Teaching Statement

As a visiting assistant professor at UCI, I have been given the opportunity to teach 8 lower-division classes, 5 upper-division classes and 1 research class[1]. I love teaching and I really care about my students. I cherish my 2+ years teaching experience from UCI and 6 years TA experience from UW-Madison, which groomed me as I developed from a math Ph.D. student to a math professor.

As a serious mathematician, I have high expectations for my students. To achieve my goals with them, I strive to implement good teaching practices including well-organized lectures, clear explanations, helpful office hours and improving my teaching skills to promote active learning. The following comments from one of my ODE students might be a good illustration of my teaching performance.

> *Professor Wang is very helpful in office hours and her class notes are clear and helpful. She is very approachable and definitely wants you to understand the subject. She is good at explaining the intuition behind the mathematical concepts, and then going through the proofs step by step. It's clear she wants her students to succeed. Overall, a great teacher!*

In the following of my teaching statement, I shall describe my teaching strengths in detail.

First, **I encourage independent and creative thinking.** A good journey in math always starts from strong curiosity and self-motivation. To motivate them, I usually present interesting applications of the subject and give a broad view of the topic. At the same time, my enthusiasm on the subject is reflected in my speaking and writing throughout the lecture. Students always enjoy discussing their independent thinking with me, both inside and outside the classroom. In my lectures, when I present a statement or a theorem, instead of directly writing down " Theorem ...", I usually give my students the opportunity and time to think what we can expect in a statement or what extra conditions are needed. For example, in a calculus class, instead of simply writing down Green's formula precisely, I invite students to discover 'the simply connected condition' (as explained to them as 'without a hole' condition) from examples by themselves. This way effectively prevents students from mechanically memorizing results without understanding the mathematics. In my upper-division classes, I assign creative final projects, and encourage them to engage group discussions. I also introduce some basic training in looking for references on the internet. For example, in my Ring and Field Theory (Math 120) class, I assigned a final bonus project on the prime ideal domain structure of the Novikov ring, with an introduction to the history and importance of this ring in modern geometry[2].

Second, in my classes **I always provide real-life examples before solid math.** Math is an abstract subject. However, almost every mathematician thinks about math in a visualizable way rather than via pure logical deduction. In my opinion, one is not able to grasp a math concept until he or she could explain it in a way that even ordinary people could get the idea. For example, usually at the beginning of a group theory class, students are not very comfortable with the abstract language. When I introduce the concept of transitivity in an equivalence relation in the first class, I prefer an example like the following before I strictly write down the precise definition, "You know there are two types of relationships among people. One is like between relatives and the other is like between friends. By the first one, if David is related to John and John is related to Tom, then David must be related to Tom too. However, by the second one, David is a friend of John and John is a friend of Tom, but David may not be a friend of Tom! Transitivity is just used to distinguish these two types of relationships. " My students always laugh, but more importantly, they will never have trouble in mastering this concept any more. After students catch the concept, I will then present them with plenty of supporting examples. The following comments from my students indicate my teaching effectiveness in this aspect.

> *She gives us a lot of examples to illustrate a really abstract idea or theorem. She explains the idea really clearly until we understand when we ask her questions; The teacher usually gives us the theorems then EXAMPLES before proceeding with the proof which is very helpful since a lot of the theorems are very abstract so we do not know what we are even trying to prove; She is able to make rather complicated things more concise and understandable. For example, the instructor made the difficult theorems in class easier to understand by carefully explaining it.*

[1] They are Linear Algebra (3A); Multivariable Calculus I (Math 2D); Multivariable Calculus II (Math 2E); Theory of ODEs (Math 118); Group Theory (Math 120A); Ring and Field Theory (Math 120B); Undergraduate Research (Math 199).

[2] available at `https://www.math.uci.edu/~ruiw10/pdf/alg2.pdf` P. 49.

