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Please see: #AcademicHaikus,
Colin Snider, 22 Sept, 2015:
https://twitter.com/hashtag/academichaikus

What's going on??

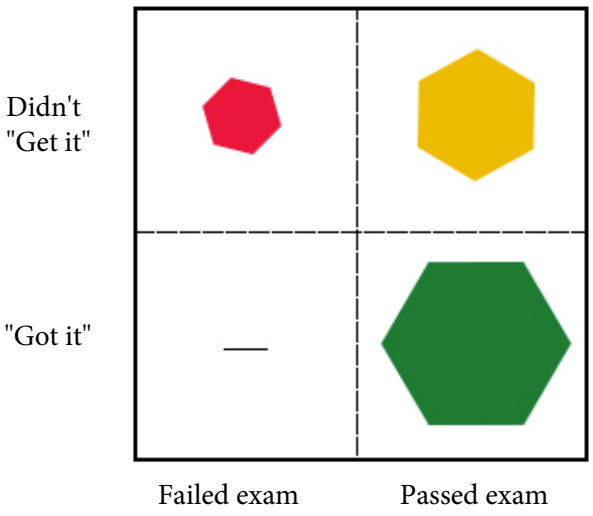


Figure by MIT OpenCourseWare.

Designing a Course & Creating a Syllabus

3

???

The procedure is actually quite simple. First you arrange items into different groups. Of course, one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities, that is the next step; otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run this may not seem important, but complications can easily arise. A mistake can be expensive as well. At first, the whole procedure will seem complicated. Soon, however, the whole procedure will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then, one never can tell. After the procedure is completed, one arranges the materials into different groups again. Then they can be put into appropriate places. Eventually, they will be used once more, and the whole cycle will then have to be repeated. However, that is part of life.

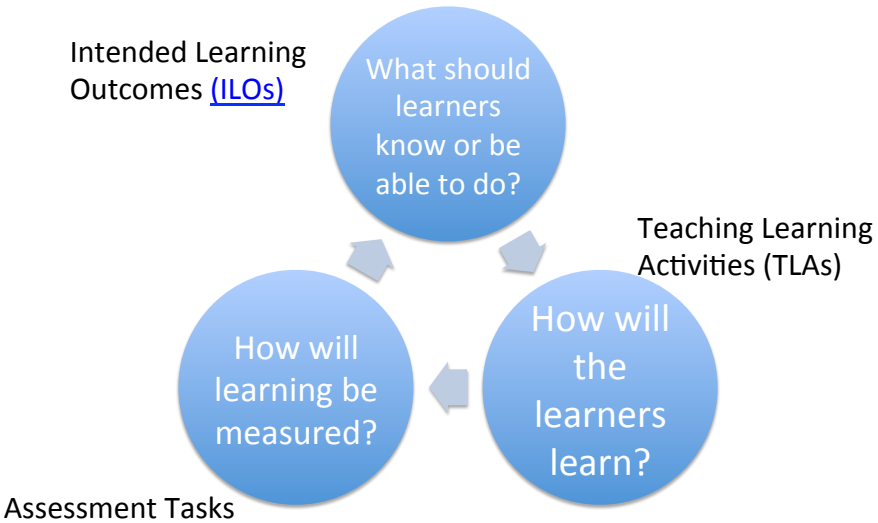
Bransford & Johnson (1972)

Intended Learning Outcomes

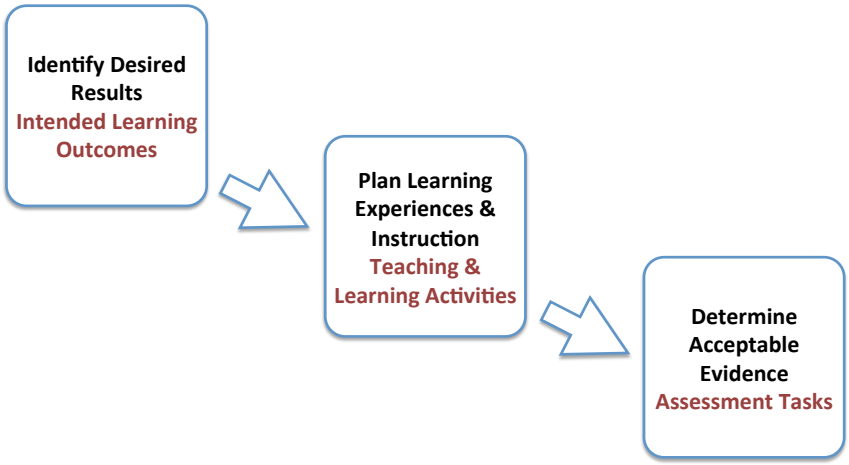
By the end of today's class, you will be able to:

- Describe the components of constructive alignment & backward design.
- Classify the content of a course you may teach
- Create measurable, specific, and realistic learning outcomes
- State the components of a syllabus

