

Building Effective and Inclusive Exams



**Stanford University
Chemistry Department
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Checklist for Inclusive Exams: Instructors' Guide

Exam writing is iterative - this checklist aims to aid you in each iteration and ensure that the final product is as inclusive and geared towards students' success as possible.

- **Before any exam questions are written, list the learning goals that the exam will assess and rank them in order of importance** (mastering certain skills, applying or explaining key concepts...).
- **Plan how many questions will be on the exam and what types of questions** (multiple choice, short answer, free response...) **will appear on the exam.**
- **Use the information from the previous two steps to plan how many questions will assess each desired learning goal, and what types of questions these will be.**
 - Recently learned material should be assessed with simpler, more introductory questions, while material that students have more in-class experience with can be assessed with more in-depth questions
 - Assessing a learning goal with multiple types of questions (multiple-choice questions involving simpler calculations with key formulas, questions requiring conceptual explanation, longer free response questions synthesizing different skills...) can provide a more accurate measurement of student knowledge.
- **Review these [inclusivity and effectiveness criteria](#) for exam questions and discuss them with all members of the teaching team.**
- **Work with the teaching team to write the exam, including by providing TAs with the guidelines labeled “For Question Writing” .**
 - Share the planning outlined above, including a ranked list of learning goals and details on potential types of questions, with all members of the teaching team
 - TAs or other members of the teaching team will label each part of each question they write with the learning goals it assesses. TAs will also submit solutions along with the questions they write.
- **Verify that the relative numbers of exam questions assessing each learning goal aligns with the ranking done at the beginning of this checklist.**
- **Check that all formulas that TAs reference in their solutions are included in the exam Formula Sheet that will be provided to students** (unless memorization of specific formulas is an expectation made clear to students in class).
- **Check that the part of each question statement specifying what students are supposed to do / calculate is bolded**
- **If practice exams / practice problems are provided to students, check that these have similar difficulty and concept coverage to the actual exam**
- **Check that [inclusivity and effectiveness criteria](#) are met**

Checklist for Inclusive Exams: Question Writers' Guide

Exam writing is iterative - this checklist aims to aid you in each iteration and ensure that the final product is as inclusive and geared towards students' success as possible.

- **Before writing each question, list the key learning goals that the question is intended to assess** (these may be assigned to you by a course instructor)
- **Need help with finding potential question topics?** (lab section topics are great!)
 - Consider question topics related to research being done at Stanford and/or highlighting scientists from underrepresented groups
 - Consider question topics related to “course themes” like green chemistry or chemical engineering
 - Make sure that the “premise” of the question does not require so much explanation / detail that it overshadows the goal of having students demonstrate their knowledge of course content
- **Review these [inclusivity and effectiveness criteria](#) for exam questions**
- **Consider including a question sub-part that asks students to explain their strategy for solving the problem, which assesses their ability to synthesize concepts**
- **After writing each question, write out a detailed solution and label the question, including each sub-part, with the relevant learning goals. Consider alternative solution strategies to the one you employed**
 - Check that the question assesses the key learning goals listed at the beginning of this checklist
- **Check that the part of each question statement specifying what students are supposed to do / calculate is bolded**
- **Check that all formulas that you referenced in your solutions are included in the exam Formula Sheet that will be provided to students** (unless memorization of specific formulas is an expectation made clear to students in class)
- **Check that [inclusivity and effectiveness criteria](#) are met**

Key Criteria for Inclusive and Effective Exams

- **The large majority of work required for each question is directly tied to the learning goals the question is designed to assess**
- **The “premise” of each question does not require so much explanation that it overshadows the goal of allowing students to demonstrate knowledge of course content, and does not require exclusive cultural knowledge**
- **Questions only require mathematical / algebraic work that is directly tied to demonstrating mastery of key learning goals.** Extraneous math distracts students from showing what they know and is a barrier to success for students with less math experience.
- **Multiple-choice questions are written without double-negatives.**
- **Multiple-choice answer choices are selected to assess learning goals and an appropriate amount of answer choices are used.**
- **Multiple choice questions provide an opportunity for partial credit, including through showing work or writing a brief explanation**
- **All questions, particularly “word problems”, contain the minimum amount of text and details required to contextualize the problem and provide needed information.** Extraneous text and details, like arbitrary values and unnecessary descriptors, distract students from showing what they know. These are a barrier to success for students with less reading comprehension experience and students learning English as a second language.
- **All questions are written using simple language and terms likely to be unfamiliar to students are clearly defined**
- **Free response questions are scaffolded into multiple parts to allow students to demonstrate their ability to perform intermediate calculations or explain relevant concepts even if they are unable to reach the correct answer for the final part**
 - Consider including a question sub-part that asks students to explain their strategy for solving the problem, which assesses their ability to synthesize concepts (the Stanford Physics Department often does this)
 - If the answers of sub-parts of free response questions are important for solving the next parts, consider phrasing these questions like “Show that the partial pressure of oxygen is 4.5 atm. Then, use this value in the next parts” rather than “Find the partial pressure of oxygen”. Providing the correct value allows

students to demonstrate their knowledge on later parts of the question even if they are unable to solve an earlier part.

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