ADVANCED CALCULUS I – MATH 341 – TERM 231

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Office	Building 5 – Room 201 - 1	**Communication**	Through TEAMS
Office Hours	Online through TEAMS	**Website**	https://faculty.kfupm.edu.sa/math/mshahrani

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:

Upon completion of this course, students should be able to:

- Identify different classes of real numbers.
- Apply concepts of limit and continuity.
- Distinguish between the concepts of continuity and uniform continuity.
- Apply properties of differentiation of functions of one variable.
- Compute Riemann sums and apply them to evaluate integrals.
- Interpret and apply the fundamental theorem of calculus.

Resources:

- Teams (Course Material)
- 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)

Grading Policy:

- Two In-Class Exams   35%
- Final (**Comprehensive**)   45%
- Quizzes   20%

Attendance:

- Students must adhere to the attendance policy of KFUPM.
- A DN grade will be given to any student who accumulates 9 unexcused absences or 15 unexcused and excused absences.
- A DN grade will be given to the eligible student after being warned twice.

Academic Integrity:

All KFUPM ethics policies apply in this course.

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	
0	Chapter 1: PRELIMINARIES	Optional (but highly recommended)	
1 27/08/2023	Algebraic and Order Properties of R	2.1	
	Absolute Value and the Real Line	2.2	
2 03/09/2023	Completeness Property of R	2.3	
	Applications of the Supremum Property	2.4	
3 10/09/2023	Sequences and Their Limits	3.1	**Quiz 1: Week 3**
	Limit Theorems	3.2	
4 17/09/2023	Monotone Sequences	3.3	
	Subsequences and the Bolzano-Weierstrass Theorem	3.4	
5 24/09/2023	Cauchy Criterion	3.5	
	Properly Divergent Sequences	3.6	**Class Test 1: Week 5**
6 01/10/2023	Limits of Functions	4.1	**Sunday 24/9 is National Day Holiday**
	Limit Theorems	4.2	
7 08/10/2023	Continuous Functions	5.1	
	Combinations of Continuous Functions	5.2	
8 15/10/2023	Continuous Functions on Intervals	5.3	**Quiz 2: Week 8**
	Uniform Continuity	5.4	
9 22/10/2023	Monotone and Inverse Functions	5.6	
	The Derivative	6.1	
10 29/10/2023	The Mean Value Theorem	6.2	
	L'Hospital's Rules	6.3	
11 05/11/2023	Taylor's Theorem	6.4	**Class Test 2: Week 11**
	Riemann Integral	7.1	
12 12/11/2023	Riemann Integrable Functions	7.2	

MIDTERM BREAK (19 Nov - 23 Nov 2021)

Week	Topic	Required Reading	
13 26/11/2023	The Fundamental Theorem	7.3	
14 03/12/2023	Absolute Convergence	9.1	
	Tests for Absolute Convergence	9.2	
15 10/12/2023	Tests for Nonabsolute Convergence	9.3	
	Series of Functions	9.4	
16 17/12/2023	Review		

FINAL EXAM – see the registrar website