

Interactive Learning Toolkit

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Outline

▶ **Peer Instruction**

- ▶ Improves student understanding
- ▶ Makes classroom learning more engaging

▶ **Using technology to help pedagogy**

- ▶ Interactive learning toolkit

What is Peer Instruction?

▶ **Main features:**

- ▶ Pre-class reading
- ▶ In class: depth, not coverage
- ▶ ConcepTests

What is Peer Instruction?

- ▶ **Move the information transfer out of the classroom:**
 - ▶ Assignments on reading material before class
- ▶ **Strategy:**
 - ▶ 2 questions on content
 - ▶ 1 feedback question
 - ▶ Graded on effort (semi-automatic)
- ▶ **Use web-based reading assignment to help students think about what they read**
- ▶ **Find out what needs attention in class**
- ▶ **Get to know the students**

What is Peer Instruction?

- ▶ **Use classroom to deepen and broaden understanding**
- ▶ **by identifying key ideas**
- ▶ **and giving students opportunity to think**
- ▶ **Strategy:**
 - ▶ Frequent suitable ConcepTest questions
 - ▶ Rewards for participation
 - ▶ Adjust lecture based of feedback from question

How can technology help?

▶ **Information collection**

- ▶ Collect student responses in classroom and outside

▶ **Information distribution**

- ▶ Deliver materials and information to students

▶ **Information presentation**

- ▶ Discover connections between all the different pieces of information that go with a course

Peer Instruction in ILT

[Complete profile](#)
[Schedule lectures](#)
[Reading assignments](#)
[Create assignments](#)

QUICK LINKS
[Students](#)

[Sections](#)

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[Report a problem](#)

START DATE: Feb 2 2003
END DATE: Jun 2 2003
LECTURES ON: ☐ Mon ☒ Tues ☐ Wed ☒ Thurs ☐ Fri ☐ Sat ☐ Sun
LECTURE START: 9 : 00 am Eastern Standard Time
LECTURE DURATION: 1 Hrs : 30 Mins
STUDENT ACCESS: 1 hours after start of lecture
LECTURE HEADER:

<P ALIGN="center">
<H3>This is the lecture</H3></P>

ENROLLMENT DATES: Feb 2 2003 - Mar 2 2003

- Create a calendar-based lecture schedule

Peer Instruction in ILT

Yahoo! News ▾ ILT ▾ DEAS ▾ Apple ▾

VU Course

Logged in as Savendra Dutta
Sign out

HOME READING LECTURES ASSIGNMENTS FORUMS NEWS HANDOUTS

Courses > VU Course > Introduction > Add CT

Please select the CTs you want to add to your lecture and click "Add to lecture". You can also click "Generate slides" to produce slides of question selected. You can modify your search or perform a new search using the search tools on the left. You can change the view of the CTs using the "Expand all" or "Collapse all" links on the left.

1 - 10 of 156 CTs > > Sort by: Question text Sort

1. Consider two identical resistors wired in series. If there is an electric current through the combi...
1. equal to
2. half
3. smaller than, but not necessarily half

2. A CuSO_4 solution is placed in a container housing coaxial cylindrical copper electrodes...
1. positive,
2. negative,
3. both positive and negative.

3. A battery establishes a steady current around the circuit below. A compass needle is placed successi...
1. P, Q, R,
2. Q, R, P,
3. R, Q, P,

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Yahoo! News ▾ ILT ▾ DEAS ▾ Apple ▾

VU Course

Logged in as Savendra Dutta
Sign out

HOME READING LECTURES ASSIGNMENTS FORUMS NEWS HANDOUTS

Courses > VU Course > Introduction 2/4 > Create ConceptTest

Add a new ConceptTest

Introductory text of your question.

Text to appear after image.

1 Multiple choice no. 1
2 Multiple choice no. 2

1 More choices

Text to appear after answer choices.

Explanation of answer.

