

**Instructor:** Xiaohua Li  
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**Lecture Time:** MWF 10:30am-11:20am room B142  
**Office Hours:** MWF 1:00pm-2:00pm or by appointment  
**TA Office Hours:** will be posted in blackboard later

**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, surface integrals and volume integrals
4. Use integrals to solve mechanical engineering problems: measure areas, calculate fluid pressures, compute volumes, find centers of mass and mass moment of inertias
5. Find roots for algebra equation using Iterative method and Newton's method
6. Understand Lagrange interpolation method
7. Understand Newton interpolation method
8. Find numerical value for integration using Trapezoidal and Simpson's method
9. Solve linear equations using Gaussian elimination method
10. Solve first ODE using Euler method and RK method
11. Solve higher order ODE using Euler method and RK 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		
11	X				X				X		

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

### Homework:

- Homework should be turned in on the due day before the lecture starts. **NO late homework will be collected, NO EXCEPTIONS**
- Definition of “**late**”: when class is over and instructor steps outside the classroom, homework turned in thereafter will be considered as “late” and will not be collected
- Having no textbook is not a valid excuse for not doing homework. It is the student’s responsibility to acquire textbook for his/her study
- Homework can be turned in earlier than the due day
- Homework dropped in the instructor’s departmental mailbox will NOT be collected
- Homework slid through the door into the instructor’s office will NOT be collected
- Homework dropped in the “homework dropbox” in front of the department door will NOT be collected
- Homework turned in other than the due day or outside classroom must be turned in to instructor either IN PERSON or through EMAIL.
- If homework is turned in through email, it should be scanned (or a picture by smart phone) and emailed to instructor before the class ends (**11:20a.m.**)
- Homework should be stapled, instructor or TA will not be responsible for lost loose homework
- Exceptions (late homework will be collected): medical emergence (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
- (2) **Exams are closed book and closed notes with formula sheets.**
- (3) **Using Smart phone and/or Internet during the exam is prohibited.**
- (4) Formula sheets could be maximum 5 pages on top of instructor's handouts (if any), A4 or letter size, both sides
- (5) Student is responsible for preparing his/her own formula sheet
- (6) 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 MEE department and university.
- (7) 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 MEE department and university
- (8) **There will be NO make-up quiz, NO EXCEPTIONS**
- (9) **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; depends on when chapter 9 is finished; Covers Ch 9 only):  
**Sep. 28<sup>th</sup> 2015, Monday, 1030-1120am, B142**

**Exam #2:** (tentative; depends on when chapter 10 is finished; Covers Ch 10 only):  
**Nov. 2<sup>nd</sup> 2015, Monday, 1030-1120am, B142**

**Exam #3:** (UNT official Schedule; Covers Numerical Methods only):  
**December 5<sup>th</sup> 2015, Saturday, 830-1030am, B142**

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**UNT Official Academic Calendar: Fall 2015**


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Date	Event
August 24, 2015	First Class Day
September 7, 2015	Labor Day (no classes: university closed)
November 26-29, 2015	Thanksgiving Break (no classes: university closed)
November 28-December 4, 2015	Pre-final Week
December 5-11, 2015	Finals

