MATH 2413 DIFFERENTIAL CALCULUS

Syllabus-Spring 2026

Class Information:

Class Section	Room	Days/ Time	Instructor
MATH 2413.001	SCI 2.215	MWF 11:00am-11:50am	Runzhou Liu
MATH 2413.002	SCI 2.215	MWF 12:00pm-12:50pm	Runzhou Liu
MATH 2413.003	SCI 2.225	MWF 9:00am-9:50am	Rabin Dahal
MATH 2413.004	SCI 2.230	MWF 10:00am-10:50am	Adannah Duruoha
MATH 2413.005	SCI 2.230	MWF 11:00am-11:50am	Rabin Dahal
MATH 2413.006	SCI 2.225	MWF 12:00pm-12:50pm	Rabin Dahal
MATH 2413.007	SCI 2.230	MWF 1:00pm-1:50pm	Runzhou Liu
MATH 2413.008	SCI 2.230	MWF 2:00pm-2:50pm	Runzhou Liu
MATH 2413.010	SCI 2.225	MWF 8:00am-8:50am	Casey Crane

Instructor Information:

Instructor: Rabin Dahal Office: FO 2.410B Email: `Rabin.Dahal@utdallas.edu` Office Phone: 972-883-6584 Office Hours: MWF 1:00pm-2:00pm or by appt.	Instructor: Runzhou Liu Office: FN 2.206 Email: `Runzhou.Liu@utdallas.edu` Office Phone: 972-883-6424 Office Hours: MWF 2:50pm-3:20pm or by appt.
Instructor: Casey Crane Office: FO 2.602 J Email: `Casey.Crane@utdallas.edu` Office Phone: Office Hours: Wed. 9:00am-10:00am or by appt.	Instructor: Adannah Duruoha Office: FO 2.110 Email: `Adannah.Duruoha@utdallas.edu` Office Phone: Office Hours: MWF 1:00pm-1:50pm or by appt

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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.

Textbook and Materials:

- **Recommended Textbook:** Calculus, Early Transcendental 8/9E J. Stewart. This book is available in UTD Library. Detailed lecture notes will be posted on eLearning course MATH 2413.701. Therefore, a textbook is not required.

- **Calculator:** Calculators are not allowed on the quizzes or exams. The quizzes and exams will involve simple calculations so that you will not need a calculator.

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 ϵ-δ 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 decimals using linear approximations or differentials.
6. Students will be able to find the extrema of given functions and use it 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 WebWork for 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%):** 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://atlas.utdallas.edu/TDClient/30/Portal/KB/ArticleDet?ID=152`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.

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 will count 24% toward your semester average.

   Note: Detailed information regarding each exam will be posted 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 below.

$$[90;\ 93) = \text{A-} \quad [93;\ 97) = \text{A} \quad [97;\ 100] = \text{A+}$$

$$[80;\ 83) = \text{B-} \quad [83;\ 87) = \text{B} \quad [87;90) = \text{B+}$$

$$[70;\ 73) = \text{C-} \quad [73;\ 77) = \text{C} \quad [77;80) = \text{C+}$$

$$[60;\ 63) = \text{D-} \quad [63;\ 67) = \text{D} \quad [67;70) = \text{D+}$$

$$[0,\ 60) = \text{F}.$$

Tentative Schedule for Lecture and Problem Section

Monday (Lecture)	Tuesday (Prob Sec)	Wednesday (Lecture)	Thursday (Prob. Sec)	Friday (Lecture)
Jan 19th **1**	20th **2** Pre-Cal Review	21st **3** Pre-Cal Review	22nd **4** Pre-Cal Review	23rd **5** Pre-Cal Review
26th **6** Limit of a Function	27th **7** Limit of a Function	28th **8** Calculating Limits	29th **9** Limit of a Function	30th **10** Infinite Limits
Feb 2nd **11** Limits of Trig. Functions	3rd **12** Calculating Limits, Infinite Limits, Trig. Limits, Quiz 1	4th **13** The Precise Definition of a Limit	5th **14** Calculating Limits, Infinite Limits, Trig. Limits, Quiz 1	6th **15** Continuity-I
9th **16** Continuity-II	10th **17** Precise Def. of Limit, Continuity Quiz 2	11th **18** Limits at Infinity & Horizontal Asymptotes	12th **19** Precise Def. of Limit, Continuity Quiz 2	13th **20** Derivative
16th **21** Derivative as a Function	17th **22** Limits at Inf. & HAs, Derivatives, Derivative as a Function Quiz 3	18th **23** Basic Derivative Rules	19th **24** Limits at Inf. & HAs, Derivatives, Derivative as a Function Quiz 3	20th **25** Tangents, Derivatives of Exponential Functions
23rd **26** The Product and Quotient Rules	24th **27** Derivative Rules, Der. of exp. functions The Product and Quotient Rules	25th **28** Derivatives of Trig. Functions	26th **29** Derivative Rules, Der. of exp. functions The Product and Quotient Rules	27th **30** The Chain Rule-I
Mar 2nd **31** The Chain Rule-II	3rd **32** Der. of Trig Functions, Chain Rule. Quiz 4	4th **33** Implicit Differentiation	5th **34** Der. of Trig Functions, Chain Rule. Quiz 4	6th **35** Derivatives of Inv. Trig. Functions
9th **36** Derivatives of Log. Functions, Log. Differentiation	10th **37** Imp. Diff., Der. of Inv. Trig/Log., Log. Diff. Quiz 5	11th **38** Related Rates	12th **39** Imp. Diff., Der. of Inv. Trig/Log., Log. Diff. Quiz 5	13th **40** Linear Approximation & Differentials
16th **41** Spring Break	17th **42** Spring Break	18th **43** Spring Break	19th **44** Spring Break	20th **45** Spring Break

