## Statement of Teaching Philosophy

**Background and Principles:** I was fortunate to be introduced to research by the time I was in grade school. Helping place radio-tracking collars on beaver to study their travel patterns, and completing other scientific studies with engaging teachers and mentors caused a lasting impression and set the stage for my career. It also provided a great example of incorporating research into learning. Over the past two decades, I've taught courses as a climbing guide, emergency medicine instructor, in outdoor education, and in earth sciences. I have mentored students in glaciological, broader cryosphere, climate, and geophysics research in the Arctic, Antarctic, and the Continuous United States and taught these concepts in the classroom. My teaching pedagogy includes principles based on this prior experience and from current research on education methods. The first principle is that most students seem to learn best through inquiry, research, or project-based learning. The second is that most students retain material best when it is relevant to their personal or professional interests. Third, current societal needs are interdisciplinary and problem-solving based which requires an entrepreneurial and collaborative workforce. Lastly, rapid scientific and technological development is likely to continue, resulting in the need for life-long learners.

**Teaching Objectives:** Based on these principles, my teaching objectives include:

- *Linking earth sciences to interests or passions of each student so that they recognize the **interdisciplinary** nature of societal questions;*
- *Improving student **problem solving skills** and **base knowledge** to help them make informed decisions regarding human activities within the natural world;*
- *Inspiring students to become **life-long learners** within and transcending earth sciences.*

**Teaching Methodology and Student Assessment:** I prefer smaller class sizes because evidence suggests it improves learning retention by minimizing peer-intimidation and maximizing individual mentorship. Supplementary to lessons, I incorporate student research projects into each course. I also incorporate my own (and other) research into lessons that I teach. Each student has a unique career trajectory. I therefore prefer that students select individual or group research topics based on their interest. When possible, I am supportive of students picking topics related to their senior thesis, MS thesis, or dissertation. For example, if a student is studying to develop their expertise in geophysics or electricity and magnetism, I would be supportive of a research topic using satellite or ground based EM methods for their class project. I instill student ownership by allowing students to pursue such topics of interest. I envision linking material in my courses with others taught through related courses within a students undergraduate or graduate eduction to reinforce the interdisciplinary nature of earth sciences. I also incorporate question-centered group projects into learning. This leads to students developing problem solving skills and collaborations, respectively. I require written work with oral presentations and solicit open but directed discussion to help students learn how to scientifically engage one another, provide, and receive constructive criticism. I also recommend that students pursue avenues to present their research elsewhere. Within the past few years, I have mentored several undergraduate and graduate students presenting at annual Earth science conferences such as AGU or GSA. I also frequently solicit undergraduate and graduate assistance with my research. Each of these opportunities help students increase their confidence in the scientific community. I am most interested in teaching courses in glaciology, remote sensing/ geomatics, field geophysics, Earth science field methods, or field camps. An effective way to explain my teaching pedagogy is to provide examples of prior methods that I have incorporated into curriculum. The common themes to these examples are 1) that I incorporate current research into each lesson; 2) I display life-long learning in my own teaching by using recent data and new methods; and 3) to assure comprehension of complex topics, I require individual research along with collaborative problem-solving.

**Glaciology:** I envision an undergraduate introduction to glaciology course that covers classical topics such as physical snow and ice properties, mass and energy budgets, ice flow, glacial hydrology, erosion and deposition, ice-ocean-atmosphere interactions, ice cores, and associated periglacial environments. I have taught lessons on each of these topics using a range of datasets for individual or group projects. For example, in relation to mass and energy, my students have used snow thickness, ablation, and meteorological data with temperature index modeling from Alaska, Greenland, Antarctica to calculate winter accumulation snow-water equivalence, mass loss, and net balance. In regards to erosion and past glacial extent, I have had students examine remnant glacial geology features in New England and Alaska to determine deglaciation processes from deposits and altered surfaces left behind. I have also incorporated geophysical, remote sensing, and field observational data over periglacial features from Alaska, Antarctica, and Greenland into cryosphere lessons and student projects. Although advanced numerical model programming is not my expertise, I am comfortable working with and have helped students use or build snapshot, steady state, and transient numerical models in COMSOL Multiphysics or MATLAB to simulate and answer questions about glaciers with different domain or boundary properties (e.g. mass balance; temperature; basal conditions). My interest in combining field data with numerical modeling has expanded significantly over the past decade. I plan on these combined methods becoming a central component to my glaciology course as I improve my model programming and modeling teaching skills. I have numerous extensive geophysical datasets from ice shelf, ice cap, and temperate to polar mountain glacier systems which provide a strong starting point to draw from. Numerical modeling is often a strength of other faculty within departments so I will continue to draw from that expertise through collaboration or mutually beneficial mentoring to improve my overall skills as a benefit to my students.

**Remote Sensing and Geomatics:** I envision four modules in a remote sensing/geomatics course: Satellite and airborne remote sensing, ground-based remote sensing, surveying, and geographic information systems (GIS). My goal is to provide students with the correct mix of theory and application as a starting point for future careers using these techniques as a critical tool. Like my Glaciology pedagogy, I envision lessons supplemented with projects related to individual student interests. Extensive airborne (e.g. LiDAR digital elevation data) and satellite imagery data exist across the globe which can be used to link remote sensing material to other common themes taught Earth sciences (e.g. glacial geology, glaciology). I have access to a survey-grade drone which can be used for generating and analyzing high-resolution optical imagery and structure-from-motion digital elevation models. I have access to and am an expert in ground-penetrating radar systems and envision students collecting, processing, and interpreting such ground-based geophysical datasets. My surveying experience includes both theodolite and GPS use over two decades both of which can be incorporated into geomatics curriculum. I also have almost 20 years of experience using GIS in research. My applied use of remote sensing, surveying, and GIS methods over the past two decades will be the basis for designing remote sensing course projects around student needs.

**Teaching Assessment Methods:** I measure effectiveness of my teaching by feedback from students and professional colleagues. Early evidence for the quality of my teaching capabilities include being selected as valedictorian of a National Outdoor Leadership School Instructor Program in 2003. More recently, every student survey returned to me from courses I've taught (2007 through 2015) noted that my hands-on lessons were the most positive aspects, particularly those of relevance to their own interests. I have also received overwhelmingly positive instructor reviews suggesting that I am consistently maintaining student engagement and interest. For example, anonymous feedback from the most recent course I co-taught (n = 32) revealed that 56% of students ranked me excellent, 38% ranked me very good, 6% ranked me adequate, and 0% ranked me poor, as an instructor. In regards to colleague feedback, my most recent Peer-Instructor panel review (2016) may provide some insight: *"Through his research and mentoring, Seth Campbell brings an exciting and dynamic contribution to the research and education mission of…."* Despite this positive feedback, I believe that constant improvement as an educator is necessary to maintain success. I therefore aspire to teach confidently, yet maintain humility, be self-critical, learn from my peers and senior colleagues, and welcome student and colleague constructive criticism.