How to Give a Test

1. Should we teach to the test?
2. What is the goal?
3. Which type of question is best?
4. Are there tools for grading?
5. What are the overarching principles?
Should we teach to the test?

Some say NO

- Lost joy of learning
- Harmful focus on the test
Should we teach to the test?
YES, if done carefully

• Avoid a “summative” Final Exam with high stakes
• Use “formative” questions throughout the course
  • Qs with teaching videos
  • Qs to prepare for small group discussions
  • Qs in lecture to highlight key points
The goal is critical thinking
What type of question is best?

• MCQs (multiple-choice questions)
  • Pros: ⚫
  • Cons: ⚫

• Short answer (with a strict word limit)
  • Pros: ⚫
  • Cons: ⚫

• Open-ended questions

This means Q for you
What type of question is best?

• MCQs (multiple-choice questions)
  • **Pros**: rapid grading, objective scoring
  • **Cons**: test-taking skills, “rabbit holes”

• Short answer (with a strict word limit)
  • **Pros**: no guessing
  • **Cons**: cumbersome to grade

• Open-ended questions
Guides for writing questions

• Bloom’s taxonomy
  Knowledge > Comprehension > Application > Analysis > Synthesis

• Vanderbilt guide for MCQs
  https://cft.vanderbilt.edu/guides-sub-pages/writing-good-multiple-choice-test-questions/

• Other on-line guides
Let’s examine a multiple choice question
MCQs need the right menu of choices

Five Easy Pieces:
Jack Nicholson wants a side order of toast

I want a chicken salad sandwich on wheat toast, no mayo, no butter, no lettuce... hold the chicken... and bring me the toast
In addition to the nucleus, _____ are organelles that contain DNA.

A. Golgi bodies  
B. Mitochondria and chloroplasts  
C. Ribosomes
In addition to the nucleus, which organelles contain DNA?

A. Golgi bodies
B. Mitochondria and chloroplasts
C. Ribosomes
Can you improve the alternative choices?

In addition to the nucleus, which organelles contain DNA?

A. Golgi bodies
B. Mitochondria and chloroplasts
C. Ribosomes
In addition to the nucleus, which organelle contains DNA?

A. Golgi body
B. Mitochondrion
C. Ribosome
Let’s examine a short answer question
Can you analyze the Kaplan-Meier curve?

Course: Molecular Foundations (MoFo)

MCQs linked to videos prepared students for this question
Can you analyze the Kaplan-Meier curve?

Professor Ad-Hoc asserts that early palliative care improves survival 2-fold at 18 to 32 months. You wonder if Ad-Hoc is right. How many patients remained at 32 months? Write your answer in the boxes below. (2 points)

Standard care patients - [ ]
Palliative care patients - [ ]
Can you analyze the Kaplan-Meier curve?

Professor Ad-Hoc asserts that early palliative care improves survival 2-fold at 18 to 32 months. You wonder if Ad-Hoc is right. How many patients remained at 32 months? Write your answer in the boxes below. (2 points)

Standard care patients - 1
Palliative care patients - 3
Students preferred mixed-format exams

Student evaluations of MoFo final exam

- MCQ short answer
- MCQ
- MCQ short answer

![Bar chart showing student evaluations from 2009 to 2018](chart.png)
MCQs identified failures, but just barely
Mixed-format identified failures better and increased the median
## Mixed-format required more time than MCQ

<table>
<thead>
<tr>
<th>Activity (person hrs)</th>
<th>MCQs</th>
<th>Mixed</th>
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<tr>
<td>Discussing failed Qs with teachers: 12 min x 30 students</td>
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<td><strong>Total for teachers plus students</strong></td>
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<td>17</td>
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</table>
GradeScope helps mixed-format grading
GradeScope helps mixed-format grading
GradeScope helps mixed-format grading
5 Easy Pieces (for Gradescope)

• Invisible student name promotes objectivity
• Grading one question fosters consistency
• Grading rubrics can evolve
• Partial credit recognizes partial knowledge
• Software provides data on questions
What is your biggest issue with exams?

A. Unfair questions
B. Divergence from learning goals
C. Undetected mistakes
D. Difficulty in writing questions
E. Other
The overarching principles

• Critical thinking
• Conceptual learning
• Active learning
• Fairness
Thanks to Student Assessment Committee

Co-chairs: Gil Chu, Tina Cowan
Faculty: Hannes Vogel
Students: Nagehan Ayakta, Maria Filsinger Interrante, Aviva Sarah Mattingly, Charlotte Rajasingh, Mary-Grace Reeves, Tatiana Rosenblatt, Steven Sloan
OME: Mohamed Sow

Thank YOU for participating