Turning an Idea for a Course Into a Series of Lectures

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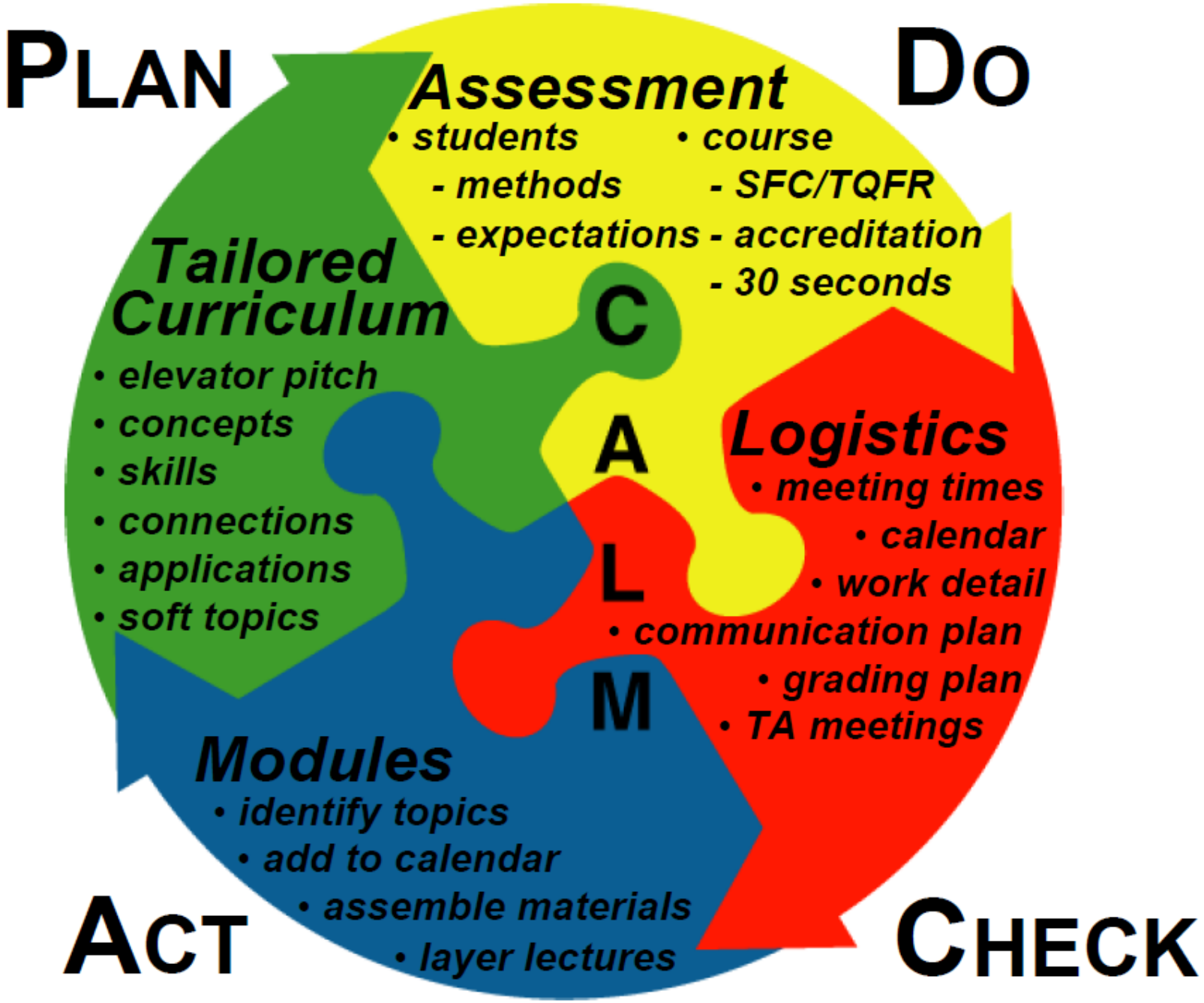
What Should You Learn Today?

- How to break down a course idea into a series of modules that is consistent with curriculum, method of assessment and course logistics.
- How to develop a lecture that is consistent with the curriculum, course goals and student interests.


