

# DOCUMENTING STUDENT LEARNING OUTCOMES

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# Related Changes to Document 103

- In addition, programs must provide at the time of the visit:
  - 3.2.5 Documentation of specific and measurable student learning outcomes that encompass the course learning outcome(s) (demonstrated in 3.3.4/3.4.4 below)
- 3.3.4/3.4.4 Student Learning Outcomes
  - Programs must demonstrate that each course has specific and measurable learning outcomes that are aligned with topical content and program learning outcome(s) (documented in 3.2.5 above).

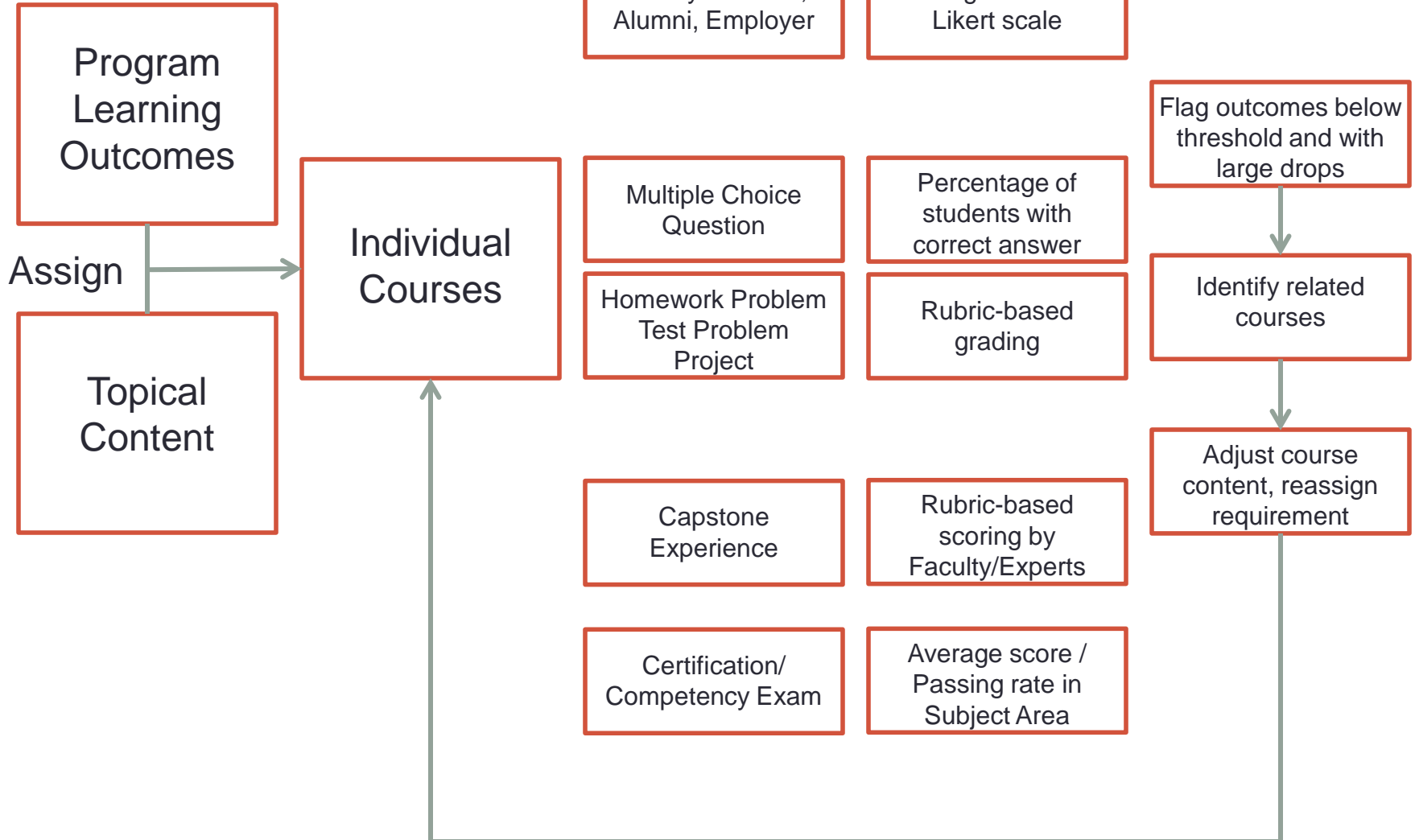
## Requirements

## Delivery

## Student Learning Outcomes

## Measure and Track

## Evaluate and Respond



# Program Learning Outcomes

- Programs develop several outcomes/objectives which cover fairly broad skills and knowledge such as:
  - Technical communication
  - Professional responsibility
  - Problem solving
- - OR - a more specific set similar to Core Subject Matter in the “matrix”
- Typically not accomplished in one course
  - May be a focus of several identifiable courses
  - May be across the curriculum

