Teaching Statement

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I have strong fundamental in all areas of mathematics and I am an experienced college math teacher. I have a huge and various experience in teaching mathematics. I have over 20 years of teaching experience with college level math. I have taught every undergraduate math courses and master degree courses from basic courses to advanced courses. These include Calculus I, II, III, Business Calculus, Half Calculus III, Probability Theory, Differential Equations, Applied Linear Algebra, and for advanced courses, Real Analysis, Abstract Algebra, Abstract Linear Algebra, Complex Variables, Applied Complex Variables, Differential Geometry (under development). I am currently teaching four courses: Differential Geometry, Complex Variables, Applied Complex Variables, and Abstract Linear Algebra, and I am active in research and learning seminars. I am participating in and attending Algebraic Number Theory seminar, Algebraic Geometry seminar, Graduate Student Algebraic Geometry seminar every semester.

• Recent Teaching:

<table>
<thead>
<tr>
<th>Course</th>
<th>Time</th>
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<tbody>
<tr>
<td>Complex Variables for Engineering Students</td>
<td>Spring 2020</td>
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<tr>
<td>Applied Complex Variables</td>
<td>Summer 2019, May 2019 ~ Present</td>
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<td>Complex Variables</td>
<td>May 2018 ~ Present</td>
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<td>Abstract Linear Algebra</td>
<td>May 2018 ~ Present</td>
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<td>Complex Variables</td>
<td>Summer 2018, May 2018 ~ Present</td>
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<td>Abstract Linear Algebra</td>
<td>May 2018 ~ Present</td>
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<td>Abstract Algebra</td>
<td>Summer 2017</td>
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<td>Real Analysis</td>
<td>Summer 2017</td>
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• Recent course content development: Differential Geometry, Fall 2019 – Spring 2020.

• Due to COVID19 pandemic, I created 10 sets of exams of each of Applied Complex Variables (Math446) and Complex Variables (Math448) to give online proctoring exams.

I have taught and developed online courses for 8 years since 2012. I initiated online teaching of advanced courses including Real Analysis, Abstract Algebra, Abstract Linear Algebra, Complex Variables, Applied Complex Variables, Differentiable Geometry (under development) and the online courses were successful. I also created randomized exam question pools for all basic undergraduate courses (Calculus I, II, III, Business Calculus, Probability Theory, Differential Equations, Applied Linear Algebra). I created all the necessary contents to post on Moodle (a learning management system) and created exams each year and each summer. I created lecture note presentations of a whole semester (40+ lectures) of each
of Real Analysis, Abstract Algebra, Abstract Linear Algebra, Complex Variables, Applied Complex Variables(edited), I created homework assignments (and solutions), course syllabi, course topics of each of the lectures, and I designed course schedule.

As for teaching online courses, I teach open enrollment courses, not semester based and also semester based courses. The course start days of the former vary, so I manage the students’ progress individually. I teach the former in one to one manner. Each summer I created two different exams of the course I teach. There are on- and off-campus students. I grade all exams and homework and give feedback. I give virtual office hours via Blackboard and Zoom. I answer all students’ emails regarding math and administrative questions and posts in Moodle. I regularly send announcements regarding, for example, homework due dates for semester based courses.

I have made valuable contributions to mathematics education at the University of Illinois at Urbana-Champaign through my teaching over the past 17 years. I have taught all the undergraduate courses while working for online teaching, working as a TA at the University of Illinois at Urbana-Champaign, and as an adjunct professor at the Governors State University, and I went through all the course materials as I am teaching and developing the course contents for more than 10 undergraduate courses which include all level of Calculus, Differential Equations, Applied Linear Algebra, Probability theory, Abstract Algebra, Real Analysis, Complex Variables, Applied Complex Variables, Abstract Linear Algebra, and Differential Geometry. The advanced courses that I developed are Abstract Algebra, Real Analysis, Complex Variables, Applied Complex Variables, Abstract Linear Algebra, and Differential Geometry. These are for the master degree program.

I developed and randomized Testbank (Exam questions pool) questions for Calculus I, II, III, Business Calculus, Differential Equations, Applied Linear Algebra, Probability Theory. I wrote Mathematica codes which randomize numbers, functions and statements of the exam problems for the testbank. The testbank is currently being used to generate exams for the courses we are offering.

