

# Learning Goals & Objectives for Computational Physics

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PICUP

Adapted (by Danny) from SEI Learning Goals  
Workshops at CU Boulder

Adapted (by Larry) for today's shorter session

# Learning goals for this session

You will be able to:

- Appreciate the value of developing learning goals
- Develop and communicate your learning goals clearly for your course as a whole, and for a particular topic
- Recognize the value of aligning assessments with goals
- Begin writing learning goals specific to computation

# Teacher Centered Approach

Identify topics to  
"cover" in the  
course

What topics do *I need to teach my students?*

Create the  
syllabus and  
lecture slides

When will *I* teach the topics? How will *I* give them the information?

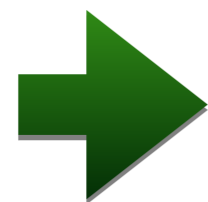
Write exam  
questions

How will *I* know that students learned the material *I* covered?

# Learner Centered Approach

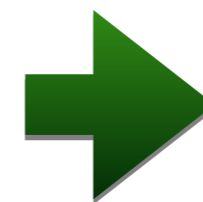
Identify learning  
goals/objectives

How will my **students**  
*be different?*



Decide on  
assessments

What evidence will **students** provide that they have changed?

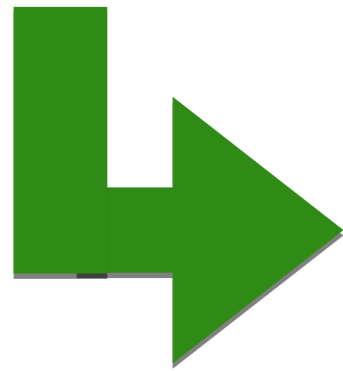


Create activities  
and syllabus

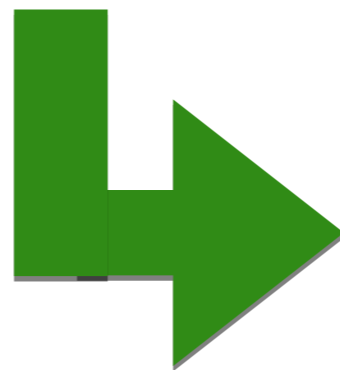
What do **students** need to achieve those goals?

# Backward Design

What should students know or be able to do by the end of the course/session?

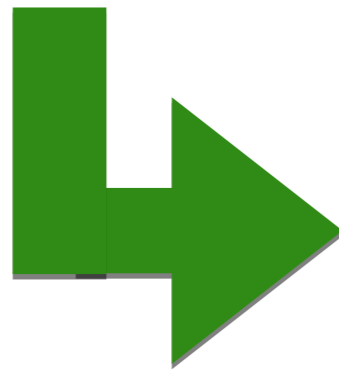
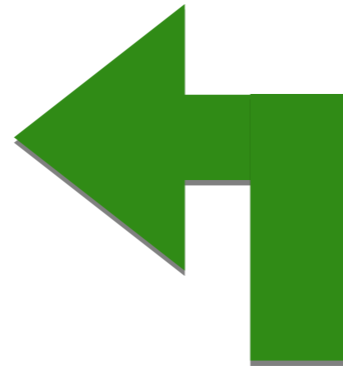


What evidence will convince you that they got there?

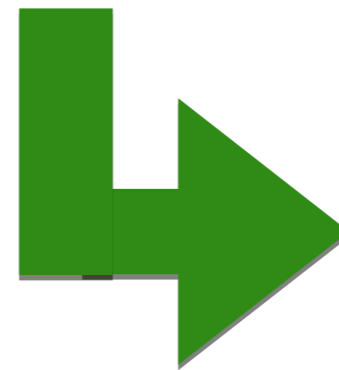
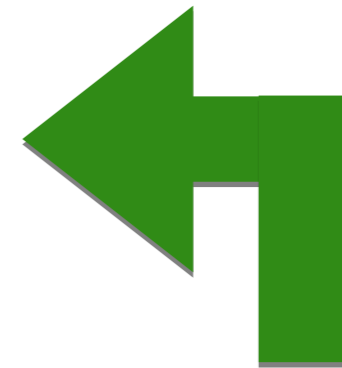


How will you help them get there?

