MATH 2413 DIFFERENTIAL CALCULUS

Syllabus-Spring 2025

Class Information:

Class Section	Room	Days/ Time	Instructor
MATH 2413.001	SCI 2.215	MWF 11:00am-11:50am	Rabin Dahal
MATH 2413.002	SCI 2.215	MWF 12:00pm-12:50pm	Anatoly Eydelzon
MATH 2413.003	SCI 2.225	MWF 9:00am-9:50am	Rabin Dahal
MATH 2413.004	SCI 2.230	MWF 10:00am-10:50am	Anatoly Eydelzon
MATH 2413.005	SCI 2.230	MWF 11:00am-11:50am	Anatoly Eydelzon
MATH 2413.006	SCI 2.225	MWF 12:00pm-12:50pm	Hui Ding
MATH 2413.007	SCI 2.230	MWF 1:00pm-1:50pm	Adannah Duruoha
MATH 2413.008	SCI 2.230	MWF 2:00pm-2:50pm	Adannah Duruoha
MATH 2413.009	SCI 2.230	MWF 3:00pm-3:50pm	Adannah Duruoha
MATH 2413.011	SCI 2.225	MWF 8:00am-8:50am	Rabin Dahal

Instructor Information:

Instructor: Rabin Dahal Office: FO 2.410B Email: `Rabin.Dahal@utdallas.edu` Office Phone: 972-883-6584 Office Hours: MW, 10:00am-10:50am . Fri 12:30pm-2:00pm or by appt.	Instructor: Anatoly Eydelzon Office: FO 2.604G Email: `anatoly@utdallas.edu` Office Phone: Office Hours: MW 1:00pm-2:00pm Fri 8:00am-9:00am
Instructor: Hui Ding Office: FO 2.110 Email: `Hui.Ding@utdallas.edu` Office Phone: 972-883-3967 Office Hours: Mon, Wed, Fri 10:00am-10:50am	Instructor: Adannah Duruoha Office: FO 2.110 Email: `Adannah.Duruoha@utdallas.edu` Office Phone: 972-883-3967 Office Hours: Mon, Wed, Fri 5:00pm-6:00pm

Course Pre-Requisite, Co-requisite and/or Other Restrictions: Prerequisite: A score of 80% on ALEKS math placement exam or a grade of at least a C- in MATH 2306 or MATH 2312. Students must enroll in one of the problem sections MATH 2413.3XX or MATH 2413.8XX. Students are automatically enrolled in MATH 2413.701 exam section which meets on exam days only.

Course Description: MATH 2413 - Differential Calculus (4 semester credit hours) Course covers topics in differential calculus of functions of one variable; topics include limits, continuity, derivative, chain rule, implicit differentiation, mean value theorem, maxima and minima, curve sketching, derivatives of inverse trigonometric functions, antiderivative, substitution method, and applications. Three lecture hours and two discussion hours a week; a problem section required with MATH 2413, and will also be registered for exam section. Not all MATH/STAT courses may be counted toward various degree plans. Please consult your degree plan to determine the appropriate MATH/STAT course requirements. A course material fee, which may include a course online access fee, of up to $100 may be charged for this course. Please see the course's syllabi in CourseBook for more details. Prerequisite: ALEKS score required or a grade of at least a C- in MATH 2306 or MATH 2312. (3-2) S.

Textbook and Materials:

- **Recommended Textbook:** Calculus, Early Transcendental 8^{th} *edition*; James Stewart. The book is available in the UTD library.
- **Lecture Notes:** Detailed lecture notes will be posted on eLearning course MATH 2413.701. Therefore, a textbook is not required.
- **Calculator:** A standard scientific calculator is allowed in the quizzes and exams. Graphing calculators, calculators with internet connectivity or ability to perform calculus operations are not allowed.

Students Learning Outcomes

1. Students will be able find the limit of a function at a given point geometrically and analytically. Students will also be able to verify the limit of a function at a given point using $\epsilon - \delta$ definition of the limit.
2. Students will be able to calculate the derivatives of: algebraic, trigonometric, exponential, logarithmic, and combination of those functions. Students will be able to calculate the derivatives using implicit differentiation and logarithmic differentiation.
3. Students will be able apply derivatives to solve related rates problems.
4. Students will be able to determine the shape of the graph of a function using the derivatives.
5. Students will be able to approximate radicals and expressions involving decimals using linear approximations or differentials.
6. Students will be able to find the absolute and relative extrema of given functions. Students will also be able to solve optimization problems.
7. Students will be able to find indefinite integrals using basic rules and the substitution rule.
8. Students will be able calculate the definite integral of simple algebraic functions using the limit definition.
9. Students will be able to calculate the definite integral using the fundamental theorem of calculus.
10. Students will be able to calculate the area of the plane regions between to curves over given interval.