I have taught graduate students at the graduate student Algebraic Geometry Seminar. I gave talks in the seminar in several topics including derived categories of abelian categories and applications, moduli space of algebraic curves, Zariski tangent space to the moduli space of vector bundles, and complete intersections in Algebraic Geometry. I hope to teach Differential Geometry, Complex Algebraic Geometry, Commutative Algebra, and Algebraic Geometry, and to teach and create an online course of Elementary Algebraic Geometry.

Teaching requires not only knowledge of the courses but also discipline through experiences. I have been disciplined as a math professor through the experiences in the master degree program and the PhD program at the Kyungpook National University in S. Korea, in the PhD program at the University of Illinois at Urbana-Champaign, and at the Governors State University as an adjunct professor. I currently use a one-to-one manner teaching method to teach Abstract Linear Algebra, Applied Complex Variables, Complex Variables for engineering students (Spring 20), and Complex Variables. I give one-to-one virtual office hours, answer students questions via emails, posts on Moodle (Learning Management System). I carefully review my students’ homework papers (One of my students submitted 43 pages of
homework paper) and write feedback on them. I grade all the exams and write feedback.

This is an experience when I taught at the Governors State University. Most of the students were working full time and the came to school at Wednesday night after work. This is a different environment compared to the students at the University of Illinois at Urbana-Champaign. Most of the students at the University of Illinois at Urbana-Champaign are full time traditional students.

I carefully prepare lecture notes for each of my classes. I also attended campus workshops to share teaching experiences. In class, there are almost nonsense questions from the students due to lack of knowledge or background. When they have the same questions, I answer each of the questions. Before classes when I prepare for classes I think over expected questions from the students including symbols, notations, concepts and traditions.

I have had a unique experience as a mathematician. I developed new courses and successfully initiated them. I have taught classes both face to face and online. I have taught students both traditional and nontraditional. I am a committee member of NMC (National Math Competition) and an ICTM (Illinois Council of Teachers of Mathematics) final judge. I have participated in Graduate Algebraic Geometry Seminar, and attended Algebraic Geometry Seminar, Algebraic Number Theory Seminar (Arithmetic Geometry). I am an excellent math professor and I reviewed and taught all undergraduate courses and advanced courses. I am a committee member of the KSEA math contest for which I create 11th grade contest questions every year since 2016. I teach AMC and Mathcounts to my children and their friends. I have had full time students who are working full time, part time students who are professionals, and traditional full time students. I employ technology to teach off-campus students who are professionals. I teach them in a one-to-one manner via virtual office hours, emails, and Forum in Moodle (a Learning management system).

Teaching Philosophy

As Martin Buber said, “Teaching is an encounter.” I know my students by name.

My students enjoy learning when they understand new concepts and catch up in the courses. My students’ ultimately goal is to finish the courses successfully so that they learn the subjects and master the topics and hopefully apply them to their research and work place. I teach both semester based synchronous courses and non-semester based open enrollment asynchronous courses. Every summer I teach both on-campus and off-campus office hours. The recent semester based courses I am teaching and taught are Applied Complex Variables (Summer 2019) and Complex Variables XGR (Spring 20). The current asynchronous courses are Complex Variables, Applied Complex Variables, and Abstract Linear Algebra.

The students like to visit during both my classroom office hours and my virtual office hours. I used Blackboard software to give virtual office hours and currently I use Zoom. I use virtual white board to write and send them to the students right after the office hours. I illustrate examples, explain concepts, algorithms, proofs during the virtual office hours. I usually use examples to explain difficult concepts and guide the students until they understand and solve all the problems they want to know. I answer the same questions until they understand.
I make all of the classes approachable for all students. I create basic examples and I also adjust exam problems to make the students successful.

From my extensive experience, I have the following:

First, I understand the course material thoroughly and draw a big picture. I give the students insights and explain complicated concepts effectively. I look at the same problem from different angles.

Second, I create examples which illustrate complicated concepts. I build upon simple concepts to help students understand more difficult concepts. I show problem solving models and standard proofs. People are able to solve similar problems created from old problems, not completely new problems.

Third, I use consistent notations. This way I can avoid confusion. Mathematical notations are distinguished from dictionary words. They are precise. I define terms as clearly as possible, making the students comfortable. They are able to get familiar with the mathematical terms as they use them repeatedly.

Fourth, I keep in touch with students in the courses. I am an available instructor through office hours or through emails. I happen to have students who were frustrated in my classes. They stop contacting and make pretty slow progress and drop the class. I keep encouraging to support those students.

Fifth, studying a math course is like building structures upon a foundation. Upon a solid foundation of basic concepts we build more advanced concepts upon it. I explain from basic concepts to more advanced concepts so the students master the main topics of the courses.