# Example Program Learning Outcomes

Objective:	Upon completion of this degree program a student will be able to:
1	Technical Communication- Demonstrate the application of oral, written, and graphic communication skills to present data/information and support decision making.
2	Technology- Demonstrate the effective utilization of discipline specific technical knowledge and skills.
3	Application of Math and Scientific Principles- Utilize critical thinking, math, statistics, and science skills for problem solving.
4	Teamwork- Demonstrate leadership, participation, and problem solving skills in a team environment.
5	Applied Management- Utilize applied management topics to manage, control, and improve corporate environments.
6	Professional Responsibility- Demonstrate knowledge of safety, ethics, non-discrimination, and diversity in the workplace.

# ACCE Long Term Task Force Proposed PSLOs - 18 Feb 11

## 2 and 4 Year Programs

- Effectively *communicate* orally and in writing ...
- *Demonstrate* ethical behavior ...
- Effectively *participate* in teams ...
- *Apply* the principles of math and science ...
- *Describe* practices of effective management ...
- + 12 more

## 4 Year Programs Only

- *Assemble* construction estimates ...
- *Calculate* necessary resource requirements ...
- *Perform* economic project and life-cycle evaluations ...
- *Identify* and evaluate sources of financing
- *Apply* principles of law ...
- *Evaluate* construction disputes ...
- + 2 more

# Topical Content

- The third level of the “matrix”
  - No specific contact hour requirement
  - Coverage in a course is designated by an “X”
- These are more specific learning outcomes that are often identified with one course but may be a component of several courses, for example
  - Construction Science (Curriculum Category)
    - Analysis and Design of Construction Systems (Core Subject Matter)
      - ***Structural (Curriculum Topical Content)***
  - Construction (Curriculum Category)
    - Planning and Scheduling (Core Subject Matter)
      - ***Network diagramming and calculations with CPM (Curriculum Topical Content)***

# Assign Outcome/Content to Courses

- Program leader / faculty assign to specific course(s)
- List in course syllabus
  - Clearly map to topical content requirements
    - Consider labeling objectives with matrix item number (e.g. ACCE 4.24)
  - Ensure consistent annotation in matrix
  - Refer to Program Learning Outcomes as appropriate (e.g. PLO 3)



CNST 321  
Advanced Building Estimating  
Professor xxxxx

Each faculty member  
received for each course

### **Course Requirements:**

- General Requirements
  - Ethics
- Construction
  - Types of Estimates & Uses
  - Quantity Takeoff
  - Labor & Equipment Productivity Factors
  - Pricing & Price Data Bases
  - Job Direct & Indirect Cost
  - Bid Preparation & Submission
  - Computer Application for Estimating

# Individual Courses

- Syllabus
  - “To accurately determine student learning outcomes, category and core subject matter credit hour distribution and the inclusion of topical content, programs must provide a syllabus/outline ... which includes the course objectives in relation to the program goals and objectives, ...” (Document 103, 3.2)
- Course objectives/Learning outcomes
- Document Student Learning Outcomes
  - Assessment Tool
    - Assignments
    - Tests
  - Measure and Track

# Syllabus

- **TCM 427 Construction Equipment Management**
- **Course Learning Outcomes**
- After successful completion of this course a student should be able to do the following:
  1. *Describe* the various equipment applications and utilizations. (ACCE 4.36, PLO 5)
  2. *Analyze* comparative costs of equipment uses. (ACCE 4.37, PLO 5)
  3. *Evaluate* equipment selection. (ACCE 4.38, PLO 5)
  4. *Apply* equipment productivity factors. (ACCE 5.13, PLO 5)
  5. *Utilize* knowledge of basic soil mechanics for use in equipment operations. (ACCE 4.31, PLO 5)
  6. *Evaluate* equipment buy/lease/rental alternatives. (ACCE 4.37, PLO 5)

