MATH220

Course Summary

Course : MATH220 **Title :** Linear Algebra
Length of Course : 8
Prerequisites : MATH200, MATH225 **Credit Hours :** 3

Description

Course Description: This course presents vectors, matrices, determinants, eigenvalues and eigenvectors; and how these concepts may be used and applied. The emphasis of the course will be on understanding the concepts and methods of linear algebra, as well as solving problems and understanding how linear algebra is used in real world applications. (Prerequisite: MATH200 AND MATH225)

Course Scope:

MATH 220 is a distance learning course designed to provide students with a working knowledge of vectors, matrices, and systems of linear equations; vector spaces; determinants, eigenvalues and eigenvectors; inner and outer product spaces; and various numerical methods based on linear algebra techniques. These mathematical techniques are widely used in engineering and scientific disciplines such as physics, computer science, electrical engineering, economics, finance, and the social sciences. Linear algebra may either be used for practical applications in these disciplines (e.g, finance and economics) or as the basis for developing more advanced analyses in the discipline (notably in theoretical physics). The emphasis of the course will be on the proper use of linear algebra techniques rather than on mathematical proofs. Emphasis will also be placed on solving application problems within a real world context.

Objectives

After successfully completing this course, you will be able to

CO-1. Apply basic operations of vectors, matrices, and determinants.

CO-2. Calculate inner and outer products

CO-3. Apply inner products to evaluating orthogonality.

CO-4. Evaluate systems of linear equations.

CO-5. Apply eigenvalues, eigenvectors and determinants to real world problems.

CO-6. Apply vector spaces to linear transformations.

CO-7. Apply linear algebra techniques to various real world situations.

Outline

Week 1: Linear Equations

Learning Objectives

CO-1. Apply basic operations of vectors, matrices, and determinants.

CO-4. Evaluate systems of linear equations.

CO-7. Apply linear algebra techniques to a number of various real world situations.

Readings

Text: Lay, Chapter 1

Lessons for Week 1: Linear Equations

MyMathLab – Chapter 1

Assignment

Introductory Forum

Week 1 Homework (located in MyMathLab)

Week 1 Practice Test (located in MyMathLab)

Week 1 Test (located in MyMathLab)

Complete Honor Code and Pledge in the Assignments area.

Week 2: Matrix Algebra

Learning Objectives

CO-1. Apply basic operations of vectors, matrices, and determinants.

CO-4. Evaluate systems of linear equations.

CO-7. Apply linear algebra techniques to various real world situations.

Readings

Text: Lay, Chapter 2

Lessons for Week 2: Matrix Algebra

MyMathLab – Chapter 2

Assignment

Week 2 Forum

Week 2 Homework (located in MyMathLab)

Week 2 Practice Test (located in MyMathLab)

Week 2 Test (located in MyMathLab)

Week 3: Determinants

Learning Objectives

CO-1. Apply basic operations of vectors, matrices, and determinants.

CO-5. Apply eigenvalues, eigenvectors and determinants to real world problems.

CO-7. Apply linear algebra techniques to various real world situations.

Readings

Text: Lay, Chapter 3

Lessons for Week 3: Determinants

MyMathLab – Chapter 3

Assignment

Week 3 Forum

Week 3 Homework (located in MyMathLab)

Week 3 Practice Test (located in MyMathLab)

Week 3 Test (located in MyMathLab)

Week 4: Vector Spaces

Learning Objectives

CO-6. Apply vector spaces to linear transformations.

CO-7. Apply linear algebra techniques to various real world situations.

Readings

Text: Lay, Chapter 4

Lessons for Week 4: Vector Spaces

MyMathLab – Chapter 4

Assignment

Week 4 Forum

Week 4 Homework (located in MyMathLab)

Week 4 Practice Test (located in MyMathLab)

Week 4 Test (located in MyMathLab)

Week 5: Eigenvalues and Eigenvectors

Learning Objectives

CO-5. Apply eigenvalues, eigenvectors and determinants to real world problems.

CO-7. Apply linear algebra techniques to various real world situations.

Readings

Text: Lay, Chapter 5

Lessons for Week 5: Eigenvalues and Eigenvectors

MyMathLab – Chapter 5

Assignment

Week 5 Forum

Week 5 Homework (located in MyMathLab)

Week 5 Practice Test (located in MyMathLab)

Week 5 Test (located in MyMathLab)

Week 6: Orthogonality and Least Squares

Learning Objectives

CO-2. Calculate inner and outer products

CO-3. Apply inner products to evaluating orthogonality.