Learning  
Goals/Objectives



Assessment  
• Formative  
• Summative



Instruction

# Terminology

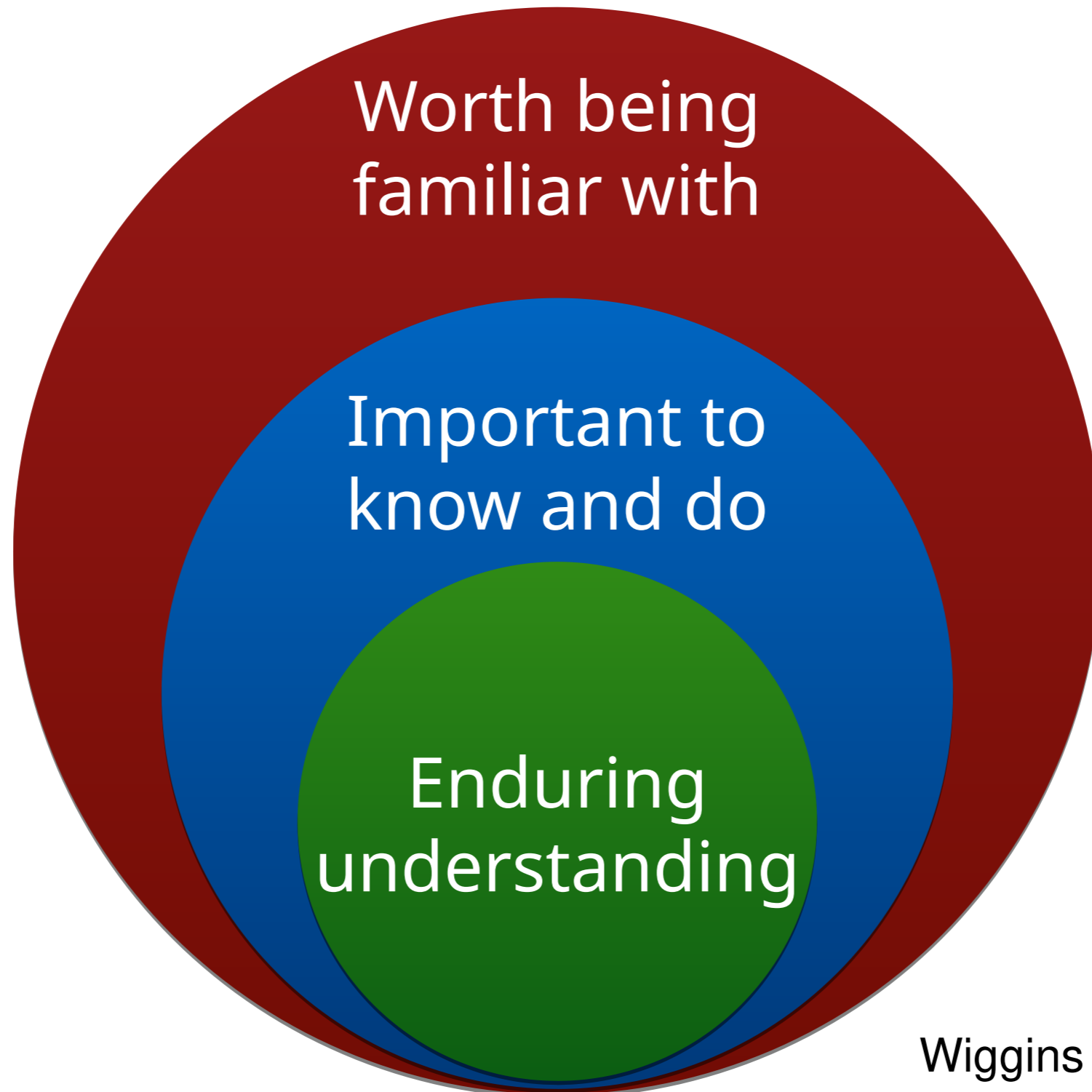
- **Learning goal:** Broad description of what students will understand and learn: often COURSE LEVEL (usually 5-10 per course)
- **Learning objective:** specific, action-oriented description of what students will be able to do: often CLASS LEVEL (usually 2-5 per topic)

This is not just a list of the syllabus topics, but statements of what students can do as a result of learning about the topic.

# Example of Learning Goal vs. Learning Objective

<b>Course learning goals</b>	<b>Topic-level learning objective</b>
Students will understand the basic concepts of probability and random variables	Students will be able to: <ul style="list-style-type: none"><li>• Explain probability in terms of long-term relative frequencies</li><li>• Find probabilities of single and complementary events</li><li>• Calculate the mean and variant of a discrete random variable</li></ul>

# Do your goals represent “enduring understandings”?





# Check-list for refining **topic-scale** learning objectives:

- Is goal expressed in terms of **what the student will achieve** or be able to do?
- Is the goal **well-defined**? Is it clear how you would measure achievement?
- Do chosen verbs have a **clear** meaning?
- Is **terminology familiar**/common? If not, is the terminology itself a goal?
- Does the goal **align** with course-scale goals?
- Do your goals cover a range of types of knowledge?
- Is it relevant and useful to students?