PLAN
DO
ACT
CHECK
Assessment
• students
- methods
- expectations
• course
- SFC/TQFR
- accreditation
- 30 seconds
Tailored Curriculum
• elevator pitch
• concepts
• skills
• connections
• applications
• soft topics
Logistics
• meeting times
• calendar
• work detail
• communication plan
• grading plan
• TA meetings
Modules
• identify topics
• add to calendar
• assemble materials
• layer lectures
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Main Concepts of the Course

- Identify major concepts for your course idea
  - Typically 3-5 concepts for 10-week course
  - Decide on proper order (curriculum)
  - Identify which have greater emphasis (curriculum)
  - Each concept should have interesting assignments
  - Easiest way: Use a single theme/concept to group multiple textbook chapters

Importance of Main Concepts

- Ch1b: Freshman Chemistry, 2nd term
  - Issue: Students complain course topics unrelated.
    - Proposed fix: “How molecules move, interact & react” should be elevator pitch & three main course topics.
  - Issue: Students were asked to recognize functional groups without knowing about these groups.
    - Fix implemented: Moved molecule-naming module to first week.

Concepts should combine to form a straightforward elevator pitch, and each lecture should be primarily identified with a single concept.

Main Concepts: ChE103a

- Five main concepts for ChE103a (Heat Transfer)
  - About the heat equation
  - Solving simple problems (ODEs)
  - Solving difficult problems (PDEs)
  - Solving macroscopic balances
  - Advanced topics

Evaluate the order of the concepts for internal and external consistency.
Evaluate whether topics are appropriate for students' education & career aspirations.
Estimate the relative duration/importance of each concept.

Main Concepts: Online TV Journalist

- You want to teach people how to be an online TV journalist. Choices for elevator pitch:
  - How to research, write, publish & market
  - How to write reviews, previews, editorials, features and interviews

Choose list of concepts so each has interesting assignments.

