

Enhancing Inclusive and Equitable Instruction through Developing Open Courses in the Schools of Mathematics and Psychology

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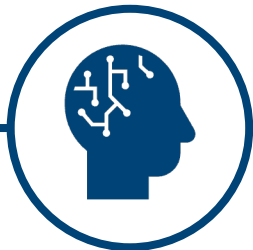
37th Annual Math, Engineering, and CS Conference
Perimeter College, Georgia State University, Clarkston Campus
February 2, 2024



Project Website

Project Goals

- Funded through fellowship from
 - Georgia Tech Center for Promoting Inclusion and Equity in the Sciences
 - Howard Hughes Medical Institute (HHMI) Inclusive Excellence Grant
- Using existing OER and our own course materials to develop interactive websites that students can engage in at **any point** during their studies.



Develop Open Courses

College Algebra
Multivariable Calculus
Introductory Statistics
Precalculus (in development)



Assess Impact

Site Analytics
Online Surveys



Disseminate

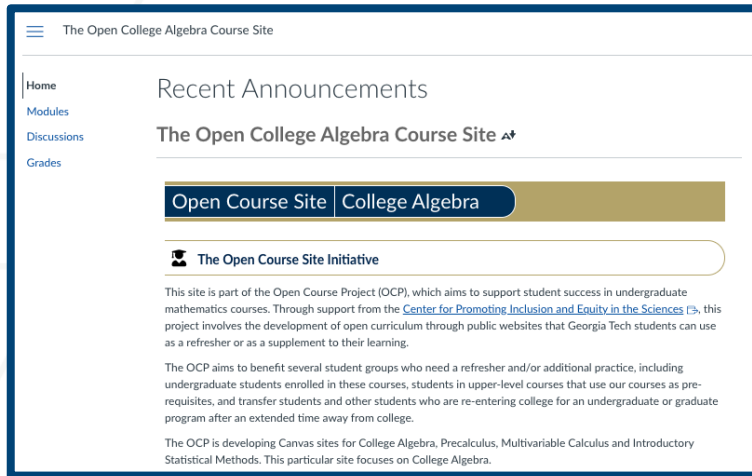
OER Repositories
Canvas Commons
Conferences

Timeline



Open Course Features

College Algebra



The screenshot shows the 'The Open College Algebra Course Site' interface. It features a navigation menu on the left with options: Home, Modules, Discussions, and Grades. The main content area is titled 'Recent Announcements' and displays 'The Open College Algebra Course Site' with a 'Start Here' button. Below this, there is a section for 'The Open Course Site Initiative' with a brief description of the project's goals and a 'Start Here' button.

Multivariable Calculus



The screenshot shows the 'Open Multivariable Calculus Site' interface. It features a navigation menu on the left with options: Home, Modules, Grades, Quizzes, People, GT Student Resources, and Media Gallery. The main content area is titled 'The Open Multivariable Calculus Site' and displays 'Open Course Site | Multivariable Calculus' with a 'Start Here' button. Below this, there is a section for 'The Open Course Site Initiative' with a brief description of the project's goals and a 'Start Here' button.

Statistics



The screenshot shows the 'Open Resources for Statistics' site interface. It features a navigation menu on the left with options: Home, Assignments, Discussions, Grades, People, Pages, Files, Syllabus, Quizzes, Modules, Collaborations, Chat, Office 365, TurningPoint, CLOS, Badges, and Ed Discussion. The main content area is titled 'Open Resources for Statistics' and displays 'Welcome to Open Resources for Statistics' with a 'Start Here' button. Below this, there is a section for 'The Open Course Site Initiative' with a brief description of the project's goals and a 'Start Here' button.

- Canvas LMS
- Canvas Quizzes
- Pre-recorded video
- Site content exported as QTI
- User tracking
- Surveys
- Conditional release (users must complete surveys to access content)

Multivariable Calculus



Question 3

1 pts

Determine the range of $f(x, y) = \sqrt{16 - x^2 - y^2}$.

