

Teaching and Mentoring Statement

Lin Jiu

“Teaching and learning promote and enhance each other.” —The Book of Rite, Warring States period.

This Chinese quote on teaching and learning reveals the mutual benefit between them, as well as between the instructor and students. Although I read it as a teenager, not until 2014, when I first became an instructor, did I finally begin to better understand the nature and connections between teaching and learning. There are several key concepts, such as

- *motivation and inspiration*: as William Arthur Ward said “The mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. The great teacher inspires.”;
- *engagement*, by, e.g., group discussion, asking and answering questions;
- systematical *training plans* and *course designs*, by organizing materials, setting appropriate homework assignments, quizzes, and tests;
- involvement of *student research projects* (, as my published my first paper as a junior student) *and beyond*;
- and finally the cultivation in *active pursuing*.

For instance, teaching objects are no longer restricted to course materials; it is more important to foster a deeper understanding, to cultivate a self-independent learning, and to guide students with problem-solving skills. My ultimate goal is to cultivate the students necessary skills in problem solving, such as critical thinking and communication, and finally to guide the students into becoming self/independent math learners outside the classroom. To fulfill those goals, certain pedagogical strategies are applied.

1. Experiential teaching enriches the contents and activities in class. Besides traditional in-class activities, e.g., group discussion on problems with interactions, model tools, such as presentations on simulation demos, can catch the attention and stimulate students to further explore materials. Connecting a real-world problem to mathematical theory, not only encourages interdisciplinary learning for students; but also reveals the process of analyzing and solving real problems.
2. Research-driven teaching opens the door of higher-level research projects to graduate, as well as undergraduate, students. Some homework problems, especially in high level courses, are particularly selected. They are either directly from research projects or published papers, to offer the opportunity to the students participating certain projects; or are given in a literature review format, as the opening step to research topics. For example, presentation on topics related but beyond the teaching materials is one of such formats.
3. Ed-tech innovative teaching becomes increasingly a major part. The use of software such as Mathematica¹ and SageMath² is not restricted in presenting simulations and plots. Programming homework, dynamic notes, etc. always appear in my class.

1 Diverse and Abundant Experiences

Throughout all three institutes I have taught: Tulane University, Dalhousie University, and Duke Kunshan University, I experienced from private university, public university to the joint-venture liberal arts college. As shown in Appendix B, up to now, I have lectured (including current teaching ones)

- 24 sections, of 10 different regular math courses, including **various levels of calculus, linear algebra, probability, complex analysis, and number theory**, at three different institutes;

¹<https://www.wolfram.com/mathematica/>

²<https://www.sagemath.org/>

- **1 miniterm**, i.e., a 1-week short course, and **6 independent study**, i.e., reading courses, for completely different topics, e.g., **combinatorics, analytic number theory, quantum computing, and algebraic geometry**.

In general, for basic math courses, e.g. calculus, linear algebra, probability and statistics, I have no preference, as all such courses are essential and important to students majoring in STEM. Meanwhile, as my research topics include several branches, such as combinatorics, number theory, etc., many advanced courses, e.g., complex analysis, abstract algebra, also fit my area perfectly. Take MATH301—Advanced Introduction to Probability at Duke Kunshan University (DKU) as an example. This course was designed by me upon my arrival at DKU. Many ingredients were taken into consideration, including but not restricted to the seven-week session structure at DKU, undergraduate curriculum, related major requirements, and other courses. The course serves as an elective in math major, and also consists of important materials for further courses, such as MATH405—Financial Mathematics. Some research topics, e.g., probabilistic methods, Shor's algorithms in quantum computing are also introduced in the end.

2 Adjustment, Improvement, and Innovation

Teaching and learning is a dynamic process, so adjustment is required almost every single time. I am always willing to modify part of my teaching and adopt new already tested techniques into my course. This continuous adjustment encourages me to constantly reconsider the purpose and aims of the course and my teaching strategies. Moreover, comments on each course's evaluation are also helpful for improvement. The current average of the overall score and some comments show that I am a “good teacher”; still, there is room and space to become a better instructor. In order to constantly improve my teaching, I am also engaged in many activities. For instance, I led two sessions by the *Center for Teaching and Learning* (CTL) of DKU, on the **usage of MaxHub**³, a digital whiteboard in hybrid teaching; and **WeBWorK**⁴.