Upload explanatory image...

Correct?
Correct?

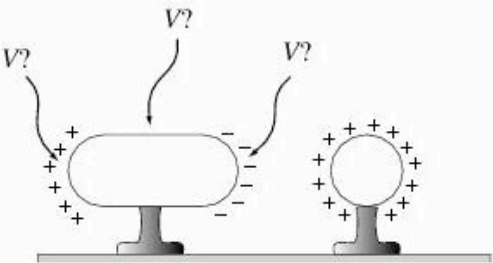
Add choices in bulk

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- Pull in ConceptTest questions from a database
- Create new ones yourself and add to the database

Peer Instruction in ILT


1. A charged object is brought near an uncharged metal object. Negative charges accumulate on the side of the uncharged object nearest to the charged sphere, positive charges on the opposite side. On the uncharged metal object, the potential is



1. largest on the positive side
2. largest on the negative side
3. largest in the middle
4. the same everywhere

Answer

2. A cylindrical piece of insulating material is placed in an external electric field, as shown. The net electric flux passing through the surface of the cylinder is

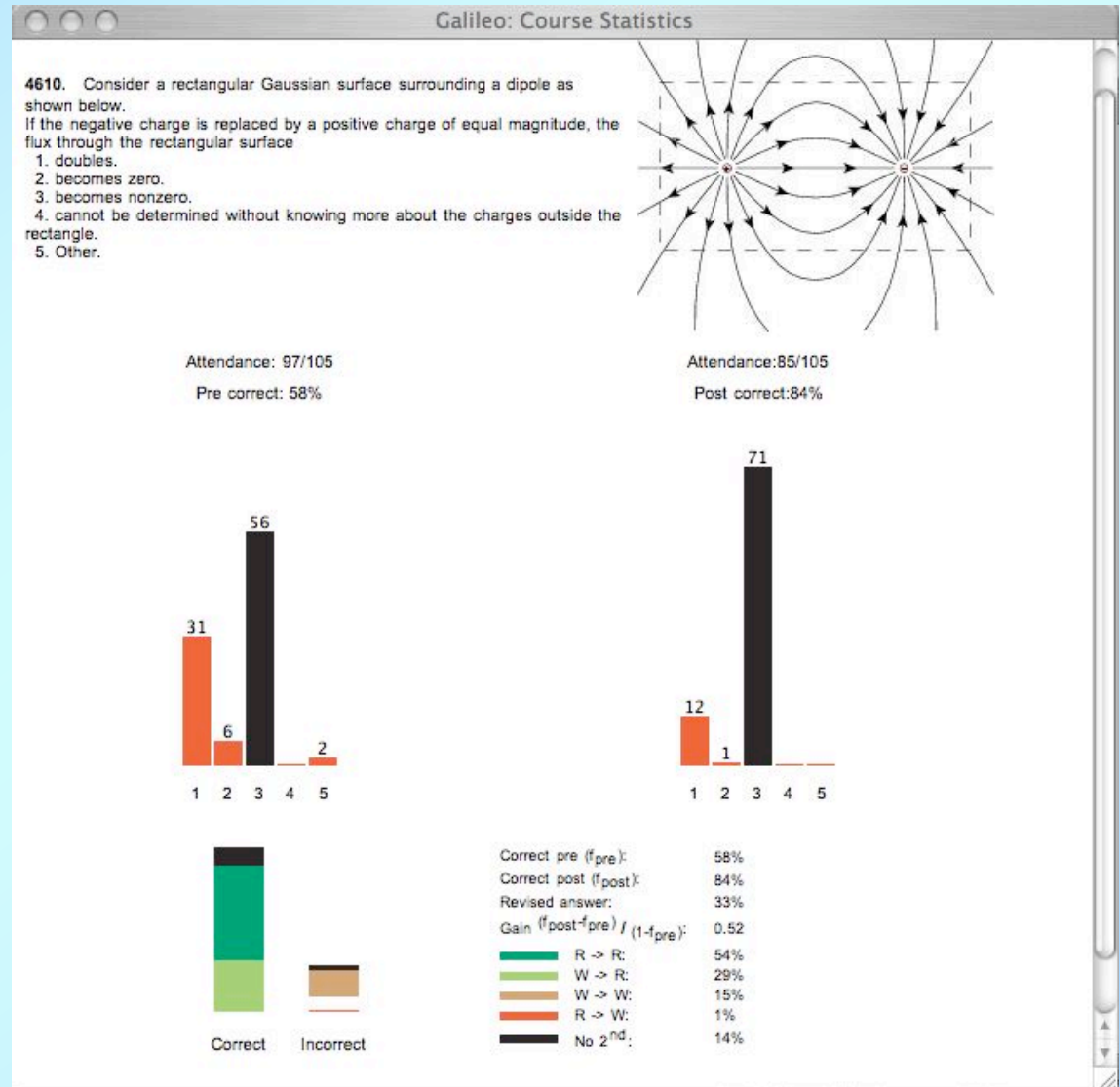


Internet zone

- ▶ Student view of lecture automatically created
- ▶ And published to students when specified

Peer Instruction in ILT

- Upload PRS session files
- Automatically grade students for participation
- Grade questions for effectiveness



Peer Instruction in ILT

▶ **Benefits**

- ▶ Automated grading (effort-based) of students
- ▶ Automated attendance recording
- ▶ Instant feedback to instructor
- ▶ Ever growing database of questions
- ▶ Systematic method of assessing quality of question

Reading assignments in ILT

The screenshot shows a web browser window titled "ILT: Reading". The address bar displays the URL: `http://net-56308.deas.harvard.edu:8182/reading/assignments/createassignments/?PHPSESSID=...