If you could choose one thing...

What would you want students to remember from your course in (1, 5, 10) years?

How do we design courses that facilitate this process?
Active Learning - Backward Design

“Traditional”

- List Course Topics
- Design Instruction
- Design Exams/Papers

= Instructor-centered

Typical syllabus/textbook
- Week 1: Chapter 1
- Week 2: Chapter 2
- ...

Typically grading:
- 1-2 midterms
- Final

Wiggins and McTighe (1998)
Active Learning - Backward Design

“Backward”

- Desired Results - What do they need to be able to know/do? (Learning Objectives)
- How will you know that they know? (Assessment)
- How will they get there? (Class Activities)

= Student-centered

Typical syllabus
- Learning objectives
- Organization of course
- ...

Typical grading (formative & summative)
- Weekly assignments
- Projects
- Exams

Wiggins and McTighe (1998)
Active Learning - Backward Design

Desired Results-
What do they need to be able to know/do?
(Learning Objectives)

How will you know that they know?
(Assessment)

How will they get there?
(Class Activities)

Learning Objectives

Feedback & Assessment

Integration

Learning Activities

Situational Factors

Wiggins and McTighe (1998)

By the end of this course, you will be able to...

• **Identify** different monitoring data types and
• **Interpret** monitoring data to assess geologic hazards relevant to northern California and at tectonic plate boundaries.

• **Compare and contrast**...
• **Communicate** about Earth science events and processes

---

**Active Learning- Backward Design (Example)**

**Course Learning Objective**

Desired Results-
What do they need to be able to know/do? (Learning Objectives)

How will you know that they know? (Assessment)

How will they get there? (Class Activities)

https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/
Active Learning - Backward Design (Example)

Course Learning Objective

By the end of this course, you will be able to...

• Interpret monitoring data to assess geologic hazards relevant to northern California and at tectonic plate boundaries.
• Compare and contrast...
• Communicate about Earth science events and processes

Assessment

• Describe to the class your groups interpretations of one of the 4 monitoring data types for the volcano studied.
• Defend the USGS alert level your group has assigned for the magmatic activity of the volcano. (verbal or written)

Desired Results-
What do they need to be able to know/do?
(Learning Objectives)

How will you know that they know?
(Assessment)
Active Learning - Backward Design (Example)

Course Learning Objective

By the end of this course, you will be able to:

- Interpret quantitative data to assess geologic hazards relevant to northern California and at tectonic plate boundaries.
- Compare and contrast...
- Communicate about Earth science events and processes.

Assessment

- Describe to the class your groups interpretations of one of the 4 monitoring data types for the volcano studied.
- Defend the USGS alert level your group has assigned for the magmatic activity of the volcano. (verbal or written)

Activity

Jigsaw activity in which expert groups each exam 1 type of data for a volcano, then groups reorganize into mixed groups to learn the other data types and interpret volcanic activity using all data.

As a group use the USGS alert level matrix to identify the appropriate alert level and write a summary report for hazard managers to use in a press conference.
Course Learning Objective

By the end of this course, you will be able to...

- *Interpret* quantitative data to assess geologic hazards relevant to northern California and at tectonic plate boundaries.
- *Compare and contrast*...
- *Communicate* about Earth science events and processes

Assessment

- Describe to the class your groups interpretations of one of the 4 monitoring data types for the volcano studied
- Defend the USGS alert level your group has assigned for the magmatic activity of the volcano. (verbal or written)

Activity

Jigsaw activity in which expert groups each exam 1 type of data for a volcano, then groups reorganize into mixed groups to learn the other data types and interpret volcanic activity using all data.

As a group use the USGS alert level matrix to identify the appropriate alert level and write a summary report for hazard managers to use in a press conference.
## Active Learning - Backward Design (Example)

### Aligning Assessments with Learning Outcomes -

<table>
<thead>
<tr>
<th>Learner Outcomes</th>
<th>Assessments (in class)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identify</strong> different monitoring data types</td>
<td>Pre-class questions (from video) In-class activities, exam</td>
</tr>
<tr>
<td><strong>Interpret</strong> quantitative data to assess geologic hazards relevant to northern California and at tectonic plate boundaries.</td>
<td>In-class activities, exam</td>
</tr>
<tr>
<td><strong>Communicate</strong> about Earth science events and processes</td>
<td>Out-of-class assignments, exam</td>
</tr>
</tbody>
</table>
Active Learning - Backward Design (Example)

Aligning Assessments with Learning Outcomes -

Work on your course/lesson:

1. Learning Objective(s)
2. Aligned Assessment