## 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	Monday (50mins)	Wednesday (50mins)	Friday (50mins)
#1	Aug. 24 <sup>th</sup> - Aug. 28 <sup>th</sup>	Course overview, 9.1 Vectors in 2-Space and 3- Space	9.2 Inner Product	9.2 line equations; plane equations; Projection
#2	Aug. 31 <sup>st</sup> - Sept. 4 <sup>th</sup>	9.2 line equations; plane equations; Projection	9.3 line equations; plane equations; Projection	9.3 Cross Product; Shortest Distance
#3	Sept. 7 <sup>th</sup> - Sept. 11 <sup>th</sup>	<b>Labor Day, No Class</b>	9.3 Cross Product; Shortest Distance	9.4 Vector and Scalar Functions and Fields. Derivatives
#4	Sept. 14 <sup>th</sup> - Sept. 18 <sup>th</sup>	9.5 Curves and Arc Length.	9.7 Gradient; directional Derivatives	9.7 Gradient; directional Derivatives
#5	Sept. 21 <sup>st</sup> - Sept. 25 <sup>th</sup>	9.8 Divergence; Curl	9.8 Divergence; Curl	Review Class
#6	Sept. 28 <sup>th</sup> - Oct. 2 <sup>nd</sup>	<b>Exam #1 -Chapter 9 only</b>	10.1 Line Integrals	10.1 Line Integrals
#7	Oct. 5 <sup>th</sup> - Oct. 9 <sup>th</sup>	10.2 Path Independence of Line Integrals	10.2 Path Independence of Line Integrals	10.4 Green's Theorem in the Plane
#8	Oct. 12 <sup>th</sup> - Oct. 16 <sup>st</sup>	10.4 Green's Theorem in the Plane	10.5 Surfaces for Surface Integrals	10.5 Surfaces for Surface Integrals
#9	Oct. 19 <sup>th</sup> - Oct. 23 <sup>rd</sup>	10.6 Surface Integrals	10.6 Surface Integrals	10.7 Triple Integrals. Divergence Theorem of Gauss
#10	Oct. 26 <sup>th</sup> - Oct. 30 <sup>th</sup>	10.7 Triple Integrals. Divergence Theorem of Gauss	10.9 Stokes' Theorem	Review Class
#11	Nov. 2 <sup>nd</sup> - Nov. 6 <sup>th</sup>	<b>Exam #2 -Chapter 10 only</b>	Part II: Numerical methods: 19.2 Solution of Equations by Iteration (Fixed-point)	19.2 Solution of Equations by Iteration (Newton, Secant);
#12	Nov 9 <sup>th</sup> - Nov. 13 <sup>th</sup>	19.3 Interpolation: Lagrange method;	19.3 Interpolation: Divided difference Table	19.5 Numerical integration: rectangular; Trapezoidal;
#13	Nov. 16 <sup>th</sup> - Nov. 20 <sup>th</sup>	19.5 Numerical integration: Simpson rules (1/3, 3/8): Numerical differentiation	20.1 linear system: Gauss elimination	21.1 Euler method; improved Euler method
#14	Nov. 23 <sup>rd</sup> - Nov. 27 <sup>th</sup>	21.1 R-K method	21.3 Methods for higher order ODEs; Euler method;	<b>Thanksgiving, NO Class</b>
#15	Nov. 30 <sup>th</sup> - Dec. 4 <sup>th</sup>	21.3 Methods for higher order ODEs; RK method;	Review class	Reading day, NO Class
<b>#16</b>	<b>Finals</b>	<b>Exam #3 (final): Numerical Methods Only December 5<sup>th</sup>, Saturday, 830-1030am, B142</b>		

## Fall 2015 Final Exams - Discovery Park

Pre-finals week is Saturday, November 28 - Friday, December 4.

\* **Evening Classes:** have their final exams on the earliest usual class time this week.

<b>Saturday, December 5</b>	
<i>This class...</i>	<i>Has a final exam at this time...</i>
All Saturday classes & All INET Classes with On Campus Finals	Contact Department
<b>MWF 10:30 a.m.</b>	<b>8:30 a.m. - 10:30 a.m.</b>
MWF 1:30 p.m.	11:00 a.m. - 1:00 p.m.
F 2:30 p.m. - 5:20 p.m.	2:00 p.m. - 4:00 p.m.
MWF 4:30 p.m.	2:00 p.m. - 4:00 p.m.
<b>Monday, December 7</b>	
<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.
<b>Tuesday, December 8</b>	
<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. .
<b>Wednesday, December 9</b>	
<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.
<b>Thursday, December 10</b>	
<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.
TR 4:00 p.m.	2:00 p.m. - 4:00 p.m.