`. The browser's toolbar includes navigation buttons and a search bar with the text "Google". Below the browser window, the page header shows "VU Course" on the left and "Logged in as Suvendra Dutta" with a "Sign out" link on the right. A navigation menu contains links for HOME, READING, LECTURES, ASSIGNMENTS, FORUMS, NEWS, and HANDOUTS. The left sidebar has sections for "E-MAIL", "COMING UP" (with a link to "2/4 Lecture 0"), "TO DO" (with links to "Complete profile", "Reading assignments", and "Create assignments"), and "QUICK LINKS" (with links to "Students" and "Sections"). The main content area is titled "Courses > VU Course > Create Reading Automatically". It contains a text box with instructions: "Use this page to create a schedule of reading assignments. Each lecture will have a reading assignment associated with it. Use this page to specify how long before the lecture you want to publish the assignment to students. Also specify when you want to make it due." Below this, there are two sections for scheduling. The first section, "HOW LONG BEFORE THE LECTURE START DO YOU WANT THE READING ASSIGNMENT MADE AVAILABLE?", has input fields for "At Hours" (12), "Mins" (1), a time selector (AM), and "2" days before start of lecture. The second section, "HOW LONG BEFORE THE LECTURE START DO YOU WANT THE READING ASSIGNMENT TO BE DUE?", has input fields for "At Hours" (11), "Mins" (59), a time selector (PM), and "1" days before start of lecture. A "Create" button is located at the bottom of the form.

- Create reading assignments schedule based on the lectures

Reading assignments in ILT

2/4 Lecture 0
2/5 Reading 3
2/5 Assignment 0

TO DO

[Complete profile](#)

TOOLS

[Edit info](#)
[Delete selected questions](#)
[Add new question](#)
[Add question from database](#)
[Credit](#)
[Grade assignment](#)
[Student view](#)

QUICK LINKS

[Students](#)

[Sections](#)

Select Section ▾

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Name: Electrostatics

Reading: Sections 1-4; Chapter 3

Issue Date: 2/5/2003 12:01 am

Due Date: 2/5/2003 11:59 am

Questions:

<input type="checkbox"/>	↑ ↓	edit	Student response
<input type="checkbox"/>	↑ ↓	edit	Student response
1) What is the symmetry of the electrical field due to a single negative charge?			
1. Spherical 2. Cylindrical 3. There is no symmetry 4. Translational Answer: 1, The electric field due to a single electric charge is spherically symmetric.			
<input type="checkbox"/>	↑ ↓	edit	Student response
2) What is the nature of the electrostatic force between two positive charges?			
1. Attractive 2. Repulsive 3. There are no forces 4. Depends on the mass of the charges Answer: 2, The electrostatic force between two like charges is always repulsive			
<input type="checkbox"/>	↑ ↓	edit	Student response
3) Please describe one thing in the reading that you found confusing. If you found nothing confusing, please mention something you found very interesting.			
Answer: Look at the notebook for explanations of common misconceptions.			

► Add questions to the assignment

Reading assignments in ILT

Readings > Current Reading

COMING UP
2/6 Reading
2/11 Problem Set 1

Due: 2/6/2003 at 11:59 AM
Status: Not completed
Reading: Sections 1-4; Chapter 3

1. What is the symmetry of the electrical field due to a single negative charge?
Choices:
☒ Spherical
☐ Cylindrical
☐ There is no symmetry
☐ Translational

2. What is the nature of the electrostatic force between two positive charges?
Choices:
☐ Attractive
☒ Repulsive
☐ There are no forces
☐ Depends on the mass of the charges

3. Please describe one thing in the reading that you found confusing. If you found nothing confusing, please mention something you found very interesting.
Answer:

I found Gauss' law very confusing. When you have a charge, how can its field be the same as the charge on a sphere?

Internet zone

- **Students can answer the assignment when it is available to them**


Reading assignments in ILT

The screenshot shows a web browser window titled "Galileo: Students" with the URL <http://www.deas.harvard.edu/galileo/reading/assignments/specificassign>. The browser's address bar also contains a Google search bar. Below the browser window, a list of student responses is displayed. Each entry includes a student's name, a small profile picture, a link to their response, and the date and time of the response. The students listed are Kay Downer, Maria Marzilli, Eleanor Adams, Gita Rao, and paul mathieu. Each student's response is a paragraph of text discussing electrostatic force and Coulomb's law. The interface also includes links for "NOTEBOOK", "ALL ANSWERS", and "Create CT" for each student. At the bottom, it indicates "1 - 10 of 87 Responses" with navigation buttons.

Student Name	Response Text	Grade	Responded At
Kay Downer	Student Response: The solution to "Electrostatic tug of war" (pg 23) is unclear. I don't really understand what the part (b) solution is saying - is it just saying that when the particles are arranged so that the vector sum on 1 is zero, then the vector sum on 2 and on 3 is NOT zero? Or is there more to it than that?	2	2/3/2002 at 4:23 pm
Maria Marzilli	Student Response: The single point of the reading I found most difficult were the sections about the resolution of electrostatic force into vectors and summing up various vectors to find the net electrostatic force on an object being attracted or repelled by various charge carriers.	2	2/4/2002 at 12:24 am
Eleanor Adams	Student Response: Determining the vectors of electrostatic force when there are multiple charged particles.	2	2/4/2002 at 12:28 am
Gita Rao	Student Response: The question 2 on this identified my confusion. I'm not sure if I understand the patterns necessary for particles to be in electrostatic equilibrium.	2	2/4/2002 at 1:04 am
paul mathieu	Student Response: section 26.6 and 26.7 coulomb's law, what is the subscript under the F? (i.e eq 26.1)	2	2/4/2002 at 1:39 am

► Students' work, face and names are all connected

Reading assignments in ILT

 Lisa Simpson

Please describe one thing in the reading that you found confusing. If you found nothing confusing, please mention something you found very interesting.