CO-7. Apply linear algebra techniques to various real world situations.

Readings

Text: Lay, Chapter 6

Lessons for Week 6: Orthogonality and Inner Products

MyMathLab – Chapter 6

Assignment

Week 6 Forum

Week 6 Homework (located in MyMathLab)

Week 6 Practice Test (located in MyMathLab)

Week 6 Test (located in MyMathLab)

Week 7: Symmetric Matrices and Quadratic Forms

Learning Objectives

CO-1. Apply basic operations of vectors, matrices, and determinants.

CO-2. Calculate inner and outer products

CO-7. Apply linear algebra techniques to various real world situations.

Readings

Text: Lay, Chapter 7

Lessons for Week 7: Symmetric Matrices and Quadratic Forms

MyMathLab – Chapter 7

Assignment

Week 7 Forum

Week 7 Homework (located in MyMathLab)

Week 7 Practice Test (located in MyMathLab)

Week 7 Test (located in MyMathLab)

Week 8: Final Examination Writing Project

Learning Objectives

CO-1. Apply basic operations of vectors, matrices, and determinants.

CO-2. Calculate inner and outer products

CO-3. Apply inner products to evaluating orthogonality.

CO-4. Evaluate systems of linear equations.

CO-5. Apply eigenvalues, eigenvectors and determinants to real world problems.

CO-6. Apply vector spaces to linear transformations.

CO-7. Apply linear algebra techniques to various real world situations.

Readings

Review for the Final Examination.

Detailed description of the Writing Project may be found in the announcement area of the Sakai classroom, as well as in the Lessons under Course Guidance.

Assignment

Week 8 Forum

Week 8 Practice Final Exam (located in MyMathLab)

Final Examination due (located in MyMathLab)

Writing Project due

Evaluation

Your course grade will be determined as follows:

Forum Assignments:

There will be an Introductory Forum worth 2.5% of the final grade and 7 other Forums, one in each of Weeks 2, 3, 4, 5, 6, 7 and 8, worth 2.5% each for a total altogether of 20% of the final grade.

Your weekly discussion forum posts must meet the minimum requirement for the number of posts and the content for that assignment:

An initial response post and at least two student replies are required for each weekly forum. Posts should be made as indicated in the forum instructions. Typically, this will consist of an "initial post" in response to the question posed in the forum description, and at least two responses to what other students (or the instructor) say in the forum. Be sure to click on the link "Read Full Description" that appears below each forum name, since sometimes the requirements for a particular forum will be different. (Note that the grading and description for a particular forum override this general introduction, so be sure to read it carefully for each individual forum.) Typically, a discussion forum is graded using a 10 point scale and you will receive 6 points for your response to the forum question or assignment, and 2 points for each student response.

To receive full credit, a post must be substantive in content. This means initial posts which contain at least 250 words and respond in a focused and substantial manner to the question assigned. Single sentence responses such as "Now I understand" or "Thank you for your help" do not constitute significant posts. For student responses, replies of at least 100 words or more are generally required.

Grading for each forum will follow the point structure outlined in the description for each forum.

Introductory Forum: It is very important that you submit a post to, and participate in, the Introductory Forum. Please introduce yourself to me and the class. Share where you work or plan to work after completing your program, your family, and any hobbies or special interests. Also tell us why you are taking this course and what you hope to gain from obtaining your degree. In addition, please take a look at the course objectives in the syllabus and discuss the relevance to your career goals.

Instructions: Your initial post should be at least 250 words. Please respond to at least 2 other students. Responses should be a minimum of 100 words. This forum submission serves as your official entry into the course and that is why we have drawn special attention to this assignment. You will be reminded of this Forum again in the Week 1 Lesson Module, but please keep in mind that this Introduction Forum must be submitted by 11:55 p.m., ET, on Sunday of Week 1 to maintain your registration in the course.

Also be sure to complete the Honor Code and Pledge in the Assignments area no later than Sunday night, the end of week 1.

Homework Assignments:

There will be seven (7) homework assignments in Weeks 1-7 assigned from the course textbook. Each is worth 2% of your final grade, for a total of 14%. The assigned homework is located in MyMathLab, so be sure to go to MyMathLab each week to complete it.

Note that the homework in MyMathLab each week is a graded assignment and is required before you will be allowed to take that week's test.

In addition, there are problems located at the end of each chapter in the textbook, which I very strongly urge you to do in addition, in order to further test your understanding. This is especially critical in a subject like Linear Algebra, where many of the concepts will be strange and unfamiliar. The MyMathLab homework, by its very nature, is cookie-cutter and "one size fits all".