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eLearning: You must regularly check the MATH 2413.701 (the exam section) page of eLearning:

`https://elearning.utdallas.edu`

Under this course on elearning: Take Home Quizzes (THQ) will be assigned; a grade book will be maintained, and other important announcements will be posted. You will also access Digital Homework (DHW) through this course on eLearning.

Academic Support Resources

1. Peer Tutoring: The Student Success Center offers free help in math, physics and statistics courses to the UT Dallas students currently enrolled in classes. Please visit their website:

   `https://studentsuccess.utdallas.edu/programs/peer-tutoring/`

   for detail information.

2. The Peer-Led Team Learning (PLTL): PLTL program provides an active, engaged learning experience for students enrolled in MATH 2413. Students who register with PLTL will meet in small groups once a week and are expected to attend every session. Students who regularly attend sessions typically earn a half to a whole letter grade higher than students who do not participate in the PLTL program.

   `https://studentsuccess.utdallas.edu/programs/peer-led-team-learning/`

Please visit the following webpage for the full list of University's academic support resources for all students.

`http://go.utdallas.edu/academic-support-resources`

Method of Evaluation:

A) **Grading System:**

1. **Homework (10%):** Weekly Digital Homework (DHW) will be generated using WebWork and made available on elearning course MATH 2413.701. To access DHW

   - On-Campus: Go to eLearning course MATH 2413.701 homepage, click on the folder DHW.
   - Off Campus: Follow the instructions on the webpage below to set up GlobalProtect VPN if you do not already have it: `https://oit.utdallas.edu/howto/vpn/`. If you have trouble installing or connecting, please click the IT Support link at the top of this webpage. Once you are connected to the UTD network via GlobalProtect VPN, go to your eLearning course MATH 2413.701, click the link DHW. Each time you want to access WebWork through the same device, you must connect to GlobalProtect VPN first. If you want to use a new device, you need to repeat the process from the beginning.

   The two lowest DHW scores will be dropped at the end of the semester. DHW average is worth 10% toward your final grade. See DHW schedule for the opening/due dates and the contents on each DHW.

2. **Quizzes (15%):** Weekly quizzes will be given during the last 25 minutes of your problem section, except during exam weeks. At the end of the semester, the two lowest quiz scores will be dropped. The average of your remaining quiz scores is worth 15% toward your final grade. A list of practice problems for each quiz will be made available on eLearning.

3. **Take Home Quiz (15%):** Five Take-Home Quizzes (THQs) will be assigned throughout the course. A PDF file for each quiz will be uploaded to the MATH 2413.701 eLearning course. You are required to print the file, complete the solutions in the provided spaces, scan the completed document, save it as a PDF, and upload it to eLearning before the due date.

   You may refer to class notes (from lectures or problem sections) and the recommended textbook while completing the quizzes. However, collaboration or assistance from any individual or external sources (including internet searches or tutoring services) is strictly prohibited.

   To receive full credit, all work must be clearly shown. Note that only a subset of the assigned problems on each THQ will be graded. The average score from all THQs will contribute 15% toward your final grade.

   Note: Unforeseen issues such as power/internet outage or eLearning malfunction may occur at any time. Therefore, it is strongly recommended that you plan to submit each THQ or DHW at least 24 hours before the deadline. This buffer will allow you to explore alternative submission methods within the remaining time, should such circumstances arise.

4. **Mid-term Exams (36%):** Two mid-term exams will be administered during the course. The dates and content coverage for each exam are outlined in the exam schedule section of this syllabus. Each mid-term exam will contribute 18% toward your semester grade.

5. **Final Exam (24%):** Final exam is comprehensive with more emphasis on the material covered after exam 2. The final exam date and time will be announced later. The final exam will count 24% toward your semester average.

   Note: Detailed information regarding each exam will be provided on the MATH 2413.701 eLearning course page approximately one week before the scheduled date.

B. **Breakdown:** Letter grades will be assigned based on the numeric-to-alphabetic conversion table provided below.

$[90; 93)$ = A- $[93; 97)$ =A $[97; 100]$ = A+

$[80; 83)$ = B- $[83; 87)$ = B $[87;90)$ = B+

$[70; 73)$ = C- $[73; 77)$ = C $[77;80)$ = C+

$[60; 63)$ = D- $[63; 67)$= D $[67;70)$ = D+

$[0, 60)$ = F.