Answer: I found Gauss' law very confusing. When you have a charge, how can its field be the same as the charge on a sphere?

1. Reduce original response to simple question:


I found Gauss' law very confusing. When you have a charge, how can its field be the same as the charge on a sphere?

2. Index question: (e.g., Section 10.2, Checkpoint 6.7)

3. Subject:

4. Compose response:

Gauss' law states that the flux of the electric field on any closed surface (not just sphere) is proportional to the electric charge inside it, and independent of the charges outside. The actual distribution of the charges inside sphere doesn't matter.

 Lisa Simpson

Please describe one thing in the reading that you found confusing. If you found nothing confusing, please mention something you found very interesting.

Answer: I found Gauss' law very confusing. When you have a charge, how can its field be the same as the charge on a sphere?

Existing Notebook Topics:

- Gauss' law (Explanation of Gauss' law)

Equation 32.21

difference between solenoid and toroid

difference between dot and cross products

Notebook Q&A

1. How do you calculate a double cross product?

To calculate a double cross product, you need to apply the rules for the cross product twice in a row. For example, the double product $a \times (b \times c)$ is the cross product of the vector a with the vector that results from the product $(b \times c)$. So, first we take the product in parentheses: curl the fingers of the right hand from b to c vector $(b \times c)$. The magnitude of this vector is $ab \sin \theta$, where θ is the angle between b and c (see Eq. 31.4). Once we have determined the vector $(b \times c)$, we must repeat the procedure to find the vector product of this vector with vector a .

Top

2. I don't understand how the field outside the solenoid can be neglected.

Because magnetic field lines always form loops, all the field lines that pass through the solenoid must loop back around the outside of the solenoid. So there are always as many fieldlines outside a solenoid as there are inside.

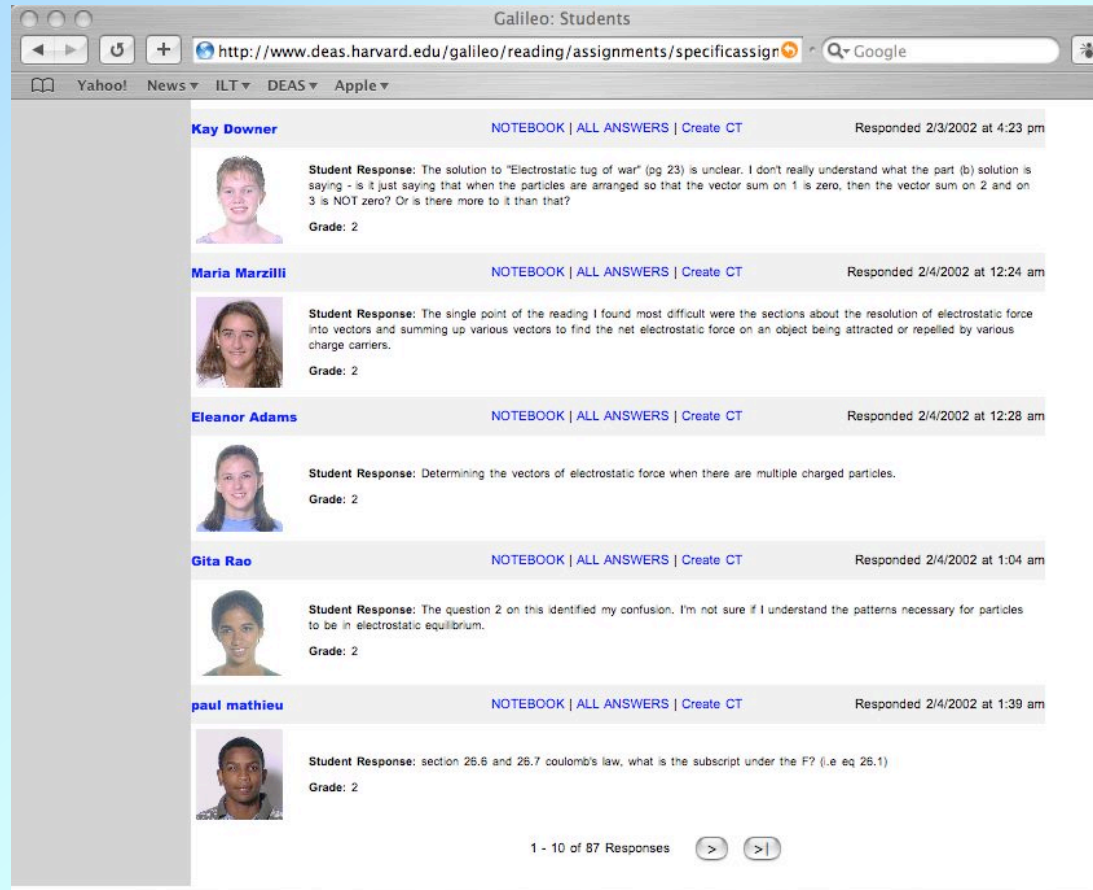
- ▶ Quickly respond to students' queries
- ▶ Build responses from previous responses to other students
- ▶ Automatically generate FAQ on student site