Monday (Lecture)	Tuesday (Prob Sec)	Wednesday (Lecture)	Thursday (Prob. Sec)	Friday (Lecture)
23rd **46** Max, Min Values	24th **47** Related Rates, Linear App. & Differentials, Max/Min Quiz 6	25th **48** Max, Min Values	26th **49** Related Rates, Linear App. & Differentials, Max/Min Quiz 6	27th **50** The Mean Value Theorem
30th **51** How Derivatives Affect the Shape of a Graph-I	31st **52** MVT, Inc/dec intervals 1st Der. Test, Quiz 7	Apr 1st **53** How Derivatives Affect the Shape of a Graph-II	2nd **54** MVT, Inc/dec intervals 1st Der. Test, Quiz 7	3rd **55** How Derivatives Affect the Shape of a Graph-III
6th **56** Indet. Forms and LH Rule-I	7th **57** Concavity, 2nd Der. Test, LH Rule-I	8th **58** Indet. Forms and LH Rule-II	9th **59** Concavity, 2nd Der. Test, LH Rule-I	10th **60** Curve Sketching
13th **61** Optimization	14th **62** LH Rule-II, Curve Sketching Optimization Quiz 8	15th **63** Antiderivatives, Indefinite Integrals	16th **64** LH Rule-II, Curve Sketching Optimization Quiz 8	17th **65** Areas and Distances
20th **66** Definite Integrals	21st **67** Antiderivatives Area/Distances Def Int Quiz 9	22nd **68** Properties of Definite Integrals	23rd **69** Antiderivatives, Area/Dist. Def Int Quiz 9	24th **70** FTC-I
27th **71** FTC-II, Integration by substitution	28th **72** Prop of Def. Integrals, FTC, Quiz 10	29th **73** Integration by Substitution	30th **74** Prop. of Def. Integrals, FTC, Quiz 10	May 1st **75** u-sub., Areas bet. Curves
4th **76** Areas bet. Curves	5th **77** u-sub., Areas bet. Curves, Quiz 11	6th **78** Average Value of Function	7th **79** u-sub., Areas bet. Curves, Quiz 11	8th **80** Review

Exam Schedule:

Exam	Topics	Date and Location
Exam 1	Limits - The Product and Quotient Rule	02/27, Friday 7:00pm-8:15pm
Exam 2	The Chain Rule- LH Rule-I	04/10, Friday 7:00pm-8:15pm
Final	Comprehensive	05/11, Monday, 8:00am-10:45am

DHW Schedule:

DHW	Topics	Posting	Due
DHW 1	Pre-Cal Review	01/20	02/01
DHW 2	Limit of a Function, Calculating Limits, Infinite Limits	01/26	02/08
DHW 3	Trig. Limits, Precise Def. of Limits, Cont.-I	02/02	02/15
DHW 4	Cont-II, Limits at Infinity, Derivative	02/09	02/22
DHW 5	Der. as Function, Basic Der. Rules, Der. of Exp. Fun.	02/16	03/01
DHW 6	Product and Quotient Rules, Der. of Trig., Chain Rule	02/23	03/08
DHW 7	Implicit Differentiation, Derivatives of Inv. Trig.	03/04	03/22
DHW 8	Derivatives of Log. & Log. Diff, Related Rates, Lin. App.	03/09	03/29
DHW 9	Max. & Min. Values, The Mean Value Theorem	03/23	04/05
DHW 10	How derivatives affect the Shape of a Graph	03/30	04/12
DHW 11	l'Hospital's Rule, Curve Sketching	04/08	04/19
DHW 12	Optimization, Antiderivatives, Areas & Distances	04/13	04/26
DHW 13	Definite Integrals, FTC, u-sub	04/20	05/03
DHW 14	u-sub., Areas bet. Curves	04/27	05/08