$\{z \mid 0 \leq z \leq 4\}$

$\{z \mid z \leq 4\}$

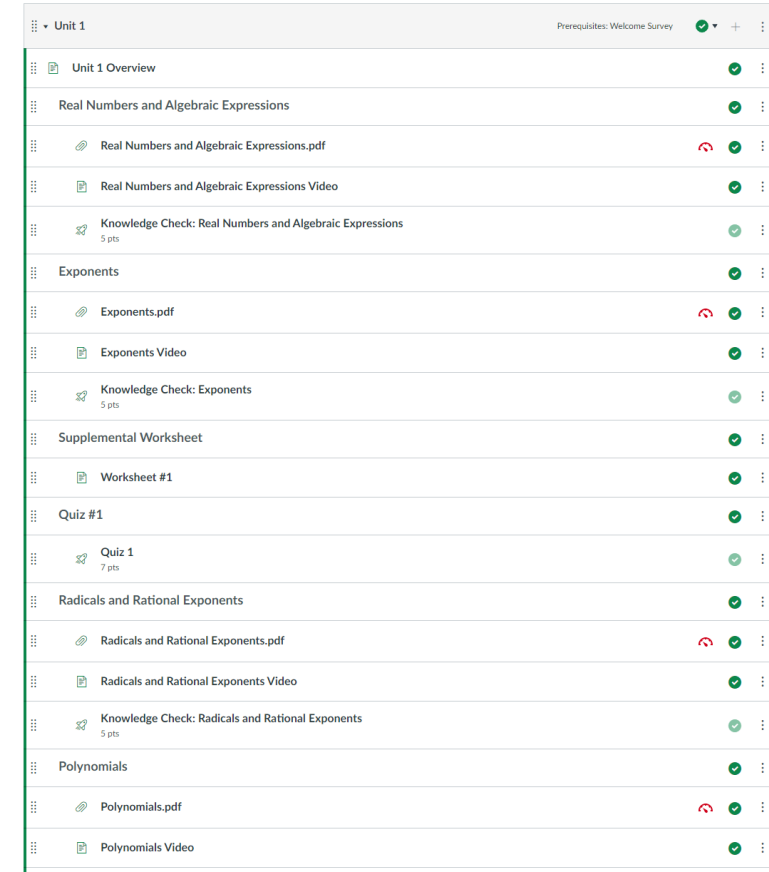
$\{z \mid z \geq 0\}$

$\{z \mid z \leq 0, z \geq 4\}$

- Course divided into modules and lessons that align with OpenStax Textbook
- Roughly 100 pre-recorded lecture videos
- 288 quiz questions (and counting!)
- Some questions developed with help of ChatGPT (eg – ideas for answer choices)

College Algebra and Precalculus

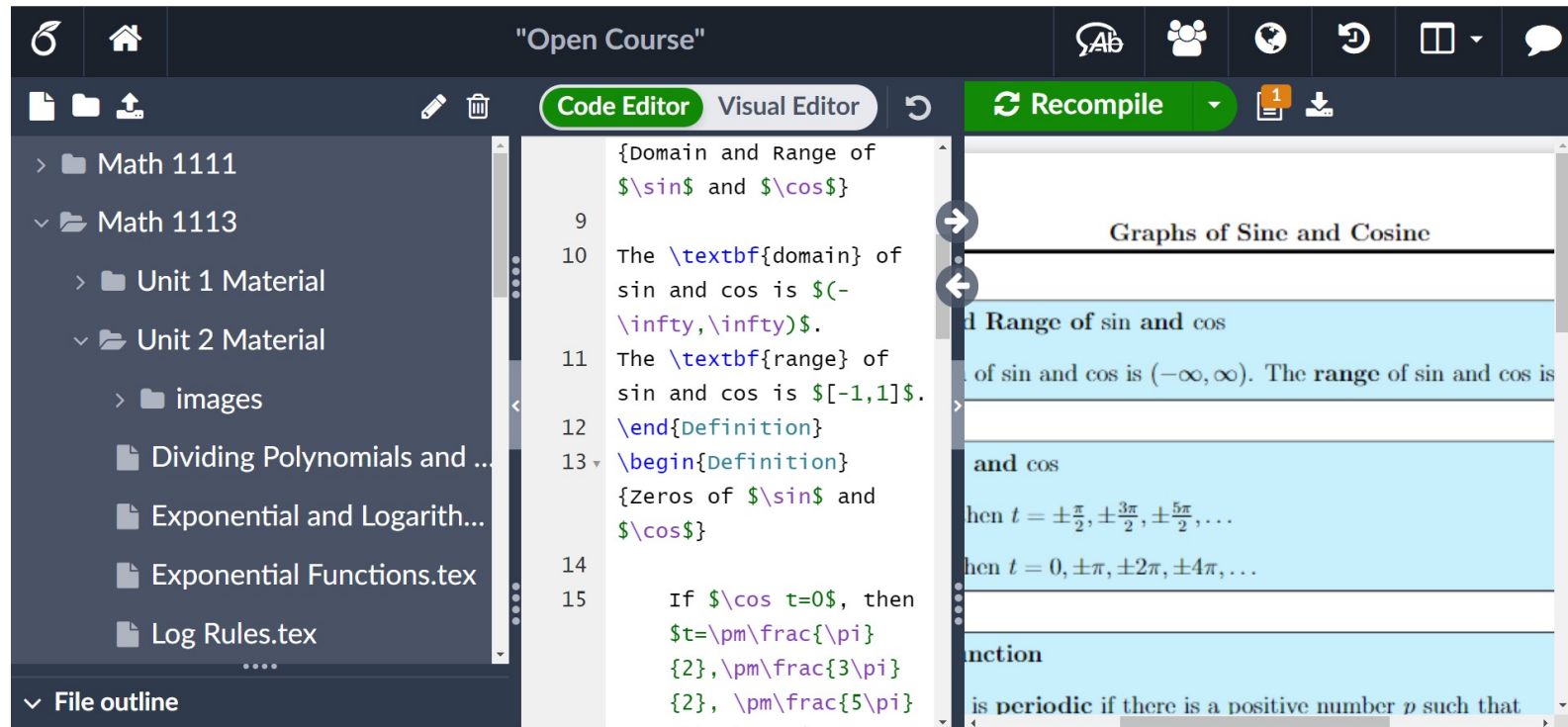
- Course divided into units by topics
- Roughly 75 pre-recorded lecture videos
- Notes and Worksheets posted with additional problems
- Knowledge Checks, Quizzes and Exams posted as "Canvas Quizzes"



