

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	MAE5002 高等数值分析 Advanced Numerical Methods												
2.	课程性质 Compulsory/Elective	专业核心课 Graduate core course												
3.	课程学分/学时 Course Credit/Hours	3/48												
4.	授课语言 Teaching Language	英语 English												
5.	授课教师 Instructor(s)	万敏平 教授												
6.	是否面向本科生开放 Open to undergraduates or not	否												
7.	先修要求 Pre-requisites	(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)												
8.	教学目标 Course Objectives	<p>This course provides an advanced introduction to numerical analysis suitable for graduate students in mathematics, computer science, physical sciences, and engineering. It is assumed that the reader is familiar with calculus and has taken a structured programming course. It covers numerous topics including Interpolation and Polynomial Approximation, Curve Fitting, Numerical Differentiation, Numerical Integration, and Numerical Optimization. Introduction to last development, such as machine learning technique will also be given. For engineering and computer science fields.</p>												
9.	教学方法 Teaching Methods	Regular lectures and a research project												
10.	教学内容 Course Contents	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Section 1</td> <td>Preliminary knowledge</td> </tr> <tr> <td style="text-align: center;">Section 2</td> <td>Non-linear equations</td> </tr> <tr> <td style="text-align: center;">Section 3</td> <td>Numerical solution of linear equations</td> </tr> <tr> <td style="text-align: center;">Section 4</td> <td>Interpolation and polynomial approximation</td> </tr> <tr> <td style="text-align: center;">Section 5</td> <td>Curve fitting</td> </tr> <tr> <td style="text-align: center;">Section 6</td> <td>Numerical differentiation</td> </tr> </table>	Section 1	Preliminary knowledge	Section 2	Non-linear equations	Section 3	Numerical solution of linear equations	Section 4	Interpolation and polynomial approximation	Section 5	Curve fitting	Section 6	Numerical differentiation
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	Section 7	Numerical integration
	Section 8	Numerical optimization
	Section 9	Numerical solution of ODE
	Section 10	Numerical solution of PDE
	Section 11	Introduction to machine learning
11.	课程考核 Course Assessment	
	<p>(① 考核形式 Form of examination; ②. 分数构成 grading policy; ③ 如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)</p> <p>1. Final exam</p> <p>2. 分数构成 grading policy</p> <p>Homework (20%)</p> <ul style="list-style-type: none"> ◆ Homework will be assigned for each topic, and will be due at the end of each month. ◆ Homework grading will be based on both completeness and correctness. <p>Mid-Term Test (30%)</p> <ul style="list-style-type: none"> ◆ The research project will be an application of the methods covered in the lectures to a practical problem. ◆ The problem will be assigned with instructions in November. ◆ The report will be presented in the format of a technical paper. <p>Final exam (50%)</p> <ul style="list-style-type: none"> ◆ The final exam will be a two-hour, close-book test. ◆ The exam will be scheduled at the completion of the lectures. <p>The final grades may be subject to curving.</p>	
12.	教材及其它参考资料 Textbook and Supplementary Readings	
	Textbook: J. Mathews and Kurtis Fink, Numerical Methods Using MATLAB	