

课程编号： 4482001 课程名称： 矩阵理论

(Course No. 4482001 : Course Name MatrixTheory)

一、课程简介 (Description)

1. 学分/学时 (Credit/Hours) : 3/48 (3Credit/48Hours)
2. 开课学期 (Semester) : 第1学期 (The first Semester)
3. 内容简介 (Introduction) :

矩阵论是线性代数的后继课程。在线性代数的基础上, 进一步介绍线性空间与线性变换、欧氏空间与酉空间以及在此空间上的线性变换, 深刻地揭示有限维空间上的线性变换的本质与思想。为了拓展高等数学的分析领域, 通过引入向量范数和矩阵范数在有限维空间上构建了矩阵分析理论。从应用的角度, 矩阵代数是数值分析的重要基础, 矩阵分析是研究线性动力系统的重要工具。为了矩阵理论的实用性, 对于矩阵代数与分析的计算问题, 利用Matlab计算软件实现快捷的计算分析。

(Matrix theory is the successor course of linear algebra. On the basis of linear algebra, the linear space and linear transformation, the Euclidean space and the unitary space and the linear transformation in this space are further introduced, and the essence and thought of the linear transformation in the finite dimensional space are deeply revealed. In order to expand the field of analysis of higher mathematics, a matrix analysis theory is constructed by introducing vector norm and matrix .From the point of view of application, matrix algebra is an important foundation for numerical analysis. Matrix analysis is an important tool for studying linear dynamical systems. For the practicality of matrix theory, the computation and analysis of matrix algebra and analysis are realized by using Matlab software.)

4. 教材名称 (Textbooks) :
《矩阵论简明教程》, 徐仲、张凯院编著, 科学出版社, 2013年。
(“A brief tutorial on matrix theory”, Zhong Xu, Kaiyuan Zhang. Sience Press, 2013.)
5. 先修课程 (Prerequisites) :
高等数学、线性代数
(Advanced Mathematics, Linear algebra)
6. 授课对象 (Teaching objects) : 硕士研究生 (Master's degree)
7. 适合专业 (Suited Professions) : 信号与信息处理 (Signal and Information Processing)
8. 教学语言 (Language of Instruction) : 中文 (Chinese)
9. 参考文献 (References) :
[1] 卜长江等.矩阵论[M]. 哈尔滨: 哈尔滨工程大学出版社, 2003 年
[1], Bu Bu Changjiang et al. Matrix theory [M].. Harbin: Harbin Engineering University press, 2003
[2] 徐仲等(西北).矩阵论简明教程(第二版)[M]. 北京: 科学出版社, 2002 年
[2]Xu Zhong, et al. (northwest). A concise course on matrix theory (Second Edition)

[M]. Beijing: Science Press, 2002

10. 任课教师及团队 (Coordinators & Team) :

二、教学目标 (Educational Objectives)

1. 目标1 (Objective 1) : 掌握矩阵理论的基本概念 (Master the basic concepts of Matrix Theory)
2. 目标2 (Objective 2) : 掌握矩阵论的基本理论和分析方法 (Master the basic theory and analysis method of Matrix Theory)

三、教学内容/学时分配/授课方式 (Topics Covered/Credit Hours/Lecture Model)

章 (Chapter.)	教学内容 (Topics Covered)	学时分配 (Credit Hours)	授课方式 (Lecture Model)
第1章 (Chapter 1)	矩阵的相似变换 (Similar transformation of matrix)	9	课堂讲授 (PPT teaching)
第2章 (Chapter 2)	范数理论 (Norm theory)	3	课堂讲授 (PPT teaching)
第3章 (Chapter 3)	矩阵分析 (matrix analysis)	12	课堂讲授、学生汇报 (PPT teaching, reports)
第4章 (Chapter 4)	矩阵分解 (matrix Factorization)	9	课堂讲授、学生汇报 (PPT teaching, reports)
第6章 (Chapter 6)	广义逆矩阵 (generalized inverse matrix)	4	课堂讲授、学生汇报 (PPT teaching, reports)
第7章 (Chapter 7)	矩阵的直积 Kronecker product of a matrix	2	课堂讲授、学生汇报 (PPT teaching, reports)
第8章 (Chapter 8)	线性空间与线性变换 Linear space and linear transformation	9	课堂讲授、学生汇报 (PPT teaching, reports)

四、考评方法 (Evaluation Method)

1. 作业 (Homework) : 列出题目所用知识点及详细解答步骤 (List the knowledge point used in the problem and the detailed solution steps)
2. 学生汇报 (student Reports) : 对题目进行详细的解题思路及解题步骤讲解
(Student should give a detailed explanation of their idea and procedure of solving the problem)
3. 期末考试 (Exams) : 闭卷考试 (Closed-book exam)

五、成绩比例 (Grading Scale)

针对课程所采用的各类考评办法, 给出以百分计算的考评成绩及其在总成绩中所占的比例, 最终给出该门课程的学习成绩 (以百分计)。

序号 (No.)	考评办法 (Evaluation Method)	成绩 (Grade)	所占比例 (Grading Scale)
1	作业 (Homework)	100	15%
2	汇报 (Reports)	100	15%
3	期末考试 (Exams)	100	70%

六、预期效果 (Assessment of Learning Outcomes)

1. 目标1 (Objective 1) : 使学生具备处理矩阵的思想与方法 (Make students have ideas and methods to deal with matrix)
2. 目标2 (Objective 2) : 使学生具有应用矩阵的理论和方法来分析问题和解决问题的能力 (students have the ability to apply the theory and methods of matrix to analyze and solve problems)