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# **Computer Engineering Program Outcomes Assessment**

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**Dept. of Computer Engineering  
King Fahd University of Petroleum & Minerals,  
Saudi Arabia**

# Outline

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- **ABET EC2K**
- **Program Educational Objectives**
- **Program Outcomes**
- **Relation of Program Outcomes & Educational Objectives**
- **Program Outcomes Coverage in Curriculum**
- **Program Objectives & Outcomes Assessment Process**
- **Conclusions**

# ABET EC 2K

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- **Engineers should be educated in a way to facilitate their adaptation to important industry mutation (Bio, Nano, Health, Comp. Technology, change in products, etc)**
- **Shift in Engineering Education**
  - Learner-Centered Focus (outcome-based)
- **Fall 2007, all Engineering programs at KFUPM seek ABET 2K accreditation.**

# KFUPM Vision

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*To be a vibrant multicultural University  
of international repute  
focusing on quality education and innovative research  
that prepares professionals and entrepreneurs  
to lead social, economic and technical development  
in the region.*

# CCSE Main Objectives

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- **To provide the skilled manpower needed for the fulfillment of the country's development plans. In particular: information & computer scientists, computer engineers, and systems engineers.**
- **To prepare students for graduate work and research in their field of specialization.**
- **To provide a link through which computer technologies and their applications could be transferred to the country.**
- **To provide the country, through research and graduate studies, with skills, ideas, and innovations in certain areas of advanced technologies.**

# Program Objectives

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- ***Objective 1: Practice profession with confidence and global competitiveness and make intellectual contributions to it.***
- ***Objective 2: Pursue a life-long career of personal and professional growth with superior work ethics and character.***
- ***Objective 3: Pursue advanced study and research at the graduate level.***

# Program Outcomes ...

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- (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 on multi-disciplinary teams**
- (e) an ability to identify, formulate, and solve engineering problems**

# ... Program Outcomes ...

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- (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**



# ... Program Outcomes

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- (j) knowledge of contemporary issues**
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.**
- (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**

# Relation of Program Outcomes and Educational Objectives

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<b>Program Educational Objectives</b>	<b>Program Outcomes</b>
1. Practice profession with confidence and global competitiveness and make intellectual contributions to it	a, b, c, d, e, g, k, l, m , n
2. Pursue a life-long career of personal and professional growth with superior work ethics and character	f, i, h, j
3. Pursue advanced study and research at the graduate level	a, b, e, g, i, k

# Program Outcomes Coverage in Curriculum

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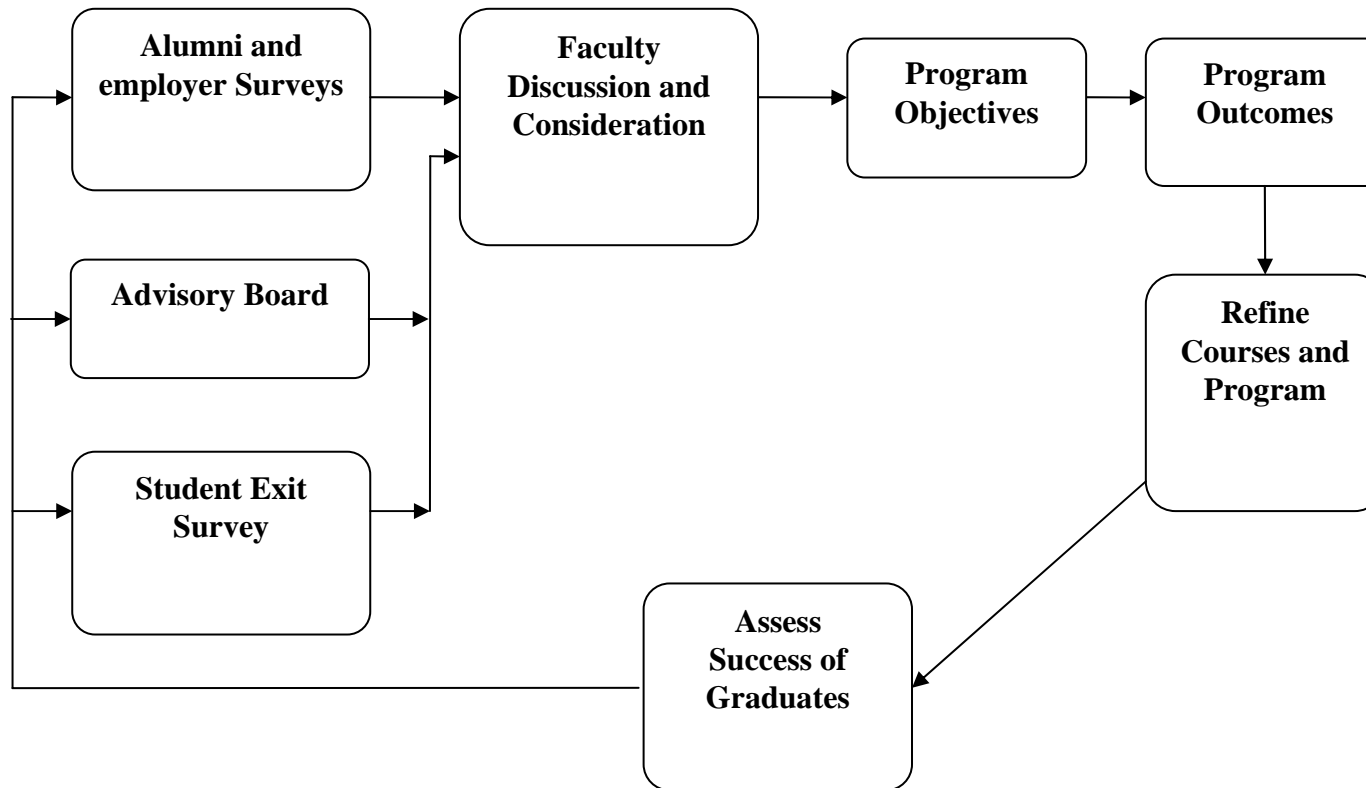
- Program outcomes are injected and well covered by core courses in the program curriculum.
- Each program outcome is addressed by a set of core courses in the program.
- Learning outcomes of core courses mapped to program outcomes with a level of emphasis being either low (L), medium (M), or High (H).

