Concordia Faculty of Arts and Science

SFYX Math 205/53 Winter 2020

Course Outline

Instructor: Dr. Fred E Szabo
Assistants: Hassan Harb and Dalia El-Farawi
Office hours: By Appointment and by ZOOM-based teleconferencing

Although Math SFYX-Math 205/53 is a sequel to SFYX-Math 203/53, the courses can be taken independently. However, a successfully completed course on differential calculus, equivalent to Math 203, is required.

Learning objectives of this special version of Math 205

- Interactivity based on Wolfram Mathematica
- Extensive use of graphic learning tools to deepen understanding
- Preparing for next-gen thinking and computational reasoning
- Making calculus relevant, enjoyable, accessible, and learnable
- All tutorials, lectures, and assignments are based on theMathematica-based interactive electronic version of the textbook CALCULUS by Briggs, Cochran, Gillett, Schulz.
- You do not required printed copy of the textbook.
- The textbook for the regular sections of Math 205 cannot be used in this SFYX section of Math 205.
- If you have bought the textbook for the regular sections of Math 205, please return it to the vendor for a refund.
- The course projects are written as interactive slide shows in Mathematica. Sample projects written by former students will be provided and templates will be posted.
- Project resources include the work of Hassan Harb and Dalia El-Farawi, prepared in the summer of 2019.
- In addition to the tutorials, additional virtual assistance is available through video-conferencing with ZOOM.

SFYX Math 205/53 - Week by Week

Week 1

Lecture (Wednesday, January 8, 2020)

- Survey of the course outline and learning objectives of the course.
- Illustration of the course technology: Laptops, Mathematica, Wolfram Alpha, and MyLab|Math.
- Introduction to the *Moodle* website and its components. By clicking on the following hyperlink, you will be taken to the appropriate Moodle webpage of SFYX Math 205/53:

Moodle Math 205/53 Winter 2020

- Introduction to successfully logging on to the Pearson MyLab|Math system by Christine Cozens (Pearson).
- Survey of the relevant chapters of the Mathematica-based electronic textbook:

Briggs et al. - Calculus (Early Transcendentals) - Pearson 2019

- Chapter 4 - Applications of the derivative
- Chapter 5 - Integration
- Chapter 6 - Applications of integration
- Chapter 8 - Integration techniques
- Chapter 10 - Sequences and infinite series
- Chapter 11 - Power series

Week 2

Tutorial (Monday, January 13, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, January 15, 2020)

- Textbook, Section 4.9 (Antiderivatives) - Page 321
- Textbook, Section 5.1 (Approximating areas under curves) - Page 338
- Textbook, Section 5.2 (Definite integrals) - Page 353

Week 2 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 2 Moodle Assignment Dropbox.

Week 2 Reflections

Week 3

Tutorial (Monday, January 20, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, January 22, 2020)

- Textbook, Section 5.3 (Fundamental theorem of calculus) - Page 367
- Textbook, Section 5.4 (Working with integrals) - Page 381

Week 3 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 3 Moodle Assignment Dropbox.

Week 3 Reflections

Week 4

Tutorial (Monday, January 27, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, January 29, 2020)

- Textbook, Section 5.5 (Substitution rule) - Page 388
- Textbook, Section 6.2 (Regions between curves) - Page 416

Week 4 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.

- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 4 Moodle Assignment Dropbox.

Week 4 Reflections

Week 5

Tutorial (Monday, February 3, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, February 5, 2020)

- Textbook, Section 6.3 (Volume by slicing) - Page 425
- Textbook, Section 8.2 (Integration by parts) - Page 525

Week 5 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 5 Moodle Assignment Dropbox.

Week 5 Reflections

Week 6

Tutorial (Monday, February 10, 2020)

- Preparing for the midterm examination

Lecture (Wednesday, February 12, 2020)

- Textbook, Section 8.3 (Trigonometric integrals) - Page 532
- Textbook, Section 8.4 (Trigonometric substitutions) - Page 538

Week 6 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 6 Moodle Assignment Dropbox.

Week 6 Reflections

Week 7 (February 19, 2020)

1. Review of the practice midterm (1 hour)

2. Online Midterm (2 hours)

Week 8

Tutorial (Monday, March 2, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, March 4, 2020)

- Textbook, Section 8.5 (Partial fractions) - Page 546
- Textbook, Section 8.9 (Improper integrals) - Page 582

Week 8 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 8 Moodle Assignment Dropbox.

