

Teaching Interests

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MISSION

Add maximum value to each student's university education and experience.

TEACHING PHILOSOPHY

Measuring value gains in education is difficult, but a student's progression from novice to expert¹ is a decent proxy. A student who stops waiting for instructions and starts deciding what to do next is a signal that they are learning, and that I am adding value.

The scholarly teaching cycle is an effective tool I use to evaluate my teaching effectiveness: design, teach, collect evidence, analyze, and revise. I apply this routine regularly to keep the parts of my teaching practice that add value, and drop the parts that do not. This approach is also central to my professional development, which my CV documents.

In the initial stages of the cycle, I use a backward design approach² to structure a syllabus. I set specific learning objectives, then choose the assessments and exercises that support them. Following tested principles for instruction in higher education³⁻⁵, I incorporate cutting-edge research, real-world applications, quantitative skill building, and student-led mini projects using real data. My students digest scientific literature, publicly communicate results, make precise measurements, organize and visualize data, and give and receive peer (and instructor!) feedback. They also practice metacognition, self-regulation, teamwork, organization, tenacity, and leadership.

During teaching and the latter stages of the cycle, I collect two-way feedback to assess my teaching performance. Asking students about their learning provokes metacognition and improves their learning experience^{6,7}. I ask students where "sticking points" are before moving forward. This helps me assess student engagement and identify my own shortcomings on the fly. Twice per semester I solicit bare-bones responses about what helps and hinders learning. I evaluate this feedback in consultation with experts to improve my teaching practice. I have documented evidence of teaching effectiveness since 2020 (see below).

The scholarly teaching cycle allows me to replace my *personal feelings* about my teaching with actual *evidence* of student learning. The evidence shows me where value is added, and where to adjust next term.

COURSES I HAVE TAUGHT

I have been teaching in some role since 2015. The list below is evidence of my capability to instruct at a high level across varying topics, class sizes, and formats.

term	course	title	format	role	size	score	dpt
S23	GLG 556	Environmental & Economic Mineralogy	Seminar	Instructor	7	3.9/4	3.4/4
S23	GLG 456	Environmental & Economic Mineralogy	Seminar	Instructor	30	3.9/4	3.4/4
S23	GLG 111	Dynamic Earth	Lecture/Lab	Instructor	342	3.6/4	3.4/4
F22	GLG 211	Chemistry of Earth Systems	Lecture/Lab	Instructor	27	3.4/4	3.4/4
F22	GLG 121	Environmental Geology	Lecture/Lab	Instructor	196	3.7/4	3.5/4
S21	GEOS 345	Igneous & Metamorphic Petrology	Lecture/Lab	TA	23	—	—
F20	GEOS 471	Field Methods	Field Lab	TA	8	—	—
F20	GEOS 315	Sedimentology & Stratigraphy	Lecture/Lab	TA	21	—	—
S20	GOES 314	Structural Geology	Lecture/Lab	Instructor	20	—	—
S19	GEOS 645	Physics & Chemistry of Mountain Building	Seminar	Guest lecturer	12	—	—
S18	GEOS 597	Subduction Zone Processes	Seminar	Co-instructor	15	—	—
S16	GEOS 300	Earth Materials	Lecture/Lab	TA & guest lecturer	23	—	—
F15	GEOS 101	Introductory Geology	Lecture/Lab	TA	48	—	—

POTENTIAL ADDITIONAL COURSE OFFERINGS

- **Computational Methods.** Students review and write code to apply geostatistical and machine-learning methods to geologic datasets through live coding and shared notebooks. They complete an open-ended project that advances their own research and learn version control and FAIR data principles.
- **Physics and Chemistry of Mountain Building.** Students examine the petrologic and thermomechanical consequences of convergence and test ideas by running simple numerical geodynamic models. The course links field and laboratory evidence to model output and often surfaces questions that stimulate my work on subduction geodynamics.
- **Raman Spectroscopic Methods.** A lab course where students collect spectra on the Raman microscope, reduce spectra, and apply elastic theory to recover pressure-temperature histories. The work supports our empirical calibration of quartz-in-garnet and related barometers. Similar formats can be applied to train students on other instruments such as Scanning Electron Microscopes.

