

课程编号 课程名称 数据科学概论

1. 课堂讲授学时 **Lecture Hours 10**
2. 课堂实验学时 **Laboratory Hours 22**
3. 课下研讨学时 **Colloquia Hours**
4. 学生课下投入学时 **Individual Study Hours**
5. 学分 **Credits 2**
6. 开课学年学期（如果有强制性的要求则必须填，否则可以不填） **Occurrence: 1st year, 2nd year, 3rd year, 4th year; Autumn, Spring**
7. 先修课程 **Prerequisite(s):** 必须先修的课程直接写课程编号和课程名称，建议先修的课程在课程名称后用*号标注，并在下一行注明：***Recommended, not required as prerequisite**
程序设计基础，概率论
8. 课程概要 **Course Description:** 100 字以内，学习内容以学术关键词出现。

本课程向学生介绍数据科学基础概念，重点讲解机器学习相关技术。课程采用理论讲授与编程实操相结合的教学模式，学习内容包括：

- (1) 数据科学核心原理及可视化工具
- (2) 机器学习的定义及其与传统编程的区别
- (3) 监督学习与无监督学习基础原理
- (4) 线性与非线性分类、回归模型
- (5) 聚类分析与降维相关技术
- (6) 借助机器学习库，使用 Python 实现各类模型
- (7) 机器学习模型的评估与结果解读

9. 课程预期学习成果 **Course Outcomes:** 用数字 1 到 9 列出每一项主要学习成果

- (1) 掌握监督学习、无监督学习等核心机器学习技术的理论概念。
- (2) 具备使用 Python 完成机器学习模型训练、评估与参数调优的实操能力。
- (3) 能够理解不同学习方法的适用场景，并掌握其应用方式。

10. 教学内容与学时分配 **Course Content, Laboratories and Laboratory Hours**（有则填，没有则不填），**Colloquia Hours**（有则填，没有则不填）：各章节目录与学时，实验内容与学时，研讨内容与学时

- (1) 数据基础入门：描述性统计、数据可视化（授课 2 学时，实验 2 学时）
- (2) 机器学习导论：监督学习基础（授课 2 学时，实验 3 学时）
- (3) 分类模型：线性与非线性分类（授课 2 学时，实验 3 学时）
- (4) 回归模型与特征工程（授课 2 学时，实验 3 学时）
- (5) 无监督学习：聚类与降维技术（授课 2 学时，实验 4 学时）
- (6) 课程作业（实验 4 学时）

11. 考核与成绩评定 **Grading:**

Homework: 100%

12. 教材，参考书 **Text & Reference Book:** 作者，书名，版本，年份，国际标准书号 ISBN

[1] HASTIE T, TIBSHIRANI R, FRIEDMAN J. The elements of statistical learning[M]. 2nd ed. New York: Springer, 2009. ISBN:9780387848589.

[2] BISHOP C M. Pattern recognition and machine learning[M]. New York: Springer, 2006. ISBN:9780387310737.

13. 编写教师 **Course Lecturer:**

Mohammad GOLBABAEE, 赵三元
编写教师 **Course Lecturer** (签字):

附录：英文课程教学大纲模板

附录:

Introduction to Data Science

1. 课堂讲授学时 Lecture Hours: 10
2. 课堂实验学时 Laboratory Hours: 22
3. 课下研讨学时 Colloquial Hours:
4. 学生课下投入学时 Individual Study Hours:
5. 学分 Credits: 2
6. 开课学年学期 (如果有强制性的要求则 必须填, 否则可以不填) Occurrence: Summer Course
7. 先修课程 Prerequisite(s): Programming-related courses* (*Recommended, not required as prerequisite) Programming experience, Basic statistics and mathematics
8. 课程概要 Course Description: 100 字以内, 学习内容以学术 关键词出现。

This course introduces students to foundational concepts in Data Science with a particular emphasis on machine learning (ML) techniques. Through a blend of theory and hands-on coding, students will explore:

- (1) Core principles of Data science and visualisation tool.
 - (2) What is ML and how does it differ from traditional programming?
 - (3) Core principles of supervised and unsupervised learning
 - (4) Classification and regression models: linear and nonlinear
 - (5) Clustering and dimensionality reduction techniques.
 - (6) Practical implementation of models in Python using related ML libraries
 - (7) Evaluating and interpreting ML models
9. 课程预期学习成果 Course Outcomes:
- By the end of successful completion of this course, the student will be able to:
- (1) Conceptual understanding of key ML techniques including supervised and unsupervised learning.
 - (2) Experience in training, evaluating, and tuning machine learning models in Python.
 - (3) Understanding when and how to use different learning approaches
10. 教学内容与学时分配 Course Content, Laboratories and Laboratory Hours (有则填, 没有则不填), Colloquial Hours (有则填, 没有则不填):
- (1) Introduction to data: descriptive statistics, data visualization (2hrs lecture, 2hrs labs)
 - (2) Introduction to machine learning (ML): Supervised learning fundamentals (2hrs lecture, 3hrs lab)
 - (3) Classification: linear and nonlinear (2hrs lecture, 3hrs lab)

- (4) Regression models and feature engineering (2hrs lecture, 3hrs lab)
- (5) Unsupervised learning: clustering and dimensionality reduction (2hrs lecture, 4hrs lab)
- (6) Assignment (4hrs lab)

11. 考核与成绩评定

Grading:

Homework: Project 100%

12. 教材，参考书 Text & Reference Book:

[1] HASTIE T, TIBSHIRANI R, FRIEDMAN J. The elements of statistical learning[M]. 2nd ed. New York: Springer, 2009. ISBN:9780387848589.

[2] BISHOP C M. Pattern recognition and machine learning[M]. New York: Springer, 2006. ISBN:9780387310737.

13. 编写教师 Course Lecturer:

Mohammad GOLBABAEE, Sanyuan Zhao

编写教师 Course Lecturer (签字):