Strategies
for
Teaching Online and Remote Courses

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Strategies for Teaching Online and Remote Courses

Key Design Questions:

1) How do you get students to engage with the content (i.e., watch lectures or read content)?
2) How do you get students to focus on subtle points of the course?
3) How do you get students to think critically about the content and to ask pertinent questions?
4) How do you keep the students current in an asynchronous course?

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Key Observation:
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Solution: Assessments as learning tools play a fundamental role!!!

Assessment Structure

1) Online Assignments: [20-40%]

- 8-10 low stake assignments worth 2-4%.
- T/F, MC and **multi-select** questions.
- Basic facts, mechanical problems.
- Many are conceptual.
- Each quiz contains review problems.
- Twists, shockers, clues, and glimpses into the future. Designed to generate discussion and highlight key points and misconceptions.
- 60-70% of questions can be completed by watching the lectures or doing the course readings.
- Entire assignment should be doable in $\sim$ 2-3 hours per week.
- Auto-graded with solutions posted after the due date.
- The tour guide to the course.
- 60% basic, 30% non-routine, 10% challenging

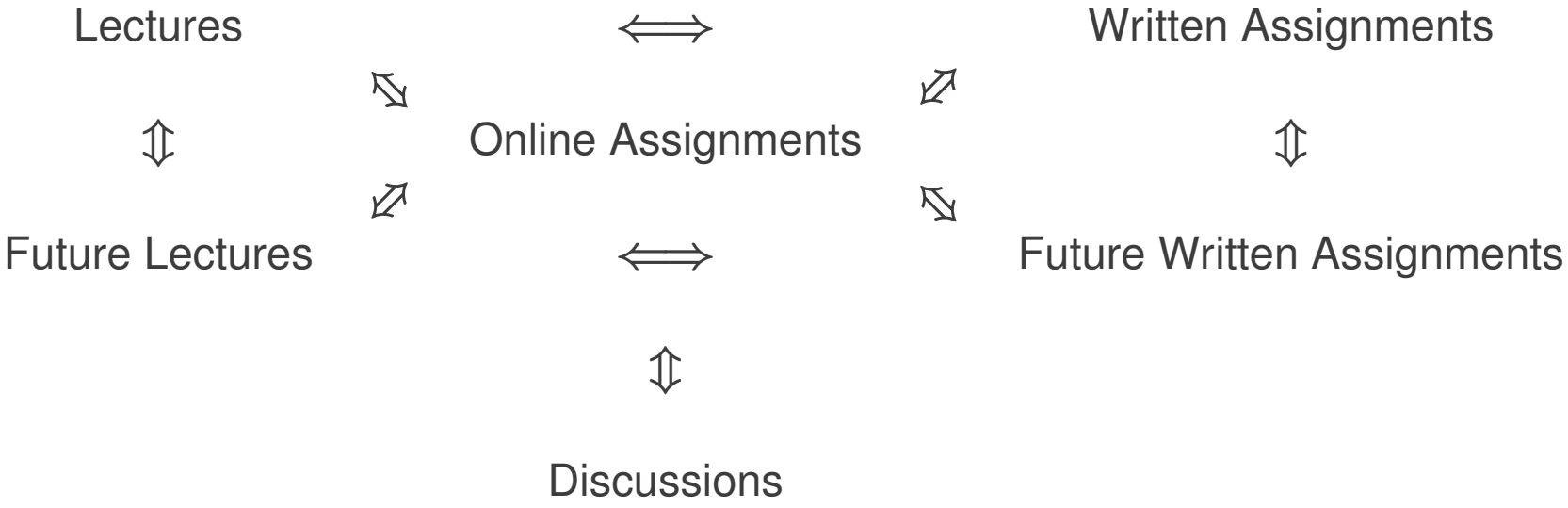
Assessment Structure

2) Written Assignments: [30-40%]

- Traditional written assignments that are graded manually.
- Multi-part themed questions that are scaffolded!!!
- Build on the online assignments.
- Encourage students to look back at lectures for information.
- 3-4 per term with broad coverage of content.
- Review questions and looks ahead.
- May include MC, Multi-Select or T-F questions.
- Possibly encourage students to work together for some or part of the assignment.
- Students should be guided to work on these over multiple weeks.
- Can be viewed like open book midterms or unit exams.
- 60% basic, 30% non-routine, 10% challenging.

