

# TEACHING STATEMENT

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## 1 Teaching history

My teaching history at Soochow University:

- **Course** (in Chinese): Applied Mathematics Topics: Using Mathematical Languages to Study Practical Problems (Spring 2018)
  - **Role:** Teaching Assistant
  - **Responsibilities:** Assisted the professor in organizing the course, preparing teaching materials, providing guidance to students, grading assignments and exams, and addressing students' questions. This course focused on the application of mathematical concepts to solve practical problems.
- **Course** (in Chinese): Numerical Partial Differential Equations (Spring 2018)
  - **Role:** Teaching Assistant
  - **Responsibilities:** Supported the professor in course management, assisted in material preparation, guided students in their studies, evaluated assignments and exams, and offered assistance to students. This course centered on numerical methods for solving partial differential equations.
- **Course** (in Chinese): Analytical Geometry (Fall 2018)
  - **Role:** Teaching Assistant
  - **Responsibilities:** aided in material preparation, provided guidance to students, graded assignments and exams, and addressed student queries. This course covered the principles of analytical geometry.
- **Course** (in Chinese): Advanced Mathematics (Summer 2019)
  - **Role:** Instructor
  - **Responsibilities:** Led the course as the primary instructor, prepared teaching and tutorial materials, conducted tutorials, graded assignments and exams, and offered academic support to students. This course delved into advanced topics in mathematics.

My teaching history at HKUST:

- **Course** (in English): Calculus, MATH 1014 (Lecture and Tutorial) (2022 Spring)
  - **Role:** Instructor
  - **Responsibilities:** developed and designed the syllabus and schedule, prepared teaching and tutorial materials, conducted lectures and tutorials, graded assignments and exams, and offered academic support to students and answer their questions one by one. This course covered the principles and applications of calculus.

Throughout my teaching history at Soochow University in Jiangsu of China and HKUST in Hong Kong, I have acquired experience as both a Teaching Assistant and an Instructor, contributing to the education and academic growth of students.

## 2 Teaching philosophy

In the teaching process and after teaching, I have always adhered to a student-centered approach. One of the challenges in teaching is getting too absorbed in delivering the content during the class, which can hinder effective interaction with students. I constantly remind myself of this. Whether it's in the classroom or after class, I make it a priority to promptly address students' questions and any issues they may have. For incoming freshmen, grasping new knowledge can be challenging, especially considering the variations in how different students comprehend and absorb information. This requires a personalized approach in my teaching, and I place particular emphasis on individual tutoring and answering questions. I have gained a lot from teaching, with the most significant reward being the feedback from students once the course is completed and student evaluations are done. Positive feedback motivates me to continue implementing teaching principles that seem reasonable, while negative feedback prompts me to reflect on any issues during the teaching process and to redesign my teaching methods. I am delighted to have received a letter of appreciation from a student at HKUST below.



In my mind, there are three key elements for effective teaching below.

- **problem-based learning approach:** Concrete mathematical examples and homework are essential for students to nail what they learn. I encourage students to propose new problems based on the old problems and solve it by the well-known mathematical principles and tools. I believe questions are often common among students and answering one specific question is actually beneficial to a lot of other students.
- **build connections:** I will make the content well organized and help students make connections. Often, new knowledge is just a variation of what they learned before. I will help them to develop a clear structure of general framework and articulate individual contents coherently within the global picture. By connecting knowledges, students can reinforce old knowledges and extend to new knowledges.
- **active interactions in class:** This can make sure students are following closely and thinking carefully about class materials.

### 3 Teaching interest

I have solid training in mathematical foundations of analysis and algebra based on the courses studied during college below:

- Advanced Algebra (I): 92/100 (score/total) Mathematical Analysis (I): 83/100;
- Analytic Geometry: 92/100 Advanced Algebra (II): 90/100;
- Mathematical Analysis (II): 92/100 Mathematical Analysis (III): 93/100;
- Ordinary Differential Equations: 97/100 Complex Analysis: 96/100;
- Fundamentals of Programming (C Language): 90/100 Class Management: 90/100;
- Mathematical Modeling and Software: 87/100 Real Analysis: 95/100;
- Probability Theory and Mathematical Statistics: 93/100 Numerical Analysis: 99/100;
- Modern Algebra: 94/100 Differential Geometry: 97/100;
- Mathematics Paper Writing Guidance: 93/100;

Moreover, I have more deep understanding of applied mathematics based the courses during the graduate study below:

- Numerical solution of Partial Differential Equations (I): 100/100;
- Partial Differential Equations: 100/100 Multi-scale Methods: 100/100;
- Material Modelling and computation: 100/100 Numerical Homogenization: 100/100;
- Modelling and Simulation of magnetic material: 100/100;
- Introduction to Homogenization: 100/100 Advanced Mathematical Statistics: 78/100;
- Numerical solution of Partial Differential Equations (II): 90/100 Real analysis: 89/100;
- Functional Analysis: 84/100 Numerical Computation: 82/100;

Based on the teaching experience and what I have learned and trained, my preferred teaching interests are below:

- For undergraduate students: Calculus (sometimes named Advanced Mathematics); Linear Algebra; Introduction to basic programming languages (C, C++, python);
- For graduate students: Numerical Analysis; Introduction to finite difference method; Introduction to finite element method; Numerical homogenization; Introduction to Micromagnetics; Introduction to numerical methods for fluid and solid mechanics; Fast numerical methods for PDEs; Machine learning model and methods for scientific computing (might be a topic of group meeting);
- Beyond (for learning and group meeting purpose): Landau-Lifshitz equation; Fluid-Structure Interaction; Two-phase flow modeling and algorithms; Phase field model, analysis and applications; Sharp interface model and simulations; Numerical methods for moving contact line problems; Machine learning methods and applications; thresholding dynamics method and its applications;

In addition to these, if there are other suitable courses, it's also a worthwhile challenge. For these courses, I will actively prepare course materials and lecture notes, making it easy for students to understand and have as reference for long-term learning. In fact, the allure of computational mathematics lies in computation. If possible, I would like to integrate theory and practice, connecting dry theory with lively computation, making science more interesting, students more accessible, and helping them lay a solid foundation for future research.

I believe that universities have an important social responsibility of training and mentoring students to have "minds" and to think rationally. Based on my teaching experience that directly mentored students for a period of time, my interactions with junior colleagues and students, and my personal positive experiences on being mentored, lead me to believe that I am qualified to do so. Teaching and mentoring gives me the opportunity to understand, learn and mold young minds to the larger cause – the betterment of both science and humankind; a cause that I passionately believe in.