Teaching statement

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My primary teaching interests are concerned with ordinary and partial differential equations, mathematical analysis, principles of applied mathematics, and probability theory

Learning outcomes. Some of the major learning outcomes for a student in my course are the following: (i) demonstrate an understanding of fundamental concepts and results in core content areas; (ii) improve logical reasoning to construct clear and concise mathematical arguments, using appropriate notation and terminology; (iii) develop an ability to make connections across disciplines, and apply the techniques to solve real-world and applied problems; (iv) build an intuition for using technological tools to support mathematical investigations, visualize concepts, and present solutions; and finally (v) improve critical thinking skills. It is ultimately expected that after successfully completing my course the student is better prepared to embark on the next step in their educational, or professional careers.

Pedagogical approach. To ensure students fulfill the learning outcomes described above various methods are employed. A detailed course syllabus is provided to students on the first day of class. Typically, students first encounter the course content during regularly scheduled in-person lectures where they have the opportunity to take notes, ask questions, and form study groups. Lectures are largely a balance between theory and problem-solving, but may also include Python demonstrations to help clarify the material. It is stressed that mathematics is an active, not passive subject. Therefore, students are provided problem sets meant to further develop their understanding of the course material covered during lecture. Communication is important. To this end educational technology such as Blackboard, or Canvas, is used in my courses. This gives students easy access to course announcements, notes, and problem sets. Moreover, it allows students to track their progress by displaying grades in one place. Finally, individualized assistance is offered to students during regularly scheduled office hours.

Assessment. Examinations are an important form of assessment that allows students to demonstrate their understanding of the subject matter. Additionally, problem sets are regularly assigned and graded throughout the semester. When appropriate bi-weekly quizzes are given during recitations and are meant to keep students focused on the course throughout the semester. Moreover, in some courses such as Introduction to Differential Equations students are assigned several labs related to scientific computing. The labs provide students the opportunity to develop skills in a programming language such as Python or Mathematica. Finally, points are given to students for class participation to foster engagement during the lectures.

Teaching is a highly rewarding profession. My favorite aspect of teaching is the role I play as a mentor to young mathematicians. One of my personal objectives as an educator is to reveal the beauty and ubiquity of mathematics. Moreover, I strive to foster an inclusive learning environment by building professional relationships with students and by promoting mutual respect. In order to improve upon my teaching careful consideration is given to anonymous course evaluations.

Student mentoring.
University of Kansas, Department of Mathematics

1. Caleb Jones
   Master's Thesis, committee member, 2025

2. Bennett Kinder
   Initial-boundary-value problems and the unified transform
   Undergraduate project, project advisor, 2024-25

   B. Kinder is now a graduate student in the Mathematics Department at University of Kansas

3. Haley Cabrera
   Fitting empirical dynamical models to describe the effect of climate change on population dynamics of fish species in the North Atlantic
   Undergraduate Research Award in Mathematics, project advisor, Fall 2023

   H. Cabrera presented her research related to this project at the Undergraduate Mathematics Symposium at the University of Illinois at Chicago, November 8, 2024

Teaching related service.
(i) Central Florida Math Circle–<https://sciences.ucf.edu/math/circle/>

  - Lead advanced group lessons (six weeks)   Spring 2023
  - Public lesson: *Patterns in mathematics and nature*   Feb. 4, 2023
  - Public lesson: *Patterns in mathematics and nature*   March 5, 2022

(ii) Professional Development at Simons Laufer Mathematical Sciences Institute (previously MSRI)

During my MSRI Postdoctoral Fellowship I organized several professional development seminars. This included inviting senior research members to serve as panelists for each seminar.

  - Grant writing
  - Job search
  - Writing an effective research statement
  - Giving a good seminar
  - Broader impacts of research in mathematics

(iii) Publicly available lecture notes

  - Introduction to Ordinary Differential Equations
    <https://j-oregero.github.io/math/ode_notes_web.pdf>

  - Introduction to Partial Differential Equations
    <https://j-oregero.github.io/math/pde_notes_web.pdf>