Reading assignments in ILT

▶ **Benefits**

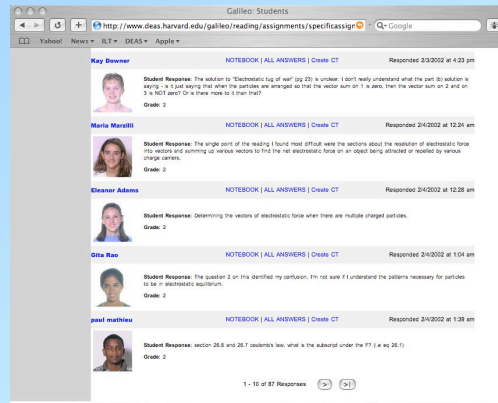
- ▶ Better use of class time
- ▶ Connects names, faces and work
- ▶ Increases student faculty interaction
- ▶ Study resource for students

Face book



- By connecting every element of the course together with the student, ILT makes it easier to get to "know" a large class

Face book



- **By connecting every element of the course together with the student, ILT makes it easier to get to “know” a large class**

Face book

The screenshot shows the Galileo Students interface for Physics 1b. The top navigation bar includes links for HOME, READING, LECTURES, ASSIGNMENTS, FORUMS, NEWS, and HANDOUTS. The user is logged in as Eric Mazur. The main content area displays the profile for Lisa Simpson (F11112222), including her class (2005), major (Music), and registered on date (4/4/2002). A table below shows performance metrics for various course elements.

RA	CT	PS	L	PT	OT	HE	FE
5/6	0/0/2	32/40	10/10	2/2	0/15	28/35	0/60
6/6	0/0/6	28/40	10/10	2/2	0/18	28/35	
6/6	0/0/7	33/40	10/10	2/2		0/35	
6/6	0/0/6	31/40	0/10	2/2			
5/6	0/0/7	0/40	0/10	2/2			
6/6	0/0/5	0/40		2/2			
6/6	0/0/8	0/40		2/2			
6/6	0/0/9	0/40		0/2			
6/6	0/0/9	0/40		0/2			
6/6	0/0/12			0/2			
4/6	0/0/10						
6/6	0/0/7						
6/6	0/0/13						
6/6	0/0/8						
6/6	0/0/6						
0/6	0/0/8						
0/6	0/0/7						
0/6	0/0/6						
0/6	0/0/8						
0/6	0/0/13						
0/6	0/0/8						
0/6	0/0/8						
80/126	0/0/173	124/360	30/50	14/20	0/33	54/105	0/60
63%	0/0%	34%	60%	70%	0%	51%	0%