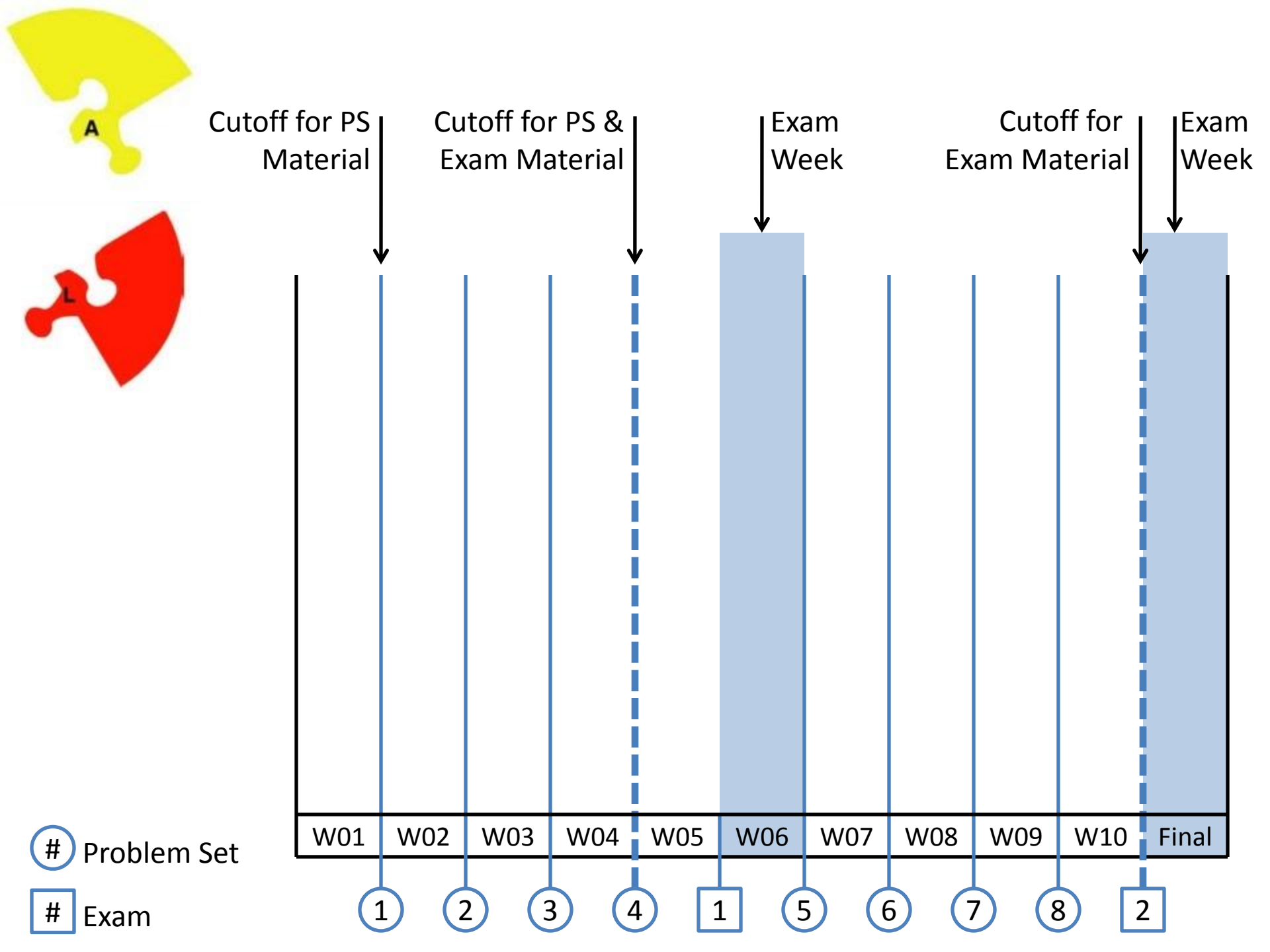
Main Concepts of the Course

- You now have 3-5 main concepts:
  - that you can combine to form an elevator pitch
  - to which every lecture can refer
  - that are in the proper order (related to each other, previous classes & later classes)
  - with appropriate emphasis (related to curriculum, student background & career aspirations)
  - that each have interesting assignments

Assessment & Logistics

- Assessment
  - Assume weekly assignments and two exams
- Logistics
  - Assume three meetings per week in 10-wk term
  - Assume one-week between midterm cutoff & exam
- Make a figure/table that captures *your* choices for assessment and logistics

We are skimming over the Assessment and Logistics aspects of the CALM method, but you should tailor this part of the process to your particular situation. You have many options to assess student performance .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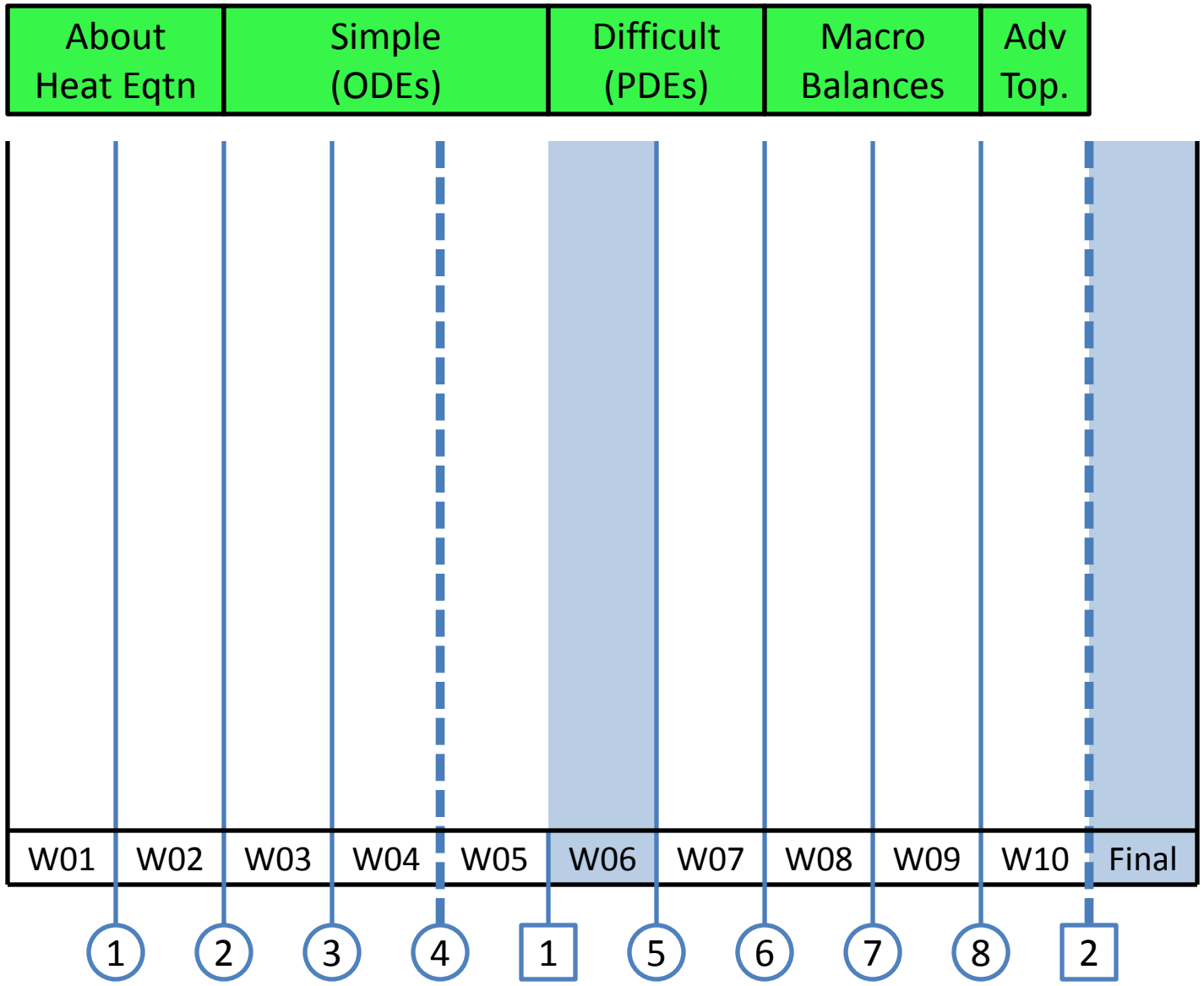
L
Cutoff for PS Material
Cutoff for PS & Exam Material
Exam Week
Cutoff for Exam Material
Exam Week
W01
W02
W03
W04
W05
W06
W07
W08
W09
W10
Final
1
2
3
4
1
5
6
7
8
2
Problem Set
Exam