EVIDENCE OF EFFECTIVE TEACHING

PEER REVIEW

Professional peer review offers independent evidence of my teaching effectiveness. Reviewers observe my teaching and speak with students privately. The reviews below summarize that assessment.

2020 **GEOS 314: Structural Geology** Sp2020 Prof. Matthew Kohn BSU

"Buchanan Kerswell was viewed as an excellent instructor, indeed one student described GEOS 314 as the 'best graduate student-led class they had ever had at BSU'. Students especially appreciated how the layout of the class was explained early and maintained through the first half of the semester, and they looked forward to the rest of the class. Other features of the class on which they commented favorably: 1) the use of [sketching & learning] portfolios, 2) how exam questions were taken directly from the portfolio, 3) the practice in professional sketching, 4) the dedication of the instructor, 5) the clarity of explanation from the instructor. Overall, the instructor is doing an outstanding job, especially considering that this is the first time he has taught a complete class. In comparison with faculty in our department, I would rate the quality of instruction as well above average (and our faculty receive some of the highest ratings on campus). While the class could use some tweaking, there is little room for improvement, both in the content and structure of the class, or in the expertise of the instructor. If a faculty member is not available to teach the class, I would strongly urge our department to hire him again. Such high quality instruction is rare."

STUDENT FEEDBACK

The bare-bones evaluations below are evidence of my teaching effectiveness and routine application of the scholarly teaching cycle.

2023 **GLG 556: Economic & Environmental Mineralogy** Sp2023 graduate

"I learned a lot in this course about scientific communication. I really like the structure of the course and that we really had a lot of time to ingest and utilize the tools we were given. Great class with a very understanding and supportive professor! I think the structure of the course could be improved to incorporate more targeted discussion related to environmental/economic mineralogy. Potentially it would be better to limit the choice of topics for presentations and term papers in order to facilitate a more targeted approach."

2023 **GLG 111: Dynamic Earth** Sp2023 undergraduate

"This course was very well-organized. The professor was an excellent, engaging lecturer, and the variety of methods; lectures, in-class questions/calculations, exams, quizzes, BEEs, and homework assignments really helped solidify student understanding of course content. Weaknesses of this course were that sometimes the historical aspects of the course content felt irrelevant, as it rarely appeared as content of quizzes/homework."

2022 **GLG 211: Geochemistry of Earth Systems** Fa2022 undergraduate

"The professor is very open to questions and making sure you understand what was covered in the lab and lecture. The professor also explains diagrams really well which is what I normally struggle the most with. My lab group works really well together and we work together to help each other understand the material which has been very useful. The review sessions are great for the exams but it feels like we run out of time to finish going over the material that could be on the exam so it might be helpful to have an additional review session."

2022 **GLG 121: Environmental Geology** Fa2022 undergraduate

"I really like the format of the course in that all lectures are found online with corresponding chapters and assignments. I also like that I am able to work on assignments at my own pace, since some of my weeks are busier than others. I also think that your Canvas set up with the chart of material and assignments is really efficient. It's nice that your lectures correspond with the textbook material and offer more details, and opportunities for questions or comments. Honestly I really do like both your lectures and format of your class. As a Poli Sci major, I was a little nervous to take a STEM course since my strengths lie in the humanities. However, I am glad I took the course because I find it interesting and accessible to complete and feel confident about."

STUDENT RECRUITMENT

Recruiting and retaining students extends my mission beyond a single course. As a first-generation student I stayed in geology because the faculty invited me into lab work early and demonstrated a research community that valued undergraduates. I invite students in the same way because I believe retention follows from opportunities to participate.

REFERENCES

- 1 Benner. *AJN The American Journal of Nursing* 82, 402–407 ([1982](#))
- 2 Wiggins. *Understanding by Design*. (ASCD, 2005)
- 3 Angelo. *AAHE Bulletin* 45, 3–7 (1993)
- 4 Angelo. *Classroom Assessment Techniques*. (Jossey Bass Wiley, 2012)
- 5 Krathwohl. *Theory into Practice* 41, 212–218 ([2002](#))
- 6 Hattie. *Review of Educational Research* 77, 81–112 ([2007](#))
- 7 Cook. *Journal of Chemical Education* 90, 961–967 ([2013](#))