

课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	线性代数 B Linear Algebra B
2.	授课院系 Originating Department	数学系 Department of Mathematics
3.	课程编号 Course Code	MA107B
4.	课程学分 Credit Value	4 学分 4 Credits
5.	课程类别 Course Type	通识必修课程 General Education (GE)Required Courses
6.	授课学期 Semester	春季 Spring / 秋季 Fall
7.	授课语言 Teaching Language	英文 English / 中英双语 English & Chinese
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	陈懿茂 数学系 慧园 3 栋 508 huy@sustech.edu.cn Chen Yi mao Department of Mathematics Block 3, Room508, Wisdom Valley Chenym@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
	64	32			96
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 None				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	线性代数数值分析、常微分方程、偏微分方程、回归分析、金融数学及金融工程等课程的先修课程，同时也是其他工程学科多门专业课的先修课程。 Linear Algebra is a prerequisite for many mathematics curriculums including Numerical analysis, Ordinary differential equations, Partial differential equations, Regression analysis, Financial Mathematics and Financial Engineering and etc.				
14. 其它要求修读本课程的学系 Cross-listing Dept.					

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程的教学目的是在培养与其专业需求相关的应用和计算能力。讲述线性代数基本的概念和理论，包括行列式、矩阵、向量和向量空间、线性方程组、矩阵的特征值和特征向量以及二次型。建议在习题课上向学生讲授如何使用 MATLAB 等软件进行矩阵的运算和求解线性方程组。本课程的重点包括行列式的计算、矩阵运算、求解线性方程组以及求解特征值和特征向量。

To introduce the basic concepts in linear algebra including determinants, matrices, vector spaces and systems of linear equations, eigenvalues and eigenvectors of matrices, and quadratic forms. In tutorials, let students use MATLAB performing matrices computation and solving systems of linear equations. The emphasis is on computation of determinants, operations with matrices, solving systems of linear equations, and solving eigenvalues and eigenvectors problems.

16. 预达学习成果 Learning Outcomes

通过对本课程的学习，学生可以理解和掌握线性代数的基本理论和技巧，能够熟练掌握行列式的基本理论和求解方法；熟练掌握矩阵的基本运算和矩阵的逆；熟练掌握求解线性方程组的方法；熟练掌握矩阵特征值和特征向量的计算；熟练掌握斯密特(Schmidt)正交化方法；熟练掌握化二次形为标准形的方法；理解向量线性相关性的理论、 n 维实空间的基和正交基、相似矩阵及矩阵可对角化、以及二次型的基本理论。

After completing this course, students should understand a few basic methods and techniques in Linear algebra. They should be able to manipulate and compute determinants, manipulate matrices and do matrix algebra, solve systems of linear equations, compute eigenvalues and eigenvectors and find the canonical form of a quadratic form. After learning this course, students should also need to understand linear independence and linear dependence, the basis and orthonormal basis of n -dimensional vector space, similar matrices and diagonalizable matrices and quadratic forms.

17. 课程内容及教学日历 (如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人)

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

Week 1:

1.1 Systems of Linear Equations

1.2 Row Reduction and Echelon Forms

1.3 Vector Equations

1.4 The Matrix Equations $Ax=b$

第一周:

1.1 线性方程组

1.2 行化简和阶梯型

1.3 向量方程

1.4 矩阵方程 $AX=b$

Week 2:

1.5 Solution Sets of Linear Systems

1.7 Linear Independence

第二周:

1.5 线性方程组的解集合

1.7 线性无关性

Week 3:

1.8 Introduction to Linear Transformations

1.9 The Matrix of a Linear Transformation

第三周:

1.8 线性变换简介

1.9 线性变换的矩阵

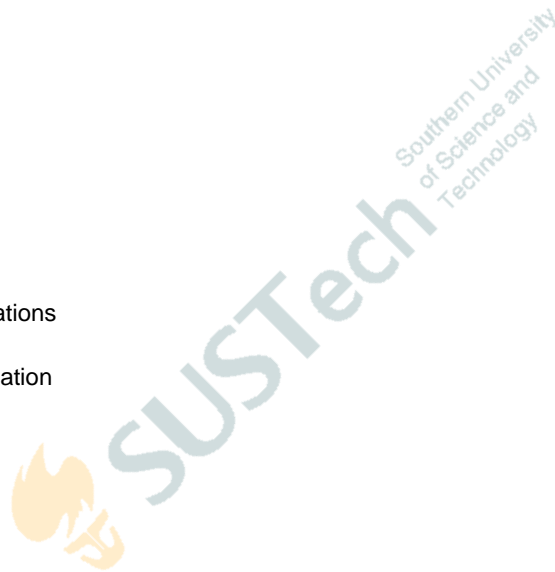
Week 4:

2.1 Matrix Operations

2.2 The Inverse of a Matrix

第四周:

2.1 矩阵运算



2.2 矩阵的逆

Week 5:

2.3 Characterizations of Invertible Matrices

2.4 Partitioned Matrices

2.5 Matrix Factorizations

第五周:

2.3 可逆矩阵的刻画

2.4 矩阵分块

2.5 矩阵分解

Week 6:

2.8 Subspaces of \mathbb{R}^n

2.9 Dimension and Rank

第六周:

2.8 \mathbb{R}^n 的子空间

2.9 维数和秩

Week 7:

3.1 Introduction to Determinants

3.2 Properties of Determinants

第七周:

3.1 行列式简介

3.2 行列式的性质

Week 8:

3.3 Cramer's Rule, Volume, and Linear Transformations

第八周:

3.3 克莱姆法则、体积和线性变换

Week 9:

4.1 Vector Spaces and Subspaces

4.2 Null Spaces, Column Spaces, and Linear Transformations

第九周:

4.1 向量空间和子空间

4.2 零空间、列空间和线性变换

Week 10:

4.3 Linearly independent Sets; Bases

4.5 The Dimension of a Vector Space

第十周:

4.3 线性无关集; 基

4.4 向量空间的维数

Week 11:

5.1 Eigenvectors and Eigenvalues

5.2 The Characteristic Equation

第十一周:

5.1 特征向量和特征值

5.2 特征方程

Week 12:

5.3 Diagonalization

5.4 Eigenvectors and Linear Transformations

第十二周:

5.3 对角化

5.4 特征向量和线性变换

Week 13

6.1 Inner Product, Length, and Orthogonality

6.2 Orthogonal Sets

第十三周:

6.1 内积、长度和正交性

6.2 正交集

Week 14:

6.3 Orthogonal Projections

6.4 The Gram-Schmidt Process

第十四周:

6.3 正交投影

6.4 Gram-Schmidt 正交化过程

Week 15:

7.1 Diagonalization of Symmetric Matrices

7.2 Quadratic Forms

第十五周:

7.1 对称矩阵的对角化

7.2 二次型

Week 16:

Review

第十六周:

学期复习

18. 教材及其它参考资料 Textbook and Supplementary Readings

教材 Textbook: David C. Lay, Steven R. Lay, Judi J. McDonald, Linear Algebra and its Applications, Fifth Edition, Pearson 2016, ISBN 13: 978-1-292-09223-2.

参考书/Supplementary Readings:

线性代数, 第六版, 同济大学数学系编, 2014, ISBN: 978-7-04-039661-4.

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		5		
课堂表现 Class Performance				
小测验 Quiz		15		
课程项目 Projects				

平时作业 Assignments		10		
期中考试 Mid-Term Test		30		
期末考试 Final Exam		40		
期末报告 Final Presentation				
其它（可根据需要 改写以上评估方 式） Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading
 B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
This Course has been approved by the following person or committee of authority