Week 8 Reflections

Week 9

Tutorial (Monday, March 9, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, March 11, 2020)

- Textbook, Section 10.1 (Sequences) - Page 639
- Textbook, Section 10.2 (Infinite series) - Page 650
- Textbook, Section 10.4 (The divergence and integral tests) - Page 671

Week 9 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.

- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 9 Moodle Assignment Dropbox.

Week 9 Reflections

Week 10

Tutorial (Monday, March 16, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, March 18, 2020)

- Textbook, Section 10.5 (Comparison tests) - Page 683
- Textbook, Section 10.6 (Alternating series) - Page 688
- Textbook, Section 10.7 (The ratio and root test) - Page 696

Week 10 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 10 Moodle Assignment Dropbox.

Week 10 Reflections

Week 11

Tutorial (Monday, March 23, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, March 25, 2020)

- Textbook, Section 11.1 (Approximating functions with polynomials) - Page 708
- Textbook, Section 11.2 (Properties of power series) - Page 722

Week 11 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 11 Moodle Assignment Dropbox.

Week 11 Reflections

Week 12

Tutorial (Monday, March 30, 2020)

- Introduction to the technical aspects of the weekly lecture and the related assignment.

Lecture (Wednesday, April 1, 2020)

- Textbook, Section 11.3 (Taylor series) Page 731

Week 12 Assignment

- All assignment questions are taken from the textbook sections covered in this lecture.
- The assignment must be completed in MyLab|Math, and the accompanying Mathematica notebook must be zipped and uploaded to the Week 12 Moodle Assignment Dropbox.

Week 12 Reflections

Week 13

Lecture (Wednesday, April 8, 2020)

- Course Summary
- The Sample Final

Weekly assignments

- All assignment questions are taken from the textbook sections covered in the relevant lectures.
- All questions must be answered in MyLab|Math, and the underlying Mathematica notebooks must be zipped and uploaded to the appropriate Moodle Assignment Dropbox.

Midterm examination

- The midterm examination is based on the material and assignments covered in Lecture 2 to 6.
- The examination consists of 20 questions to be solved using Mathematica.
- The answers must be posted on the MyLab|Math using the course assignment approach adopted in this course.

- A practice midterm will be prepared and illustrated in a ZOOM session.

Final examination

- The final examination is based on the material and assignments covered in all lectures of the course and consists of 30 questions.
- The examination is written Mathematica online and uses the same approach as the assignments and midterm.
- A practice final will be prepared and illustrated in a ZOOM session.
- This examination is scheduled and supervised by the Concordia Examination Office.

Course projects

- The purpose of the course projects is to provide all students with an opportunity to study one specific mathematics-related topic in depth, and to learn how to organize and present the result of their research in a coherent and engaging form to a simulated audience.
- The projects are meant to be stepping stones towards communicating successful modest scientific research to a wider audience. As such, this course component agrees with the next-gen objectives of the SFYX experiment of the Concordia Faculty of Arts and Science.

Reflections

- The weekly reflections are meant to be answers to the following two questions, written by completing the reflection templates posted on the Moodle website.
  - Students have fifteen minutes at the end of a lecture to write and post their answers. Reflections should be spontaneous and must be written in class.
  - The reflections are confidential to person who has written them, and will not be read by anyone unless expressly permitted by the author.

Question 1

- *Summarize in words what you have learned from today's lecture and from your participation in the class.*

Question 2

- *Summarize in words how what you have learned today fits into your previous knowledge or how you think you might be able to use it in the future.*

- Past students have found the writing of reflections an enjoyable and rewarding experience. Reflections also fit well into the goals and style of the SFYX approach to teaching and learning. The students who wrote them in other courses found that the writing of reflections promotes understanding and retention of course material, encourages exploration, and fosters curiosity.

Grading scheme

1. Assignments - 20 marks
2. Midterm (2-hour MyLab|Math examination) - 20 marks
3. Final (3-hour online MyLab|Math Examination) - 40 marks
4. Mathematica project - 15 marks
5. Reflections - 5 marks

Disclaimer

(*) The use of the teleconferencing tool ZOOM in this course is made possible by the Concordia licence for this product. Using ZOOM by Concordia faculty and students is subject to the Concordia Educational Technology Guidelines that can be found at https://www.concordia.ca/offices/ctl/-concordia-university-educational-technology-guidelines-for-faculty-and-students.html.