

Course Syllabus

MA206 **Mathematical Modeling**

Spring semester 2025

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Department Math, SUSTech
MA206 Mathematical Modeling
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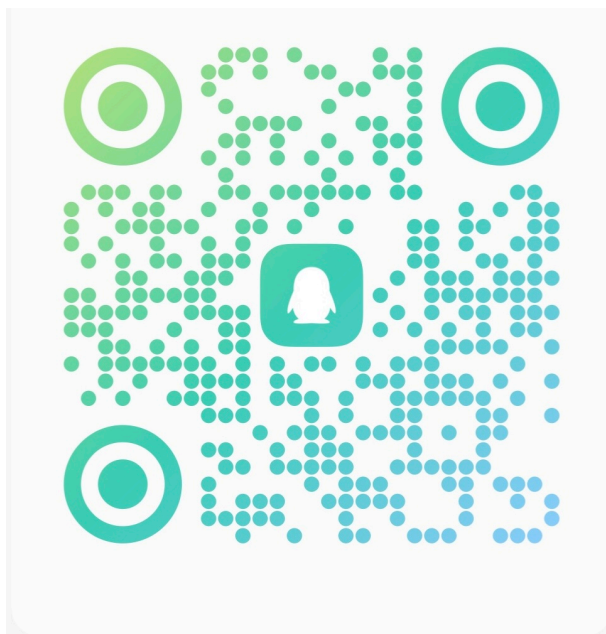


Figure 1: QQ group for MA206.

1 General information

1.1 Course Description

The course is designed for students who need to acquire the knowledge and skills of mathematical modeling at a high standard. The course emphasizes more the fundamental principle and thinking of mathematical modeling, writing skills and computational techniques.

1.2 Time and venue

Thursday	14:00 - 15:50	weekly	Rm. 510, Teaching Building #3
Thursday	19:00 - 20:50	weekly	Rm. 104, Teaching Building #3

1.3 Office Hours

Thursday, 10:00-12:00 weekly, Rm. 609, School of Science.

1.4 Textbook & Reference

- **Textbooks**

1. An Introduction to Mathematical Modeling (3rd edition), Frank R. Giordano, et al., Cengage Learning, 2003, (or 5th edition, 2014).

- **References**

1. Mathematical Modeling (4th edition), Qiyuan Jiang et al., 2011, Higher Education Press (in Chinese), (or 5th edition, 2018).

1.5 Calculators

Calculators are not allowed for exams or quizzes unless permitted.

1.6 Q & A

1. *Can I drop a course after the drop period?*

You are not allowed to drop the course after the drop period unless under extreme circumstances, such as long-term hospitalization. Excuses such as insurmountable workload for taking too many courses or oversight in checking course registration status will not be entertained.

2. *What courses should I take before MA206?*

You are suggested take courses like ODEs, PDEs, Probability, Statistics, Numerical Analysis in advance.

2 Course Structure

2.1 Attendance

Since there is a strong positive relationship between class attendance and success in the classroom, you are expected to attend all classes. Attendance will be *ad hoc* checked at **eleven** class periods. *Only* one absence will be excused without dropping your grade. After that, each absence will drop your score by 1 point. If you miss class for a valid excuse (illness, death in the family), you must email TA *and* me before the class period and complete the homework on your own to receive credit for that period.

2.2 Homework

Homework will be collected every Thursday via my email (jzlisustc@gmail.com) *no later than 13:00*, **twelve** times in total. **No late assignments will be accepted.** Best 10 (out of 12) scores are counted for credit.

The homework due in any given week is the homework corresponding to the material of the previous week. Homework must be readable and should be **sent** to (jzlisustc@gmail.com). Illegible scribbles will receive no credit. You are encouraged to typeset your homework with LaTeX or Markdown.

You are encouraged to attempt all the questions by yourself before discussing them with your classmates. However, the write-up must be of your own.

2.3 Quizzes

You will have quizzes around every three weeks in class, **five** times in total. It usually takes 40 minutes, which only requires you to understand concepts and basic problem-solving skills. **No make-ups will be made for quizzes.** Only best 4 (out of 5) scores are counted for credit, which means you can miss one quiz or have it poorly done at one quiz.

2.4 Projects

The project deliverables will be a written report and a project presentation after the conclusion of the class. Students must attend at least one project presentation, not including their own. The project can be done in groups of three or less. Programming experience with a high-level language, either Matlab, C, C++, Java, or Python, is essential for this course. The project will require a serious investment of time and effort. Do not take this course unless you are prepared for this very substantial commitment.

There will be **five** projects in total. You are encouraged to gain experience in the mathematical design, analysis, and implementation of computational algorithms for solving real-world problems through the projects. All teams shall present specific topics together with project reports and slides, which will be shared via email with the class by the Wednesday before class.

2.5 Midterm

One midterm is scheduled on **Thursday, April 17th**, tentatively. Make-ups may be given in extraordinary cases with valid excuses, but only with documented reasons.

2.6 Final Exam

The Final Exam will be given during the **Final Exam Weeks (June 9th – 20th)**. The time, venue and date of the final will be later announced in class.

2.7 Course Grade

Your course grade will be determined using the following distributions:

Attendance	10%
Homework	10%
Quizzes	20%
Projects	30%
Midterm	15%
Final	15%

Attention

Any cheating or plagiarism in homework, quiz, project or exam will lead directly to the failure of this course with zero score.

3 Tentative Course Outline

1. Introduction
2. *Writing skills
3. Programming skills
4. Modeling Change
5. Modeling proportionality and Geometric Similarity
6. Model Fitting.
7. Data-driven modeling
8. Simulation Modeling
9. Discrete Probabilistic Modeling
10. Discrete Optimization Modeling

11. Dimensional Analysis
12. Modeling with Ordinary Differential Equations
13. Optimization of Continuous Modeling
14. **Modeling with Graph Theory
15. **Modeling with Decision Theory
16. **Game Theory

**: covered in class, not required in any tests. **: not covered in class, but highly recommended to learn by yourself, and you can ask me questions about these parts.*