# Program Outcomes Coverage in Curriculum

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
COE 202	H		H								L			
COE 203		M	H	L			L				H			
COE 205			H	L					L		L			
COE 305	M	L	H	L	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	M	M				
COE 400	M	M		M	L		M		L		L			H
COE 485	L	M	H	M	L	L	M	L	L	L	M			
COE 351			H	M		M	H		M		M			
COE 399				M		M	H		M		H			
STAT 319												H		
ICS 252													H	
IAS 211						H								
ENGL 214							H							

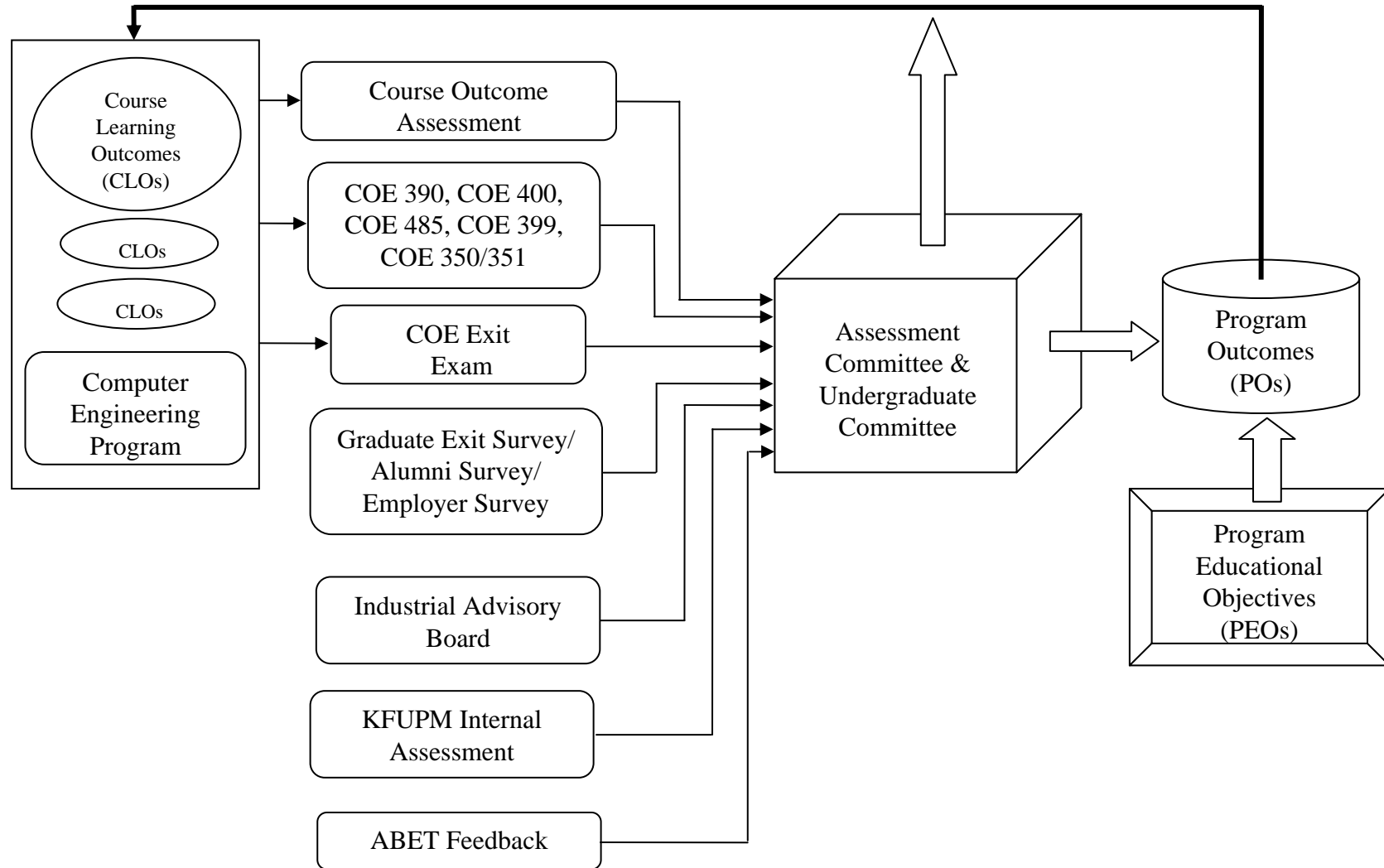
# Program Educational Objectives Assessment Process

