

**Instructor:** Xiaohua Li  
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**Lecture Time:** TTH 4:00pm-5:20pm room B190  
**Office Hours:** Open Office Policy; MTWRF 1:00pm-2:00pm or by appointment  
**TA Office Hours:** will be posted in blackboard later

**Required Textbook:** Advanced Engineering Mathematics, 10<sup>th</sup> edition  
Erwin Kreyszig  
ISBN-10: 0470458364  
ISBN-13: 978-0470458365

**Course Description:**

Applications of mathematical methods and computational techniques to typical problems in mechanical and energy engineering practice. Topics include vector calculus and numerical methods.

**Pre-requisites:** MATH 2730.

**Course Learning Outcomes (CLO):**

Upon successful completion of this course, students will be able to:

1. Understand vectors and their operations in 2D and 3D space
2. Use 2D and 3D vectors to solve mechanical engineering problems: statics and dynamics
3. Calculate vector integrals: line integrals
4. Calculate vector integrals: surface integrals
5. Calculate vector integrals: volume integrals
6. Use integrals to solve mechanical engineering problems: measure areas, calculate fluid pressures, compute volumes, find centers of mass and mass moment of inertias
7. Find roots for algebra equation using Iterative method and Newton's method
8. Understand Lagrange and Newton interpolation method
9. Find numerical value for integration using Trapezoidal and Simpson's method
10. Solve first ODE using Euler method

**ABET Student Learning Outcomes (SO)**

- a Ability to apply mathematics, science and engineering principles.
- b Ability to design and conduct experiments, analyze and interpret data.
- c Ability to design a system, component, or process to meet desired needs.
- d Ability to function on multidisciplinary teams.
- e Ability to identify, formulate and solve engineering problems.
- f Understanding of professional and ethical responsibility.
- g Ability to communicate effectively.
- h The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- i Recognition of the need for and an ability to engage in life-long learning.
- j Knowledge of contemporary issues.
- k Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

CLO	ABET Student Outcomes (SO)										
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
1	X				X				X		
2	X				X				X		
3	X				X				X		
4	X				X				X		
5	X				X				X		
6	X				X				X		
7	X				X				X		
8	X				X				X		
9	X				X				X		
10	X				X				X		

<b>Grades:</b> Homework	10%	$\geq 90\%$	A
Pop Quizzes (highest 3/4)	10%	80-89.9%	B
Exam 1	25%	70-79.9%	C
Exam 2 (noncumulative)	25%	60-69.9%	D
Final/Exam 3 (noncumulative)	25%	< 60%	F
<u>Attendance (5/6)</u>	<u>5%</u>		
<b>Total</b>	<b>100%</b>		

### Homework:

- 1) Please turn in your homework on the due day before the lecture starts. NO late homework will be collected.
- 2) Definition of "late": when class is over and the instructor steps outside the classroom, homework turned in thereafter will be considered as "late" and will not be collected
- 3) Having no textbook is not a valid excuse for not doing your homework. It is the student's responsibility to acquire the required textbook for his/her study
- 4) Homework can be turned in before the due day
- 5) Homework dropped in the instructor's departmental mailbox will NOT be collected;
- 6) Homework slid into the instructor's office will NOT be collected.
- 7) Homework dropped in the "homework dropbox" in front of the department door will NOT be collected.
- 8) If you want to turn in your homework other than the due day or if you want to turn in your homework outside the classroom, you need to turn in your homework to the instructor either IN PERSON or through email.
- 9) You can ask your friend/classmate to turn in homework for you
- 10) You can scan ( or take a picture using your smart phone) and email the homework before the class ends (5:20pm)
- 11) Homework must be stapled, instructor or TA will not be responsible for any lost loose homework
- 12) Exceptions (late homework will be collected): medical emergency (student and important ones), transportation/traffic emergency; religious holidays/duty, jury duty and military duty. Documentary evidences must be submitted.

