

## *Course Syllabus*

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**Spring 2009**

**Matrices, Vectors and Applications**

10644 Math 2333-503

MW 7:00 – 8:15pm

MC 3.610 McDermott Library

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### **Instructor Contact Information**

Department Phone (972) 883-2161

Phone number (972) 883-2161

Email [John.hedstrom@tx.rr.com](mailto:John.hedstrom@tx.rr.com) (preferred contact method)

Office location ECSN 3.106

Office hours 8:15 p.m. – 9:00 p.m. MW, MC 3.610

By appt. 4:00 p.m. – 5:00 p.m. F, ECSN 3.106

### **Course Pre-requisites, Co-requisites, and/or Other Restrictions**

Math 1314 or equivalent

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### **Course Description**

This is an introductory course in linear algebra with primary focus on theory and secondary focus on computational methods and applications in the physical and social sciences. Course Topics include matrices, vectors, determinants, matrix inverses, and systems of linear equations.

Chapter 1: Systems of Linear Equations (sections 1.1, 1.2, 1.3, 1.4 and 1.5).

Chapter 2: Matrices (sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, and 2.7).

Chapter 3: Determinants (sections 3.1, 3.2, 3.3, and 3.4).

Chapter 4: Vector Spaces (sections 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, and 4.8).

Chapter 5: Coordinate Representations (sections 5.1, 5.2, 5.3).

Chapter 6: Inner Product Spaces (section 6.1).

Chapter 8: Linear Programming (sections 8.1, and 8.2).

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### **Student Learning Outcomes**

Students will learn concepts and techniques of linear algebra, including vector spaces, matrices, determinants, and linear transformations.

### **Student Learning Objectives**

1. Given a system of linear equations, students will be able to apply the Gauss-Jordan algorithm to determine all solutions, and determine whether the system is consistent and whether the solution is unique.
2. Given a narrative description of an application problem, students will be able to select an appropriate matrix or vector technique, model the situation, and use suitable techniques to obtain a solution to the original problem.
3. Given definitions of a set of objects with a well-defined addition and scalar multiplication, students will be able to evaluate whether this constitutes a Real vector Space.
4. Given a square matrix, students will be able to accurately calculate its

determinant, and deduce whether the matrix is invertible or singular.

### Required Textbook

Linear Algebra with Applications, Sixth Edition by Gareth Williams, Jones and Bartlett Publishers.

### Suggested Course Materials

Student Solutions Manual: The Student Solutions Manual is recommended and available in the bookstore.

*Calculator*: A scientific calculator is recommended. Graphing calculators, programmable calculators, or calculators with non-numeric displays are NOT ALLOWED on exams.

### Examinations

<b>Exam I</b>	Wednesday	2/18
<b>Exam II</b>	Wednesday	3/25
<b>Exam III</b>	Wednesday	4/22
<b>Final Exam</b>	Monday	5/11

### Grading Policy

Homework assignments will be announced in this syllabus and by the end of every lecture. Assignments will not be graded. Students are strongly encouraged to work on assignments. Similar problems will appear on exams.

Course grade is determined on the following measures and according to the Grade Scale listed below:

Three major exams: @ 100pts	300 pts
Final Exam:	200 pts
Total	500 pts

**Grade: (500 pts. Max.) \* 2 /10 = (100 total pts. Max) → Grade Scale**

### Grade Scale:

[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+,  
[55, 60) D-, [60, 65) D, [65, 70) D+,  
[0, 55) F

Each major exam will occur during regular lecture time, usually on Wednesday.

### Exam policies/Attendance

- There will be no make-up exams unless the circumstances are extraordinary.
- Exams are closed book, open notes.
- A missed hour exam means the next hour exam counts double.**
- The final examination must be taken.
- SHOW ALL WORK on exams. Unsupported answers are considered miracles and, however inspirational, will receive little or no credit. Graded major exams will be

returned to you as soon as possible. Any document not picked up by the end of finals week will be destroyed.

- f) Final exams are not returned to the student but are held for review for one year.
- g) Attendance is mandatory.

**Course Schedule** (subject to change)

Week	Monday		Wednesday	
1	1/12	Sec. 1.1, 1.2	1/14	Sec. 1.2, 1.3
2	1/19	<b>MLK</b>	1/21	Sec., 1.3, 1.4
3	1/26	Sec. 1.4, 1.5`	1/28	Sec. 2.1, 2.2
4	2/2	Sec. 2.2, 2.3	2/4	Sec. 2.3, 2.4
5	2/9	Sec. 2.4, 2.5	2/11	Sec. 2.5, 2.6
6	2/16	Sec. 2.6, 2.7	2/18	<b>Hour Exam I</b>
7	2/23	Sec. 2.7,	2/25	Sec. 3.1/3.2
8	3/2	Sec. 3.2, 3.3	3/4	Sec. 3.3, 3.4
9	3/9	Sec. 3.4	3/11	Sec. 3.4, Sec. 4.1
10	3/16	<b>Spring Break</b>	3/18	<b>Spring Break</b>
11	3/23	Sec. 4.1, 4.2	3/25	<b>Hour Exam II</b>
12	3/30	Sec. 4.2, 4.3	4/1	Sec. 4.3, 4.4
13	4/6	Sec. 4.4, 4.5	4/8	Sec. 4.5, 4.6
14	4/13	Sec. 4.6, 4.7	4/15	Sec. 4.7, 4.8
15	4/20	Sec. 4.8	4/22	<b>Hour Exam III</b>
16	4/27	Sec. 5.1, 5.2	4/29	Sec. 5.2, Sec. 6.1
17	5/4	Sec. 8.1, 8,2	5/11	<b>Final Exam</b>