RA: Reading assignments; CT: ConcepTests; PS: Problem Set; L: Laboratory; PT: Pretest; OT: Online Test; HE: Hour Exam; FE: Final Exam;

- By connecting every element of the course together with the student, ILT makes it easier to get to “know” a large class

Grade book

This screenshot shows the configuration page for 'Problem Set 1' in the VU Course system. The page includes a sidebar with navigation links (HOME, READING, LECTURES, ASSIGNMENTS, FORUMS, NEWS, HANDOUTS) and a main content area with form fields for Name, Category, Link Type, Issue Date, Due Date, TimeZone, Solution Link, Solution Issue Date, and Questions. The 'Name' field is set to 'Problem Set 1', 'Category' is 'Problem Set', and 'Issue Date' is 'Feb 1 2003'. The 'Due Date' is 'Feb 11 2003' at '9:00 am'. The 'Solution Issue Date' is 'Feb 3 2003' at '1:35 am'. The 'Questions' section shows a list of questions with checkboxes and input fields for grading.

This screenshot shows the 'Grade' page for 'Problem Set 1' in the VU Course system. The page includes a sidebar with navigation links and a main content area with form fields for Name, Student ID, Sections, Question No, and a table for grading students. The 'Name' field is empty, 'Student ID' is empty, and 'Sections' is 'Unsectioned students'. The 'Question No' is '1' and 'PS 1: 2' is selected. The table shows one student, 'Lisa Simpson', with a 'Student ID' of '11112222' and a 'Grade' of '5'. The 'Save' button is visible at the bottom.


- ▶ A simple grade book which keeps a record of student scores in different assignments.


Email


Apple Visualization


READING LE


Students (23)


 Elizabeth Quinn


 Sander Gilman


 Loretta Staudt


 Elizabeth Quinn


 Daniel Goleman


 Aarti Jain


 Krystal Dineen

 Rebecca Quinn

 Elizabeth Quinn

 Ilse Quinn

 Chase Quinn



To: Eric Mazur <emazur@fas.harvard.edu> **Brendan Connors** Transfer

Received: Thu, 29 May 2003 12:18:58 -0400

Subject: re-grades

Hi Prof Mazur,

I hope your summer has started well. I didn't expect to be writing you after the email I sent last week, but I picked up my re-grades and met with Veronica yesterday afternoon, and I'm not satisfied with at least one of the re-grade responses I received. The grader suggested that I should "count myself lucky" to receive the two points that I did, but I know that others gave exactly the same answer I did and received full credit for their answer (in short: the last problem on the first Pset did not explicitly ask for an explanation and so I did not give one; initially I was given no credit while my roommate and others we worked with were given all five points). Because this is just a matter of a few points on a problem set, I was prepared to ignore it, but talking with Veronica about the course's grading showed me just how much a few points can matter. I can't be sure whether this three point change would make a difference in my grade, but I thought I should at least check in with you.

Many thanks,

Liz

Elizabeth J. Quinn

☐ Affects Grade: Message does not require response

RESPONSE

To: elizabeth quinn <ejquinn@fas.harvard.edu> [\(edit\)](#)