Constructive Alignment

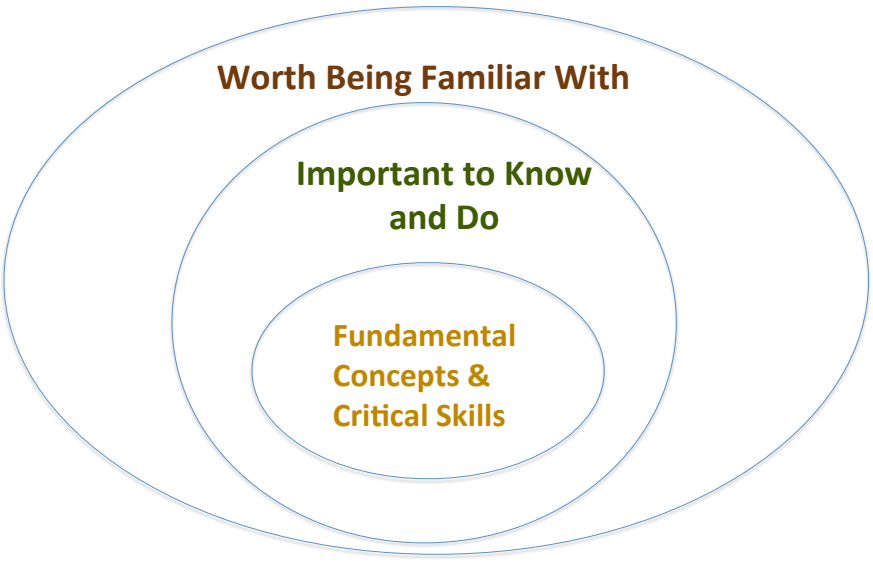


Backward Design



Adapted from Wiggins & McTighe. "What is Backward Design?" in *Understanding by Design*, 2nd ed. Pearson, 2005. ISBN:9780131950849 .

Prioritizin Content



Think - Write (Activity #1)

Using the list of topics from your pre-session assignment & the Developing ILOs Worksheet:

1. Consider what students should be able to do with each topic (a la Bloom's).
2. Assign each topic to a cell in 2nd column of the worksheet

Learning Outcomes

Should be statements describing student behaviors/characteristics that are:

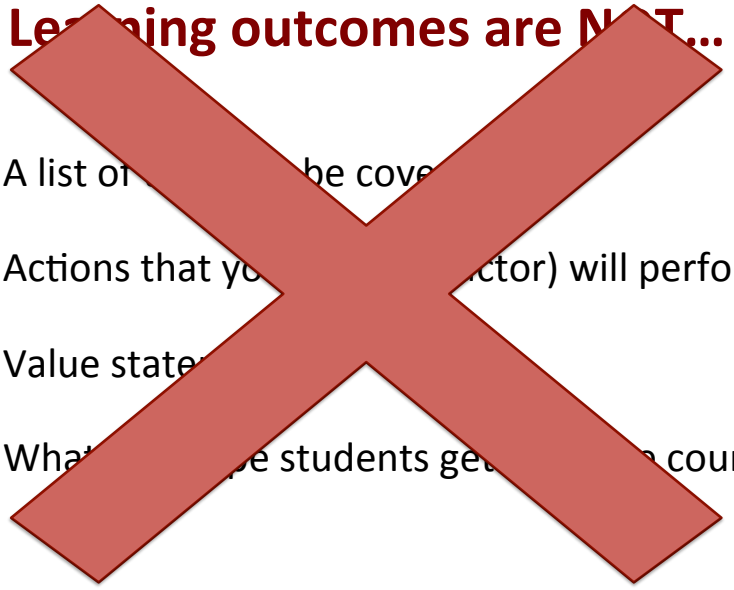
- specific
- measurable
- realistic

Learning Objectives: The S-K-A Scheme

Skills	What students should be able to do by the time the course is completed.
Knowledge	What students should know and understand by the time the course is completed.
Attitudes/ Attributes	For example, how confident students are that they can perform identified skills.

9/17/14

Learning outcomes are NOT...



- A list of be cove
- Actions that yo ctor) will perform
- Value state
- What e students ge course

All ILO's are **NOT** Created Equal

- Students will understand plate tectonics.

- Students will be able to interpret unfamiliar tectonic settings based on information on volcanic activity and seismicity.

Learning outcomes should be student focused

Course or Teacher-Centered Outcome in Syllabus	Learner-Centered Equivalent in Syllabus
1. introduce students to the major turning points and … in North American history from … the end of the Civil War	1. **list and describe** the major turning points and processes in North American history from early colonization to the end of the Civil War era
2. create an understanding of the formal constructs of physical design	2. understand the formal constructs of physical design Explain to an INE Use formal constructs to…
3. enable students to practice their skills of written analysis	3. **develop and practice** their skills of written analysis and communication
4. to enhance students' understanding of gender, race, and socioeconomic class in Americans' lives	4. understand how gender, race, ethnicity, and socioeconomic class have shaped Americans' lives ??
5. Introduce the basics of partial differential equations	5. **solve** an array of partial differential equations

Your learning outcomes should address a range of cognitive processes

Revised Bloom's Taxonomy diagram removed due to copyright restrictions. See: From: Bloom, B. S. (ed.). *Taxonomy of Educational Objectives*. Vol. 1: Cognitive Domain. New York: McKay, 1956 ; and Anderson, L.W. (Ed.), Krathwohl, D.R. (Ed.), et al. *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives* (Complete edition). New York: Longman. 2001.