## Assignments

In order to succeed in this course, one must work a large number of problems. Here is the list of selected exercises which everyone is expected to do. Many students might find it necessary to have more practice; they should choose similar problems from each section, or from the review exercises or practice tests, which can be found at the end of each chapter. Homework will not be collected, however, exams may contain problems taken directly from the assigned problems.

Sec1.1 #1,2,3,4,5a,c,e,6b,d,f,h,7,8a,b,c,10a,c,e,12b,e,13a,b,c

Sec1.2 #1,2,3,4,5a,e,6a,7d,e,8e,g,10a,11a,12,13

Sec 1.3 #1,4,5,6 (no electric circuits or traffic flow)

Sec1.4 # 1a,b,3a,c,6a,c,e,8a,b,c,11,13

Sec1.5 # 3a,c,6a,c,e,8a,9a,c,12a,13a,16a,c,19a,21,26a,c

Sec2.1 #1,2,4,5a,6,7b,9,10a,c,12,a,b,16,25

Sec2.2 #1,2,4,5a,b,d,6,8,11a,b,c,14,18a,c,19a,b,20a,b,23,24,27,28

Sec2.3 #1a,d,e,f,g,i,2,a,b,c,6,9,10,11a,15b,c

Sec2.4 #1,a,b,2,b,c,3a,c,e,4a,d,5c,d,6c,8a,c,11,13,15,17,18,21,24

Sec2.5 #3,5a,d,6,9c,12a,c,20,24a,c

Sec2.6 #1,4,5,6,7,11,13

Sec2.7 #1a,b,2b,3a,b,d,4,5,8a,b,e,13a,d,14a,17,23

Sec3.1 #1,2,3a,c,d,5a,c,7,a,c,8b,c,9c,d,11a,b,c,12,13,14,17

Sec3.2 #2a,b,4a,b,5,6a,b,7a,b,8,9,10a,b,d,12,16,19

Sec3.3 #1,2a,b,4a,b,5a,b,6a,7a,b,8,9,10,11,12a

Sec3.4 #1,2a,b,4a,b,5a,b,6a,7a,b,8,9,10,11,12a

Sec4.1 #1,3a,b,5a,d,g,6,7a,b,d,9b,d,10a,b,c

Sec4.2 #1a,3a,c,e,4c,d,5a,d,6e,7a,b,c,e,8c,e,10,13a,d,16,19a,e,24,28

Sec4.3 #1,2a,5,16

Sec 4.4 #1a,b,2a,d,3a,c,5,6a,c,7a,b,c,8,12a,b,c matrices

Sec4.5 #1a,c,2a,b,3a,d,6b,c,8a,c,9a,c,10,13,17,22<sup>a</sup>

- Sec4.6 #1a,b,2a,c,3a,4a,b,e,5a,b,6a,b,c,7a,b,c,  
 Sec4.7 #1a,2a,3a,d,5a,b,c,6,10,12,13,15a,b,c,d,21,31,32a,b,c  
 Sec4.8 #1c,d,2a,c,d,3a,b,4c,5a,b,6a,c,7a,c,9,12,14a  
 Sec5.1 #2,6,12,15,18,21,23,27  
 Sec5.2 #2,6,9a,c,13,16a,b,19  
 Sec6.1 #1,2,3,4,5,6,7,10,12,15a,b,16,18  
 Sec8.1 #1,2,3,5,6  
 Sec8.2 #1,6

### **Additional Resources**

The new year brings with it a significant move and “merger” within the Office of Student Success and Assessment (OSSA). As of 5 January 2009, the Learning Resource Center has moved its staff, offices and all related services to the GEMS Center (CN 1.126) and adjoining Conference Center spaces, thereby bringing the entire OSSA team together in one location. Please help us (re)direct students and visitors from the former Library location to the GEMS Center where we are presently in “move-in” mode but functional.

The UTD Math Lab is located in McDermott Library in Room 2.412 (phone: 972-883-6707) The hours are 10am until 8pm, Monday through Thursday; Friday and Saturday 10am until 2pm. The Math Lab provides free walk-in tutoring for students. In addition to the help available during normal operating hours, each registered student is entitled to a free, one-hour, individual tutorial per week. Individual tutorials require an appointment which are arranged via learning center personnel.