Assessment Structure

Feedback Loop:



Sample Questions

Question 1) Is the following statement true or false?

$$\frac{1}{1001} < \frac{1}{1000}$$

a) True

b) False

Sample Questions

Question 2) Assume that f is continuous and even. Which of the following are true?

a) $\int_{-x}^{0} f(t)dt = \int_{x}^{0} f(t)dt$ for every $x > 0$.

b) $\int_{-x}^{0} f(t)dt = -\int_{x}^{0} f(t)dt$ for every $x < 0$.

c) $\int_{-2}^{2} f(t)dt = 2 \cdot \int_{0}^{2} f(t)dt$.

d) $\int_{-2}^{2} f(t)dt = 0$.

e) $\int_{-2}^{5} f(t)dt = \int_{2}^{-5} f(t)dt$.

Question 3) Assume that f is continuous and odd. Assume that $\int_{-3}^{2} f(t)dt = 4$ and $\int_{0}^{2} f(t)dt = 1$. Which of the following are true?

a) $\int_{-3}^{-2} f(t)dt = 3$.

b) $\int_{2}^{3} f(t)dt = -4$.

c) $\int_{-2}^{0} f(t)dt = -1$.

d) $\int_{-2}^{2} f(t)dt = 2$.

e) $\int_{-2}^{2} f(t)dt = 0$.

Sample Questions

Question 4) Prove that if f is continuous and even, then

$$\int_{-2}^{2} f(t)dt = 2 \cdot \int_{0}^{2} f(t)dt.$$

Sample Questions

Question 5) A brine containing 25g of salt per litre of water is pumped into a tank containing $200L$ of water at rate of 1 litre per second. At the same time a second brine solution containing 5g of salt per litre of water is pumped into the tank at rate of 2 litre per second. The tank which initially contained 10Kg of salt contains a device that thoroughly mixes its contents. The resulting solution is simultaneously drained at a rate of $3L$ per second. Let $S(t)$ denote the amount of salt in the tank at time t seconds measured in kilograms. Which of the following statements are true?

a) $S'(25) < 0$

b) $S''(25) > 0$

c) $5 < S(25) < 6$

d) $4 < S(25) < 5$

e) $\lim_{t \to \infty} S(t) = \frac{7}{3}$ Kg

Sample Questions

Question 6) Let $y = f(x)$ be a solution to the differential equation

$$y' = y^3 + x.$$

Which of the following statements are true?

a) Assume that $f(0) = 0$. Using the partition $P = \{0, \frac{1}{10}, \frac{2}{10}, \ldots, \frac{9}{10}, 1\}$ with Euler's method our estimate for $f(\frac{1}{5})$ would be 0.1.

b) Assume that $f(0) = 0$. Using the partition $P = \{0, \frac{1}{10}, \frac{2}{10}, \ldots, \frac{9}{10}, 1\}$ with Euler's method our estimate for $f(\frac{1}{5})$ would be 0.01.

c) Assume that $f(0) = 0$. Then $|f(5) - f(4)| > 4$.

d) Assume that $f(0) = 0$. Then $|f(5) - f(4)| < 5$.

e) Assume that $f(0) = 0$. The graph of the function f is concave upwards on all of $\mathbb{R}$.

Sample Questions

Question 7) Let $\{a_n\}$ be a sequence of positive real numbers. Let

$$L_n = \frac{\ln(\frac{1}{a_n})}{\ln(n)} \quad \text{for } n \geq 2.$$

Assume that $\lim_{n\to\infty} L_n = L$. Which of the following statements is true?

a) If $L < 1$, the series $\sum_{n=1}^{\infty} a_n$ converges.

b) If $L < 1$, the series $\sum_{n=1}^{\infty} a_n$ diverges.

c) If $L > 1$, the series $\sum_{n=1}^{\infty} a_n$ converges.

d) If $L > 1$, the series $\sum_{n=1}^{\infty} a_n$ diverges.

e) The series $\sum_{n=1}^{\infty} (\frac{1}{2})^{\ln(n)}$ converges.

Assessment Structure

3) Final Assessment: [20-30%]

- 50-60 True/False and **Multi-Select** questions.
- Small number of additional written questions can be added if desired.
- Open book. Time permitted = ?
- 60% basic, 30% non-routine, 10% challenging.

Managing Integrity Issues

Mitigating Cheating

- Design the online assessments so that much of the assignment can be done just as quickly by actually engaging with the content as it would take to get the answers from some other source.
- Bonus marks for the twists, shockers, clues, and glimpses into the future so that these does not seem to be punitive.
- Include enough basic questions so students can get started and feel they are making progress.
- **Multi-select** questions seem to do the trick!!