You’ve Really FLIPPED!

Active Learning at its best

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lecture

/ˈlekChər/ (n)

noun

1. an educational talk to an audience, esp. to students in a university or college.

synonyms: speech, talk, address, discourse, disquisition, presentation, oration, lesson
I'M TEACHING
Thirty years of research in the scholarship of teaching and learning in higher education have demonstrated that when students are engaged in the classroom, they learn more.

In most college classrooms students are not required to pay attention. The real norm is paying civil attention—or creating the appearance of paying attention. Why can students get away with only paying civil attention? The answer is that we as faculty let them.

Jay R. Howard is the dean of the College of Liberal Arts and Sciences at Butler University. His most recent book is titled Discussion in the College Classroom: Getting Your Students Engaged and Participating in Person and Online (Jossey-Bass, 2015).
So what should we do?
Active Learning

Active learning refers to techniques where students do more than simply listen to a lecture. Students are DOING something including discovering, processing, and applying information.
THE LEARNING PYRAMID

KNOWLEDGE RETENTION RATES

Passive Teaching Methods

Lecture 5%
Reading 10%
Audio/Visual 20%
Demonstration 30%
Discussion Group 50%
Practice by Doing 75%
Teach Others 90%

Participatory Teaching Methods

Adapted from National Training Laboratories, Maine
Active Learning for Critical Thinking

CRITICAL THINKING

“Learning without thought is a labor lost.”

-Confucius
So how should we structure the course?
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Week 3

Class Activities:  (print these out and bring to class)

- Activity - Continuity
- Activity - The Precise Definition of Limit Graphically

Content Videos & MOM:

Before class Tuesday:

- Watch Continuity
- Complete MOM - Composition & Continuity

Before class Wednesday:

- Watch Continuous Functions

Before class Thursday:

- Watch The Formal Definition of Limit

Textbook:

- 2.4 Continuity.pdf
- 2.5 the Precise Definition of Limit.pdf

Homework Problems:

M 2.4 - Continuity
M 2.5 - Formal Definition of Limit

Weekly Reflection:

Week Three Reflection - Newton
Content Videos & MOM:

Before class Tuesday:

- Watch Continuity
- Complete MOM - Composition & Continuity

Before class Wednesday:

- Watch Continuous Functions

Before class Thursday:

- Watch The Formal Definition of Limit
Continuity
The equation of the line that goes through the points $(1, 8)$ and $(-9, -9)$ can be written in the form $y = mx + b$

where $m$ is: 

and where $b$ is: 

Points possible: 1
This is attempt 1 of 3.
Given the function \( f(x) = -5 + 2x^2 \), calculate the following values:

\[
f(a) = \underline{\quad} \quad \text{Preview}
\]

\[
f(a + h) = \underline{\quad} \quad \text{Preview}
\]

\[
\frac{f(a + h) - f(a)}{h} = \underline{\quad} \quad \text{Preview}
\]
Textbook:

- 2.4 Continuity.pdf
- 2.5 the Precise Definition of Limit.pdf
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Active Calculus

Devoted to free calculus resources for students, free and open source materials for instructors, and active engagement for all.
ACTIVE CALCULUS
2016 Edition

Grand Valley State University
Open Educational Resource
Used for classroom activities
Part 1. A function $f$ defined on $-4 < x < 4$ is given by the graph in Figure below. Use the graph to answer each of the following questions. Note: to the right of $x = 2$, the graph of $f$ is exhibiting infinite oscillatory behavior.

(a) For each of the values $a = -3, -2, -1, 0, 1, 2, 3$, determine whether or not $\lim_{x \to a} f(x)$ exists. If the function has a limit $L$ at a given point, state the value of the limit using the notation $\lim_{x \to a} f(x) = L$. If the function does not have a limit at a given point, write a sentence to explain why.
Homework Problems:

M 2.4 - Continuity
M 2.5 - Formal Definition of Limit

The graph below is the function \( f(x) \)

![Graph of function f(x)](image)

Determine which one of the following explains why continuity is violated at \( x = -1 \).

- \( \lim_{x \to a} f(x) \) does not exist.
- \( f(a) \) is undefined.
- \( \lim_{x \to a} f(x) \) and \( f(a) \) exist but are not equal.

Get help: Video
Week Three Reflection - Newton

Have you heard of Sir Isaac Newton? Without Googling him, what do you know about him?

Now read the following article:  http://www.storyofmathematics.com/17th_newton.html

What are three things you learned about Newton in regards to calculus from the article?
Active Trigonometry

Math 1060
Trigonometry

Course Information | MyOpenMath | Course Materials
--- | --- | ---
Week 1 | Week 5 | Week 9 | Week 13 | Week 17
Week 2 | Week 6 | Week 10 | Week 14
Week 3 | Week 7 | Week 11 | Week 15
Week 4 | Week 8 | Week 12 | Week 16
Activity: The Unit Circle

Part 1.

a) What is the equation of the unit circle shown here?

b) Plot and label each of the $x$ and $y$ intercepts of the circle.

c) For the point $(x, y)$ on the circle, if $x = \frac{1}{2}$, find $y$ and plot and label the point.
So what is class like?
\[ \int_0^1 \sqrt{1 - x^2} \, dx = \pi \]
3. $h(x) = x - 3x^{2/3}$

1. $\mathbb{R}$

2. $h(0) = 0 - 3(0)^{2/3} = (0, 0)$ y-intercept

\[
\begin{align*}
  x - 3x^{2/3} &= 0 \\
  x^{2/3} (x^{2/3} - 3) &= 0 \\
  x^{2/3} &= 0, 3 \\
  x &= 0, 3^{3/2}
\end{align*}
\]

3. Symmetry: neither

$h(-x) = -x - 3x^{2/3}$

4. No asymptotes

5. $h'(x) = 1 - \frac{2}{x^{4/3}}$
   
   \[
   1 - \frac{2}{x^{4/3}} = 0 \text{ at } x = 8
   \]
   
   Critical points: $0, 8$

6. Increasing: $(-\infty, 0) \cup (8, \infty)$
   Decreasing: $(0, 8)$

7. $h''(x) = \frac{2}{3x^{4/3}}$
   
   Points: $0$

8. $h(8) = 8 - 3(8)^{2/3}$
   
   $8 - 12 - 4 = (8, 4)$

9. Graph of $h(x)$
So what do students think?
I hated this format in the beginning but now I enjoy and like the format! I wish all classes were like this! I am usually not very good at math but I feel like I learned everything so well!
Here I have some videos of student comments on their experience. They are available at my website but eliminated here because the file size was too large.
So what do you think?

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