Course Syllabus
MA206 **Mathematical Modeling**
Spring semester 2018-2019

February 16, 2019

Department Math, SUSTech
MA206 Mathematical Modeling
Spring 2019
Syllabus

Instructor: Dr. Jingzhi Li
E-mail: jzlisustc@gmail.com
Office: Rm. 418, Block 3, Wisdom Valley
QQ group: MM2019Spring, 261153832
TA 1: Mr. Hao'an Yi
E-mail: yiha@mail.sustc.edu.cn
TA 2: Mr. Yudong Liang
E-mail: 11711217@mail.sustc.edu.cn
Office: Rm. 413, Block 3, Wisdom Valley

MM2019Spring

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

Tuesday, 14:00 - 16:00 weekly, Rm. 206 Block 2, Lychee hill,
Thursday, 14:00 - 16:00 biweekly odd, Rm. 206 Block 2, Lychee hill.

1.3 Office Hours

Wednesday, 14:00-17:00 weekly, Rm. 418, Block 3, Wisdom Valley

1.4 Textbook & Reference

- **Textbooks**
  1. first
     An Introduction to Mathematical Modeling (3rd edition) Frank R. Giordano, et al., Cengage Learning, 2003, (or 5 ed., 2014)
- **References**
  1. Mathematical Modeling (4 ed.) Qiyuan Jiang et al., 2011, Higher Education Press (in Chinese).

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

10/11

Because 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

on by email to TA. Mr. Liang

Homework will be collected every Tuesday in class or in TA's office *no later than 14:00*, **twelve times in total. No late assignments will be accepted.** Best 10 (out of 12) scores are counted for credit. 10/12

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 **stapled**. Illegible scribblings will receive no credit.

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 on Tuesday every three weeks in class, **five** times in total. It usually takes 20 minutes, which only requires you to understand concepts and basic problem solving skills. **No makeups 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. 4/5

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++, or Java, 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 financial 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 Tuesday before class. 5

2.5 Midterm

One midterm is planned on Tuesday, April 9th, tentatively. Makeups 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 Week (June 3rd – 7th).
The time, venue and date of the final will be announced later in class.

2.7 Course Grade

Your course grade will be determined using the following distributions:

