: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.				
Performance Indicator	**1=Unsatisfactory**	**2=Developing**	**3=Satisfactory**	**4=Exemplary**
***PI**: Contributes to team project goals and objectives.*	Provides no contributions across project goals and objectives; offers little to project success.	Provides minimal levels of contribution across project goals and objectives; contributions support project success.	Provides satisfactory levels of contribution across project goals and objectives; contributions lead to project success.	Provides extensive levels of contributions to project goals and objectives; contributions critical to project success.
Assignment Assessment				
P1. Initiation Document				
P2. Design Document				
P3. Database Implementation				
***PI:** Values team members.*	Provides no feedback on project related tasks; makes no attempt to extend or refine team contributions.	Provides some feedback on project related tasks; makes an initial attempt to extend or refine team contributions.	Provides feedback on most project related tasks; helps extend or refine some team contributions.	Provides feedback on all project related tasks; helps extend or refine most team contributions.
Assignment Assessment				
P1. Initiation Document				
P2. Design Document				
P3. Database Implementation				

PI: *Team communication and cohesiveness.*	Makes no effort to communicate with teammates; disengaged from all project activities.	Makes effort to communicate with some teammates; engages in some project activities.	Makes efforts to communicate with all teammates; engaged in most project activities.	Actively communicates with all teammates; engaged in all project activities.
Assignment Assessment				
P1. Initiation Document				
P2. Design Document				
P3. Database Implementation				