Break Concepts Into Modules

- Overlay concepts on calendar
  - One box per concept
  - All boxes connected side-to-side in proper order
  - Box width indicates relative duration/emphasis

Concepts → Modules: ChE103a



Problem Set

Exam

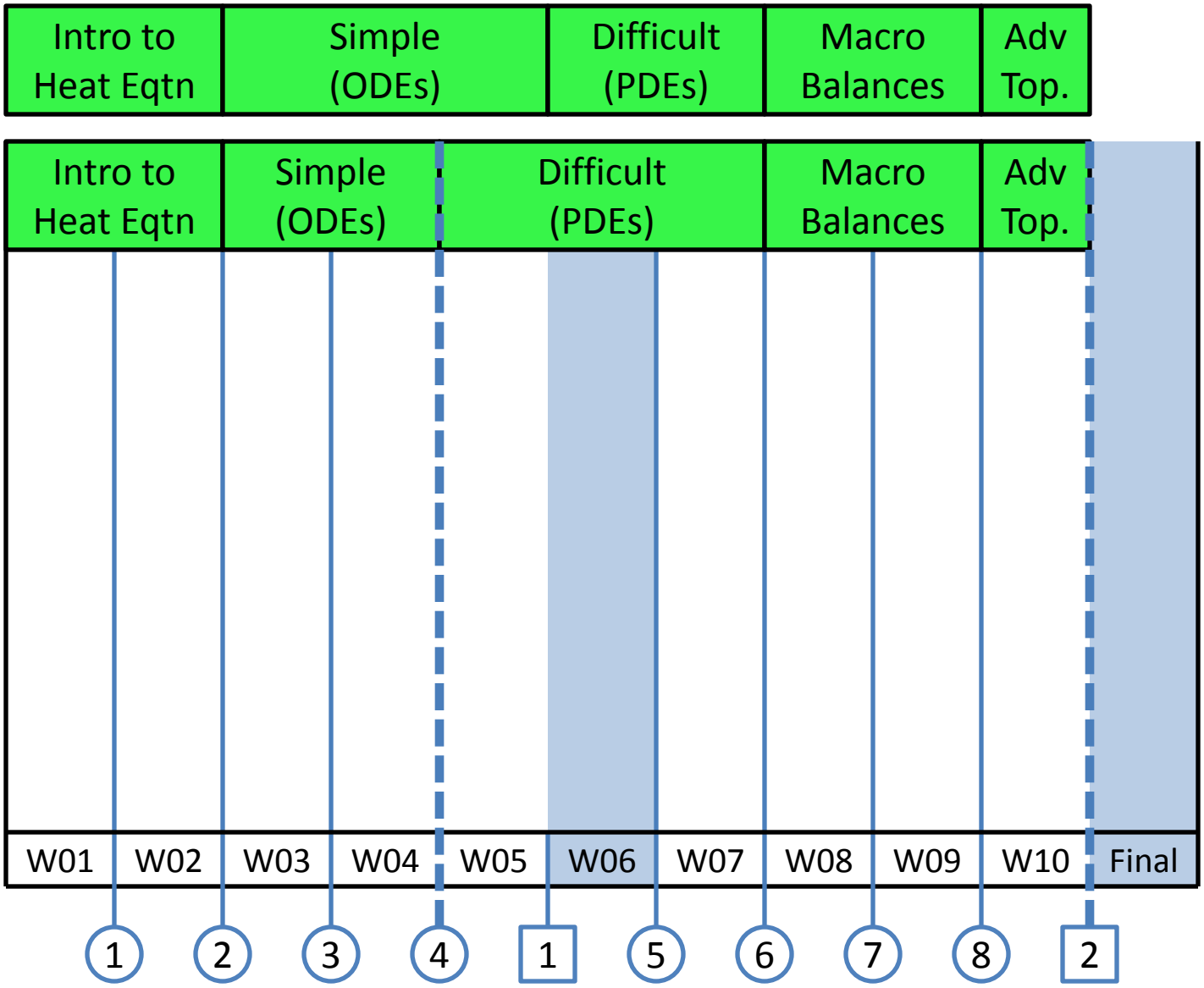
Break Concepts Into Modules

- Use two rules to determine box width
  - A box may span multiple vertical lines, but each box must begin and end at a vertical line
  - Each dashed vertical line (e.g., exam or project) must be at a box boundary

