

《线性代数》理论课程教学大纲

《Linear Algebra》理论课程教学大纲(英语)

课程代码 Course Code	102176901L	课程类别 Course Category	学科平台课 Disciplinary Common Course
中文名称 Chinese Name	线性代数	英文名称 English Name	Linear Algebra
适用专业 Program	软件工程，电子信息科学与技术， 通信工程 Software engineering, Science and technology of Electronic information, Telecommunication engineering	开课单位 College	物理与电子信息工程学院 Physics and Electronic Information Engineering
总学时 Total Learning Hours	64 学时（64 理论，0 实践，0 实验） 64	学 分 Credit	4 4
先修课程 Prerequisite	无 None	后续课程 Follow-up Courses	专业课程 Specialized Courses

1. 课程性质、目的和任务/ Nature of the Course, Objectives and Mission

Linear algebra is a branch of mathematics that studies systems of linear equations and the properties of matrices. This course covers linear equations, matrix theory and vector space, emphasizing topics useful in other disciplines.

The concepts of linear algebra are extremely useful in physics, economics and social 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.

表 1 课程对培养标准达成的支撑表

对应的三级培养标准	本课程的贡献度
1. 2. 1 掌握本专业所必须的自然科学和数学基础知识：包括高等数学、线性代数、复变函数及积分变换、概率论及数理统计等数学基础知识；包括电学、磁学、力学、光学等及相应的实验操作技能基础。（电子信息科学与技术）	0. 15

1.2.5掌握信号与系统基础知识:包括线性系统的基本理论、信号与系统的基本概念、线性时不变系统、连续与离散信号的傅里叶表示、傅里叶变换以及时域和频域系统的分析方法等知识。(电子信息科学与技术)	0.10
2.1.1 具有数学、科学、工程基础知识的应用能力,能应用这些知识分析与解决复杂工程问题。(电子信息科学与技术)	0.20
1.2.1具有从事本专业相关工作所必备的数学和大学物理基本知识(通讯工程)	0.20
2.1.1具有科学思维与计算思维的能力(通讯工程)	0.20
1.1.2 具有科学和工程基础知识,包括数学、自然科学等方面的知识(计算机科学与技术)	0.10
2.2.1 计算思维能力(计算机科学与技术)	0.05

备注:“S”表示“强”,“N”表示“中”,“W”表示“弱”。

2. 课程基本要求/ Basic Course Requirements

- Solve $Ax = b$ for square systems by elimination and determine whether the linear system is consistent or inconsistent by rank of A .
- grasp the operations, such as addition, multiplicity, inverse, transpose, of matrix. Find the null space and range space, rank of a matrix A .
- understand notations such as Linear independence and Linear dependence, basis and dimension of vector space well.
- know how to do orthogonalization by Gram-Schmidt.
- know how to find eigenvalues and eigenvectors, Diagonalization. know concepts such as Symmetric matrices and positive definite matrices.
- master well-known properties of determinants.

3. 教学内容与学时分配/ Course Contents and Study Hours

章节 Chapter	标题 Title	课内学时数 In-Class Study Hours		课外学时数 Out-Class Study Hours
		理论授课 Lectures	实验(或实践) Practical Experience	
第一章	Linear Systems	12	0	12
第二章	Vector Spaces	12	0	12
第三章	Map Between Spaces	12	0	12
第四章	Determinants	12	0	12
第五章	Similarity	16	0	16
	总 计	64 学时		64

4. 使用教材与主要参考书/ Textbook and Reference Books (Recommended)

1. Linear Algebra, third edition, by J. Hefferon

2. A First Course in Linear Algebra, Version 3.50, by R.A. Beezer
3. Elementary Linear Algebra, K.R. Matthews, Univ. of Queensland

5. 教学方法/ Teaching Method

We use “Lectures+Recitations” to help students master these important subjects.

6. 课外学习要求/ Extra Learning Requirement

The homeworks are essential in learning linear algebra. They are not a test and you are encouraged to talk to other students about difficult problems after you have found them difficult. Talking about linear algebra is healthy. But you must write your own solutions.

7. 课程考核与成绩评定/ Coursework Evaluation

There are four quizzes and I will drop the lowest score of your four quizzes; Each quiz of the three left will count 10% of your grade. The final exam will be worth 50%. The attendance of class will count 10% of your grade and the final 10% will come from the homework.

Final Grade=Class attendance(10%)+Homework(10%)+Quizzes(30%)+Final exam(50%).

8. 其它说明/ Other Information

None

9. 大纲正文/ Course Outline

表 2 理论教学内容与基本要求

章次	内容	教学目标			难点	学时数
		了解	理解	掌握		
第 1 章	1. Solving Linear Systems			√		12
	2. Linear Geometry			√		
	3. Reduced Echelon Form			√	√	
第 2 章	1. Definition of Vector Space			√		12
	2. Linear Independence			√	√	
	3. Basis and Dimension			√	√	
第 3 章	1. Isomorphisms			√		12
	2. Homomorphisms			√		
	3. Computing Linear Maps			√	√	
	4. Matrix Operations			√	√	
	5. Change of Basis			√		
	6. Projection			√		
第 4 章	1. Definition			√		12

章次	内容	教学目标			难点	学时数
		了解	理解	掌握		
	2. Geometry of Determinants			√		
	3. Laplace' s Formula			√	√	
第 5 章	1. Complex Vector Spaces			√		16
	2. Similarity			√	√	
	3. Nilpotence			√		
	4. Jordan Form			√		

10.编制与审核/ Editor and Verifier

制定人 Edited by: 金柏琪 (Course Lecturer)

2017 年 9 月 25 日

审核人 Verified by: ____ (Program Coordinator)

年 月 日