

## Teaching Philosophy

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Over the 33 years that I have been a professor, the Earth Sciences have been transformed by issues related to the future sustainability of our planet. Climate change, sea level rise, energy, water and food security, and natural hazards are all challenges that will impact the habitability of the Earth. My teaching philosophy is centered on a firm belief that my courses must equip students with the knowledge and skills that they will need to make informed decisions in the future. Over my career, the way students learn has changed radically and teaching technology has been revolutionized. I've been presented with incredible opportunities to communicate critical information in increasingly effective ways to students who have the technical skills to analyze large Earth datasets. Thus my teaching has become progressively active, modular, and problem-based, with content that is increasingly centered on Earth challenges and their solutions.

My involvement in national Earth science education programs led to an evolving pedagogy, transitioning my focus from lecture-based courses to a mixture of blended and online education. I have had the opportunity to share this new pedagogy with teams of faculty colleagues with expertise in science, engineering and policy in developing courses as part of an online certificate program in Earth Sustainability at Penn State. The centerpiece of this program is my *Earth Futures* course which is focused on Earth's climate system and how climate change will impact the planet over the next century. I teach this course online through the World Campus and at six Commonwealth campuses every semester, and blended at University Park once a year.

My courses, including *Earth Futures*, are designed for students to learn actively, understand the complexity of Earth systems, use metacognition to enhance learning and communicate about Earth challenges through writing or speaking. My online class materials include text or "lectures" which I have tried to make engaging as if I were speaking to the class, daily primers about core concepts or news items delivered via Canvas, weekly laboratories where students manipulate large datasets or use models to project into the future, and Capstone activities where students communicate about key Earth issues in language suitable for laypeople or policymakers. In my blended courses, students come to class having mastered the lecture content then work together in "jigsaw" format groups on presentations, problems solving activities, or debates of difficult policy issues.

The Penn State World Campus reaches a diverse group of students and I have relished the opportunity to reach adult learners in all corners of the globe, especially as climate change is an inherently global issue. Yet the online environment presents challenges for instructors, especially scaling classes to serve large numbers of students using effective assessment. Fortunately I've been able to work with learning designers at the Dutton e-Education institute to overcome some of these barriers. Effective materials allow students to learn from their mistakes and redo assignments, favoring problem solving over rote memorization. For a professor teaching climate change, the challenge is to keep courses current and accurate at a time when the world is changing so rapidly, thus I constantly revise materials and update assignments.

Overall my goal as a professor is to instill in my students vital knowledge, a new way of thinking about their Earth, and, hopefully, the inspiration to make change. My materials are designed to challenge but ultimately provide students with the confidence to solve problems. I'm passionate about the Earth and the challenges that climate change presents. The impact will be greater in the lifetimes of my students and thus I hope that the awareness my courses provide will equip them with the skills to thrive in a changing Earth.