Tentative Schedule for Lecture and Problem Section

Monday (Lecture)	Tuesday (Prob Sec)	Wednesday (Lecture)	Thursday (Prob. Sec)	Friday (Lecture)
Jan 20th **1**	21st **2** Pre-Cal Review	22nd **3** Pre-Cal Review	23rd **4** Pre-Cal Review	24th **5** Pre-Cal Review
27th **6** Limit of a Function	28th **7** Pre-Cal Review Limit of a Function, Quiz 1	29th **8** Calculating Limits	30th **9** Pre-Cal Review Limits, Calculating Limits, Quiz 1	31st **10** Infinite Limits
Feb 3rd **11** Limits of Trig. Functions	4th **12** Calculating Limits, Infinite Limits, Trig. Limits, Quiz 2	5th **13** The Precise Definition of a Limit	6th **14** Infinite Limits, Trig. Limits, The Precise Def. of Limit, Quiz 2	7th **15** Continuity-I
10th **16** Continuity-II	11th **17** The Precise Def. of a Limit, Continuity Quiz 3	12th **18** Limits at Infinity & Horizontal Asymptotes	13th **19** Continuity, Limits at Infinity & HA, Quiz 3	14th **20** Horizontal Asymptotes, Derivative
17th **21** Derivative as a Function	18th **22** Limits at Infinity & HAs, Derivatives, Derivative as a Function, Quiz 4	19th **23** Basic Derivative Rules	20th **24** Derivative, Derivative as a Function, Basic Derivative Rules-I, Quiz 4	21st **25** Tangents, Derivatives of Exponential Functions
24th **26** The Product and Quotient Rules	25th **27** Derivative Rules Derivatives of Exp. Functions, The Product and Quotient Rules, Quiz 5	26th **28** Derivatives of Trig. Functions	27th **29** Derivatives of Exp./Trig. Functions, The Product and Quotient Rules, Quiz 5	28th **30** The Chain Rule-I
Mar 3rd **31** The Chain Rule-II	4th **32** Derivatives of Trig Functions, The Chain Rule	5th **33** Implicit Differentiation	6th **34** The Chain Rule, Implicit Differentiation	7th **35** Derivatives of Inv. Trig. Functions
10th **36** Derivatives of Log. Functions, Log. Differentiation	11th **37** Implicit Diff., Derivatives of Log. Functions, Log. Differentiation Quiz 6	12th **38** Related Rates	13th **39** Derivatives of Inv. Trig./Log. Functions, Log. Diff. Related Rates, Quiz 6	14th **40** Linear Approximation & Differentials

Monday (Lecture)	Tuesday (Prob Sec)	Wednesday (Lecture)	Thursday (Prob. Sec)	Friday (Lecture)
17th **41** Spring Break	18th **42** Spring Break	19th **43** Spring Break	20th **44** Spring Break	21st **45** Spring Break
24th **46** Max, Min Values	25th **47** Related Rates, Linear Approx. and Differentials Quiz 7	26th **48** Max, Min Values	27th **49** Linear Approx. and Differentials Max/Min Values Quiz 7	28th **50** The Mean Value Theorem
31st **51** How Derivatives Affect the Shape of a Graph-I	Apr 1st **52** Max/Min, MVT Inc/dec intervals 1st Der. Test, Quiz 8	2nd **53** How Derivatives Affect the Shape of a Graph-II	3rd **54** MVT, Inc/Dec. Intervals, 1st Der. Test Quiz 8	4th **55** How Derivatives Affect the Shape of a Graph-III
7th **56** Indet. Forms and l'Hospital's Rule-I	8th **57** Concavity, 2nd Der. Test, LH Rule-I, Quiz 9	9th **58** Indet. Forms and l'Hospital's Rule-II	10th **59** Concavity, 2nd Der. Test, LH Rule, Quiz 9	11th **60** Curve Sketching
14th **61** Optimization	15th **62** LH Rule-II, Curve Sketching Optimization	16th **63** Antiderivatives, Indefinite Integrals	17th **64** Curve Sketching Optimization, Antiderivatives, Indef. Integrals	18th **65** Areas and Distances
21st **66** Definition of Definite Integrals	22nd **67** Antiderivatives Indef. Integrals, Areas/ Distances Def. Integrals Quiz 10	23rd **68** Properties of Definite Integrals	24th **69** Areas and Distances Def. Integrals, Quiz 10	25th **70** Fundamental Theorems of Calculus (FTC)
28th **71** FTC, Integration by substitution	29th **72** Properties of Def. Integrals, FTC, Quiz 11	30th **73** Integration by Substitution	May 1st **74** FTC, Int. by Sub., Quiz 11	2nd **75** Int. by sub., Areas between Curves
5th **76** Areas bet. Curves	6th **77** Int. by Sub., Areas bet. Curves, Quiz 12	7th **78** Average Value of Function	8th **79** Areas bet. Curves, Review, Quiz 12	9th **80** Review