### **Exams and Quizzes:**

- (1) Quizzes are open book and open notes. **Exams are closed book closed notes with formula sheets.**
- (2) Formula sheets can be maximum 5 pages, A4 or letter size, both sides
- (3) Each student is responsible for preparing his/her own formula sheets.
- (4) Formula sheets could include anything BUT: solutions to homework or examples. Student who failed to follow this rule will score zero in the exam and this cheating matter will be reported to the department and university.
- (5) Formula sheets must be turned in with the exam papers (in the case of formula sheets were not checked by the instructor during the exam). Student who failed to follow this rule will score zero in the exam and this cheating matter will be reported to the department and university.
- (6) **There will be NO make-up quiz.**
- (7) **There will be NO make-up exam.** Exceptions: medical emergence (student and important ones), transportation/traffic emergency; religious holidays/duty, jury duty and military duty. Documentary evidences must be submitted.

**Disability Accommodations:** If you need academic accommodations for disability you must have document which verifies the disability and makes you eligible for accommodations, then you can schedule an appointment with the instructor to make appropriate arrangements.

### **Academic Dishonesty:**

There is a zero tolerance policy. Cheating of whatsoever will result in an automatic 'F' in this course and the matter will be turned over to the appropriate student disciplinary committee.

### **IMPORTANT EXAM DATES**

#### **Exam #1**

**(Tentative, it actually depends on when ch9 is completed):**

**Sept. 30<sup>th</sup>, 2014, Tuesday, 4:00pm-5:20pm, room B190; Covers Ch 9 only**

#### **Exam #2:**

**(Tentative, it actually depends on when ch10 is completed):**

**Oct. 30<sup>th</sup>, 2014, Thursday, 4:00pm-5:20pm, room B190; Covers Ch 10 only**

#### **Exam #3 (Final Exam):**

**UNT official final exam schedule**

**Dec. 11<sup>th</sup>, 2014, Thursday, 2:00 p.m.-4:00p.m; Covers “numerical methods” only**

**MEEN 3250.001**  
**Analytical Methods for MEE Engineers**  
**Schedule Overview**

(Please note the schedule may change based on the needs during the semester)

Week	Date	Lecture Topics
#1	Aug.25 <sup>th</sup> - Aug.29 <sup>th</sup>	Course overview, 9.1 Vectors in 2-Space and 3-Space 9.2 Inner Product
#2	Sept.1 <sup>st</sup> - Sept.5 <sup>th</sup>	9.3 line equations; plane equations; Projection 9.3 line equations; plane equations; Projection
#3	Sept.8 <sup>th</sup> - Sept.12 <sup>th</sup>	9.3 Cross Product; Shortest Distance 9.4 Vector and Scalar Functions and Fields. Derivatives
#4	Sept.15 <sup>th</sup> - Sept.19 <sup>th</sup>	9.5 Curves and Arc Length 9.7 Gradient; directional Derivatives
#5	Sept.22 <sup>nd</sup> - Sept.26 <sup>th</sup>	9.7 Gradient; directional Derivatives 9.8 Divergence; Curl
#6	Sept.29 <sup>th</sup> - Oct.3 <sup>rd</sup>	<b>Sept 30th Tuesday, Exam #1: Ch 9</b> 10.1 Line Integrals
#7	Oct. 6 <sup>th</sup> - Oct.10 <sup>th</sup>	10.1 Line Integrals 10.2 Path Independence of Line Integrals
#8	Oct. 13 <sup>th</sup> - Oct.17 <sup>st</sup>	10.4 Green's Theorem in the Plane 10.5 Surfaces for Surface Integrals
#9	Oct. 20 <sup>th</sup> - Oct.24 <sup>th</sup>	10.6 Surface Integrals 10.7 Triple Integrals. Divergence Theorem of Gauss
#10	Oct.27 <sup>th</sup> - Oct.31 <sup>st</sup>	10.9 Strokes' Theorem; Review <b>Oct 30<sup>th</sup>, Thursday, Exam #2: Ch 10</b>
#11	Nov.3 <sup>rd</sup> - Nov.7 <sup>th</sup>	Part II: Numerical methods: 19.2 Solution of Equations by Iteration (Fixed-point) 19.2 Solution of Equations by Iteration (Newton, Secant);
#12	Nov.10 <sup>th</sup> - Nov.14 <sup>th</sup>	19.3 Interpolation: Lagrange method; Newton's Divided difference Table 19.5 Numerical integration: rectangular, Trapezoidal; Simpson rules (1/3,3/8): Numerical differentiation
#13	Nov.17 <sup>th</sup> - Nov.21 <sup>st</sup>	21.1 Numerical methods for ODE: Euler method; improved Euler method; 21.1 Numerical methods for ODE: R-K method; backward Euler method
#14	Nov.24 <sup>th</sup> - Nov. 28 <sup>th</sup>	21.1 Numerical methods for ODE: multistep methods: Adam-Bashforth and Adam-Moulton method <b>No class, Thanksgiving holidays</b>
#15	Dec.1 <sup>st</sup> - Dec. 5 <sup>th</sup>	Pre-final week, Reviews, No new lectures
#16	Dec 11 <sup>th</sup>	<b>Exam week: Exam #3 (Final): Numerical methods</b> <b>(Dec. 11<sup>th</sup> Thursday: 2:00 p.m.-4:00p.m.)</b>