Unit 1		Prerequisites: Welcome Survey
Unit 1 Overview		✓
Real Numbers and Algebraic Expressions		✓
Real Numbers and Algebraic Expressions.pdf		🔄 ✓
Real Numbers and Algebraic Expressions Video		✓
Knowledge Check: Real Numbers and Algebraic Expressions 5 pts		✓
Exponents		✓
Exponents.pdf		🔄 ✓
Exponents Video		✓
Knowledge Check: Exponents 5 pts		✓
Supplemental Worksheet		✓
Worksheet #1		✓
Quiz #1		✓
Quiz 1 7 pts		✓
Radicals and Rational Exponents		✓
Radicals and Rational Exponents.pdf		🔄 ✓
Radicals and Rational Exponents Video		✓
Knowledge Check: Radicals and Rational Exponents 5 pts		✓
Polynomials		✓
Polynomials.pdf		🔄 ✓
Polynomials Video		✓

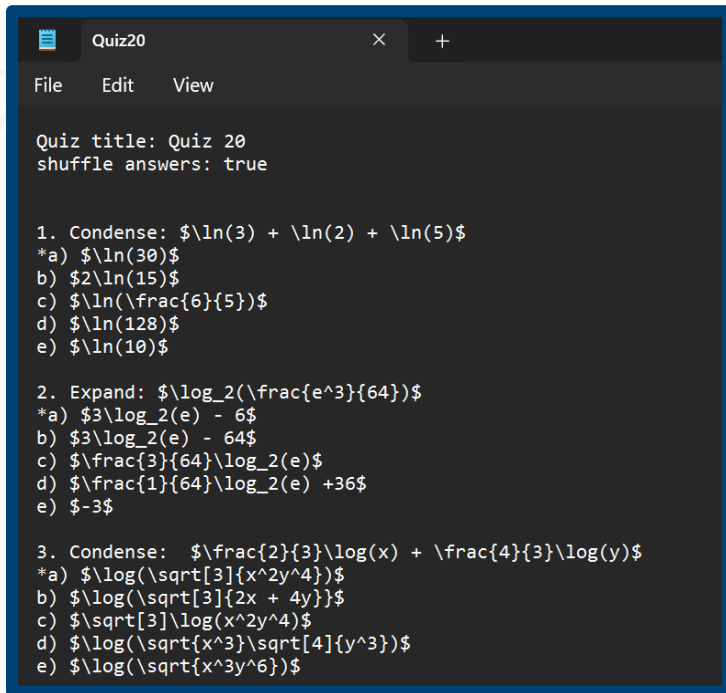
Creating Course Notes with Overleaf

- Overleaf is an online LaTeX editor
- Real-time collaboration and version control make it easy for large teams to work together



