Syllabus for MATH 21-120, Differential and Integral Calculus, Section 1

Carnegie Mellon University, Fall 2019

Instructor: Dr. Neranga Fernando

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Office hours: Mondays and Wednesdays 2pm – 3.30pm.

Meeting times and location: MWF, 8.30am – 9.20am at PH 100.

Course Objectives: Students completing the course should be able to recognize and use the following concepts and methods of calculus when they occur in their disciplines:

- Differentiation: definition via limits, derivations rules, applications including optimization.
- Basic functions (exp and log, trig and inverse trig) and their derivatives.
- Integration: antiderivatives and integration by substitution, integration by parts, definite integral, Fundamental Theorem of Calculus.

Textbook: *Calculus, Early Transcendentals,* by James Stewart, 8th edition.

Web materials: All class announcements, material, and grades will be posted on Canvas.

Quizzes:

You will be taking a 30-minute quiz in recitation meting every other Thursday starting from the second week, but the last quiz will be on Tuesday in the last week of classes. Unless you have a very serious, well-documented, and compelling reason to miss a quiz, there will be NO make-up quizzes. No quiz grade will be dropped.

Here are the dates you will be taking a quiz:
Quiz 1 (September 5), Quiz 2 (September 19), Quiz 3(October 3), Quiz 4 (October 24), Quiz 5 (November 7), Quiz 6 (December 3)

Homework:

Homework is due at the beginning of the recitation meeting every other Thursday starting from the third week, i.e. on Thursdays you are not taking a quiz. If you do not hand them in at the beginning of the recitation meeting when collected by your TA, they will be counted as a zero. Even if your work is partially complete, please submit your work. Because partially complete is better than a zero. Discussion on homework is allowed, but each student must prepare and submit their own assignment. No homework grade will be dropped.

Here are the due dates of homework:

Homework 1 (September 12), Homework 2 (September 26), Homework 3 (October 31), Homework (November 14)

You should only submit the homework problems with an asterisk, but it is strongly advised that you do all of assigned homework since the quizzes will closely resemble the homework problems.

Mid-term exams and final exam:

There will be two mid-term exams and a cumulative final exam in this course. The mid-term exams are 50-minute in-class exams; they will be on Friday, October 11 and Friday, November 22. Location and time of the final exam are to be determined. Unless you have a very serious, well-documented, and compelling reason to miss an exam, there will be NO make-up exams. No mid-term exam grade will be dropped.

Grading: The course grade will be determined as follows:
Final exam: 30%
Mid-term exams: 40% (20% each)
Quizzes: 20%
Homework: 10%

Letter grades are determined numerically:

$A \geq 90$, $90 > B \geq 80$, $80 > C \geq 70$, $70 > D \geq 60$, $60 > R$

The grade I (Incomplete) will be given only if you have at least a C in class before the final exam, have completed all quizzes and homework before the final exam, and have missed the final exam for a valid reason, and otherwise are doing passing work. An incomplete grade is given at the discretion of the instructor.

Calculators : Calculators are NOT permitted on quizzes, mid-term exams and the final exam.

Additional resources:

Course TA Information and recitation meetings on Tuesdays and Thursdays:

Name	***Recitation meeting time and location***	***Office hours and location***
Kian Cho	Section A, 8.30am – 9.20am, PH A18B	Tue 10-11am, Thu 2.30-3.30pm, WEH 6209
Alexandra Van Praag	Section B, 9.30am – 10.20am, WEH 5312	Tue 4.30 – 6.30pm, WEH 8215
Jiawei Li	Section C, 11.30am – 12.20pm, PH A18C	Wed 4-5pm, Thu 2-3pm, WEH 8214
Steve Wong	Section D, 12.30pm – 1.20pm, WEH 4623	Tue 4.30 – 6.30pm, WEH 8215
Mingting Xia	Section E, 3.30pm – 4.20pm, WEH 4709	Tue 10am – 12pm, WEH 7215

Academic Honesty: Collaboration on quizzes, mid-term exams and final exam is not allowed. A necessary prerequisite to the attainment of the goals of the University is maintaining complete honesty in all academic work. Students are expected to present as their own only that which is clearly their own work in tests and in any material submitted for credit. Students may not assist others in presenting work that is not their own. Offenders are subject to disciplinary action."

For more on Academic Integrity see: https://www.cmu.edu/policies/student-and-student-life/academic-integrity.html

Important:

1) Any student with a disability is encouraged to meet with the instructor during the first week of classes to discuss accommodations. The student must bring a current Memorandum of Accommodations from the Office of Disability Resources.

2) If you are an athlete and have conflicts with an important class activity (quiz, mid-term, or final), you should let your instructor know before the end of second week of classes. You should also bring an official letter from the Office of Athletics.

3) All electronic devices (mobile phones, laptops etc.) should be turned off during class time, recitation meetings, quizzes, mid-term exams and final exam.

Syllabus: Syllabus is subject to change**.** It is your responsibility to be aware of any changes the instructor may make to the syllabus as they are announced in class. Students are responsible for all information given when they are absent.