Exam Schedule:

Exam	Topics	Date and Location
Exam 1	Limits, Continuity, Derivatives (Definition - The Chain Rule)	03/07, Friday 7:00pm-8:15pm
Exam 2	Implicit Differentiation- Curve Sketching	04/18, Friday 7:00pm-8:15pm
Final	Comprehensive	TBD

DHW Schedule:

DHW	Topics	Posting	Due
DHW 1	Pre-Cal Review	01/21	02/02
DHW 2	Limit of a Function, Calculating Limits	01/29	02/09
DHW 3	Precise Def. of Limits, Continuity	02/05	02/16
DHW 4	Limits at Infinity, Derivative, Derivative as a Function	02/12	02/23
DHW 5	Basic Derivative Rules, The Product and Quotient Rules	02/19	03/02
DHW 6	Derivatives of Trig. Functions, The Chain Rule	02/26	03/09
DHW 7	Implicit Differentiation, Derivatives of Logarithmic Functions & Logarithmic Differentiation	03/05	03/23
DHW 8	Related Rates, Linear Approximations, and Differentials	03/12	03/30
DHW 9	Max. & Min. Values, The Mean Value Theorem, Inc/Dec. Functions, The First Derivative Test	03/24	04/06
DHW 10	Concavity, The second Derivative Test, Ind. Forms & l'Hospital's Rule-I	04/02	04/13
DHW 11	l'Hospital's Rule-II, Curve Sketching, Optimization	04/09	04/20
DHW 12	Antiderivatives, Areas & Distances, Definite Integrals by Definition	04/16	04/27
DHW 13	Properties of Def. Integrals, FTC, Integration by Substitution	04/23	05/04
DHW 14	Int. by sub., Areas bet. Curves	04/30	05/09

THQ Schedule:

DHW	Topics	Posting	Due
THQ 1	Limits, Continuity	01/27	02/23
THQ 2	Derivatives	02/20	03/23
THQ 3	Applications of Derivatives (excluding curve sketching and optimization)	03/12	04/14
THQ 4	LH Rule, Curve Sketching, Optimization, Antiderivatives & Indefinite Integrals, Areas & Distances, Definite Integrals	04/07	05/04
THQ 5	FTC, Integration by Substitution, Areas bet. Curves	04/25	05/09

Important Dates

- **Classes begin:** Tuesday, January 21.
- **Last Day to Drop a class without a "W" Full Term Session:** Wednesday, Feb. 05.
- **Midterm Exam I**: Friday, March 07, 7:00pm-8:15pm, Location: TBA
- **Spring Break**: Monday, March 17 - Sunday, March 23 - No classes.
- **Last Day to Drop a Course**: Wednesday, April 09.
- **Midterm Exam II**: Friday, April 18, 7:00pm-8:15pm, Location: TBA
- **Last Day of Classes** - Friday, May 09.
- **Final Exam**: Date: TBD; Location: TBD

Course & Instructor Policies

1. **Late/Missed Coursework:** There is no make-up for any missed HW or quiz or THQ. However, we drop the two lowest homework and two lowest quizzes to account for possible missed works. Also, there will be no make-up exam, unless in case of extreme circumstances (such as UTD related events, illness or a death in family) with proper documentation accepted by the instructor. In such cases, you should contact your lecture section instructor immediately.

2. **Attendance:** Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. If you have to miss a class, you are responsible for the material covered in class. You are responsible for any/all assignments regardless of your attendance.

3. **Class Participation:** Regular class participation is encouraged, however, please raise your hand to speak. Avoid having side conversations and using electronic devices (such as phone, laptop) to prevent unnecessary distractions to yourself and your classmates. You are welcome to use a writing tablet to take lecture notes.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the **Student Code of Conduct**.