Making Canvas Quizzes with text2Qti

- Open-source tool to turn text files with LaTeX into Canvas Quizzes
 - <https://github.com/gpoore/text2qti>



```
Quiz20
File Edit View

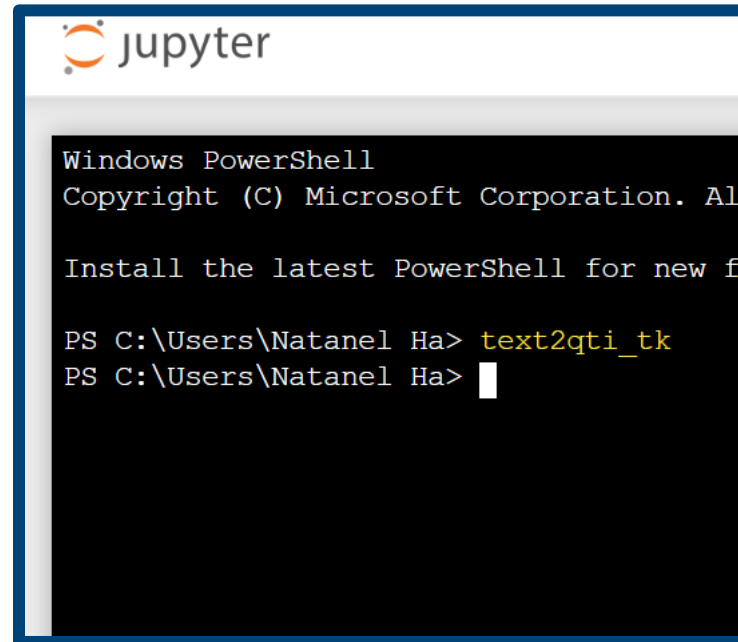
Quiz title: Quiz 20
shuffle answers: true

1. Condense:  $\ln(3) + \ln(2) + \ln(5)$ 
*a)  $\ln(30)$ 
b)  $2\ln(15)$ 
c)  $\ln(\frac{6}{5})$ 
d)  $\ln(128)$ 
e)  $\ln(10)$ 

2. Expand:  $\log_2(\frac{e^3}{64})$ 
*a)  $3\log_2(e) - 6$ 
b)  $3\log_2(e) - 64$ 
c)  $\frac{3}{64}\log_2(e)$ 
d)  $\frac{1}{64}\log_2(e) + 36$ 
e)  $-3$ 

3. Condense:  $\frac{2}{3}\log(x) + \frac{4}{3}\log(y)$ 
*a)  $\log(\sqrt[3]{x^2y^4})$ 
b)  $\log(\sqrt[3]{2x + 4y})$ 
c)  $\sqrt[3]{\log(x^2y^4)}$ 
d)  $\log(\sqrt{x^3}\sqrt[4]{y^3})$ 
e)  $\log(\sqrt{x^3y^6})$ 
```

1) Write a .txt file with LaTeX



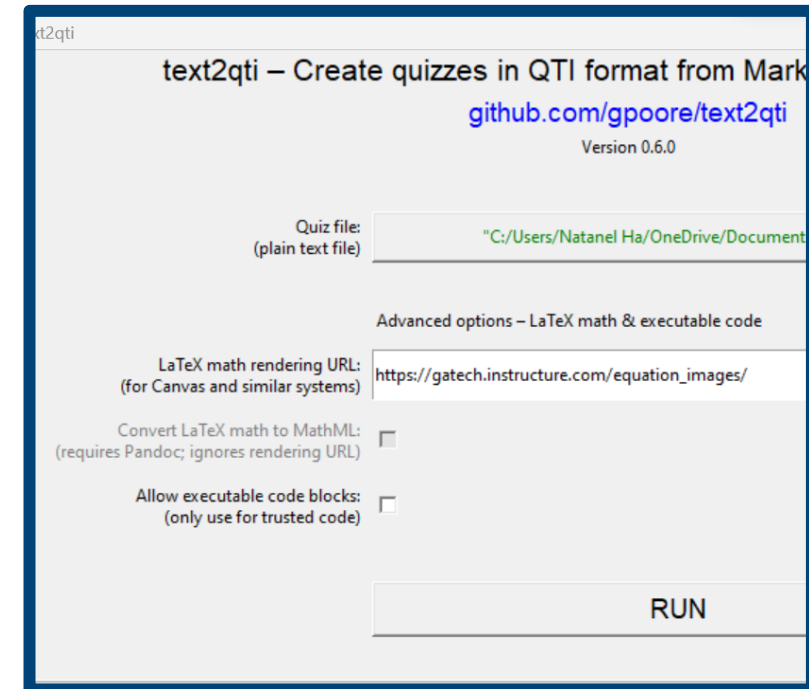
```
jupyter

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements!

PS C:\Users\Natanel Ha> text2qtiTk
PS C:\Users\Natanel Ha> 
```

