Capital University of Economics and Business
Overseas Chinese College
Course Syllabus

Semester and Year	2019 Fall (September 2, 2019— January 3, 2020)
Course Name	Linear Algebra
Course Code	MAT 221
Course Type	☑ General Education (Required) ☐ General Education (Elective) ☐Professional Course (Required) ☐ Professional Course (Elective) ☐ Basic Disciplinary Course
Course Credits	3
Course Hours	51
Prerequisites	MAT111, MAT112
Instructor	Jianming Huang(Jake Huang)
Contact Information	Office: C217 Tele: (010)83951082 Email: huangjianming@cueb.edu.cn
Office Hour	T&W: 15:30-17:30 TH: 10:00-12:00
Learning Center	W: 18:00-20:00 TH: 15:30-17:30
Grade/Section	2018BA1/Y01 2018IT/Y05 2018CFA/Y06
Course Time/Place	Y01 M: 13:30-15:20/5#206 TH: 9:00-9:50/5#206 Y05 T: 10:00-12:00/5#109 TH: 8:00-8:50/5#109 Y06 T: 13:30-15:20/B215 W: 10:10-11:00/B215

Textbook

Lee W. Johnson, R. Dean Riess, Jimmy T. Arnold. *Introduction to Linear Algebra,5th Edition*. China Machine Press, ISBN: 7-111-10628-8

Course Description

Linear algebra studies linearity, the simplest form of quantitative relationship and provides a basis for the study of many areas of pure and applied mathematics, as well as key applications in the physical, biological and social sciences. Topics include systems of linear equations, vectors, vector equations, matrices, determinants, vector spaces, bases, and linear transformations. Prerequisite: MAT 111 & MAT112 Calculus

Student Learning Objectives

- To learn important concepts of linear algebra, such as vector spaces, basis, linear transformations, projections, least squares method, eigenvalues, and eigenvectors.
- To understand the importance of linear algebra and learn its applicability to practical problems, i.e., how the linear equations and eigenvalue problems appear in some practical applications.
- To enhance your understanding of the above concepts through occasional MATLAB-based homework problems.

Library Sources

Students can find reference books in the library or related materials on the Internet.

Reference Materials

- Strang, Gilbert (July 19, 2005), *Linear Algebra and Its Applications* (4th ed.), Brooks Cole, ISBN 978-0030105678
- Meyer, Carl D. (February 15, 2001), *Matrix Analysis and Applied Linear Algebra*, Society for Industrial and Applied Mathematics (SIAM), ISBN 978-0898714548.
- Shores, Thomas S. (December 6, 2006), *Applied Linear Algebra and Matrix Analysis*, Undergraduate Texts in Mathematics, Springer, ISBN 978-0387331942

Some Websites

- http://planetmath.org/encyclopedia/LinearAlgebra.html
- http://ocw.mit.edu/OcwWeb/Mathematics/18-06Spring-2005/VideoLectures/index.htm
- http://mathworld.wolfram.com/topics/LinearAlgebra.html

Teaching Methods

This course consists of lectures, discussions and individual presentations. Students will be divided into small groups with a group leader to help other students in the group with their study. Students must be prepared to finish some small questions and small quiz during the class. After each chapter there will be some mini presentations which should be held by individuals.

Grade Criterion:

Component	Weight	Description
Final Exam	20%	A cumulative final examination will be given based on all of the contents of the class. A minimum of 25% of the exam (5 of the 20%) will consist of questions utilizing the application of critical thinking.
Mid-Term Exam	20%	A cumulative midterm examination will be given based on all of the contents of the first half of the class. A minimum of 25% of the exam (5 of the 20%) will consist of questions utilizing the application of critical thinking.
Homework	15%	Homework problems will be assigned throughout the term, including but not limited to: terminologies, research project, and reading assignments.

Quiz	20%	There will be several times quizzes during the semester. The purpose of the quizzes is to ensure that students keep up with the readings.
Participation	10%	Individuals will be asked to participate individually in questions during the semester. Students are required to meet with their teachers every week. Their performances should be counted in their participation.
Presentation	5%	Refer to the handouts.
Attendance	10%	Refer to attendance policy listed below.
Total	100%	

Detailed Grade Calculation

In the semester, the grades of attendance, participation, homework assignments, and quizzes account for 60 percent of a student's final grade, and the midterm exam and final exam both account for 20 percent of the final grade. 40 percent of the final grade comes before midterm and 60 percent after midterm, as shown in the following table:

	Before midterm	After midterm
Attendance	5%	5%
Participation	5%	5%
Homework/assignment	5%	10%
Quiz	5%	15%
Midterm exam	20%	
Final exam		20%
Presentation		5%
Total	40%	60%

Grading Policy

A+ 100 – 97 A 96-93 A- 92–90 B+ 89-87 B 86-83 B- 82–80
C+ 79–75 C 74-70 C- 69–67 D+ 66–63 D 62-60 F 59 -0

Exam Schedule

- **Midterm: Oct. 28– Nov. 01, 2019**
- **Final Exam: Jan. 01 – Jan. 10, 2020**

Homework

Students should finish their homework (except for group projects) by themselves. **Copying from others will be treated as cheating. Students' homework scored will be lowered.** Students should hand in all

assignments promptly and on time. Late assignment will be accepted at the discretion of the instructor (i.e., when the student was ill or had an excused absence). Assignment turned in late without proof of illness or had an excused absence will be reduced in score by 50%.

