2014 – 2015 Spring Semester MATH 3210/5210 Section 100 (Barsamian)

Course	• MATH 3210 Linear Algebra Section 100, Class Number 6070 • MATH 5210 Linear Algebra Section 100, Class Number 6089
Class Meets:	10:45am – 11:40am Mon, Wed, Fri in Morton 215
Description:	A course in linear algebra for students majoring or minoring in the mathematical sciences. The course will introduce both the practical and theoretical aspects of linear algebra and students will be expected to complete both computational and proof-oriented exercises. Topic covered will include: • Solving Linear Systems, Gauss's Method, Echelon Forms • Vector Spaces, Subspaces, Linear Independence, Basis, Dimension • Homomorphisms, Isomorphisms, Range Space, Null Space • Matrix Representation of Linear Map, Matrix Operations & Inverses • Determinants • Similarity, Diagonalizability, Eigenvalues and Eigenvectors
Prerequisites:	2302 Calculus II and (3050 Discrete Math or CS 3000) WARNING: No credit for both this course and MATH 3200/5200 (always deduct credit for first course taken):
Textbook:	Linear Algebra, 2014 Edition, by Jim Hefferon, Orthogonal publishing, 2014, ISBN 0989897524
Course Web Page:	http://www.ohio.edu/people/barsamia/2014-15.2.3210
Calculators:	Calculators will not be allowed on exams.
Instructor:	Mark Barsamian, email: barsamia@ohio.edu, phone: (740) 593-1273
Office Hours:	Tuesday, Thursday 9:30am – 11:40am in Morton Hall Room 538

Grading: During the semester, you will accumulate points:

Homework Sets (10 Sets, 10 points each):	100 points possible
In-Class Exams (4 exams, 150 points each):	600 points possible
Comprehensive Final Exam:	300 points possible
Total:	1000 points possible

At the end of the semester, your Total will be converted to your Course Grade using this table:

Your Total	Your Percentage	Your Course Grade	Interpretation
900 - 1000	90% - 100%	A	You mastered all concepts, with no significant gaps
850 - 899	85% - 89.9%	A-	
800 - 849	80% - 84.9%	B+	You mastered all essential concepts and many advanced concepts, but have some significant gaps.
750 - 799	75% - 79.9%	B	
700 - 749	70% - 74.9%	B-	
650 - 699	65% - 69.9%	C+	You mastered most essential concepts and some advanced concepts, but have many significant gaps.
600 - 649	60% - 64.9%	C	
550 - 599	55% - 59.9%	C-	
400 - 549	40% - 54.9%	D	You mastered some essential concepts.
0 - 399	0% - 39.9%	F	You did not master essential concepts.

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Course Structure: One learns math primarily by trying to solve problems. This course is designed to provide structure for you as you learn to solve problems, and to test how well you have learned to solve them. This structure is provided in the following ways:

- **Textbook Readings:** To succeed in the course, you will need to read the book.
- **Suggested Exercises:** On page four of this document and on the course web page, you will find a table of suggested exercises, taken from the textbook. The goal of the course is for you to be able to solve the exercises on that list. These exercises are not to be turned in and are not graded, but you should do as many of them as possible and keep your solutions in a notebook for study. Note that the solutions to all of the textbook exercises are available free online.
- **Homework Sets:** Ten homework sets will be collected, graded, and returned to you. The homework sets will be described on cover sheets that will be handed out in class and available on the web.
- **Lectures:** In lecture, I will sometimes highlight textbook material that is particularly important, sometimes present material in a manner different from the presentation in the book, and sometimes solve sample problems. We have 37 lectures, totaling 2035 minutes. It is not possible to cover the entire content of the course in 2035 minutes, and the lectures are not meant to do that. Lectures are meant to be a supplement to your reading the textbook and solving problems.
- **Exams:** The exams will be made up of problems based on suggested and assigned homework exercises.

Attendance: Attendance is required for all lectures and exams, and will be recorded by a sign-in system.

Missing Class: If you miss a class for any reason, it is your responsibility to copy someone's notes and study them. I will not use office hours to teach topics discussed in class to students who were absent.

Missing an Exam Because of Illness: If you are too sick to take an exam, then you must
(1) send me an e-mail before the exam, telling me that you are going to miss it because of illness,
(2) then go to the Hudson Student Health Center.
(3) Later, you will need to bring me documentation from Hudson showing that you were treated there.
Without those three things, you will not be given a make-up exam.