# Curriculum Matrix Annotation

TCM  
427

4.3	<b>Construction Methods and Materials (6 sem/9 qt) 90 instructional hours [including: concrete, steel, wood, and soils]</b>	15
4.31	Composition and properties	X
4.32	Terminology & Units of measure	
4.33	Standard designations, sizes, and graduations	
4.34	Conformance references and testing techniques	
4.35	Products, systems and interface issues	
4.36	Equipment applications and utilization	X
4.37	Comparative cost analysis	X
4.38	Assembly techniques & equipment selection	X
4.39	Building Codes and Standards	

# Student Learning Outcomes

- Courses
  - Multiple-choice questions
  - Homework problem
  - Project
  - Test problem
- Capstone
- Certification/Competency Exam
- Surveys
  - Senior
  - Alumni
  - Employer

# Sample Multiple Choice Course SLOs

## IDM 321 Mechanical Systems For Buildings

Course Description: Prerequisite: IDM 121. The study of architectural working drawings. Principles of computer aided design drafting including architectural drafting standards and building code requirements. Basic orthographic projection, sketching theory and conventions, auxiliaries, sections and dimensioning. A semester long design project is an integral part of the course.

Program Objective	Course Number	Competency Number	Level of Cognition	Author	Modified	Questions: Enter the question and highlight the answer as shown below.	Correct Answer
2	321	1	3	SS	5-May	A room has an exposed wall area of 200sq ft. with an R value of 13, an exposed floor area of 300sq ft with a U value of .05 and a design temperature difference of 67F. What is the approximate heat loss in BtuH for this space? a. 2000 b. 5000 c. 8600 d. 175000	a.
2	321	2	6	SS	4-Mar	Electric heat has a higher installation cost but lower life cycle cost. a. True b. False	b.
2	321	3	2	SS	4-Mar	A VAV system utilizes _____ for improved efficiency. a. changing air volume b. changing air temperature c. none of the above	a.
2	321	4	3	SS	4-Mar	A 3" vent stack is connected to a 1-1/2" stack vent. Is this a violation of code? a. Yes b. No	b.
2	321	5	3	SS	5-May	If the temperature coming out of the furnace is 130F and the return temp is 70F and the structure has 70,000BTU loss what size blower is required? (Q=H/(1.08 x Delta t)) a. 1080 b. 3080 c. 5080 d. 10,080	a

# Multiple Choice Question

- Develop one or more questions to be given on tests, final exam, and/or exit exam that will *track* the course objective
- For example
  - Course Objective 1 – (ACCE 4.36 Equipment applications and utilization)
  - When operating scrapers and pushers (dozer) the general rule is that:
    - a. the scraper should never wait on the pusher
    - b. the pusher should never wait on the scraper
    - c. both the scraper and pusher should never wait on each other
    - d. minimize the time that the scraper and pusher wait on each other

# Homework / Test Problem or Project

- Evaluate assignment based on consistent rubric
- For example
  - Course Objective 2 – (ACCE 4.37 Comparative cost analysis)
  - The mass diagram for a road project indicates that 10,000 bank cubic yards (BCY) of soil must be moved an average of 200 feet. The production rate for a D9U dozer which costs \$170/hour is 300 BCY/hour. The production rate for a crew of two CAT 631 scrapers (\$270/hour) with one D8 push dozer (\$150/hour) is 900 BCY/hour. Which crew provides the lowest cost per BCY?
  - Rubric
    1. Correctly calculates cost per BCY for the dozer crew 4 pts
    2. Correctly calculates cost per BCY for the scraper crew 4 pts
    3. Make the correct selection based on the results from 1 and 2 2 pts
    - Total possible 10 pts



# Other SLOs

- **Capstone Experience**
  - May track to
    - Curriculum Topical Content
    - Core Subject Matter
    - Program Learning Outcome
      - E.g. Student Presentations – Technical Communication
- **Certification/Competency Exam**
  - Standardized exam, e.g. AIC Certification Exam
  - Usually track to Core Subject Matter
- **Surveys**
  - Generally track questions to Program Learning Outcome

# Measure and Track

- Courses
  - Multiple-choice questions – % answering correctly
  - Project, Homework/Test problem – rubric-based score
- Capstone
  - Rubric-based scoring by Faculty/Experts
- Certification/Competency Exam
  - Percent of students passing full exam or subject category
  - Average score on full exam or subject category
- Surveys
  - Average score on Likert scale