Student AccessAbility

It is the policy and practice of The University of Texas at Dallas to make reasonable accommodations for students with properly documented disabilities. However, written notification from the Office of Student AccessAbility (OSA) is required. If you are eligible to receive an accommodation and would like to request it for this course, please discuss it with me and allow one week advance notice. Students who have questions about receiving accommodations, or those who have, or think they may have, a disability (mobility, sensory, health, psychological, learning, etc.) are invited to contact OSA for a confidential discussion. OSA is located in the Student Administration Building, AD 2.224. They can be reached by phone at 972-883-2098, or by email at: `studentaccess@utdallas.edu`

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the **Student Code of Conduct**.

Problem Sections Information: Students are required to enroll in and attend one of the problem sections.

Section	Days & Time	Location	Teaching Assistant
MATH 2413.301	Tue 8:00am-9:50 am	SCI 3.260	Sungbum Kim
MATH 2413.302	Thu 8:00am-9:50 am	SCI 3.260	Hyeonduk Sim
MATH 2413.305	Tue 1:00pm-2;50pm	SCI 3.260	Yubaraj Neupane
MATH 2413.306	Thu 1:00pm-2:50pm	SCI 3.260	Hyeonduk Sim
MATH 2413.307	Tue 3:00pm-4:50pm	SCI 3.260	Bhimsen Khadka
MATH 2413.308	Thu 3:00pm-4:50pm	SCI 3.260	Abinash Khandelwal
MATH 2413.309	Tue 10:00am-11:50am	SCI 3.270	Rozina Akter
MATH 2413.310	Thu 10:00am-11:50am	SCI 3.270	Bruno De Queiroz
MATH 2413.311	Tue 1:00pm-2:50pm	SCI 3.270	Yuanqing Wang
MATH 2413.312	Thu 1:00pm-2:50pm	SCI 3.270	Razuana Norin
MATH 2413.313	Tue 3:00pm-4:50pm	SCI 3.270	Yubaraj Neupane
MATH 2413.314	Thu 4:00pm-5:50pm	GR 4.208	Razuana Norin
MATH 2413.316	Tue 1:00pm-2:50pm	FN 2.204	Rozina Akter
MATH 2413.317	Tue 3:00pm-4:50pm	FN 2.204	Yuanqing Wang
MATH 2413.318	Thu 3:00pm-4:50pm	SCI 3.270	Bhimsen Khadka
MATH 2413.319	Thu 1:00pm-2:50pm	FN 2.204	Bruno De Queiroz
MATH 2413.321	Tue 4:00pm-5:50pm	SLC 1.102	Sungbum Kim
MATH 2413.322	Tue 4:00pm-5:50pm	SLC 1.204	Ishtiaque Ahmed
MATH 2413.323	Thu 4:00pm-5:50pm	CB 1.206	Ishtiaque Ahmed
MATH 2413.324	Tue 4:00pm-5:50pm	FN 2.106	Abinash Khandelwal

During problem sessions, the Teaching Assistant (TA) will:

- Review class material and related topics.

- Return graded assignments, quizzes, and exams.
- Solve problems or facilitate problem-solving activities with students.
- Administer quizzes.
- Answer students' questions

Teaching Assistant (TA) Office Information:

TA	Office	Office Hour	Email
Abinash Khandelwal	FO 1.208	Mon 4-5pm.	Abinash.Khandelwal@utdallas.edu
Bhimsen Khadka		Mon. 4-5pm	Bhimsen.Khadka@utdallas.edu
Yubaraj Neupane			Yubaraj.Neupane@utdallas.edu
Ishtiaque Ahmed	FO 2.204 F	Wed 4:00pm-5:00pm	Ishtiaque.Ahmed@utdallas.edu
Sungbum Kim	FN 1.114	Tue 3:00pm-4:00pm	Sungbum.Kim@utdallas.edu
Bruno De Queiroz			bruno.dequeiroz@utdallas.edu
Yuanqing Wang	FO 1.208	Thu 10:30am-11:30am	Yuanqing.Wang@utdallas.edu
Rozina Akter	FO 1.210C	By appt.	rozina.akter@utdallas.edu
Razuana Norin			Razuana.Norin@utdallas.edu
Hyeonduk Sim			Hyeonduk.Sim@utdallas.edu

UT Dallas Syllabus Policies and Procedures:

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the **credit/no credit** or **pass/fail** grading option and withdrawal from class. Please go to

`http://go.utdallas.edu/syllabus-policies`

for these policies.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Note: `The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professors.`