— Students from Group Theory, Ring and Field Theory and Theory of ODEs

Third, **I am effective from both inside and outside the classroom.** As a math professor, I deliver every lecture in high quality, which requires good preparation in both content and organization. I prepare my lectures and select homework problems very carefully, so that they cover the key knowledge points of the course. To help students think actively in my lecture instead of busily coping notes, I prepare and post my lecture notes online systematically[3]. I also practice good skills of (black/white-)board writings so that every students in my class can read clearly. These efforts bring me a lot of appreciation from my students and here are some of their comments from various classes (Calculus, Linear Algebra, Group Theory and Ring and Field Theory).

> *She is very knowledgeable. Teaches without any notes in hand or book, which is quite impressive; Professor Rui knows the material really well and she understands the concepts very deeply; She writes very neatly and big enough to see from the back of the classroom; Her logic is very clear. She writes extremely clear lecture notes on the board. It is perfect to tell her lecture is an art of performance; Provides thorough lectures in class accompanied by regularly-updated summary notes that give an overall outline of what was covered, which is exceedingly helpful.*

Outside the lectures, besides regular office hours, I also provide meeting times for those who are not available in my office hours. Students commented that I was "extremely patient and approachable". Starting from this quarter, I created a discussion board from the course website for my Group Theory students. This encourages students to join math discussions, share their mathematical ideas and practice their math expressions.

Fourth, **I construct an interactive teaching environment.** I think the role of an instructor is to guide, not to push. Hence, I always provide a comfortable environment for my students to ask questions in my class. "Don't be shy to ask questions" is always the first advice I give to my students. A student from my Ring and Field Theory wrote such a comment on the evaluation –"The instructor asks if we have questions throughout the lecture and actually WAITS FOR A RESPONSE, unlike other teachers who don't really want people to ask questions."– which exactly reflects my teaching style from this perspective. I never worry that too many questions would slow down the pace of lectures. In my opinion, learning to ask important questions is an essential ability and the best evidence of understanding. Moreover, the quality of questions shows how well students follow the class, which helps me to judge the pace of my class. Opposite to intuition, experience shows that to setup an interactive environment at the beginning of each semester/quarter will NOT slow down the pace but make the teaching much more effective.

> *Whenever there is a confusing concept that is being lectured and explained, she does not hesitate to ask the class if there are questions before proceeding. In addition, when asked about a misunderstanding of a question, she will go back and explain slightly differently and focus a little more time to make sure we grasp the proper definition.*
>
> *— A student from Calculus*

The last but not the least, **I care about every student.** I never consider math as a subject only for very smart people. Everyone who is eager to learn should have an equal opportunity to see the beauty of math. For those who appear to be falling behind, I choose to ask them if they have special difficulty in my class. I suggest basic topics or skills for them to review. When students feel that they have been cared for, they always would make more effort to catch up. For those who are particularly interested in math and willing to learn more, I am happy to provide extra help to introduce them into the wonderful world of modern mathematics. In the past year, I have been supervising two students in Undergraduate Research (Math 199), in which I guide them to read more advanced books for research and help them to choose research/survey topics.

Since I was a little girl, my dream has always been to become a mathematician. Born to a very ordinary family, this dream couldn't have been realized without a great deal of help from my teachers. Therefore, I deeply understand the importance of being a qualified mentor for students. I am willing to pass down my knowledge and my passion for math to every student of mine.

[3]available at `https://www.math.uci.edu/~ruiw10/`.

Course List

- University of California at Irvine (Oct, 2015 – present) [Visiting Assistant Profressor]
  - Math 2D: Multivariable Calculus I
  - Math 2E: Multivariable Calculus II
  - Math 3A: Linear Algebra
  - Math 120A: Group Theory
  - Math 120B: Ring and Field Theory
  - Math 118: Theory of ODEs
  - Math 199: Undergraduate Research
- University of Wisconsin at Madison (Jul, 2006 – May, 2013) [Teaching Assistant]
  - Math 210: Calculus for business school students
  - Math 221: Calculus I
  - Math 222: Calculus II
  - Math 234: Calculus III
  - Math 340: Linear Algebra
  - 2011 Summer Instructor of Summer International TA Training Program
    An honored appointment for TAs with excellent evaluations
    Duty: Organizing a six-week training section to prepare new international TAs with better teaching ability and responsibilities.