2) Open text2qti window using python terminal



```
text2qti
text2qti – Create quizzes in QTI format from Mark
github.com/gpoore/text2qti
Version 0.6.0

Quiz file:
(plain text file) "C:/Users/Natanel Ha/OneDrive/Document

Advanced options – LaTeX math & executable code

LaTeX math rendering URL:
(for Canvas and similar systems) https://gatech.instructure.com/equation_images/

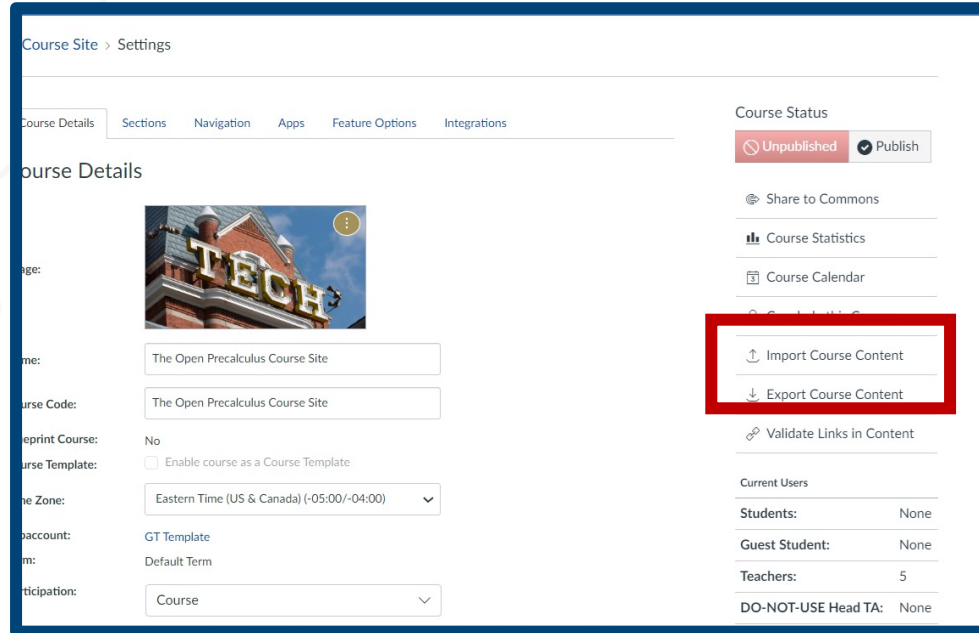
Convert LaTeX math to MathML:
(requires Pandoc; ignores rendering URL) 

Allow executable code blocks:
(only use for trusted code) 

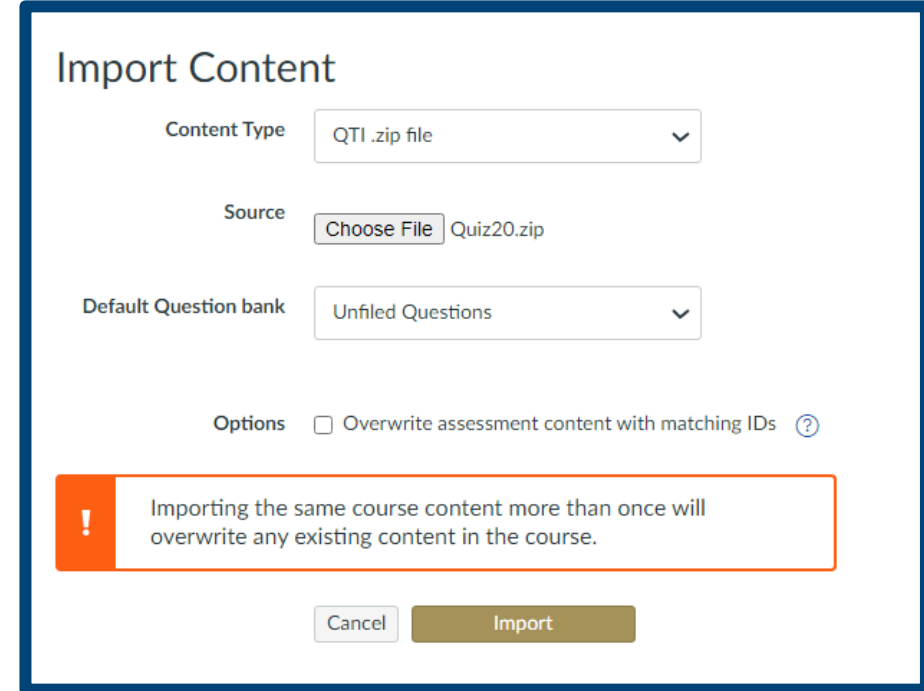
RUN
```

