

ADVANCED CALCULUS I – MATH 311 – TERM 171

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Office Hours Sunday – Tuesday: 3:00-3:50PM
and by appointment

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Text:

Introduction to Real Analysis by Robert G. Bartle and Donald R. Sherbert, 4th Ed, Wiley (2011)

Description:

- The real number system.
- Continuity, limits, uniform continuity and differentiability of functions of one variable.
- Definition, existence and properties of the Riemann integral.
- The fundamental theorem of calculus.
- Sequences and series of real numbers.

Student Learning Outcomes:

After completion of the course, the students should be able to:

- Analyze a mathematical statement.
- Identify hypothesis and conclusion(s) from the statement of a mathematical result.
- Identify the set of mathematical results that lead to the proof of a statement.
- Compose the arguments leading to the proof of a mathematical statement.
- Acquire, whenever appropriate, a geometrical feeling of a statement.
- Apply the results to solve exercises, mostly theoretical in nature.
- Prepare the students for higher-level analysis courses.

Grading Policy:

- 70%: Two In-class Exams: Midterm 30% & Final (**Comprehensive**) 40%
- 20%: Homework
- 10%: Term paper

Resources:

- 🔗 Blackboard (Course Material)
- 🔗 My website for following on grades and attendance
- 🔗 YouTube Playlist by Professor Francis Su of Harvey Mudd College. (<https://goo.gl/grv7vS>)

- 🔗 YouTube Playlist by Prof. S.H. Kulkarni, Department of Mathematics, IIT Madras. (<https://goo.gl/HyuhNc>)

Evaluation:

Final grade is according to the scale

GRADE	RANGE
A+	[90%, 100%]
A	[80%, 90%)
B+	[75%, 80%)
B	[70%, 75%)
C+	[65%, 70%)
C	[55%, 65%)
D+	[50%, 55%)
D	[45%, 50%)
F	[0%, 45%)

Course Schedule:

Week	Topic	Required Reading	
1	Algebraic and Order Properties of R	2.1	
	Absolute Value and the Real Line	2.2	
2	Completeness Property of R	2.3	Reading Section 2.5 is optional. You may consider it for a term paper
	Applications of the Supremum Property	2.4	
3	Sequences and Their Limits	3.1	
	Limit Theorems	3.2	
4	Monotone Sequences	3.3	Normal Sunday Classes Saturday October 6 th
	Subsequences and the Bolzano-Weierstrass Theorem	3.4	
5	Cauchy Criterion	3.5	
	Properly Divergent Sequences	3.6	
6	Limits of Functions	4.1	Midterm Tuesday October 26 th , 2017 12:00PM – 02:00PM
	Limit Theorems	4.2	
7	Continuous Functions	5.1	
	Combinations of Continuous Functions	5.2	
8	Continuous Functions on Intervals	5.3	You may consider Section 5.5 for a term paper
	Uniform Continuity	5.4	
9	Monotone and Inverse Functions	5.6	
	The Derivative	6.1	
10	The Mean Value Theorem	6.2	You may consider a term paper on the contributions of the Bernoulli Family to Mathematics
	L'Hospital's Rules	6.3	
11	Taylor's Theorem	6.4	You may consider a term paper on the contributions of Riemann
	Riemann Integral	7.1	
12	Riemann Integrable Functions	7.2	
13	The Fundamental Theorem	7.3	You may consider a term paper on some topics of chapter 8
14	Absolute Convergence	9.1	
	Tests for Absolute Convergence	9.2	
15	Tests for Nonabsolute Convergence	9.3	You may consider a term paper on some topics of chapter 10
	Series of Functions	9.4	

FINAL EXAM - Tuesday January 2nd, 2018 - 8:00 am - 11:00 am