So you are sure to find that in one topic area or another, you need additional practice. The textbook problems located at the end of each chapter in the textbook are the best way to obtain that additional practice. The answers – not the solutions, but the answers -- are located in the back of the book, so that you can test your understanding and make sure that you master thoroughly all the topics covered in each chapter, before you go on to the test.

Again a reminder – you will not be allowed to take that week's test until you have completed the homework assigned for that week in MyMathLab.

Weekly Practice Tests

Each week you will see a Weekly Practice Test (Week 1 Practice Test, etc.). These are assignments you must complete before taking the "real" test that week for the first time. Even though they have no points assigned and do not count for your final grade, they will give you valuable practice at taking the "real" weekly test. Note that you must take and complete the practice test (as well as the homework) before you will be allowed to take the "real" weekly test.

Besides being ungraded, one other difference you will note is that the practice test is not timed. My advice, however, is to attempt it under "test conditions" and give yourself only the same amount of time that you are permitted on the real tests (3.5 hours).

Exams/Quizzes

There will be 7 weekly Tests, for weeks 1-7, worth 6% each for a total of 42% of the final grade. Tests are located in MyMathLab, so be sure to go to MyMathLab to complete the test each week. Remember to complete that week's homework, as well as that week's practice test; both are located in MyMathLab. Both must be completed before you will be allowed to take the test for that week.

Please complete each test by the due date noted in the syllabus and in the classroom. These are 3.5 hour, open-book and open-note tests, but they are not collaborative efforts.

These are dual-access tests. You may access each test twice, and the higher score will automatically be recorded in the MML gradebook. Once you have accessed the test twice however, it cannot be made up. Also once you enter the test for any reason, whether or not you complete it, an "attempt" is recorded and reduces the number of tries you have left by one. So once you open the test, you will be expected to complete it – there is no option to "Save for later".

Also remember that no help or assistance from anyone else is allowed on any weekly test. Tests are due Sunday night at 11:55pm ET of the week they are assigned to.

Final Exam:

There will be a Final Exam in week 8, worth 20% of the Final Grade, and it is located in MyMathLab (MML).

Note that it is required that you take the Practice Final in MML before attempting the actual Final Exam. Even though the Practice Final is not worth any points towards your final grade, it will give you very valuable practice in taking the final exam, and let you know if you are prepared to do so. Besides being ungraded, one other difference you will note is that the Practice Final is not timed. My advice, however, is to attempt it under "test conditions" and give yourself only the same amount of time that you are permitted on the real tests (4.0 hours).

The final exam is four hours long. It is to be completed during the last week of the term and will be open-book and open-notes. Note *you may not receive help from anyone*. The final exam will consist of all material covered during the entire term. You will not need a proctor to take the final exam.

Unlike the weekly tests, the final exam is single-access, that is you may only access the final exam once. As with the weekly tests, once you enter the final exam for any reason, whether or not you complete it, an "attempt" is recorded – so be sure that you do not open the exam until you are ready to take and complete it in one sitting.

The final exam is due Sunday night at 11:55pm ET of week 8 (that is, the last day of the course).

Assignments

There is one writing assignment worth 4% of your final grade, and it is due at the end of week 8. A detailed description of this assignment may be found posted in the week 1 announcement on the writing project, and also in the Lessons area of the classroom under Course Guidance, along with the grading rubric that will be used to evaluate it.

The Writing Project should be submitted to the Assignments area in the Sakai classroom in APA format and include a complete list of references.

Time Management:

Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment. A schedule of all assignments (homework, tests and exams, readings, discussion, and any other assignments), and the weeks they are due, is included in the syllabus below. All assignments are due Sunday night of the week noted. You should also check the announcements, as they may contain reminders of what assignments are due each week. However, be sure to not rely on the announcements to remind you; in all cases the syllabus (and the homework schedule at the end of it) function as the class contract.

Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. For late assignments, students need to contact the faculty member ahead of time about their individual situation.

While tests and exams, and homework, may be submitted late (subject to possible late penalties) up to the last day of class, all discussion postings and all discussion forum assignments are due the week that the discussion forum is active. No late discussion postings, or assignment postings to a discussion forum, are permitted. Be sure to plan your work and week accordingly. If you will be out of internet contact entirely for the whole week and it is due to circumstances beyond your control, be sure to contact the faculty member ahead of time about your individual situation. Work submitted late without prior faculty member approval will not count for credit.

All assignments, tests, and exams must be submitted by the last day of class unless you have an approved, school-issued course extension.

