Worcester Polytechnic Institute

MME 522 Applications of Calculus
Mathematics Department
Fall Term 2024

PROFESSOR:
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COURSE DATES: R, 8/29-10/10, R, 10/24-11/21, R, 12/5-12/12

TEXTS

- Any Calculus text will suffice for review as a reference to the course. An open source option is:

  Calculus Volume I-III Gilbert Strang and Edwin "Jed" Herman, OpenStax publishing, Updated Jan 16, 2020, ISBN-13: 978-1-947172-13-5
      https://openstax.org/details/books/calculus-volume-1
      https://openstax.org/details/books/calculus-volume-2
      https://openstax.org/details/books/calculus-volume-3

- Applications of Calculus, Philip Straffin (Editor), MAA Notes Number 29, ISBN 0-88385-085-0
  Out of Print – PDF available

https://www.maa.org/sites/default/files/pdf/pubs/books/members/NTE29.pdf

SOFTWARE PACKAGES

- Use of Desmos, GeoGebra, Excel, MATLAB, and other software packages.
- Select problem sets using WebWork.

TECHNICAL REQUIREMENTS:
Access to all software used in the course is available remotely**.**

Go through WPI VPN GlobalProtect through
https://hub.wpi.edu/software/570/globalprotect . Login is required.

After logging into the GlobalProtect VPN, access the WPI terminal applications
through "Remote Desktop Connection". Search on your computer: "Remote
Desktop Connection" -> Type in windows.wpi.edu -> Full login@wpi.edu and
Password.

Excel: Use "Analysis Toolpack": File->Options->Add-Ins->Analysis Toolpack->Go.

https://hub.wpi.edu/Software-Library

> **If you want to use a different software program** for the course provide
> proper documentation on assignments and grading can be adapted to
> your program of choice. I am flexible to your program of preference.

OBJECTIVE
Highlight various applications using derivatives, integrals, and multivariable
calculus. Applications in business and economics, engineering, probability and
statistics, and physical and social sciences are addressed.

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READINGS

- **Sections from Strang text will be highlighted in the first part of the course**

Core topics will be discussed but use on applications will be the primary focus. Topics will include Volume I: derivatives as rates of change (3.4), related rates (4.1), applied optimization (4.7), finite sums estimating integrals (5.1), The Fundamental Theorem of Calculus (5.3), physical applications (6.5), exponential change and separable equations (6.8); Volume II: Volume III: vectors (2.2), , motion and space (3.4), partial derivatives (4.3), directional derivatives and gradient vectors (4.6), and double integrals over general regions (5.3).
Outside Strang: Probability (highlighted in one class)

- **The 2nd part of the course will concentrate on Chapters from the Straffin text**

Adjustments can be made based on your preferences but I will use the following as default options in the 2nd half of the course.
Chapter 8 (Measuring Voting Power)
Game Theory and Utility
Chapter 1 (Arbitrating Disputes)
Chapter 5 (Newton's Method and Fractal Patterns)

OFFICE HOURS
Stratton Hall 421, M, 6-7pm by Zoom and by appointment live or in-person.
I will respond daily to e-mails and use **Zoom** for online office hours.

GRADING

Exam 1, R, 10/10   30%

- Focused on the applications of undergraduate Calculus covered in class notes and on the homework from the first half of the course.

Homeworks   40%

I create HW problem sets based on the material covered in class. I choose random problems to grade but you are responsible for all of them. They are due regularly on Thursdays – allowing 9-16 days to complete each assignment from the day they are assigned.

- R 9/5, 9/12, 9/19, 9/26, and 10/3 (15%);
- R, 10/31, 11/7, 11/14, and T, 11/26 (before Thanksgiving break) (25%)

End of Term Project/Presentation   30%

- Typed 6-10 page paper due on F, 12/13 or before
- Power Point Presentations on R, 12/12 (and possibly another night if we have a larger group of students).
- Individually done or two team members – your choice

ACCOMODATIONS:
We strive to create an inclusive environment where all students are valued members of the class community. If you need course adaptations or accommodations, or if you have medical needs that may impact your performance or participation in this course, please make an appointment with us as soon as possible. If you have approved accommodations, please request your accommodation letters online through the Office of Accessibility Services student portal. If you have not already done so, students with needs who plan to utilize accommodations for this course are encouraged to contact the Office of Accessibility Services as soon as possible to ensure that such accommodations are implemented in a timely fashion.
Email – AccessabilityServices@wpi.edu
Phone – (508) 831-4908
On Campus – Unity Hall, 5th Floor

ACADEMIC HONESTY

The academic honesty policy can be accessed at:
http://www.wpi.edu/Pubs/Policies/Honesty/Students/

I encourage working in groups but all homework should represent individual thought. Copying is unacceptable and similar solution patterns will be subject to a 0 penalty.

EXPECTATIONS AND BEHAVIOR
Reasons for missing homeworks, an exam, or a presentation should be discussed beforehand with the professor.