# Course Objective Assessment Tracking

## Instructor's Course Evaluation and Improvement Plan

Course Number: TCM 427

Course Title: Construction Equipment Management

Course Instructor: Kerry Slattery

Semester and Year: Spring 2011

Assessment Exam	Obj. 1	Obj. 2	Obj.3	Obj. 4	Obj. 5	Obj. 6	Obj. 7
Running Average	77	82	74	78	71	65	
Current Average	81	87	75	72	72	73	
Course Average	72	80	76	94	64	76	

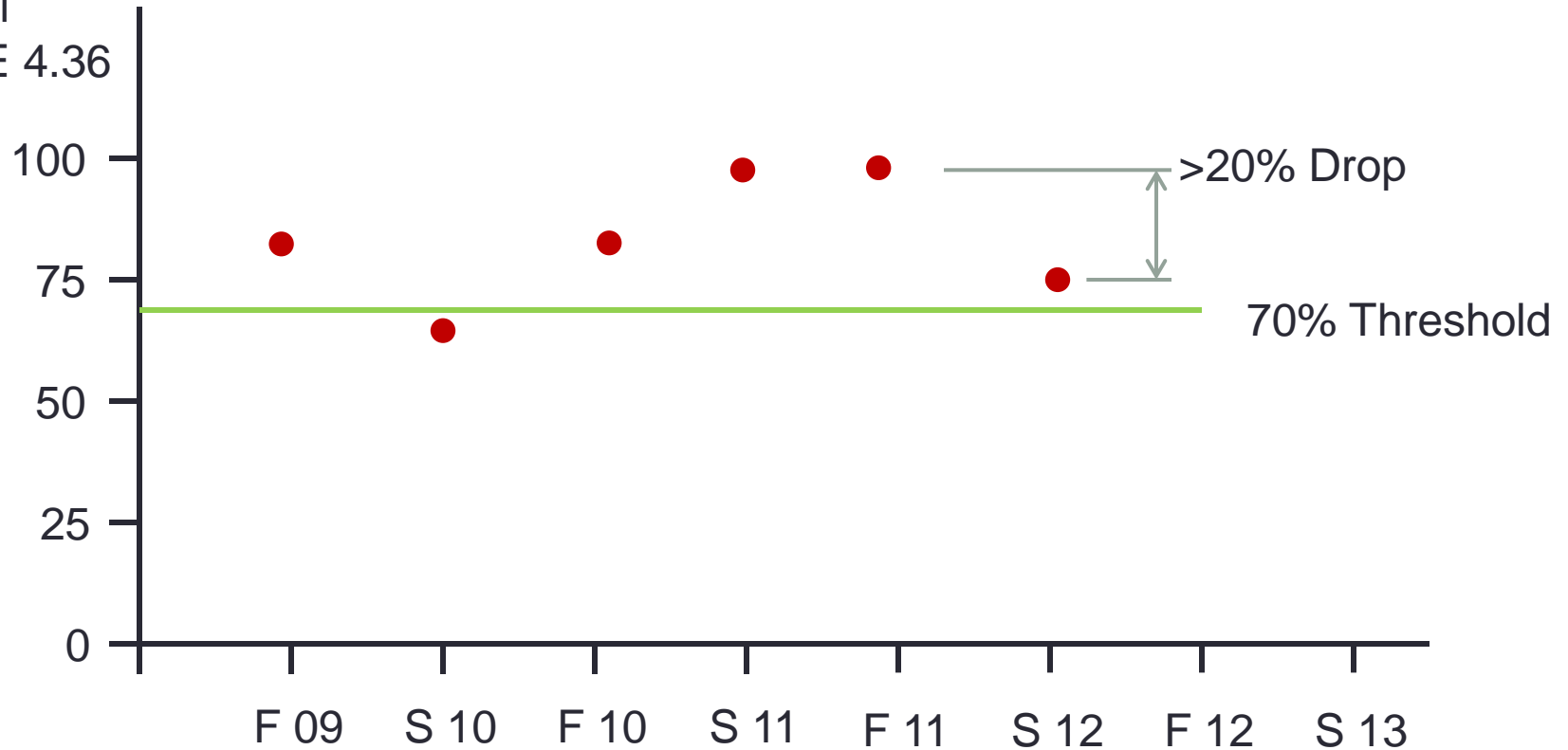
Highlight scores below 70% in red and gaps of 20% or more between current and course average in yellow.

# Record and Track Average Scores

TCM 427

CO #1

ACCE 4.36



# Evaluate and Respond

- Faculty meets to review results
- Flag outcomes below threshold and with large drops
- Identify related courses
- Adjust course content, reassign requirement, etc.
- Document the response
- “Close the loop”