Missing Exams Because of a University Activity: If you have a University Activity that conflicts with one of our exams, you must contact me before the exam to discuss arrangements for a make-up. I will need to see documentation of your activity. If you miss an exam because of a University Activity without notifying me in advance, you will not be given a make-up exam.

Late Homework Policy: Homework is due at the start of class on the due date. Late homework is not accepted.

Collaborating on Homework: You are encouraged to work together on the homework. If you work in a productive way with other students, you will probably learn the math better. You will certainly learn valuable communication skills. But collaborating does not mean copying. You may figure out problems and arrive at solutions together, but the words you write and turn in should be your own. If two or three or five students work together, the result should be a higher quality of work, with fewer errors. When I grade homework, if I find identical wording, identical math, and identical mistakes in different students' papers, I will deduct points. If this happens, it is not meant to be a punitive measure, and I do not mean for you to think that I am accusing you of cheating. But I do mean for it to be feedback that tells you that you are not really collaborating and that you are not doing good work. Collaborating is a skill that requires practice.

Cheating on Exams: If cheat on an exam, you will receive a zero on that exam and I will submit a report to the Office of Community Standards and Student Responsibility (OCSSR). If you cheat on another exam, you will receive a grade of F in the course and I will again submit a report to the OCSSR.

Special Needs: If you have a physical, psychiatric, or learning disability that requires accommodation, please let me know as soon as possible so that your needs may be appropriately met.

Schedule for 2014 – 2015 Spring Semester MATH 3210/5210 (Barsamian)

Week	Date	Class topics
1	Mon Jan 12	One.I.1 Solving Linear Systems: Gauss's Method
	Wed Jan 14	One.I.1 Solving Linear Systems: Gauss's Method
	Fri Jan 16	One.I.2 Solving Linear Systems: Describing the Solution Set **(H1 Due)**
2	Mon Jan 19	Martin Luther King Day
	Wed Jan 21	One.I.3 Solving Linear Systems: General = Particular + Homogeneous
	Fri Jan 23	One.I.3 Singular & Non-Singular Matrices; Set Gen. by a Set of Vectors
3	Mon Jan 26	One.III.1 Reduced Echelon Form: Gauss-Jordan Reduction **(H2 Due)**
	Wed Jan 28	One.III.2 Reduced Echelon Form: The Linear Combination Lemma
	Fri Jan 30	**Exam I Covering Chapter 1**
4	Mon Feb 2	Two.I.1: Definition of Vector Space
	Wed Feb 4	Two.I.1: Definition of Vector Space
	Fri Feb 6	Two.I.2: Subspaces
5	Mon Feb 9	Two.I.2: Spanning Sets **(H3 Due)**
	Wed Feb 11	Two.II.1: Linear Independence
	Fri Feb 13	Two.III.1: Basis
6	Mon Feb 16	Two.III.2: Dimension **(H4 Due)**
	Wed Feb 18	Two.III.3: Vector Spaces and Linear Systems
	Fri Feb 20	**In-Class Exam 2 Covering Chapter 2**
7	Mon Feb 23	Three.I.1: Isomorphisms: Definitions and Examples
	Wed Feb 25	Three.I.1: Isomorphisms: Definitions and Examples
	Fri Feb 27	Three.I.2: Isomorphisms: Dimension Characterizes Isomorphism **(H5 Due)**
8	Mon Mar 2	Spring Break
	Wed Mar 4	
	Fri Mar 6	
9	Mon Mar 9	Three.II.1.Homomorphisms: Definition
	Wed Mar 11	Three.II.2.Homomorphisms: Range Space **(H6 Due)**
	Fri Mar 13	Three.II.2.Homomorphisms: Null Space
10	Mon Mar 16	Three.III.1: Computing Linear Maps: Representing Maps with Matrices
	Wed Mar 18	Three.III.1: Computing Linear Maps: Rep. Maps with Matrices **(H7 Due)**
	Fri Mar 20	Three.III.2: Computing Linear Maps: Any Matrix Represents a Linear Map
11	Mon Mar 23	**In-Class Exam 3 Covering Chapter 3 Sections I, II, III**
	Wed Mar 25	Three.IV.1: Matrix Operations: Sums and Scalar Products
	Fri Mar 27	Three.IV.2: Matrix Operations: Matrix Multiplication
12	Mon Mar 30	Three.IV.3: Matrix Operations: The Mechanics of Matrix Multiplication
	Wed Apr 1	Three.IV.4: Matrix Operations: Inverses **(H8 Due)**
	Fri Apr 3	Three.V.1: Change of Basis: Changing Representations of Vectors
13	Mon Apr 6	Three.V.2: Change of Basis: Changing Map Representations
	Wed Apr 8	Four.I.1,2: Exploration of the Determinant; Properties of Determinants
	Fri Apr 10	Four.I.3: The Permutation Expansion **(H9 Due)**
14	Mon Apr 13	Four.III.1: Laplace's Formula
	Wed Apr 15	**In-Class Exam 4 Covering Ch. 3 Sections IV, V and Ch. 4 Sections I, III**
	Fri Apr 17	Five.II.1: Similarity
15	Mon Apr 20	Five.II.2: Diagonalizability
	Wed Apr 22	Five.II.3 Eigenvalues and Eigenvectors **(H10 Due)**
	Fri Apr 24	Five.II.3 Eigenvalues and Eigenvectors
16	Mon Apr 27	**Cumulative Final Exam 10:10am – 12:10pm in Morton 215**