Also facilitated by the CTL, I was selected as one of the two instructors at DKU to conduct the **Gradescope⁵ Research Project**, awarded a grant of \$2,000. Gradescope is a digital grading system that allows instructors to scan and upload exams, and to grade them online. It reduces the grading time for classes of large size and digitizes the tests. In addition, I was selected as a **member of Faculty Learning Community** (FLC) 2022-2023, across all disciplines, to discuss and learn from each other in teaching.

3 Outside the Classroom—Undergraduate Mentoring

As an advisor at DKU, we are assigned **totally 10-16** undergraduate mentees, from each year, so that students can get guide and suggestions from course registrations, major declaration, etc. For instance, every semester before registering courses for the next term, advisees are required to meet the mentor, for discussion.

Undergraduate research has always been a strong part of my academic life; and I have benefited from it myself, by joining seminars and publishing my first 2 papers as an undergraduate student. As the current Discrete Math Seminar⁶ organizer, many talks/presentations are given by undergraduate students; and some projects eventually end as papers. Since 2020 at DKU, **each summer**, I have guided **at least 2 students** for summer research projects; in Summer 2024, as a visiting scholar at Dalhousie University, I also co-mentor, with Dr. Karl Dilcher, two undergraduate students. Since an undergraduate thesis, which is called Signature Work project at DKU, is required in China, I have guided **7 in 2023** and **3 in 2024**; among which, **three were based on publish/submitted papers**.

Admittedly, there is always a distance from being a great teacher, and I am willing to constantly improve in teaching. As my experience grows, my teaching will be more effective, diverse, and innovative. My enthusiasm and commitment will never decrease.

³<https://www.maxhub.com/>

⁴<https://openwebwork.org/>

⁵<https://www.gradescope.com/>

⁶https://sites.duke.edu/kits_team_101_48585/

Appendix

A TEACHING GRANTS AND AWARDS

2022.12–2024.06	Faculty Learning Community Grant	Duke Kunshan University
2022.01–2022.12	Gradescope Research Project Grant Facilitated by Center for Teaching and Learning at Duke Kunshan University	Gradescope
2012–2013	Gradescope for math courses. Excellent Graduate Student Teacher	Math Dept., Tulane Univ.

B Teaching Experience

2025 Winter	MATH 6200	Integer Partitions and q -Series	Dalhousie University
2024 Fall	MATH 307	Complex Analysis	Duke Kunshan University
2023 Fall	MATH 105	Calculus	Duke Kunshan University
	MATH 202	Linear Algebra	Duke Kunshan University
	MATH 105	Calculus	Duke Kunshan University
	MATH 301	Advanced Introduction to Probability	Duke Kunshan University
2023 Spring	MATH 205	Probability and Statistics	Duke Kunshan University
	MINITERM 102	Experimental Mathematics and Symbolic Computation	Duke Kunshan University
2022 Fall	INDSTU 391	Introduction to Algebraic Geometry	Duke Kunshan University
	MATH 105	Calculus	Duke Kunshan University
	MATH 306	Number Theory	Duke Kunshan University
	MATH 301	Advanced Introduction to Probability	Duke Kunshan University
2022 Spring	INDSTU 391	Variational Quantum Algorithms	Duke Kunshan University
	MATH 201	Multivariable Calculus	Duke Kunshan University
	MATH 301	Advanced Introduction to Probability	Duke Kunshan University
	MATH 201	Multivariable Calculus	Duke Kunshan University
2021 Fall	MATH 105	Calculus	Duke Kunshan University
	INDSTU 391	Riemann Zeta-Function	Duke Kunshan University
	INDSTU 391	Quantum Algorithm	Duke Kunshan University
	MATH 306	Number Theory	Duke Kunshan University
	INDSTU 391	Combinatorics	Duke Kunshan University
2021 Spring	MATH 205	Probability and Statistics	Duke Kunshan University
	MATH 301	Advanced Introduction to Probability	Duke Kunshan University
2020 Fall	MATH 105	Calculus	Duke Kunshan University
	MATH 201	Multivariable Calculus	Duke Kunshan University
2019 Summer	MATH 1030	Matrix Theory and Linear Algebra I	Dalhousie University
2019 Winter	MATH 3080	Introduction to Complex Variables	Dalhousie University
2016 Spring	MATH 1060	Long Calculus II	Tulane University
2015 Fall	MATH 1310	Consolidated Calculus	Tulane University
2015 Spring	MATH 1210	Long Calculus I	Tulane University
2014 Summer	MATH 1160	Long Calculus II	Tulane University