Concepts → Modules: ChE103a

By ending a box at any vertical line, you won't have an assignment that covers two concepts.

By ending a box at a dashed vertical line, you can easily describe material on exams.



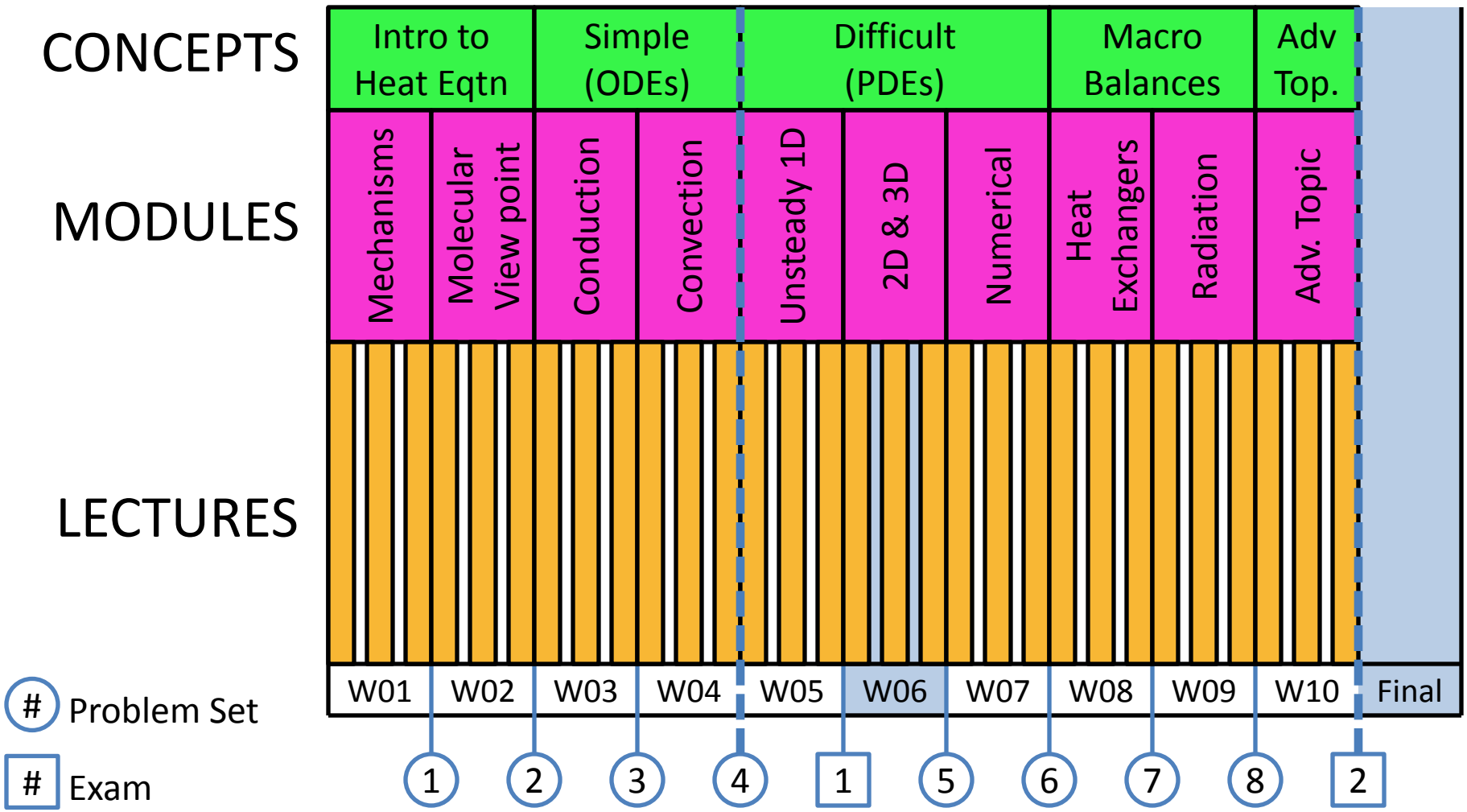
(#) Problem Set

[#] Exam

Break Concepts Into Modules

- Break each concept into week-long modules.
  - Identify theme for each module
- Break each module into the appropriate number of lectures. (We assumed 3/week.)
  - Don’t worry about lecture topics yet

Concepts → Modules: ChE103a



Preparing Lectures

- In four columns list *everything* you want/need to cover at some time in the course:
  - Critical Concepts/Facts
  - Required Skills
  - Applications, Motivations & Examples
  - Other Topics (Ethics, Sustainability, Globalization, Safety, Course Connections)

Preparing Lectures: ChE103a

Each item has a significant number of concepts/facts as sub-items, which should all be written out.