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Suggested Exercises for 2014 – 2015 Spring Semester MATH 3210/5210 (Barsamian)

The goal of the course is for you to be able to solve the 233 exercises on this list. These exercises are not to be turned in and are not graded, but you should do as many of them as possible and keep your solutions in a notebook for study. Note that the solutions to all of the textbook exercises are available free online.

Chapter	Section	Subsection	Suggested Exercises	Pages
One	I	1	18, 20, 23, 29, 30, 32, 33, 35	p. 9 - 12
One	I	2	18, 20, 21, 22, 23, 24, 26, 27, 30	p. 19 - 22
One	I	3	14, 16, 17, 19, 20	p. 32 - 33
One	III	1	8, 9, 10, 12	p. 54 - 55
One	III	2	10, 16, 18, 19	p. 62 - 63
Two	I	1	19, 20, 21, 22, 24, 29, 32, 35, 36, 37, 38	p. 86 - 90
Two	I	2	20, 21, 22, 25, 26, 27, 28, 30, 31, 39, 43	p. 97 - 101
Two	II	1	10, 21, 23, 26, 27, 29, 29, 34, 41ac	p. 110 - 114
Two	III	1	18, 19, 20, 21, 22, 23, 26, 27, 29, 33, 35, 36	p. 118 - 120
Two	III	2	18, 19, 23, 24, 25, 29, 31	p. 125 - 126
Two	III	3	19, 20, 21, 23, 24, 25, 27, 35, 36, 38	p. 132 - 134
Three	I	1	13, 15, 16, 18, 21, 22, 27, 30, 31, 35	p. 172 - 175
Three	I	2	10, 15, 17, 20	p. 181 - 182
Three	II	1	18, 19, 20, 21, 23, 24, 26, 30, 31, 34, 39, 41, 42	p. 188 - 191
Three	II	2	21, 22, 23, 24, 26, 31, 33, 36	p. 200-201
Three	III	1	12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 28	p. 210-213
Three	III	2	12, 16, 20, 21, 22, 23, 26	p. 218-221
Three	IV	1	8, 12, 14, 15, 16	p. 224 - 226
Three	IV	2	14, 17, 20, 25, 26, 31, 33, 34	p. 237 - 234
Three	IV	3	24, 26, 29, 31, 32, 33, 36, 37, 41, 42	p. 241 - 243
Three	IV	4	15, 17, 18, 20, 21, 26, 27, 30	p. 249 - 251
Three	V	1	8, 11, 12, 15, 18	p. 255 - 256
Three	V	2	12, 15	p. 262 - 263
Four	I	1	3, 5, 6, 8, 9 ($a \neq 0$ and $ae - bd \neq 0$), 16, 17	p. 319 – 321
Four	I	2	9, 12, 13, 14, 15, 16, 19	p. 324 – 326
Four	I	3	17, 20, 21, 26, 28, 33	p. 333 – 335
Four	III	1	11, 12, 14, 15, 18, 21, 23, 24	p. 355 - 356
Five	II	1	4, 6, 7, 11, 18	p. 387 - 388
Five	II	2	7, 8, 9, 10, 11, 14, 15, 17, 18	p. 392 - 393
Five	II	3	20, 21, 23, 25, 27, 28, 31, 33, 40	p. 400 - 402