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

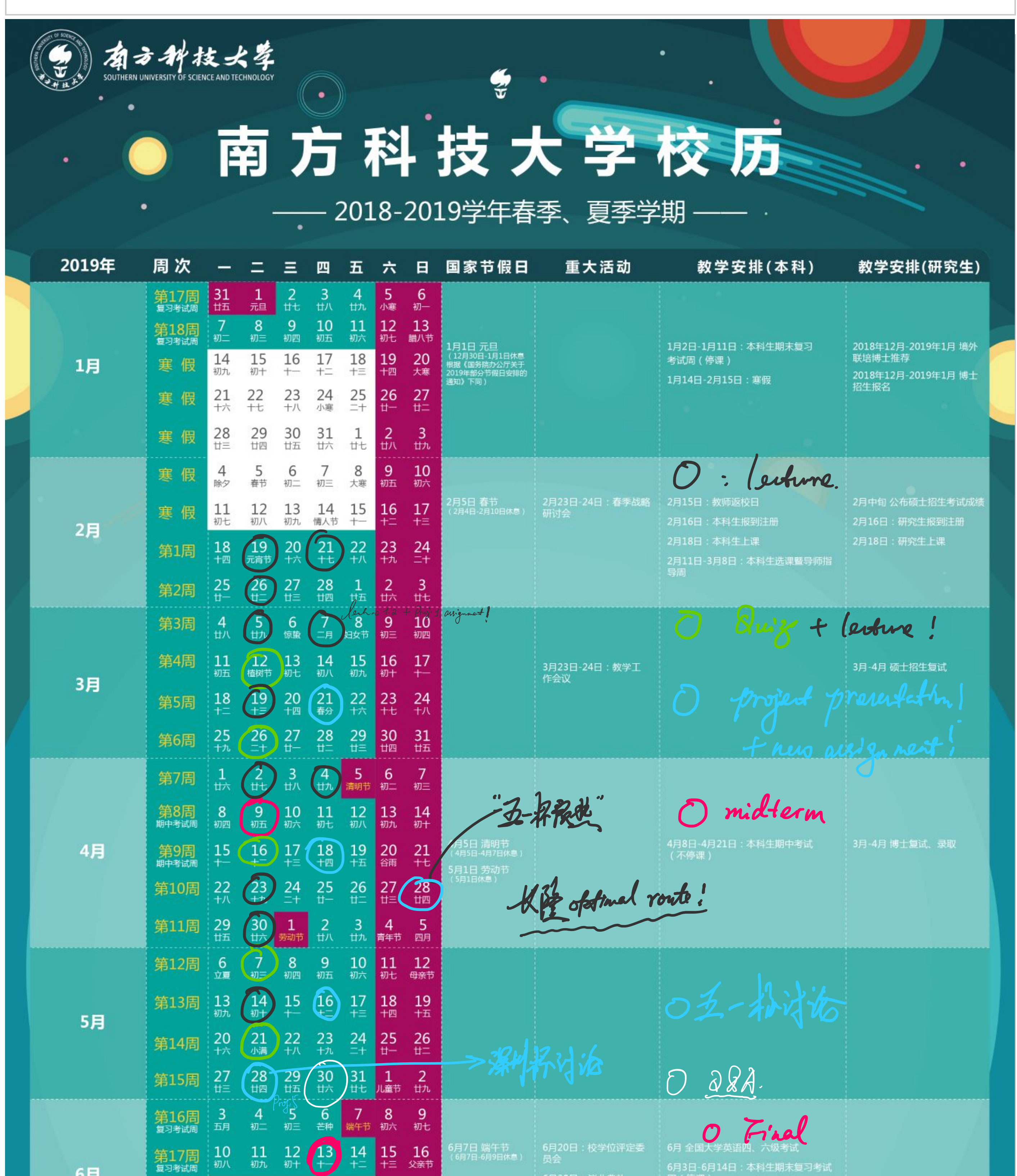
3 Tentative Course Outline

0. Syllabus + Course plan + suggestions! Week 1.
2. Introduction + Programming techniques via Matlab. Week 3. + Quiz 1 (Thursday)
1. *Writing skills → Next lecture! LaTeX + MarkDown. Week 2.
3. Modeling Change Week 4.
4. Modeling proportionality and Geometric Similarity
5. Model Fitting.
6. Data-driven modeling
7. Simulation Modeling
8. Discrete Probabilistic Modeling
9. Discrete Optimization Modeling
10. Dimensional Analysis
11. Modeling with Ordinary Differential Equations
12. Optimization of Continuous Modeling
13. **Modeling with Graph Theory

14. **Modeling with Decision Theory
15. **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.*