Concepts/Facts	Skills	Applications & Examples	Other Topics
Conduction	Integrate ODEs	Materials Track	ChE63ab
Convection	Special Functions	Biomol. Eng. Track	Ch1ab
Radiation	Similarity Transf.	Environ. Track	ACM95abc
Dimensionless #s	Order of Mag. Est.	Process Track	Ethics
Boundary Layers	Scaling	Medical	Patents
Material Derivative	Eliminate terms in PDE using Dim #s	Culinary	Safety
(and more)	(and more)	(and more)	(and more)

Preparing Lectures: Online TV Journalist

Concepts/Facts	Skills	Applications & Examples	Other Topics
Review/Recap	Writing/Grammar	Drama	Film Class
Preview	Blogging	Sitcom	Annual Schedule
Interview	Twitter	Reality Competition	Publicists & Press Rooms
Feature	Facebook	Docureality	Spoilers
Editorial	Press Junket	Talk	Ethics
Ratings	Red Carpet	TV Movie/Mini	Globalization
(and more)	(and more)	(and more)	(and more)

Assess Items in Table

- Curriculum
  - Survey other courses and add relevant items that students don't learn elsewhere
  - Highlight items that students only see in this course
- Accreditation
  - Review criteria and add relevant items
  - Highlight items only covered in this course

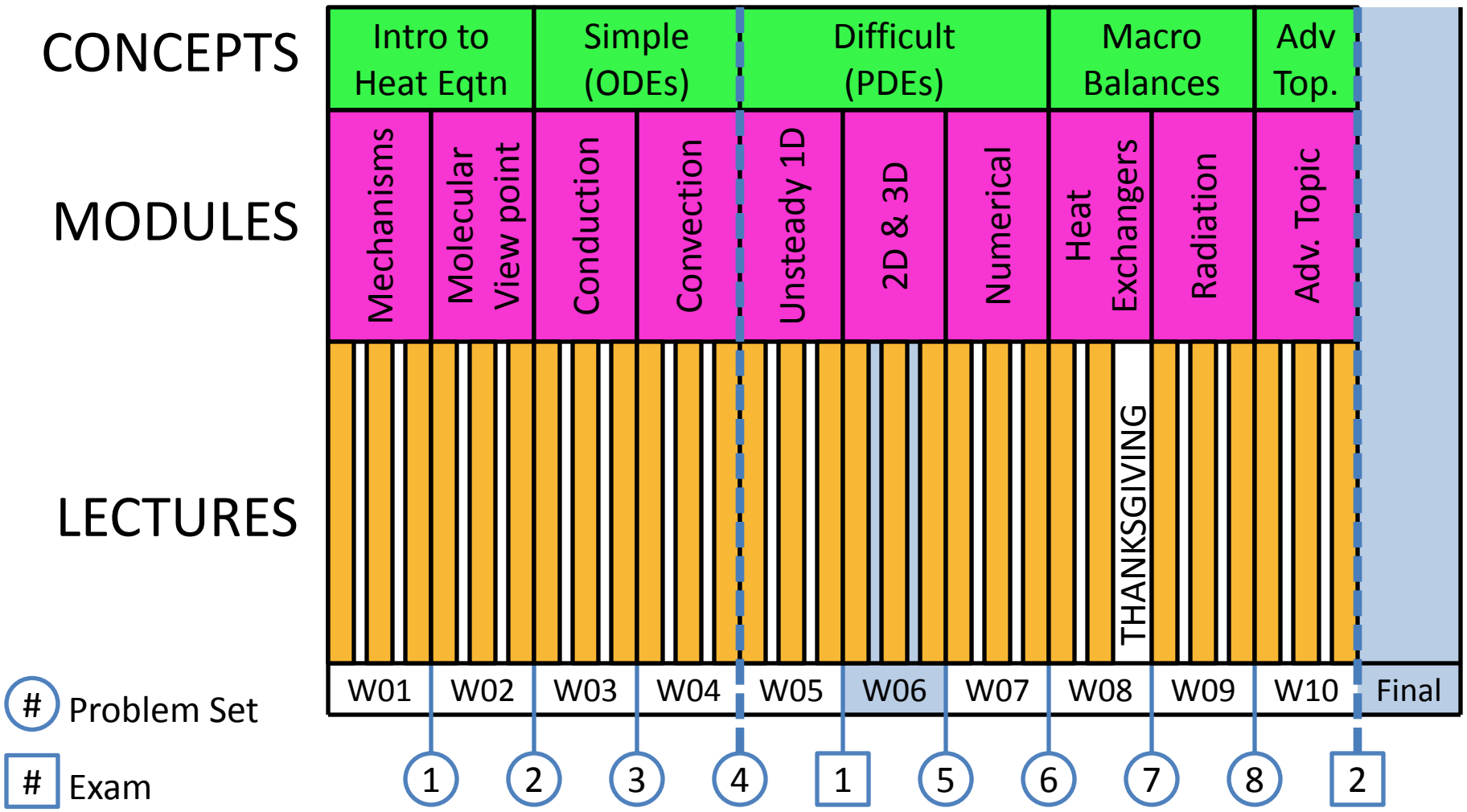
We are again skimming over the Assessment aspect of the CALM method, but the important point is that you should assess and mark the items in the table that are critical for students' education.

