ABET 2000 Program Learning Outcomes

Engineering programs **must** demonstrate that their graduates have:

(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

(d) an ability to function as an effective team member

(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 and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Computer Engineering Outcomes:

(l) Knowledge of Probability and Statistics and their applications in Computer Engineering

(m) Knowledge of Discrete Mathematics

(n) **The ability to design a system that involves the integration of hardware and software components**

Course Learning Outcomes Guidelines

1. Course learning outcome should be **easily and directly measurable**.
2. Course learning outcomes are suggested to be **4-6 outcomes**.
3. Each outcome should **map to exactly one** of the ABET program outcomes.
4. Include **Course Learning Outcomes Table** that includes the following for each outcome:
    - Outcome indicators and details: this describes the main course topics that will be focused on to achieve the outcome.
    - Suggested assessment methods and metrics.
    - A mapping between the course learning outcome and ABET program outcomes.
    - Each outcome will be given a rank as **Low, High, Medium** that correlates with the weight used for assessing the outcome. This weight will be used in the final mapping table between courses and ABET program outcomes.
        - When the course outcome weight is ≤ 10%, it will be given a Low rank (L).
        - When the course outcome weight is between 11% and 20% it will be given a Medium rank (M).
        - When the course outcome weight is > 20% it will be given a High rank (H).

5. Include **Course Learning Outcomes Evaluation Table** that includes the following for each outcome:
    - **Outcome minimum weight**: this indicates the importance of the outcome in the course. It is the minimum weight from the total course score (out of 100) that must be used for assessing the outcome.
    - **Outcome weight**: this is to be filled by the instructor indicating how much weight was used by the instructor for assessing the outcome.
    - **Assessment Method**: this describes what methods are used to asses the outcome, the weight of each method, and the evidence of assessment.
    - **Class Average:** indicates the student's average performance in the outcome.

    It should be noted that the evaluation criteria for each outcome is flexible and can vary from an instructor to an instructor. However, it should be constrained with the minimum weight specified.

6. Include **Instructor Comments and Feedback**: this field is for the instructor to comment about the assessment of the course outcomes and suggest possible actions for improvement if necessary.
7. A **suggested weekly lecture breakdown** is to be provided. This will help faculty as a guideline for course delivery. If the faculty changes the material content or the order of material delivery, he needs to clearly indicate that in the course file along with justification.

COE 205 Computer Organization & Assembly Language

Course Learning Outcomes Table

Course Learning Outcomes	Outcome Indicators and Details	Assessment Methods and Metrics	ABET 2000 Criteria
1. Ability to analyze, design, implement, and test assembly language programs.	• Instruction Set Architecture • Number (unsigned and signed) and character representation • Addressing modes • Syntax, semantics, and effect on flags of Pentium instructions. • Input/output. • Arithmetic and logic operations. • Flow-control structures. • Procedures. • Macros. • String manipulation. • Interrupt mechanism. • Implementation of Pseudo code algorithms in assembly language.	• Assignments • Quizzes • Exams • Project	C(H)
2. Ability to use tools and skills in analyzing and debugging assembly language programs.	• Assembly language vs. machine language. • Assembling and linking assembly programs (including use of multiple files). • Use of debugger to analyze and debug programs. • Use of libraries.	• Lab work	K(L)
3. Ability to design the datapath and control unit of a simple CPU.	• Fetch-execute cycle • Data, address and control busses • Register transfer • Data path design: 1-bus, 2-bus and 3-bus CPU. • Derivation of control steps for assembly instructions.	• Assignments • Quizzes • Exams	C(M)

	• Hardwired Control unit design • Microprogrammed control unit design. • Fixed vs. variable instruction format.		
4. Ability to demonstrate self-learning capability.	• Ability to learn a course topic alone (e.g. Macros) • Course Project may involve topics not studied in the course	• Assignments • Quizzes	I(L)
5. Ability to work in a team.	• Project is divided into separate parts that will be integrated for project completion.	• Project	D(L)

Course Learning Outcomes Evaluation Table

Outcome	Outcome Min. Weight	Assessment Method								
		Assignments	**Quizzes**	**Exam I**	**Exam II**	**Exam III**	**Final Exam**	**Lab Work**	**Project**	**Total**
O1	**55%**	**15%**	**8%**	**15%**	**20%**			**5%**	**8%**	**71%**
	Average	12.1%	5.3%	9.5%	12.1%			4.1%	7%	50.1%(70.6%)
	Evidence	#1-4	#1-4, 6	Q1-5	Q1-5			#1-13	Report	
O2	**4%**							**5%**		**5%**
	Average							4.1%		4.1% (82%)
	Evidence							#1-13		
O3	**15%**						**20%**			**20%**
	Average						11.8%			11.8% (59%)
	Evidence						Q1-5			
O4	**2%**		**2%**							**2%**
	Average		1.3%							1.3% (65%)
	Evidence		#5							
O5	**2%**								**2%**	**2%**
	Average								1%	1% (50%)
	Evidence								Report	
Weight		**15%**	**10%**	**15%**	**20%**		**20%**	**10%**	**10%**	**100%**
Average		**12.1%**	**6.6%**	**9.5%**	**12.1%**		**11.8%**	**8.2%**	**8%**	**68.3%**

Outcome Evaluation Example:

Class average for an outcome is computed by adding the average weights obtained from each assessment method used for the outcome divided by the total outcome weight. An example is shown below:

Class Average of Outcome 1 = [Assignments (12.1) + Quizzes (5.3) + Exam I (9.5) + Exam II (12.1) + Lab Work (4.1) + Project (7)] / 71 * 100 = 50.1/71*100 = 70.6.

Instructor Comments and Feedback:

Instructors need to comment here about outcomes that they think were not achieved or there is a need for improvement. The instructor needs to suggest ways for improving outcome achievement in next course offerings.

Mapping of Courses to ABET Outcomes

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
COE 202	H		H								L			
COE 203		L	H	L			L				H			
COE 205			H	L					L		L			
COE 305	L		H		H				L		L			
COE 308	H		H		L				L		L			
COE 341	M		H		H				L		L			
COE 344	M	L			H					L	L			
COE 360	L	L	H	L			L				M			
COE 390						M	H			L				
COE 400	M			L	L		L		L		L			H
COE 485	L	M	H		L	L	L	L	L	L	M			
COE 351			H	L		L	H		L		M			
STAT 319												H		
ICS 252													H	

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