## UNT Academic Calendar at a Glance, 2014-2015

### FALL 2014

Date	Event
August 25, 2014	First Class Day
September 1, 2014	Labor Day (no classes; university closed)
November 27-30, 2014	Thanksgiving Break (no classes; university closed)
November 29 - December 5, 2014	Pre-finals Week
December 4, 2014	Last Class Day
December 5, 2014	Reading Day (no classes)
December 6-12, 2014	Finals
December 12, 2014	Doctoral and Master's Commencement
December 12-13, 2014	Undergraduate Commencement
December 24, 2014 – January 2, 2015	Winter Break (no classes; university closed)

Link for **Fall 2014 Final Exams - Discovery Park** <http://registrar.unt.edu/exams/fall>

Monday, December 8	
<i>This class...</i>	<i>Has a final exam at this time...</i>
MWF 8:30 a.m.	8:30 a.m. - 10:30 a.m.
MWF 11:30 a.m.	11:00 a.m. - 1:00 p.m.
MWF 2:30 p.m.	2:00 p.m. - 4:00 p.m.
MW 2:30 p.m. - 3:50 p.m.	2:00 p.m. - 4:00 p.m.
M 2:30 - 5:20 p.m.	2:00 p.m. - 4:00 p.m.
Tuesday, December 9	
<i>This class...</i>	<i>Has a final exam at this time...</i>
TR 8:30 a.m.	8:30 a.m. - 10:30 a.m.
TR 11:30 a.m.	11:00 a.m. - 1:00 p.m.
TR 2:30 p.m.	2:00 p.m. - 4:00 p.m.
T 2:30 p.m. - 5:20 p.m.	2:00 p.m. - 4:00 p.m. .
Wednesday, December 10	
<i>This class...</i>	<i>Has a final exam at this time...</i>
MWF 9:30 a.m.	8:30 a.m. - 10:30 a.m.
MWF 12:30 p.m.	11:00 a.m. - 1:00 p.m.
W 2:30 p.m. - 5:20 p.m.	2:00 p.m. - 4:00 p.m.
MWF 3:30 p.m.	2:00 p.m. - 4:00 p.m.
MW 4:00 p.m. - 5:20 p.m.	2:00 p.m. - 4:00 p.m.
Thursday, December 11	
<i>This class...</i>	<i>Has a final exam at this time...</i>
TR 10:00 a.m.	8:30 a.m. - 10:30 a.m.
TR 1:00 p.m.	11:00 a.m. - 1:00 p.m.
R 2:30 p.m. - 5:20 p.m.	2:00 p.m. - 4:00 p.m.
<b>TR 4:00 p.m.</b>	<b>2:00 p.m. - 4:00 p.m.</b>