

# Creating an Immersive and Digitally-Augmented Introductory College Calculus Course

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# Outline

- 1 Overview
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# Why this Project?



- Cost Savings
- Augmentation of Class Materials

Picture, courtesy: © <https://www.ulethbridge.ca/teachingcentre/why-use-oer>

# Calculus Courses at SAIT

Program	Course	Outcomes
ENT & EET	MATH 280	<ul style="list-style-type: none"> <li>• Limits and Continuity</li> <li>• Up to Fourier Series</li> </ul>
Engineering Technology	MATH 238	<ul style="list-style-type: none"> <li>• Limits and Continuity</li> <li>• Up to Applications of Integrals of Algebraic Functions</li> </ul>
Engineering Technology	MATH 288	<ul style="list-style-type: none"> <li>• Limits and Continuity</li> <li>• Up to Applications of Integrals of Transcendental Functions</li> </ul>

○ Junior-to-senior level course in calculus delivered in both blended and face-to-face online synchronous

# In Recent Times!



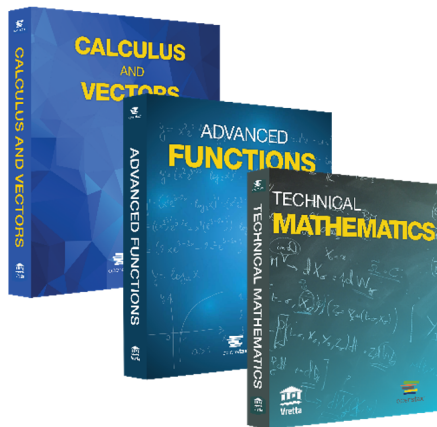
- Classrooms or no classrooms?

- How about OERs?  
[Openstax.com](https://openstax.org)
- How about online assessment systems?  
[Intromath.ca](https://intromath.ca)
- Are students ready for the **real world** where they may have to work as well as produce correct results in a **virtual environment**?

Picture, courtesy: © <https://medium.com/age-of-awareness/social-distancing-in-public-schools-a-key-to-economic-recovery-44f69a8c7d8b>

# Custom OER Criteria

- Requirement to match outcomes of course without giving too much content to overwhelm.
- Pool of questions to be dynamic yet equal in performance expectations.
- OERs were curated from OpenStax and customized by Vretta.
- eTextbooks available under creative commons license for students to download at no costs and view offline.



Picture, courtesy: © <https://secure.vretta.com/>

# Assessment Criteria

- Dynamic pools of questions created for each chapter to be completed online.
- Students tend to be more engaged when the system works with them.
- The Intromath Logbook allows for review of students work on each and every question. Very useful for assigning partial marks!

Find the slope of the tangent to the following function at the given points:

$$y = \frac{6}{x} - \frac{3}{x^2} + 3x$$

a.  $x = -4$

$\frac{dy}{dx} \Big|_{x=-4} = 2.531$  ✓

*Round to three decimal places if necessary*

b.  $x = 3$

$\frac{dy}{dx} \Big|_{x=3} = 2.556$  ✓

**Evaluating at  $x = -4$**   $\frac{dy}{dx} = -\frac{6}{x^2} + \frac{6}{x^3} + 3$

$$\frac{dy}{dx} = -\frac{6}{-4^2} + \frac{6}{-4^3} + 3$$

$$\frac{dy}{dx} = -\frac{6}{16} - \frac{6}{64} + 3$$

$$\frac{dy}{dx} = -\frac{6}{16} - \frac{6}{64} + 3$$

$$\frac{dy}{dx} = 2.531$$

**96) Evaluating at  $x = 3$**   $\frac{dy}{dx} = -\frac{6}{x^2} + \frac{6}{x^3} + 3$

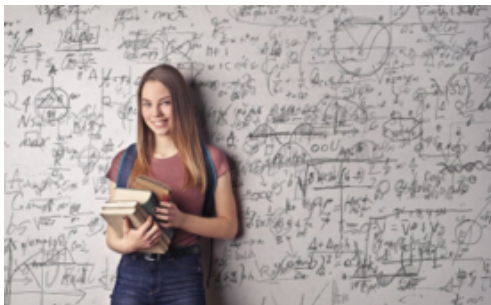
$$\frac{dy}{dx} = -\frac{6}{3^2} + \frac{6}{3^3} + 3$$

$$\frac{dy}{dx} = -\frac{6}{3^2} + \frac{6}{3^3} + 3$$

$$\frac{dy}{dx} = 2.556$$

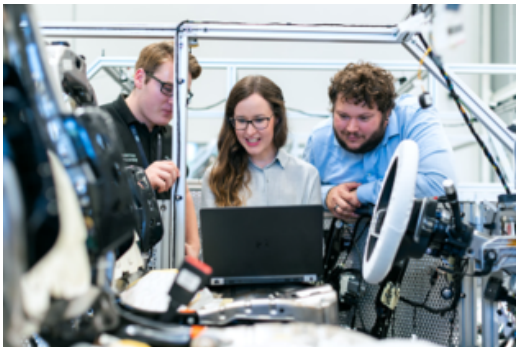
Picture, courtesy: © <https://secure.vretta.com/>

# Online class Experience



- Helping students to use an online text.
- Choice and ordering of particular topics.
- Homework Exercises.

# Benefit in Terms of Marketable Skills



- Working collaboratively online for students.
- Writing and presenting well-made documents and spreadsheets.
- Incorporating both communications and computer skills in ENT.

Picture, courtesy: © <https://www.jobapplicationworld.com/>

# Outside the Classroom



- Transferable and online skills used in life after college.
- Technology literacy and improved awareness of pragmatic calculus.

Picture, courtesy: © <https://www.youtube.com/watch?v=JrS89zfAt1w>

# References



Openstax

© <https://www.openstax.com>



Custom OERs available



Vretta Online Educational Resources

<https://www.intromath.ca>

# Thanks for Coming!