3) Find file and Run

Making Canvas Quizzes with text2Qti



4) Go to setting and then click important course content



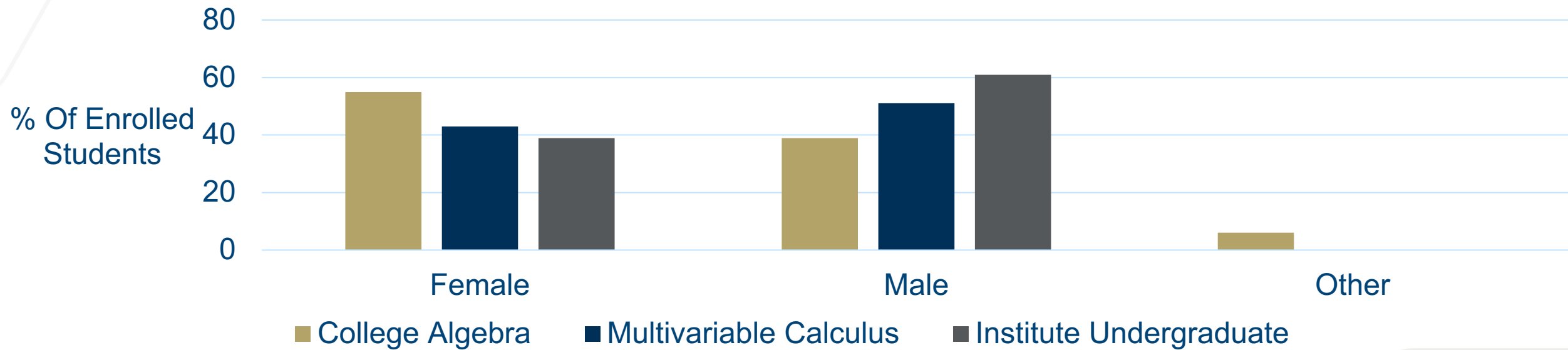
5) Find .zip file and import

- Then you're done! Settings and questions can be edited after

Preliminary Data

Course	Current Enrollment
College Algebra	44
Multivariable Calculus	384
Open Statistics	11

% Enrollment in Multivariable Calculus and College Algebra



Institute Undergraduate data from: <https://irp.gatech.edu/disclosures/student-demographics>

Challenges

- Technical issues making a public Canvas page
- Graded quizzes not available on public Canvas sites
- We are making two copies of each site:
 - GT Community site – requires completion of a welcome survey to access content
 - Public site – does not collect user statistics
- Student assistant hiring and training

Benefits

- Using course materials current and future offers of courses
- Additional learning resources for students across campus and beyond
- Helping transition away from publisher materials to free open access
- Used statistics curriculum as placement test
- Greater awareness of OER at our institute
- Our team of assistants are also
 - more involved in the teaching and learning of mathematics
 - career development
 - part of an open access initiative

Where to Find Our Work

- Curriculum development still underway.
- GT Websites (for GT students only for user tracking)
 - [College Algebra](#)
 - [Multivariable Calculus](#)
 - [Statistics](#)
- Public Websites
 - [College Algebra](#)
 - [Multivariable Calculus](#)
- OER Repositories
 - Multivariable Calculus Quizzes: [OER Commons](#), [MERLOT](#)

Questions

- We would be happy to answer any questions that you might have about our work!
- Contact information:
 - Stephanie Reikes, sreikes7@gatech.edu
 - Greg Mayer, greg.mayer@gatech.edu
 - Hi Shin Shim, hishin@gatech.edu
 - Bekki George, bekgeorge@comcast.net



Project Website