Lecture Logistics #1

- Calendar
  - Remove lectures scheduled for holidays
  - Move lectures that you reschedule because of travel, conferences, etc.

We are again skimming over the Logistics aspect of the CALM method.
We are not discussing TA hours, office hours, and many other important items since we are focused only on the lectures.

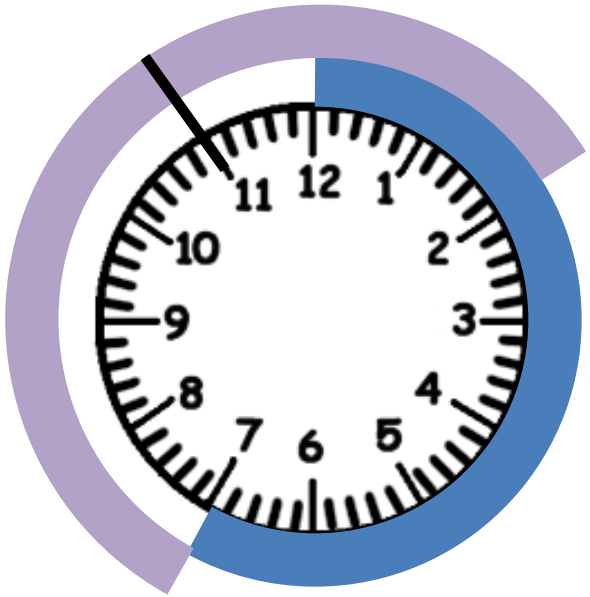
Lectures: ChE103a



Lecture Logistics #2

- Planning each lecture, you should:
  - Identify concepts & skills related to module that you plan to cover in 2/3 of allotted time.
  - Identify applications and other topics that would require 2/3 of allotted time to cover.
  - Mark each item in table.

For a 55-minute lecture:



Preparing Lectures: ChE103a

Concepts/Facts	Skills	Applications & Examples	Other Topics
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Convection	Special Functions	Biomol. Eng. Track	Ch1ab
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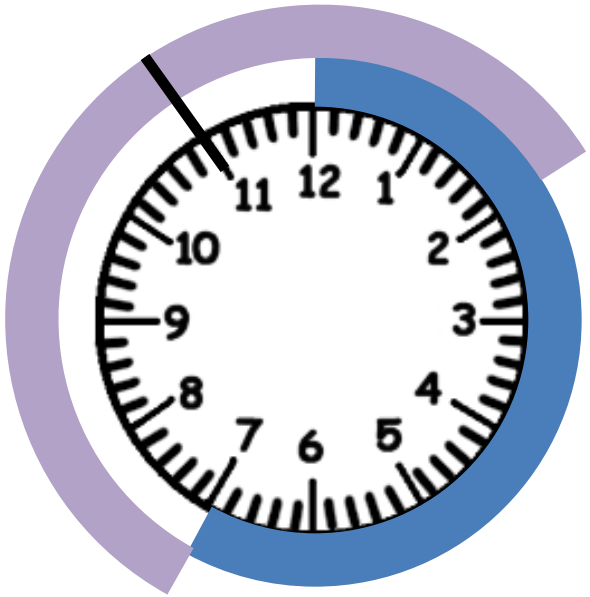
Dimensionless #s 1	***Order of Mag. Est.***	Process Track 1	***Ethics***
Boundary Layers	***Scaling***	Medical	***Patents*** 1
Material Derivative	Eliminate terms in PDE using Dim #s	Culinary	***Safety*** 1
(and more)	(and more)	(and more)	(and more)

Lecture Logistics #3

- During each lecture, you:
  - Must cover concepts & skills related to module.
  - Should ask questions to assess student need and interest in applications and other topics, then cover what you can.