4 Academic calender for spring term 2019


南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

南方科技大学校历

—— 2018-2019学年春季、夏季学期 ——

2019年	周次	一	二	三	四	五	六	日	国家节假日	重大活动	教学安排（本科）	教学安排（研究生）
1月	第17周 复习考试周	31 廿五	1 元旦	2 廿七	3 廿八	4 廿九	5 小寒	6 初一	1月1日 元旦（12月30日-1月1日休息 根据《国务院办公厅关于2019年部分节假日安排的通知》下同）		1月2日-1月11日：本科生期末复习考试周（停课） 1月14日-2月15日：寒假	2018年12月-2019年1月 境外联培博士推荐 2018年12月-2019年1月 博士招生报名
	第18周 复习考试周	7 初二	8 初三	9 初四	10 初五	11 初六	12 初七	13 腊八节				
	寒假	14 初九	15 初十	16 十一	17 十二	18 十三	19 十四	20 大寒				
	寒假	21 十六	22 十七	23 十八	24 小寒	25 二十	26 廿一	27 廿二				
	寒假	28 廿三	29 廿四	30 廿五	31 廿六	1 廿七	2 廿八	3 廿九				
2月	寒假	4 除夕	5 春节	6 初二	7 初三	8 大寒	9 初五	10 初六	2月5日 春节（2月4日-2月10日休息）	2月23日-24日：春季战略研讨会	O : lecture. 2月15日：教师返校日 2月16日：本科生报到注册 2月18日：本科生上课 2月11日-3月8日：本科生选课暨导师指导周	2月中旬 公布硕士招生考试成绩 2月16日：研究生报到注册 2月18日：研究生上课
	寒假	11 初七	12 初八	13 初九	14 情人节	15 十一	16 十二	17 十三				
	第1周	18 十四	19 元宵节	20 十六	21 十七	22 十八	23 十九	24 二十				
	第2周	25 廿一	26 廿二	27 廿三	28 廿四	1 廿五	2 廿六	3 廿七				
3月	第3周	4 廿八	5 廿九	6 惊蛰	7 二月	8 妇女节	9 初三	10 初四	lecture 1.2 + proj. 1 assignment!	3月23日-24日：教学工作会议	O Quiz + lecture ! O project presentation! + new assignment!	3月-4月 硕士招生复试
	第4周	11 初五	12 植树节	13 初七	14 初八	15 初九	16 初十	17 十一				
	第5周	18 十二	19 十三	20 十四	21 春分	22 十六	23 十七	24 十八				
	第6周	25 十九	26 二十	27 廿一	28 廿二	29 廿三	30 廿四	31 廿五				
4月	第7周	1 廿六	2 廿七	3 廿八	4 廿九	5 清明节	6 初二	7 初三	“五一杯预热” 4月5日 清明节（4月5日-4月7日休息） 5月1日 劳动节（5月1日休息） 长隆 optimal route!		O midterm 4月8日-4月21日：本科生期中考试（不停课）	3月-4月 博士复试、录取
	第8周 期中考试周	8 初四	9 初五	10 初六	11 初七	12 初八	13 初九	14 初十				
	第9周 期中考试周	15 十一	16 十二	17 十三	18 十四	19 十五	20 谷雨	21 十七				
	第10周	22 十八	23 十九	24 二十	25 廿一	26 廿二	27 廿三	28 廿四				
	第11周	29 廿五	30 廿六	1 劳动节	2 廿八	3 廿九	4 青年节	5 四月				
5月	第12周	6 立夏	7 初三	8 初四	9 初五	10 初六	11 初七	12 母亲节			O 五一杯讨论 O Q&A.	
	第13周	13 初九	14 初十	15 十一	16 十二	17 十三	18 十四	19 十五				
	第14周	20 十六	21 小满	22 十八	23 十九	24 二十	25 廿一	26 廿二				
	第15周	27 廿三	28 廿四 Proj. 5	29 廿五	30 廿六	31 廿七	1 儿童节	2 廿九	深圳杯讨论			
6月	第16周 复习考试周	3 五月	4 初二	5 初三	6 芒种	7 端午节	8 初六	9 初七	6月7日 端午节（6月7日-6月9日休息）	6月20日：校学位评定委员会 6月28日：毕业典礼	O Final 6月 全国大学英语四、六级考试 6月3日-6月14日：本科生期末复习考试周（停课） 6月17日-28日：夏季学期选课周	
	第17周 复习考试周	10 初八	11 初九	12 初十	13 十一	14 十二	15 十三	16 父亲节				
	招生面试周	17 十五	18 十六	19 十七	20 十八	21 夏至	22 二十	23 廿一				
	暑假 夏季学期第1周	24 廿二	25 廿三	26 廿四	27 廿五	28 廿六	29 廿七	30 廿八				
7月	暑假 夏季学期第2周	1 建党节	2 三十	3 六月	4 初二	5 初三	6 初四	7 小暑		7月1日：七一表彰大会	6月24日-8月30日：暑假（其中6月24日-8月2日为夏季学期）	7月 研究生招生夏令营
	暑假 夏季学期第3周	8 初六	9 初七	10 初八	11 初九	12 初十	13 十一	14 十二				
	暑假 夏季学期第4周	15 十三	16 十四	17 十五	18 十六	19 十七	20 十八	21 十九				
	暑假 夏季学期第5周	22 二十	23 大暑	24 廿二	25 廿三	26 廿四	27 廿五	28 廿六				
	暑假 夏季学期第6 周	29 廿七	30 廿八	31 廿九	1 建军节	2 初二	3 初三	4 初四				

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5 lecture 1. 2.

7. Matlab .

Project 1.

① One chapter { Zhao! + Higham!
coding

② Listing in latex code!

③ 去年份赛题!

请先录指纹