附件1：

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| 课程名称（中英文） | 数学建模和数据分析  Mathematical Modeling and Data Analysis |
| 课程先修条件  Course prerequisite  （中英文） | 微积分，线性代数，微分方程  Calculus, Linear Algebra, Differential Equations |
| 课程学时  Course hours | 课内学时\_\_\_32\_\_\_\_\_ |
| 课程大纲及  考核方式 | Mathematical modeling and data analysis are key technologies in broad areas of science and engineering. This course will cover numerical methods for mathematical modeling, fundamentals and algorithms for machine learning, and statistical and computational inverse problems. Each theoretical lecture will be followed by a computational lab session to implement the formula- and algorithm-based method with a programming language.  本课程主要教学内容包括：①数学建模和数据分析的基本概念：基本术语，发展历程，应用现状；②应用线性代数：矩阵分解，SVD方法，平衡问题，图模型，递归最小二乘；③应用微分方程：有限差分，有限体积，有限元，谱方法，物理信息神经网络；④数据挖掘：监督学习，无监督学习，强化学习，大语言模型训练和测试；⑤反演和优化问题 ：线性问题，非线性问题，贝叶斯推测，MCMC。  The main teaching contents of this course include: (1) Basic concepts of mathematical modeling and data analysis: basic terms, development history, application status; ② Application of linear algebra: matrix decomposition, SVD methods, equilibrium problems, graph models, recursive least squares; ③ Applied differential equations: finite difference, finite volume, finite element, spectral method, physical information neural network; Data mining: supervised learning, unsupervised learning, reinforcement learning, large language model training and testing; Inversion and optimization problems: linear problems, nonlinear problems, Bayesian conjecture, MCMC.  考核方式及成绩评定标准：  作业 60 %、  小组合作 40 %  Assessment methods and performance evaluation criteria:  Homework 60%,  Group cooperation 40% |