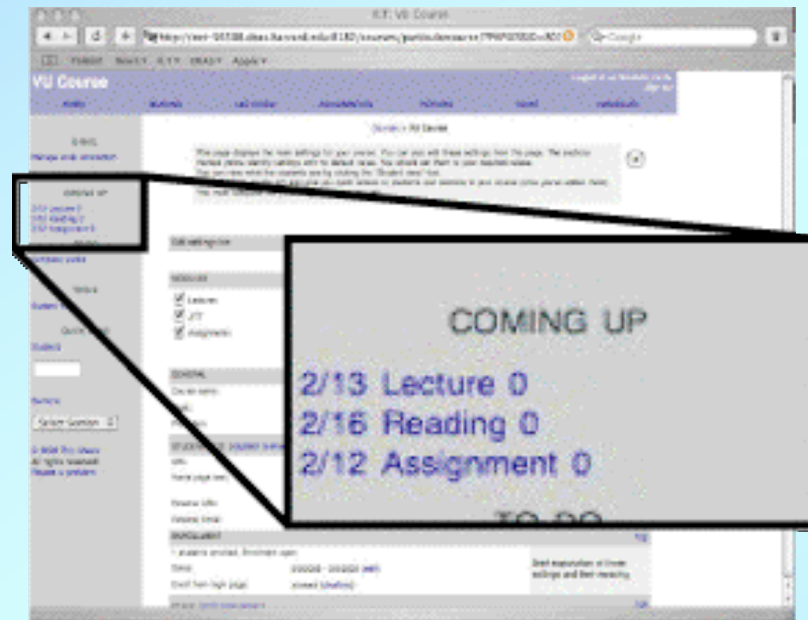
Co: (separate emails with ',')

Subject:

Edit or copy over FAQ response:

- RA not saved
- Please post on forum
- no CT scores
- Some CT points missing
- Lab 1 grade missing
- waiting on a problem set grade
- Missed CTs due to anti-war walk
- PS extension
- RA change on 4/21
- Online test retake

Making it easier for the instructor



- **Calendar-based schedule means the application can advise instructor on the course elements that need attention**

Clone a course



The screenshot shows a web browser window with a navigation bar at the top containing links for Yahoo!, News, ILT, DEAS, and Apple. Below this is the 'VU Course' header, which is logged in as 'Suvendra Dutta' with a 'Sign out' link. A secondary navigation bar includes links for HOME, READING, LECTURES, ASSIGNMENTS, FORUMS, NEWS, and HANDOUTS. The main content area is titled 'Courses > Clone Courses' and contains a form for creating a new course. The form includes a 'New course name' field with 'VU Course' entered, a 'New course description' text area containing HTML-formatted text, and a 'Select information to copy' section with checkboxes for JITT reading assignments, Lectures and ConceptTests, Assignments, Sections, Staff, Students, Handouts, and Forum. A 'Clone' button is located at the bottom right of the form. The left sidebar contains sections for 'E-MAIL', 'COMING UP' (with dates and links for Lecture 3, Reading 0, and Assignment 0), 'TO DO' (with a 'Complete profile' link), 'QUICK LINKS' (with a 'Students' link and a search box), and a 'Select Section' dropdown menu. At the bottom of the sidebar, there is a copyright notice for 2002 Eric Mazur and a 'Report a problem' link.

Logged in as Suvendra Dutta
Sign out

HOME READING LECTURES ASSIGNMENTS FORUMS NEWS HANDOUTS

Courses > Clone Courses

New course name:

New course description:

<P ALIGN="center"><H3>Welcome</H3> to the VU Course.</P>

This course is to demonstrate the features of ILT to the faculty of Vanderbilt University.

Select information to copy

- ☒ JITT reading assignments
- ☒ Lectures and ConceptTests
- ☒ Assignments
- ☒ Sections
- ☒ Staff
- ☐ Students
- ☒ Handouts
- ☒ Forum

Clone

E-MAIL

COMING UP

2/4 Lecture 3
2/9 Reading 0
2/12 Assignment 0

TO DO

Complete profile

QUICK LINKS

Students

Sections

Select Section

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Report a problem

- ▶ Ability to “clone” a course saves an enormous amount of time the second time the course is taught!

Summary

- ▶ **Reduce time spent in non-instructional activities**
- ▶ **Implementation of tools for research-based pedagogies**
- ▶ **Features field tested in classrooms**
- ▶ **Modular implementation**
- ▶ **Students have easy access to study materials**
- ▶ **And have new avenues of interaction with instructor!**

Acknowledgments

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DEAS Information Technology Group

For more information please visit:

<http://mazur-www.harvard.edu>

<http://www.deas.harvard.edu/galileo>