

2018

## Seminar Descriptions

Morton Sternheim

*University of Massachusetts - Amherst*

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# Science & Engineering Saturday Seminars

Spring 2018

**Feb 3. Concentration, Amount, and Counting by Weighing.** Julian Tyson, Chemistry. I have difficulty getting students (both STEM and non-STEM) in UMass 100-level chemistry courses to understand and work with the concepts of (a) concentration and (b) the mole, which requires counting by weighing. My goals for this workshop are to find ways of (1) linking concentration with familiar ideas and situations, (2) visualizing (and working with) concentrations expressed as parts per million or billion. I'll talk about the different ways that amounts of substances can be specified, the definitions of concentration that apply to solids, liquids and gases, and the various scaling factors that scientists use. We'll also touch on what chemists mean by "stoichiometry," and discuss whether sandwiches are a good analogy for molecules. Participants should bring some ideas regarding (1) and (2) above.

**Feb 10. Air Pressure, Clouds and Weather Prediction.** Laura Schofield, Bartlett Community Partnership School, Lowell Public Schools. Weather affects many aspects of our and our students' daily life. Air pressure and clouds can help provide clues of future weather. Goals of the workshop are to 1) Support teachers own understanding of Earth's dynamic atmospheric environment by providing content and hands on experiences using real time data and 2) Provide student friendly activities and resources from NWS, NOAA and NASA. Content Focus will be on basics of Earth's atmosphere, air pressure, clouds and weather systems.

**March 3. Engagement and Positive Psychology for STEM Learning and Beyond.** Mark Tuominen, Physics, Lori Tuominen, Lori Tuominen Coaching and Wholebeing Institute. Positive psychology is the study of how people flourish. A considerable amount of recent scientific research is now showing how the basic tenets of positive psychology used in schools can boost engagement, learning and wellbeing for students and teachers. These principles apply to any type of learning, including STEM courses. The concepts and practices of positive psychology effectively serve as affective multipliers, enhancing learning success and personal wellbeing. This seminar will introduce a sampler plate of ideas and activities from their course for first-year UMass students, entitled "Positive Psychology: The Science of Happiness, Creativity, and Accomplishment."

**March 31. Brain Science = Biology + Engineering.** Guangyu Xu, Electrical and Computer Engineering; Jennifer Welborn, Amherst Regional Middle School; Chris Emery, STEM Ed. This interdisciplinary (physical and life sciences) seminar exposes participants to cutting edge research at UMASS, Amherst, on cell imaging using a chip which gathers a variety of data on the activities of single cells. Part of the seminar will be a presentation of current research in this area, followed by hands-on activities and a visit to the lab where this research is conducted. Application of this new technology to brain research will be discussed as well as the NGSS standards alignment and classroom applications at various levels and disciplines.

**April 7. Sustainability.** Ezra Small, Sustainability Program Manager. In 2017, UMass Amherst installed over 15,000 photovoltaic panels on existing buildings and as part of three solar parking-lot canopies on campus. This project is just one of the many components of the "Sustainable UMass" program which strives to both practice and teach about creating and maintaining a sustainable world. This workshop will provide an overview of the work of the campus sustainability program ranging from academics and research to waste and recycling, with a focus on the science and technology of solar electric energy and emissions accounting. Skills such as problem solving, data analysis, predicting and modeling will be incorporated into activities intended to provide information and ideas for teachers to make use of this material in designing classroom lessons. The workshop will include a tour of the solar parking lot canopy at the Robsham Visitor Center on campus where the "solar energy dashboard" (available via Internet) will be demonstrated and explained.