Bloom's Taxonomy –
of Learning Outcomes

Image removed due to copyright restrictions. Please see: Bloom's Revised Taxonomy: The interlocking of cognitive processes, copyright 2012. Kathy Schrock. All rights reserved. http://www.schrockguide.net/uploads/3/9/2/2/392267/8178269_orig.jpg?490

Same topic - Different cognitive processes

Topic: Interstitial sites

- **Identify** interstitial sites in various crystal structures
- **Calculate** the maximum size of interstitial ions in a variety of crystal structures

Topic: X-Ray diffraction

- **Apply** Bragg's law to calculate d-spacings
- **Index** unknown diffraction patterns

Same topic - Different cognitive processes

Topic: VSEPR Theory

Levels of ILOs using Bloom's taxonomy

- List (identify) the common geometric shapes found in simple molecules.
- Explain the assumptions of VSEPR theory.
- Apply VSEPR theory to predict 3D molecular structures from 2D Lewis structures.
- Compare and contrast (analyze) the geometry of XYZ molecule as predicted by VSEPR theory and molecular orbital theory.
- Evaluate the accuracy of each theory in predicting the geometry of transition metal compounds.
- Create a list of recommendations of when to use each theory taking into account the trade-off of effort and accuracy.

Learning outcomes should be specific,measurable & realistic

In pairs, rewrite one of these ILOs to make it more:
specific, measurable, realistic, student focused.

1. Understand how to use t-tests in data analysis
2. Gain an appreciation for the use of linearization techniques
3. Have an intuition for the most effective method of integration for a given problem
4. Provide problem solving tools & strategies
5. Use thermodynamics to solve engineering problems
6. Build an SAE race-car
7. Learn to use Laplace transforms to solve differential equations
8. Know how to upper-diagonalize a matrix

Think - Pair - Share (Activity #2)

Using the Developing ILOs Worksheet:

1. Draft ILOs based on your categorizations;
2. Trade worksheets with a partner, read, discuss & give feedback;
3. Write 2 ILOs on flip-chart paper, display;
4. View the postings of your peers;
5. We will debrief in the large group.

What's the purpose of a syllabus?

1. Sets tone
2. Motivates students
3. Planning tool for faculty
4. Structures student work
5. Helps faculty meet course goals
6. Contract between faculty and students
7. Portfolio artifact

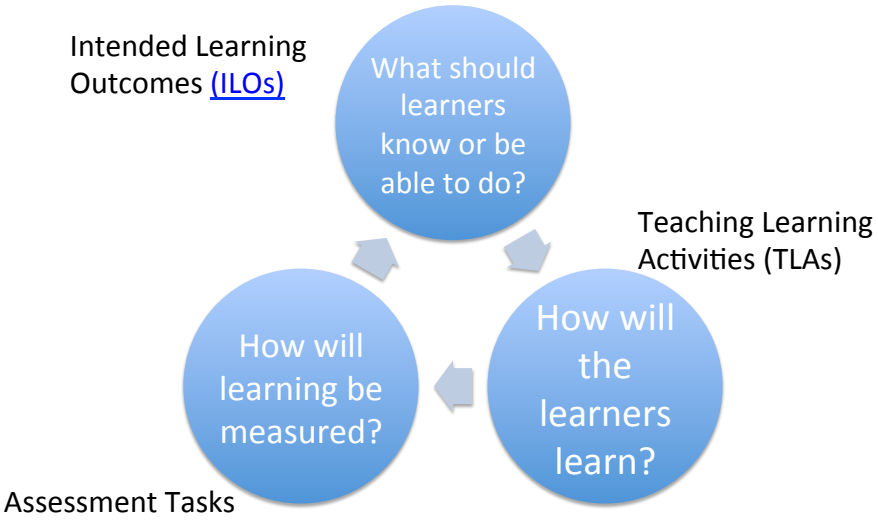
MOTIVATIONAL – STRUCTURAL - EVIDENTIARY

What's *in* a syllabus?

- Basic course information: managerial stuff
- Course Description: including the key concepts and course philosophy
- Intended Learning Outcomes (ILOs)
- Teaching and Learning Activities
- Student Assessments (how you will measure what/if students have achieved the ILOs)
- Lecture schedule/course calendar
- Course policies / Syllabus statements (will post)

These are the core of the explicit contract

Constructive Alignment



Wrap-up

- What questions do you still have?
- What comments/thoughts do you want to share?
- Mud cards - please fill them out!

5.95J / 6.982J / 7.59J / 8.395J / 18.094J / 1.95J / 2.978J Teaching College-Level Science and Engineering
Fall 2015