The syllabus of Linear Algebra

<table>
<tr><td colspan="7">课程基本信息（Course Information）</td></tr>
<tr><td>课程代码
（Course Code）</td><td>MA077</td><td>学时
（Credit Hours）</td><td>48</td><td>学分
（Credits）</td><td>3</td></tr>
<tr><td rowspan="2">课程名称
（Course Name）</td><td colspan="5">（中文）线性代数</td></tr>
<tr><td colspan="5">（英文）Linear Algebra</td></tr>
<tr><td>课程属性
(Course Type)</td><td colspan="5">Common Basic Course</td></tr>
<tr><td>开课院系
（School）</td><td colspan="2">（英文）Department of Mathematics</td><td>开课学期
（Term）</td><td colspan="2">（英文）Autumn</td></tr>
<tr><td>先修课程
（Prerequisite course）</td><td colspan="5">（英文） No</td></tr>
<tr><td>授课教师
（Instructors）</td><td colspan="5">（英文） Xiao-Dong Zhang</td></tr>
<tr><td>课程简介（Description）
300-500 字</td><td colspan="5">（英文）This course covers linear equations, matrix theory and vector space, emphasizing topics useful in other disciplines. Linear algebra is a branch of mathematics that studies systems of linear equations and the properties of matrices. The concepts of linear algebra are extremely useful in physics, economics and social sciences, natural sciences, and engineering. Due to its broad range of applications, linear algebra is one of the most widely taught subjects in college-level mathematics. After successfully completing the course, you will have a good understanding of the following topics and their relations: linear systems, matrix theory and vector space.</td></tr>
<tr><td colspan="7">课程教学大纲（course syllabus）</td></tr>
<tr><td>*学习目标(Learning Outcomes)</td><td colspan="5">After completing the course, students should:
1. Solving Ax = b for square systems by elimination and determine whether the linear system is consistent or inconsistent by rank of A .
2. grasp the operations, such as addition, multiplicity, inverse, transpose, of matrix Find the null space and range space, rank of a matrix A.
3. Linear independence and Linear dependence, basis and dimension of vector space.
4. Orthogonalization by Gram-Schmidt.
5. Eigenvalues and eigenvectors. Diagonalization. Symmetric matrices and positive definite matrices,
6. Properties of determinants</td></tr>
<tr><td>*教学内容、进度安排及要求
(Class Schedule</td><td colspan="5"><table><tr><td>教学内容
topics</td><td>学时
Credit hours</td><td>教学方式
Teaching methodology</td><td>作业及要求
tasks</td><td>基本要求
Intended learning outcomes</td><td>考查方式
Assessment methods</td></tr></table></td></tr>
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& Requirements)	Introduction to matrices and systems of linear equations	2	teaching	6 questions	Grasp	homework
	Echelon form and Gouss-Jordan elimination	2	teaching	5 questions	Grasp	homework
	Consistent systems of linear equations and applications	2	teaching	6 questions	Grasp	homework
	Matrix operations. and algebraic properties of matrix operations	2	teaching	7 questions	Grasp	homework
	Linear independence and nonsingular matrices, Matrix inverses and their properties.	4	teaching	6 questions	Grasp	homework
	Introduction and vector space properties of n-dimension vectors	4	teaching	5 questions	Grasp	homework
	Bases for subspaces.	2	teaching	6 questions	Grasp	homework
	Dimensions of subspaces of n-dimension vectors.	4	teaching	4 questions	Grasp	homework
	Orthogonal bases for subspaces.	2	teaching	5 questions	Grasp	homework

	Definition and properties of determinants.	2	teaching	8 questions	Grasp	homework
	Elementary operations and determinants.	2	teaching	6 questions	Grasp	homework
	Cram's rule and its applications.	2	teaching	5 questions	Grasp	homework
	Eigenvalues and characteristic polynomial.	2	teaching	5 questions	Grasp	homework
	Eigenvectors and eigenspaces.	2	teaching	5 questions	Grasp	homework
	Diagonalization and Diagonalization of symmetric matrices.	4	teaching	6 questions	Grasp	homework
	Definition and basic properties of general vector spaces and subspaces.	2	teaching	5 questions	Grasp	homework
	Subspaces. Linear independence, Bases and Coordinates	2	teaching	6 questions	Grasp	homework
	Dimension, Orthogonal bases and inner product spaces	2	teaching	5 questions	Grasp	homework
	Definition of quadratic forms and Orthogonal transformation	2	teaching	5 questions	Grasp	homework
	Positive definite	2	teaching	5 questions	Grasp	homework

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<tr><td>quadratic forms and positive semidefinite quadratic forms</td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>考核方式
(Assessment methods and Grading)</td><td>There will be two-hour final exam. The use of calculators or notes is not permitted.
Grading : Problem sets 20%--30%
Final exam 70%-80%</td></tr>
<tr><td>教材或参考资料
(Textbooks & Other Reading Materials)</td><td>Textbook:
Introduction to Linear Algebra , fifth edition, by Lee W. Johnson, R. Dean Riess and Jimmy T. Arnold, Pearson Education,.
Reading Materials:
1. Matrix analysis and applied Linear Algebra, by Caul D. Meyer; SIAM, 2005.
2. On the Teaching of Linear Algebra, by Jean-Luc DORIER ,Kluwer Academic Publishers; 2002
3 Introduction to Linear Algebra, Strange, MIT
4. Linear Algebra Challenging Problems for Students, Fuzhen Zhang, The Johns Hopkins University Press.</td></tr>
<tr><td>备注
（Notes）</td><td>（英文）</td></tr>
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