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# Program Outcomes Assessment Process

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# Program Outcomes Assessment Process

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- **Two committees to conduct assessment process, assessment committee and undergraduate committee.**
- **Assessment committee responsible of**
  - design and control of the direct and indirect assessment processes,
  - data collection and presentation,
  - data delivery to undergraduate committee.

# Program Outcomes Assessment Process

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- **Undergraduate Committee responsible of**
  - Carrying out analysis of direct and indirect assessment data provided by the Assessment Committee and the Faculty based on course assessment results.
  - identify potential problems and suggest recommendations for making improvements.
  - Implementing approved recommendations.



# Course Outcomes Assessment

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- Provides a corrective feedback at the course level
- Each COE course has Course Learning Outcomes assessed both directly and indirectly
- **Direct Assessment**
  - Exams, Quizzes, Homeworks, Project, Lab
  - Instructor reports outcomes that need improvement
- **Indirect Assessment**
  - Students give perceptions on outcomes achievement

# Program Outcomes Assessment

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- **For each program outcome, an assessment and evaluation plan is developed that contains the following elements:**
  - *Assessment and Evaluation Methods:* assessment methods used to collect data and how data evaluated & interpreted.
  - *Performance Criteria:* determines criteria used to indicate outcome achievement.
  - *Logistics:* indicates when data frequency of assessment

# Assessment Methods

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- Industrial Advisory Board
- Employer Survey
- Graduate Exit Survey
- Computer Engineering Exit Exam
- Seminar Course (COE 390)
- System Design Laboratory (COE 400)
- Senior Design Project (COE 485)
- Cooperative Work (COE 350/351)
- Summer Training (COE 399)

# Industrial Advisory Board

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- **Review of department area of concentrations and recommend some enhancement to undergraduate program in some specialized areas.**
- **Provide inputs on the undergraduate student qualifications and skills based on new trends and local industry needs.**
- **Provide feedback on the Educational Objectives and Program Outcomes and their implications on the program curriculum.**
- **Provide feedback on the achievement of program outcomes by our graduates.**

# Program Outcomes Assessment

Program Outcome	Assessment & Evaluation Methods	Performance Criteria	Logistics
<p><i>(b) an ability to design and conduct experiments, as well as to analyze and interpret Data</i></p>	<ul style="list-style-type: none"> <li>• Samples of COE 400, COE 344 and COE 305 lab reports</li> <li>• Graduate Exit Survey</li> <li>• Coop Employer Survey</li> </ul>	<ul style="list-style-type: none"> <li>• A score <math>\geq 2.5</math> out of 4</li> <li>• A score <math>\geq 3</math> out of 5</li> <li>• A score <math>\geq 3</math> out of 5</li> </ul>	<p>Assessments will be conducted every semester.</p>

# Conclusions

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- **COE department seeking accreditation from ABET EC 2K as one quality assurance for its BSc program.**
- **COE department determined to improve program both technical and behavioral components to meet EC 2K.**
- **New instruction techniques for outcome-based education will be gradually introduced at all levels to improve quality.**
- **Industrial Advisory Board is important channel to provide department with feedback on achievement of long term educational objectives as experienced by our COE alumni.**