**《线性代数B》课程教学大纲**

1. **课程基本信息**

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| --- | --- | --- | --- | --- |
| **课程代码** |  | **课程名称** | **线性代数A** | |
| **开课院系** | **数学与统计学院** | **授课对象** | **理工科专业** | |
| **课程学分** | **3** | **课程学时** | **理论课程学时** | **48** |
| **实践课程学时** | **0** |
| **授课教师**  **(负责人)** | **湛少锋** | **邮箱** | **Shfzhan.math@whu.edu.cn** | |
| **电话** | **027-68752958** | |
| **授课教师** |  | **邮箱** |  | |
| **电话** |  | |
| **授课类别** | **专业必修课** | | | |
| **前导课程** | **高等数学** | | | |

**二、课程简介**

《线性代数》课程是数学的一个分支，它的研究对象是向量、向量空间、线性变换和有限维的线性方程组。由于线性问题广泛存在于科学技术的各个领域，而某些非线性问题在一定条件下可以转化为线性问题，因此本课程所介绍的方法广泛地应用于各个领域。

《线性代数》课程是高等学校经济管理类和理工类本科各专业学生的一门必修的重要基础理论课，属于基础数学类课程。是大部分经济管类和理工类课程的必备基础。

《线性代数B》课程是为本校理工科专业学生开设的一门必修的公共基础理论课。通过本课程的学习，学生不仅能够获得线性代数的基本知识，而且能够得到“两个基本训练”即：代数学基本方法的训练、线性代数基本计算的训练，同时培养和训练学生运用数学方法分析和解决问题的能力，拓展学生的数学知识，为进一步学习有关专业课程提供必要的数学基础。本课程内容包括：行列式（行列式定义、性质和按行（列）展开、克莱姆法则），矩阵（矩阵运算、逆矩阵、分块矩阵、初等矩阵与初等变换、矩阵的秩），线性方程组、向量空间与线性变换（欧式空间）、矩阵的特征值与特征向量、二次型（用配方法和正交化方法化二次型为标准形、正定二次型）。

**三、课程内容与学时分配**

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| --- | --- |
| **内容** | **学时** |
| **行列式** | **8** |
| **矩阵及其运算** | **10** |
| **线性方程组** | **12** |
| **向量空间与线性变换** | **4** |
| **相似矩阵** | **8** |
| **二次型** | **6** |
| **合计** | **48** |

**四、课程成绩评定**

**平时考勤与作业占总成绩20%，期中测验占总成绩10%，期末考试成绩占总成绩70%。**

**五、教材及参考书**

**教材:《线性代数》居余马编著，清华大学出版社, 2002 年9月**

**辅导教材：1、《线性代数学习指南》 居余马、林翠琴编著 清华大学出版社，2005年7月**

**2、《线性代数习题与解析》 湛少锋编著 清华大学出版社，2004年3月**

**Syllabus for Linear algebra B**

**1. Basic Course Information**

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| --- | --- | --- | --- | --- |
| **Course code** |  | **Course name** | **Linear algebra B** | |
| **Offered By** | **School of Mathematics and Statistics** | **Suitable For** | **Science and Engineering undergraduate** | |
| **Credits** | **3** | **Credit hours** | **Lecture** | **48** |
| **Experiment** | **0** |
| **Course director** | **Zhan Shaofeng** | **Email** | **Shfzhan.math@whu.edu.cn** | |
| **Tel.** | **027-68752958** | |
| **Course teacher** |  | **Email** |  | |
| **Tel.** |  | |
| **Course type** | **Compulsory courses** | | | |
| **Prerequisites** | **Advanced Mathematics** | | | |

**2. Course Description**

Linear Algebra is a branch of mathematics. It is studied in vector, vector space, linear transformation and finite dimensional linear equations. Since linear problems are widely existed in various fields of science and technology, and some nonlinear problems can be transformed into linear problems under certain conditions, the methods introduced in this course are widely used in various fields.

Linear Algebra is a compulsory basic theory course for economics management and science and engineering undergraduate students in colleges and universities. It belongs to basic mathematics courses. It is an essential foundation for most economic management and science and engineering courses.

Linear Algebra B is a compulsory public basic theory course for students of science and engineering majors. Through the study of this course, students can not only obtain the basic knowledge of linear algebra, but also get the "two basic trainings": the training of basic methods of algebra, the training of basic calculation of linear algebra, and the training and training of students using mathematical methods. Meanwhile, it can also cultivate the ability to solve problems, expand students' mathematical knowledge, and provide the necessary mathematical foundation for further study of relevant professional courses. The course content includes determinant (determinant definition, nature and row (column) expansion, Cramer's law), matrix (matrix operation, inverse matrix, block matrix, elementary matrix and elementary transformation, rank of matrix), Linear equations, vector spaces and linear transformations (Euclidean space), eigenvalues ​​and eigenvectors of matrices, quadratic forms (using quadratic forms as standard forms, positive definite quadratic forms).

**3. Course contents and lectures**

|  |  |
| --- | --- |
| **Contents** | **Lectures** |
| **Determinant** | **8** |
| **Matrix and its calculation** | **10** |
| **Systems of linear equations** | **12** |
| **Vector space and linear transformation** | **4** |
| **Similar matrix** | **8** |
| **Quadratic form** | **6** |
| **Sum** | **48** |

**4. Grading policy**

Attendance and homework 20%, mid-term exam 10% and final 70%.

**5. Textbooks and references**

**TextBook：**“Linear Algebra”, edited by Ju Yuma, published by Tsinghua University Press, September, 2002.

**Reference books:**

1、“Linear Algebra learning guide”, edited by Ju Yuma、Lin Cuiqin published by Tsinghua University Press, July, 2005.

2、“Problem and analysis of linear algebra” edited by Zhan Shaofeng published by Tsinghua University Press, March, 2004.