Standards-Based Grading Design Worksheet Example

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Course: C&PE 221 – Chemical Engineering Thermodynamics I

Target (course, unit, assessment): Full course

1. Write learning objectives

No more than one per week of the semester!

By the end of the semester, students will be able to . . . (use verb from Bloom's Taxonomy)

For today: write one learning objective

	Learning Objective	How will you assess this objective?
LO1	Define system boundaries and classify systems by mass exchange, energy exchange, and process constraints (open, adiabatic, isothermal, etc.).	In-person exam
LO2	Determine phase behavior by identifying process stream phases and interpreting phase diagrams and phase transition data.	In-person exam
LO3	Apply material balance equations to analyze chemical engineering systems.	In-person exam
LO4	Apply energy balance equations to analyze chemical engineering systems.	In-person exam
LO5	Compute changes in internal energy and enthalpy using heat capacities or thermodynamic tables.	In-person exam
LO6	Apply the ideal-gas law and determine when ideal-gas behavior is appropriate.	In-person exam
LO7	Assess process feasibility using the Second Law by evaluating entropy changes and applying entropy balance equations.	In-person exam
LO8	Identify reversible and irreversible processes and recognize irreversible features that lead to entropy generation.	In-person exam
LO9	Analyze thermodynamic cycles by evaluating efficiencies and COPs, assessing unit operations, and proposing designs that meet specifications.	In-person exam
LO10	Evaluate work in thermodynamic processes by computing actual and ideal work.	In-person exam
LO11	Manipulate thermodynamic equations to derive and prove fundamental relationships.	In-person exam
LO12	Evaluate real behavior by computing and applying residual properties obtained from equations of state.	In-person exam
LO13	Apply cubic equations of state by computing their parameters, solving them, and interpreting the physical meaning of each root.	In-person exam
LO14	Estimate vapor pressure using Clausius–Clapeyron, shortcut, and Antoine equations and select the appropriate equation based on the assumptions.	In-person exam
LO15	Determine the equilibrium state of a system by applying the equilibrium criterion and calculating fugacity from an equation of state.	In-person exam
LO16	Learn new concepts through preparation, participation, and by engaging in a cycle of practice, feedback, and revision.	Homework, lecture attendance, goal setting
LO17	Solve problems collaboratively by engaging in effective teamwork within a small group.	Discussion problems, discussion attendance, peer evaluation

2. Define mastery

Target 2N attempts for every N required successful demonstrations for mastery.

For today: define for one learning objective or one type of assessment

Learning objectives: LO1–LO11

Decision	Your Policy
Definition of mastery	Received "Achieved" on **two** exam problems
Reattempts	**Four** attempts given across exams

Learning objectives: LO12–LO15

Decision	Your Policy
Definition of mastery	Receive "Achieved" on **one** exam problem
Reattempts	**Two** attempts given across exams

Learning objective: LO16

Decision	Your Policy
Definition of mastery	Receive ≥80 of the 94 possible points for homework, lecture attendance, and goal setting assignments
Reattempts	- Can rework and resubmit each homework assignment one week after the original due date. - Can write a lecture summary for any missed lecture, due at the end of the semester.

Learning objective: LO17

Decision	Your Policy
Definition of mastery	Receive ≥34 of the 40 possible points for discussion problems, discussion attendance, and peer evaluation
Reattempts	None

2.1 Assessment plan

How many assessments will you need to give to provide the number of attempts planned for each learning objective?

For today: define for one type of assessment

Assessment Type	Number	Learning Objectives Covered
In-person exam	7 exams 52 problems	LO1–LO15
Homework	8	LO16
Goal Setting	3	LO16
Discussion	7	LO17
Peer Evaluation	3	LO17

3. Set the rating scale

Cross out the ratings you will not use.

Mastery	~~Exceeds Standard~~	*I do not want to spend the extra grading time to figure out what "meets" vs. "exceeds" means for each learning objective.*
	Meets Standard	
	~~Needs Revision~~	*Because I am offering multiple reattempt problems on later exams, I decided not to spend the extra grading time allowing students to revise existing problems.*
	Not yet	

4. Roll up the final grade

Cross out the grades you will not use.

For today: write your thoughts about what students must demonstrate to pass the course, and what they must demonstrate to get an A.

Grade	Requirements	
A	Master 14 of LO1–LO15	Master both LO16 and LO17
A-	Master 14 of LO1–LO15	
B+	Master 12–13 of LO1–LO15	Master both LO16 and LO17
B	Master 12–13 of LO1–LO15	
~~B-~~	~~----------~~	
C+	Master 11 of LO1–LO15	Master both LO16 and LO17
C	Master 11 of LO1–LO15	
~~C-~~	~~----------~~	
D	Master 10 of LO1–LO15	
F	Master < 10 of LO1–LO15	