Teaching Experience

I have over 20 years of college level teaching experience. I have taught upper-level courses including Complex Variables, Complex Variables for engineering students, Applied Complex Variables, Abstract Linear Algebra, Abstract Algebra, Elementary Real Analysis. They are both synchronous and synchronous. I am currently teaching Abstract Linear Algebra, Complex Variables, Applied Complex Variables, and , Complex Variables for engineering students (Spring 20). I successfully have taught all the courses. In the end course survey, overall quality of the courses in the summer of 2017 is as follows. 92 % of real analysis student gave Good/Excellent and 67 % of abstract algebra gave Good/Excellent. Due to this success, in the following year, the summer 2018, the real analysis course was full and abstract algebra course was almost full. In the summer of 2018, 83 % of complex variables student gave Good/Excellent.

I am a Lecturer and the content developer of the new upper-level courses towards the master degree program. I have taught and teach both asynchronous courses and synchronous courses. I have taught and teach off-campus students who are enrolled in the University of Illinois at Urbana-Champaign. I have taught and teach students who are enrolled in Universities other than University of Illinois at Urbana-Champaign. They working professionals, PhD students,
Master degree students, and international students outside the US. I developed course contents of about 10 undergraduate courses and new advanced upper-level courses towards the master’s degree program at the University of Illinois at Urbana-Champaign. I created all the course resources including randomized TestBank (Exam problem pool) questions for about 10 undergraduate courses, and lecture note presentations of each of Differential Geometry, Complex Variables, Applied Complex Variables (Edited), Abstract Linear Algebra, Abstract Algebra, Elementary Real Analysis. These courses have 40 (or 42) lectures (a whole semester) each for 50 minutes classes or 27 lectures classes each for 75 minutes. I created homework assignments of each of the courses. I wrote solutions. I created exam preps and solutions of each of the courses. I created exams: one set for asynchronous courses each year and two sets for synchronous courses each summer; I created extra exams as needed. Students retake the same courses. In the COVID19 pandemic situation I created 10 different exam sets of Complex Variables and Advanced Complex Variables. They are total 70 exams.

I taught students who were working full time at the Governors State University in 2013 as an adjunct professor. I taught Complex Variables and Applied Calculus every Wednesday evening. During that time I gained confidence and insight in teaching students who have weak background in mathematics and are working full time. I had to prepare extra materials for those students to make them familiar with basic algebra and trigonometry. I returned homework assignments with feedback after one week. I had to made a change for them to succeed in tests. What I have learned through this experience is that I need to help them learn basic math skills including basic algebra. This could be achieved by guiding the students to complete the courses. I learned that it is important for them to complete a small thing every class.

I have taught and reviewed all undergraduate courses including Calculus I, II, III, Business Calculus, Half Calculus III, Probability Theory, Applied Linear Algebra, Introduction to Differential Equations, and upper-level courses including Abstract Algebra, Elementary Real Analysis, Abstract Linear Algebra, Complex Variables, Applied Complex Variables, Differential Geometry. My experiences of tutoring, grading, and discussion sections as a Teaching Assistant include Non-euclidean geometry, Abstract Algebra, Real Analysis, Linear algebra, Differential Equations, Elementary Number Theory, Abstract Algebra II (Ring and Module theory) and Analytic Number Theory. The last two are graded courses usually for PhD students.

I taught a blended course for a year; Finite Mathematics as a TA. I taught undergraduate NetMath Mathematica based courses; Calculus I, II, Business Calculus, Half Calculus III, Applied Linear Algebra, Differential Equations, and Probability Theory. I graded exams and gave feedbacks. I graded all homework and I responded students’ questions regarding both math and administrative.

Through these extensive experience I reviewed all undergraduate courses, most upper level-courses, some graduate courses for PhD students.

I created all resources to teach online courses including lecture notes presentations, syllabi, course schedule, topics of each sections, course objectives, quizzes and solutions, exams, practice exams and solutions, and supplementary materials. Quizzes are created for students
to review what they learned. Exams are created to test students on multiple concepts they had learned over a period of time. Quizzes are straight-forward computational questions, while exams require more efforts. I adjust the difficulty of exam problems by dividing them into three levels, easy, medium and hard. I write both computational and proof based questions. I give hints and steps to guide difficulty questions as I wrote exams. I create simple and clear exam questions. Grading exams are also a teaching process, so I give helpful comments responding to students’ answers.

Through my 20 years experience I learned that teaching mathematics is challenging, rewarding and definitely enjoyable.

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