Assignment should be printed out. Anything that cannot be read will be marked wrong. Printing requirements are as followed: single space between lines, double space between paragraphs, font size is 12 (maximum).

Attendance

Being late for 15 minutes will result in unexcused absence. Each unexcused absence will result in 10% reduction of attendance grade. Five hours of unexcused absences will result in the lowering of grade by one level, i.e. A to A-. **17 class hours** of absences under any circumstances forces a withdrawal from the course and get a grade of "F". An excused absence must be discussed directly with the teacher. An incomplete grade (I) will be considered in case of medical or family emergencies. **Students must bring their textbooks to class.**

Participation

Students should participate in classes actively**.** Half of participation grade is determined by their presentation in class. They are encouraged to ask questions relevant to the subject and express their own opinions. Every student should respect the ideas, opinions, and questions of their classmates. Students should also use office hour to ask questions or talk with the instructor for good communication and effective learning. Any misbehavior and non-class related activities in class will result in the lowering of the participation grade, including ringing beepers and cell phones. Student better frequent visit their instructors and chat in English everyday. All above behaviors will be solely evaluated by the instructor for scoring.

Topical Course Outline

Week	Date	Topics
1	0902-0906	**Syllabus & Orientation** **Chapter 1 Matrices and Systems of Linear Equations** ○ Section 1.1: Introduction to matrices and systems of linear equations ○ Section 1.2: Echelon form and Gauss-Jordan elimination
2	0909-0913	**Chapter 1 Matrices and Systems of Linear Equations** ○ Section 1.3: Consistent systems of linear equation ○ Section 1.5: Matrix operations ○ Section 1.6: Algebraic properties of Matrix operations

3	0916-0920	**Chapter 1 Matrices and Systems of Equations** ○ Section 1.7: Linear independence and nonsingular matrices ○ Section 1.9: Matrix inverses and their properties **Review & Exercise**
4	0923-0927	**Chapter 3 The Vector Space R^n** Review for chapter 2 ^{n}
5	0930-1004	**National Holiday**
6	1007-1011	**Chapter 3 The Vector Space** ○ 3.1 Introduction ○ 3.2 Vector Space Properties of R^n
7	1014-1018	**Chapter 3 The Vector Space R^n** ○ 3.3 Examples of Subspaces
8	1021-1025	**Chapter 3 The Vector Space R^n** ○ Section 3.4: Bases for Subspaces ○ Section 3.5: Dimension
9	1028-1101	**Quiz and Midterm Exam**
10	1104-1108	**Chapter 3 The Vector Space R^n** ○ Section 3.6: Orthogonal Bases for Subspaces ○ Section 3.7: Linear transformations from R^n to R^m
11	1111-1115	**Chapter 5 Vector Space and Linear Transformations** ○ Section 5.2: Vector spaces ○ Section 5.3: Subspaces ○ Section 5.4: Linear independence, bases and coordinates ○ Section 5.5: Dimension ○ Section 5.7: Linear transformation
12	1118-1122	**Chapter 6 Determinants** ○ Section 6.2: Cofactor Expansions of Determinants ○ Section 6.3: Elementary Operations and Determinants ○ Section 6.4: Cramer's Rule ○ Section 6.5: Inverses
13	1125-1129	**Chapter 4 The Eigenvalue Problem** ○ Section 4.4: Eigenvalues and the Characteristic Polynomial ○ Section 4.5: Eigenvectors and Eigenspaces
14	1203-1207	○ Section 4.7: Similarity Transformations and Diagonalization
15	1209-1213	**Chapter 5 Vector Space and Linear Transformations** ○ Section 5.8: Operations with linear transformations ○ Section 5.9: Matrix representations for linear transformations ○ Section 5.10: Change of basis and diagonalization
16	1216-1220	**PRESENTATION**
17	1223-1227	**PRESENTATION**
18	1230-0103	**Quiz and Final Exam Review**
19	0106-0110	**Final Exam**

Note: Self-Study contents will be also included in your quiz and examinations.

Teacher's Office Hours

The instructor's office hour is shown in the front of the office door. Students are required to use the instructor's office hour to ask questions or talk with the instructor once at least per week for good communication and effective learning, which is recorded in the students' participation. The time can be scheduled by instructors or students, or both.

Withdrawal Policy

Students can drop the class in the first week of the semester without leaving any marks to the final grade. However anyone with 24 hours absences automatically receives an F.

Cheating and Plagiarism

Cheating is not tolerated. Any student caught cheating on a quiz; test or exam will be given a mark of zero (0) for the particular work. At the beginning of the semester the definition of plagiarism will be carefully explained. When any thoughts or writings of another person are used, they must be clearly identified (usually one uses quotation marks) and the source notes.

Important Dates

Fall Semester, 2019	**August 30, 2019— January 10, 2020**
Aug.30	Registration
Sep.2	Classes Begin
Sep.7-20	Freshmen's Military Training
Sep.13	Mid-Autumn Festival (tentative)
Sep.23	Classes Begin（Freshmen）
Oct.1	National Day Holiday (tentative)
Oct.28- Nov.1	Midterm Test
Jan.1, 2020	New Year's Day Holiday (tentative)
Jan.1-10	Final Exam Period
Jan.13	Winter Vacation Begins

Note: *This syllabus is tentative and may be changed or modified throughout the semester. All students will be notified and a new syllabus will be given.*

Instructor: Prof. Jake Huang **Department Head：Prof. Jingning Li**