# Communicate your learning goals

Students appreciate knowing the explicit expectations of them.

It helps them focus their effort.

# How well did you achieve today's learning goals?

You will be able to:

- Appreciate the value of developing learning goals
- Develop and communicate your learning goals clearly for your course as a whole, and for a particular topic
- Recognize the value of aligning assessments with goals

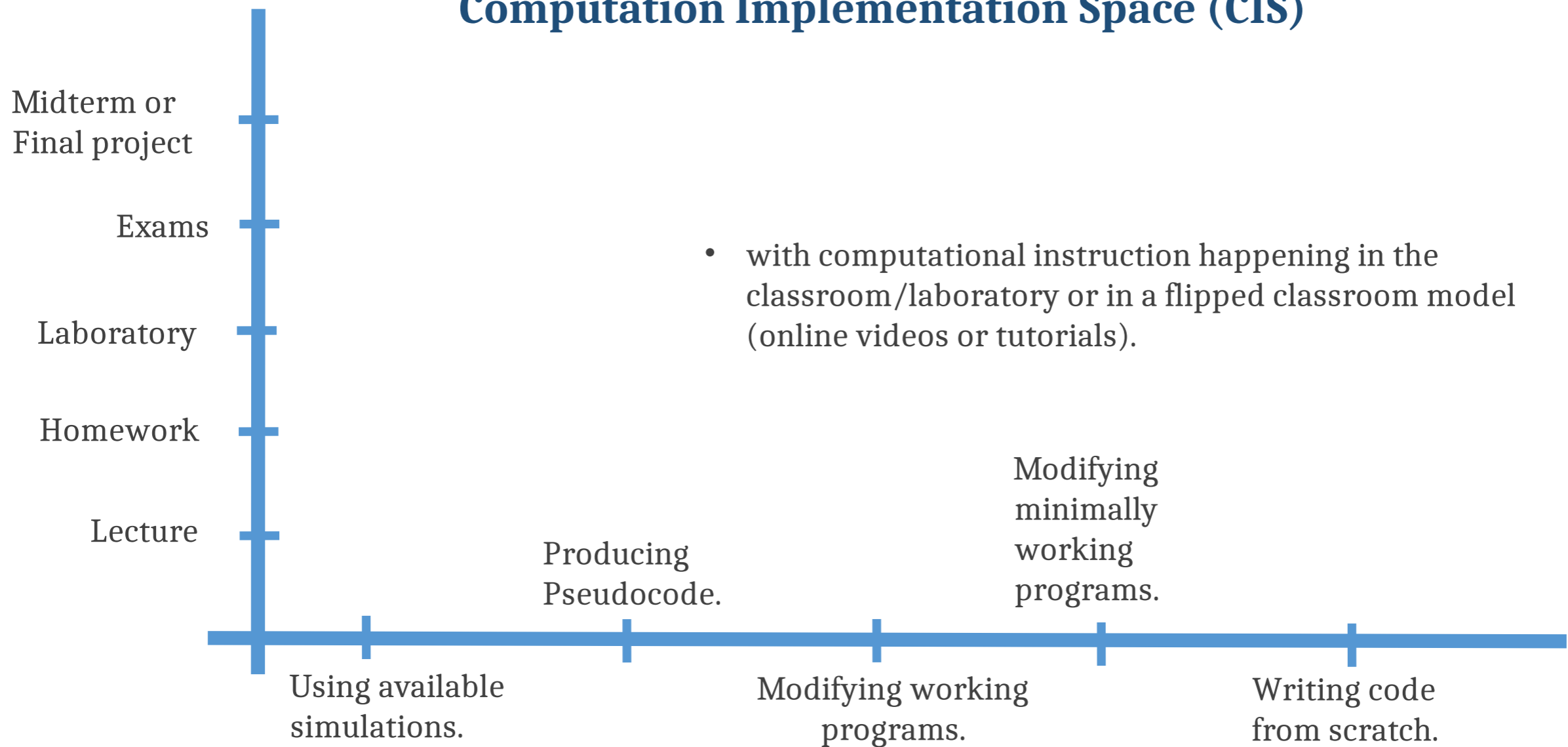


**WARNING**



INITIAL TRY  
MAY NOT PRODUCE  
DESIRED OUTCOME

## Computation Implementation Space (CIS)



# Questions/ Comments?

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