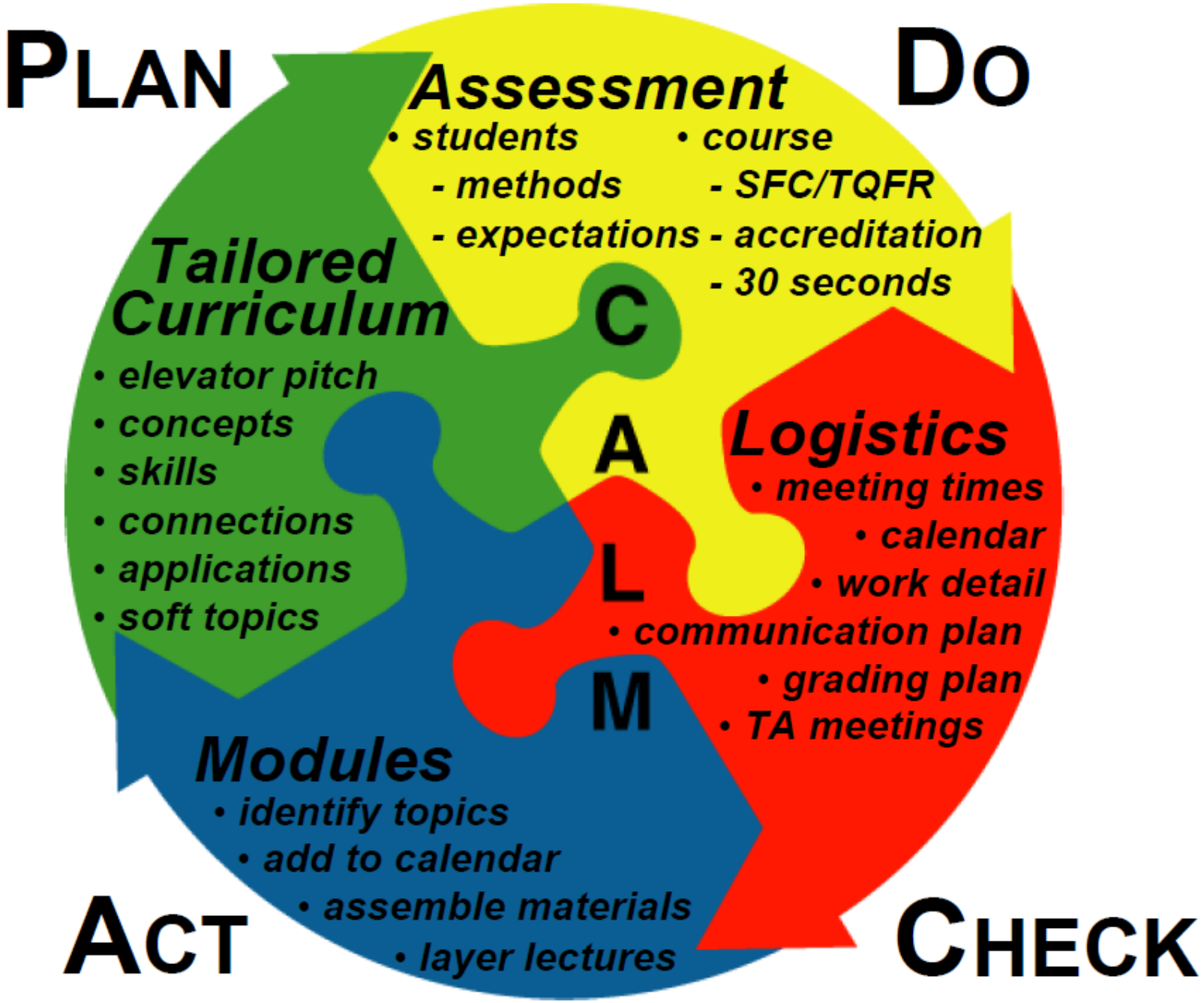
For a 55-minute lecture:



Completing the Module

- Handouts
  - Topics you need to cover that are less important but provide depth & background
- Assignments & Exam Questions
  - Use leftover items from lecture
  - Identify new problems by using the table the same way you used it for lecture

You'll often create a new table to help track nuances and variations of the concepts and skills, making sure that you discuss and/or assess how well students understandthese differences. For example: different types of boundary conditions.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