Schedule of Topics and Suggested Homework Exercises

Week 1: August 26 – 30

Section 2.1 The Tangent and Velocity Problems 1, 4, 6

Section 2.2 The Limit of a Functions 4, 8, 10, 12, 18, 22, 26, 28, 32, 34, 52

Section 2.3 Calculating Limits Using the Limit Laws 2, 6, 8, 12, 18, 24, 28, 38, 41, 42, 62, 64

Week 2 (partial): September 3 – 6

Monday, September 2: Labor Day – no classes

Section 2.5 Continuity 4, 6, 18*, 22, 24*, 26*, 36, 42, 52, 54*, 58

Quiz 1

Section 2.6 Limits at Infinity; Horizontal Asymptotes 4, 6*, 8, 14, 16, 22, 32, 36*, 38, 48*, 52, 60*

Week 3: September 9 – 13

Section 2.7 Derivatives and Rates of Change 4(a, b), 6, 8, 12, 14, 16*, 24, 28, 32, 34, 38, 52, 54*

Section 2.8 The Derivative as a Function 2, 3, 4, 12, 16, 18, 24, 28, 30, 42, 58(a, b, c)

Homework 1

Section 3.1 Derivatives of Polynomials and Exponential Functions 4, 6, 10, 12, 14, 22, 32, 36, 50(a, b), 56, 66(a), 70

Week 4: September 16 - 20

Section 3.2 The Product and Quotient Rules 4, 6, 8, 14, 16, 18, 22, 26, 32, 38, 42, 62

Section 3.3 Derivatives of Trigonometric Functions 2, 4, 6*, 10, 16*, 22*, 31, 32, 40*, 44, 48

Quiz 2

Section 3.4 The Chain Rule 2, 4, 10*, 14, 26*, 34, 36, 42, 46, 50, 62, 68

Week 5: September 23 – 27

Section 3.5 Implicit Differentiation 6, 8, 12*, 14, 22, 26, 28*, 32, 36*, 44, 50*, 56, 58

Section 3.6 Derivatives of Logarithmic Functions 4, 10, 12, 16, 24, 26, 34, 40, 42, 46, 50, 52, 56

Homework 2

Section 3.7 Rates of Change in the Natural and Social Sciences 8, 9, 11, 14, 18, 20, 24, 26, 30, 39

Week 6: September 30 – October 4

Section 3.8 Exponential Growth and Decay 2, 4, 8, 10, 11, 12, 14, 16, 18

Section 3.9 Related Rates 2, 6, 8, 12, 16, 20, 28, 29, 40

Quiz 3

Section 3.10 Linear Approximations and Differentials 4, 12, 20, 26, 34, 38

Week 7: October 7 - 11

Section 3.11 Hyperbolic Functions 8, 10, 12, 16, 20, 24(a, b), 30, 34, 38, 48(b, c, d), 52

Review

Test 1 – All sections covered up to review

Week 8 (partial): October 14 – 17

Section 4.1 Maximum and Minimum Values 16, 28, 30, 36, 38, 48, 52, 54, 60, 70

Section 4.2 The Mean Value Theorem 2, 6, 12, 14, 18, 22, 26, 28, 36

Friday, October 18: Mid-Semester Break – no classes

Week 9: October 21 – 25

Section 4.3 How Derivatives Affect the Shape of a Graph 10, 12, 16, 20, 22, 24, 28, 32, 34, 38

Section 4.4. Indeterminate Forms and L'Hospital's Rule 10, 14*, 22, 24*, 32, 44*, 46, 50, 52, 54*, 58, 60

Quiz 4

Section 4.5 Summary of Curve Sketching 2, 4, 10*, 12*, 40, 42, 50, 52*

Week 10: October 28 – November 1

Section 4.7 Optimization Problems 2, 6, 12(b-f)*, 16*, 18, 22, 26*, 42, 46*, 50, 64, 74*

Section 4.9 Antiderivatives 2, 4, 14, 20, 32, 34, 44, 46, 54, 60, 68, 74

Homework 3

Section 5.1 Areas and Distances 4, 8, 14, 22, 26

Week 11: November 4 - 8

Section 5.2 The Definite Integral 4, 8, 10, 18, 22, 24, 36, 38, 44, 56, 66

Section 5.3 The Fundamental Theorem of Calculus 2, 8, 10, 14*, 20, 22, 26, 32*, 36, 40, 46*

Quiz 5

Section 5.4 Indefinite Integrals and the Net Change Theorem 2, 6*, 8, 10, 14*, 16, 30, 32, 40*, 64

Week 12: November 11 - 15

Section 5.5 The Substitution Rule 2, 4, 8*, 20*, 22, 36, 42*, 64, 70*, 88

Section 6.1 Areas Between Curves 2, 14, 16, 18, 36, 50

Homework 4

Section 6.2 Volumes 2, 4, 6, 10, 28, 30, 54

Week 13: November 18 - 22

Section 6.5 Average Value of a Function

Review

Test 2 – All sections covered after Test 1

Week 14 (partial): November 25 - 26

Section 7.1 Integration by Parts (day 1) 4, 10, 18, 24, 38, 42, 48, 52, 54, 56, 58, 72

Wednesday – Friday, November 27 – 29: Thanksgiving break: no classes

Week 15: December 2 – 6

Section 7.1 Integration by Parts (day 2) 4, 10, 18, 24, 38, 42, 48, 52, 54, 56, 58, 72

Quiz 6

Section 7.2 Trigonometric Integrals 2, 6, 12, 16, 18, 24, 34, 40, 42, 44, 48, 58

Section 6.3 Volumes by Cylindrical Shells (if time permits)

Section 6.4 Work (if time permits)

Review

December 6, Friday, Last day of classes
Final Exam is based on all sections covered in class.