Grading:

Name	Grade %
Weekly Tests	42.00 %
Week 1 Test	6.00 %
Week 2 Test	6.00 %
Week 3 Test	6.00 %
Week 4 Test	6.00 %
Week 5 Test	6.00 %
Week 6 Test	6.00 %
Week 7 Test	6.00 %
Final Exam	20.00 %
Final Exam	20.00 %
Forums	20.00 %
Week 1 Forum	2.50 %
Week 2 Forum	2.50 %
Week 3 Forum	2.50 %
Week 4 Forum	2.50 %
Week 5 Forum	2.50 %

Week 6 Forum	2.50 %
Week 7 Forum	2.50 %
Week 8 Forum	2.50 %
Honor Code	0.00 %
APUS Honor Code and Pledge	0.00 %
Weekly Homework	14.00 %
Week 1 Homework	2.00 %
Week 2 Homework	2.00 %
Week 3 Homework	2.00 %
Week 4 Homework	2.00 %
Week 5 Homework	2.00 %
Week 6 Homework	2.00 %
Week 7 Homework	2.00 %
Assignments	4.00 %
Week 8 Writing Project	4.00 %

Materials

Book Title: MATH220 Pearson MyLab access provided inside the classroom

Author:

Publication Info: Pearson

ISBN: 126945935X

Book Title: Linear Algebra and Its Applications, 4th ed - The VitalSource e-book is provided via the APUS Bookstore

Author: Lay

Publication Info: Pearson

ISBN: 9781269459358

Book Title: You must validate your cart to get access to your VitalSource e-book(s). If needed, instructions are available here - http://apus.libguides.com/bookstore/undergraduate

Author: N/A

Publication Info: N/A

ISBN: N/A

Required Readings and Additional Resources

All students will be provided access to an e-Book available through the VitalSource e-reading platform. Please remember that you must validate your cart to get access

to your VitalSource e-book(s). If you need to, instructions for doing this are available here - http://apus.libguides.com/bookstore/undergraduate

MyMathLab is an online system that provides you with powerful learning tools and is provided to you by the

University. The lectures and practice exercises are tied to your course textbook to provide you with material that will assist your learning and comprehension of the concepts.

Students will also benefit from having a calculator (either a physical calculator or an online calculator) to successfully complete this course. The calculator should include a memory, a square root function and a power function xn (generally these are labeled “scientific calculators”). Students may make use of calculators for all graded assignments and exams during the course.

Web Sites

In addition to the required course texts, the following public domain web sites are useful. Please abide by the university’s academic honesty policy when using Internet sources as well. Note web site addresses are subject to change.

Site Name	Web Site URL/Address
Mathematics Videos	http://www.apus.edu/media/mathWV/index.htm Note: Choose the “Contemporary Math” option.
Calculator Website	http://www.calculator.com
The Khan Academy	http://www.khanacademy.org/ Note: Type “Linear Algebra” into the search box in the upper right hand corner of the screen, to see a lengthy list of videos on linear algebra that are available. A second website within Khan Academy is https://www.khanacademy.org/math/linear-algebra
“A First Course in Linear Algebra”	http://linear.ups.edu/html/fcla.html This is a free textbook, available online. You can download it as a PDF file for offline reading, or read it online, where it has fully worked out (and highly detailed) examples that “open up” when you click on the link. Some of the examples also invite you to work out your own solution, and then give online feedback. On the downside, the topics are somewhat limited; but it is a very interesting supplement to check out.

	Video Tutorials
Video Tutorials by APUS	Note: Selected topics on matrices, and solving systems of linear equations, may be useful.

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- Tutor.com offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

- Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment.
- Generally speaking, late work may result in a deduction up to 15% of the grade for each day late, not to exceed 5 days.
- As a working adult I know your time is limited and often out of your control. Faculty may be more flexible if they know ahead of time of any potential late assignments.

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise specified.

Disclaimer Statement

- Course content may vary from the outline to meet the needs of this particular group.

Communicating on the Forum

- Forums are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the forum. The purpose of the forums is to actively participate in an on-going discussion about the assigned content.
- "Substantive" means comments that contribute something new and hopefully important to the discussion. Thus a message that simply says "I agree" is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.
- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

University Policies

Student Handbook

- Drop/Withdrawal policy
- Extension Requests
- Academic Probation
- Appeals
- Disability Accommodations

The mission of American Public University System is to provide high quality higher education with emphasis on educating the nation's military and public service communities by offering respected, relevant, accessible, affordable, and student-focused online programs that prepare students for service and leadership in a diverse, global society.