THQ Schedule:

THQ	Topics	Posting	Due
THQ 1	Limits, Continuity	01/26	02/16
THQ 2	Limits at Infinity-The Chain Rule	02/13	03/08
THQ 3	Imp. Diff.- How Derivative affects Shape of a Graph	03/09	04/06
THQ 4	LH Rule, Curve Sketching, Optimization, Antiderivatives	04/07	04/30
THQ 5	Areas & Distances, Definite Integrals, FTC	04/17	05/04

Quiz Topics:

Quiz	Topics
Quiz 1	Limit of a Function, Calculating Limits, Infinite Limits
Quiz 2	Limits of Trig. Functions, Precise Def. of Limits, Cont.-I
Quiz 3	Cont-II, Limits at Infinity & HA, Derivative
Quiz 4	Derivative of Exp. Functions, product and Quotient Rules, The Chain Rule
Quiz 5	Derivatives of Trig and Inv. Trig. Functions, Implicit Diff.
Quiz 6	Derivatives of Log. & Log. Differentiation, Related Rates, Differentials
Quiz 7	Maximum & Minimum Values, MVT
Quiz 8	How Derivatives Affect the Shape of a Graph, Indet. Forms & LH Rule
Quiz 9	Optimization, Antiderivatives, Areas & Distances
Quiz 10	Def. of Definite Integrals, properties of Def. Integrals, FTC-I
Quiz 11	FTC-II, u-sub, Area bet. Curves

Important Dates

- **Classes begin:** Jan. 20, Tuesday
- **Last Day to Drop a class without a "W" Full Term Session:** Feb. 04, Wednesday
- **Midterm Exam I**: Feb. 27, Friday, 7:00pm-8:15pm, Location: TBA
- **Midterm Exam II**: April 10, Friday, 7:00pm-8:15pm, Location: TBA
- **Spring Break** : March 16, Monday-March 22, Sunday - No classes.
- **Last Day to Drop a Course**: April 08, Wednesday.
- **Last Day of Classes** - May 08, Friday.
- **Final Exam**: May 11, Monday, 8:00am-10:45am

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 exams unless the circumstances are extraordinary. 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	Islam Kazi Sabrina
MATH 2413.303	Tue 1:00pm-2:50pm	SCI 3.260	Zijiang Yang
MATH 2413.304	Thu 1:00pm-2:50pm	SCI 3.260	Razuana Norin
MATH 2413.305	Tue 3:00pm-4:50pm	SCI 3.260	Islam Kazi Sabrina
MATH 2413.306	Thu 3:00pm-4:50pm	SCI 3.260	Richik Das
MATH 2413.307	Tue 10:00am-11:50am	SCI 3.270	Mohammad Asif Arefin
MATH 2413.308	Thu 10:00am-11:50am	SCI 3.270	Akhtar Naveed
MATH 2413.309	Tue 1:00pm-2:50pm	SCI 3.270	Surbhi Kumar
MATH 2413.310	Thu 1:00pm-2:50pm	SCI 3.270	Akhtar Naveed
MATH 2413.311	Tue 3:00pm-4:50pm	SCI 3.270	Zijiang Yang
MATH 2413.313	Tue 1:00pm-2:50pm	FN 2.204	Mohammad Asif Arefin
MATH 2413.314	Tue 3:00pm-4:50pm	FN 2.204	Richik Das
MATH 2413.316	Thu 1:00pm-2:50pm	FN 2.204	Bruno De Queiroz
MATH 2413.317	Thu 4:00pm-5:50pm	CB 1.206	Surbhi Kumar
MATH 2413.319	Thu 8:00am-9:50am	FN 2.106	Bruno De Queiroz
MATH 2413.320	Tue 8:00am-9:50am	FN 2.106	Chin-Ling Chang
MATH 2413.321	Thu 3:00pm-4:50pm	SLC 3.102	Razuana Norin
MATH 2413.322	Thu 8:00am-9:50am	FN 2.204	Chin-Ling Chang

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
Kazi Sabrina Islam			KaziSabrina.Islam@utdallas.edu
Naveed Akhtar			Naveed.Akhtar@utdallas.edu
Zijiang Yang			Zijiang.Yang@utdallas.edu
Mohammad Asif Arefin			MohammadAsif.Arefin@utdallas.edu
Bruno De Queiroz	FO 1.204 L	Thu 10:00am-12:00pm	bruno.dequeiroz@utdallas.edu
Richik Das	FO 2.408 L		Richik.Das@utdallas.edu
Surbhi Kumar		By appt.	Surbhi.Kumar@utdallas.edu
Razuana Norin	FN 1.116 A		Razuana.Norin@utdallas.edu
Chin-Ling Chang			Chin-Ling.Chang@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.