SWE-Society of Women Engineers, <http://swe.utdallas.edu/>  
 NSBE-National Society of Black Engineers,  
<http://www.utdallas.edu/orgs/nsbe/nsbehome.htm>

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### **Academic Calendar (partial)**

#### **Classes Begin**

Full-term session ..... Monday, January 12

#### **Census Day**

Full-term session ..... Wednesday, January 28

#### **Last Day for Regular Registration**

Full-term session ..... Thursday, January 8

#### **Late Registration**

*If you register or add during late registration, payment is due the same day you register. You will be assessed a minimum \$100 late payment fee. See Bursar's Office information.*

Full-term session ..... Fri., Jan. 9 – Tues., Jan. 20

### **Last Day to Add a Course**

*If you are already registered for courses and wish to add a course during late registration, payment is due the same day your register.*

Full-term session ..... Tuesday, January 20

### **Drop/Withdrawal Deadlines**

*Please check Comet calendar for signature procedures.*

#### **Full-Term Session**

Last day to drop a class without a "W" ..... Wed., Jan. 28

"Signature required" period to withdraw from

UG courses ..... Thurs., January 29 – Mon., March 16

Undergraduate course WP/WF

withdrawal period begins ..... Monday, Feb. 9

Last day to withdraw from an undergraduate

course with WP/WF ..... Monday, March 16

### **Last Day of Classes**

These dates do not include final exams.

Full-term session ..... Monday, May 4

#### **Reading Days (Study days prior to final exams)**

Full-term & 2<sup>nd</sup> 8-week sessions only..... Tues. & Wed., May 5 & 6

#### **Final Exams**

Full-term session ..... Thurs., May 7 – Wed., May 13

#### **Mid-Term Grades Due**

***All midterm grades must be submitted online by 10:00 AM.***

Midterm (undergraduate courses only) ..... Friday, March 6

#### **Final Grading Period**

***All grades must be received by Wednesday, May 20.***

Full-term session ..... Thurs., May 7 – Wed., May 20

#### **Grades Available Online**

Midterm (undergraduates only) ..... Friday, March 6

Full-term session ..... Thurs., May 7 – Wed., May 20

#### **University Closings**

Spring break ..... Mon., March 16 – Sat., March 21

Martin Luther King Day ..... Monday, January 19

#### **Incompletes**

Incomplete grades due for undergraduates and graduates from previous long semester ..... Tuesday, March 3

### ***Citizenship***

Any action that disturbs your classmates or interrupts the lecture is unacceptable.

Examples of such actions are:

- (a) Entering the classroom late...be punctual.
- (b) Leaving the classroom before break or before the end of lecture.
- (c) Cell phones, ringers, buzzers, beepers, alarms ... turn them off unless you are a member of an emergency response team.

Student participation in class is desired, however, please raise your hand to speak and avoid having side conversations with your classmates.

### ***Extra credit***

No extra credit

### **Intercollegiate Competitions**

Students involved in a UTD sanctioned competitive activity must supply the instructor with a letter certifying his/her eligibility to participate in such a competition. Said letter may be obtained from the Intercollegiate Compliance Officer. It is the students' responsibility to discern scheduling conflicts and to inform the instructor well in advance of a class, quiz, or exam that will be missed due to a competition. The instructor will make reasonable accommodation to resolve the conflict.

## **Technical Support**

If you experience any problems with your UTD account you may send an email to: [assist@utdallas.edu](mailto:assist@utdallas.edu) or call the UTD Computer Helpdesk at 972-883-2911.

## **Field Trip Policies / Off-Campus Instruction and Course Activities**

*Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address*

*[http://www.utdallas.edu/BusinessAffairs/Travel\\_Risk\\_Activities.htm](http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm). Additional information is available from the office of the school dean. Below is a description of any travel and/or risk-related activity associated with this course.*

## **Student Conduct & Discipline**

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD printed publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Series 50000, Board of Regents, The University of Texas System*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391) and online at <http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs-HOPV.html>

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well

as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

### **Academic Integrity**

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic Dishonesty, any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

### **Copyright Notice**

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials, including music and software. Copying, displaying, reproducing, or distributing copyrighted works may infringe the copyright owner's rights and such infringement is subject to appropriate disciplinary action as well as criminal penalties provided by federal law. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. As a UT Dallas student, you are required to follow the institution's copyright policy (Policy Memorandum 84-I.3-46). For more information about the fair use exemption, see

<http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm>

### **Email Use**

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student

email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

### **Withdrawal from Class**

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

### **Student Grievance Procedures**

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

### **Incomplete Grade Policy**

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

## **Disability Services**

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:  
The University of Texas at Dallas, SU 22  
PO Box 830688  
Richardson, Texas 75083-0688  
(972) 883-2098 (voice or TTY)  
[disabilityservice@utdallas.edu](mailto:disabilityservice@utdallas.edu)

If you anticipate issues related to the format or requirements of this course, please meet with the Coordinator of Disability Services. The Coordinator is available to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Services to notify them of your eligibility for reasonable accommodations. Disability Services can then plan how best to coordinate your accommodations.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

## **Religious Holy Days**

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment

within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

**These descriptions and timelines are subject to change at the discretion of the Professor.**