

**Section Instructors:** By now you should be scheduled into one of the following Sections:

LEC0101 Cohen, S.	LEC0102 Cho, S.	LEC0103 Huang, J. J.	LEC0104 Pugh, M.
LEC0105 Bell, J.	LEC0106 Burbulla, D.	LEC0107 Hay, D.	LEC0108 Santiago, L.

**Textbook:** *Elementary Linear Algebra with Applications* by Jeffrey Holt. Any version of this book, be it hard cover or binder-ready soft cover, will do. **Warning:** this is the first time we are using Holt's book. Its order of topics is totally different than the book we were using previously. Keep this in mind when you look at old quizzes and term tests. Moreover, Holt includes much more material on linear transformations than our previous book, but less material on vectors in three dimensions than our previous book. Anything you know from high school—such as the dot product, the cross product, equations of lines and planes in three dimensions—can be used in this course, if it helps you.

**Tutorials:** By now you should be scheduled into one tutorial. You should attend tutorials on a regular basis; it is one place you can get help with your homework, and it is the **only** place you can pick up your graded term tests and see the solutions taken up. There will also be some tutorials devoted to general advice and supplementary topics, such as proof by induction and complex numbers, which you may or may not have seen in high school. Tutorials start on Monday, Sep 9<sup>th</sup> and end on Monday, Dec 2<sup>nd</sup>. There will be no tutorials on Monday, Oct 14<sup>th</sup>.

**Marking Scheme:** Diagnostic test: 5%; WeBWorK: 5%; Quiz: 10%; Test: 30%; Final Exam: 50%

**WeBWorK:** Information regarding this on-line homework website will be posted on the course website in the second week of classes. WeBWorK homework will not begin until September 23.

**Homework:** Consider all the odd numbered exercises from the textbook, which have answers in the back of the book, as your homework. You can get help from your TA in tutorials.

**Quiz:** A 50-min quiz will be written in your tutorial during the week of Sep 30-Oct 4.

**Test:** a 100-min term test is scheduled for Tuesday, Oct 29, 12:15-1:55 PM, locations TBA.

**Final Exam:** There will be a common final exam, 150 min long, during the exam period, Dec 9-20.

**Math Aid Office:** GB 149. Hours: MTWRF 12:10-2 PM.

**Classroom Deportment:** the format of lectures is more formal than what you may be used to. This means that during lectures there should not be any disruptions that would prevent other students from hearing or seeing the instructor. That is: no talking, no cell phones, no music, no eating or drinking. You should raise your hand to ask a question. You should arrive on time. If you do arrive late, please enter by a back door and sit down in the first available seat so as not to disrupt the rest of the class.

**Calculators:** Use of a Casio FX-991MS or Sharp EL-520X calculator will be permitted during all quizzes, tests and exams. However, it is still your responsibility to explain your work. A correct answer with no justification will receive no marks.

**Course Outline, Lecture Schedule and Tutorial Schedule:** The following schedule of 38 lectures is only approximate. Sections marked with an asterisk (\*) are optional and may not be covered in lectures, but you may find them interesting to read! Optional sections will not be tested or examined.

Chapter	Section	Topic	Lectures
Systems of Linear Equations	Sec 1.1	Lines and Linear Equations	2
	Sec 1.2	Linear Systems and Matrices	2
	Sec 1.4	Applications of Linear Systems	1
Euclidean Space	Sec 2.1	Vectors	1
	Sec 2.2	Span	2
	Sec 2.3	Linear Independence	2
↓ Oct 2 ↓ Matrices	Sec 3.1	Linear Transformations	2
	Sec 3.2	Matrix Algebra	2
	Sec 3.3	Inverses	2
	Sec 3.4*	$LU$ Factorization	optional
	Sec 3.5*	Markov Chains	optional
Subspaces	Sec 4.1	Introduction to Subspaces	2
	Sec 4.2	Basis and Dimensions	2
	Sec 4.3	Row and Column Spaces	1
Determinants ↓ Nov 6 ↓	Sec 5.1	The Determinant Function	2
	Sec 5.2	Properties of the Determinant	2
	Sec 5.3	Applications of the Determinant	1
Eigenvalues and Eigenvectors	Sec 6.1	Eigenvalues and Eigenvectors	2
	Sec 6.3	Change of Basis	2
	Sec 6.4	Diagonalization	2
	Sec 6.5*	Complex Eigenvalues	optional
	Sec 6.6	Systems of Differential Equations	1
Orthogonality  ↓ Dec 4 ↓	Sec 8.1	Dot Products and Orthogonal Sets	2
	Sec 8.2	Projections and the Gram-Schmidt Process	2
	Sec 8.3	Diagonalizing Symmetric Matrices	1
	Sec 8.4*	The Singular Value Decomposition	optional
	Sec 8.5*	Least Squares Regression	optional

We will not cover numerical methods, Sections 1.3 and 6.2. Some tutorial time will be spent on complex numbers, reference Section 6.5, because they no longer seem to be covered in high school. Your lecturer may or may not include complex eigenvalues in Sections 6.5 and 6.6. Either way, quizzes, tests and exams in MAT188H1F will *not* require complex numbers. In Section 8.3 we'll skip  $QR$  Factorization. We won't do anything from Chapters 7, 9, 10 or 11.

**Tutorial Schedule:**  $T_n$  represents the  $n$ -th tutorial,  $1 \leq n \leq 12$ .

T1: proof/induction	T2: notation/advice	T3: pre-quiz Q & A	T4: quiz on Ch 1 & 2
T5: linear maps of $\mathbb{R}^2$	T6: invertibility	T7: pre-test Q & A	T8: subspaces/dimension
T9: test returned	T10: determinants	T11: eigenvectors	T12: diagonalization

**Course Coordinator:** D. Burbulla. Office: GB 149

email: burbulla@math.toronto.edu; office hours: MTWRF 12:10-2 PM.

**Course Websites:** In addition to the course websites which can be accessed through the U of T portal there is the coordinator's home page: <http://www.math.toronto.edu/burbulla/>