Elisa Kallioniemi, Ph.D.
Teaching Statement

Teaching philosophy

My goals for student learning are that students: 1) learn the basic understanding of the subject matter, 2) understand how to apply the subject matter to solve engineering problems, and 3) engage in learning activities that further develop their critical thinking of available knowledge, problem-solving, creativeness, communication, writing and teamwork skills.

To achieve these goals in my teaching, I will apply team-based learning approaches, which can be implemented in classes of varying sizes and at the undergraduate and graduate levels. I became interested in these approaches after I participated in a class that was constructed based on team-based learning and found it helpful to learn complex topics in a way that forced me to participate actively and apply knowledge, not just memorize facts. In 2020, I completed the basic-level team-based learning teacher certificate.

In these team-based learning approaches, the students will be divided into diverse teams based on a quick quiz before the first class, and the same teams will be held throughout the course. A typical class format would be that first, the students receive a pre-class reading that they need to go through before the start of the class. At the beginning of each class, students would then complete a short, multiple-choice quiz to test how well they comprehended the pre-reading material at the basic level. This quiz would also keep students accountable for going through the material. After the individual test, the students would join a team to complete the same quiz together. In this team quiz, the students would need to discuss their answers. Both individual and team quizzes would contribute to the overall course grade. The quizzes would be "scratch-off" sheets. After the quizzes, I would ask teams for their justifications and which concepts were the most challenging. This would be followed by a short lecture in which I would go through the topic and clarify all the concepts that were challenging for the students. The lecture would be followed by team-based activities in which students would have to apply and extend their collaborative knowledge on the lecture topic to a problem. All teams would work on the same problem, but they would be allowed to make meaningful choices about approaching the problem and justify their choices. The course would also have an assessment at the end of the course to evaluate whether the goals for student learning were met. Depending on the topic, this could include an essay or problems to which the student would have to provide written solutions.

In all my teaching and mentoring activities, inclusive strategies are essential, and I am committed to providing an inclusive and culturally safe learning environment for all my students and mentees. I will do this, for example, by teaching study skills to support first-generation students, providing pre-reading materials before the lecture to allow enough time for English as a second language speakers and neurodivergent individuals to familiarize themselves with the subject matter. I will also develop an inclusive curriculum that lets students view ideas and concepts from various perspectives and choose course content by highlighting authors of diverse backgrounds.

Teaching interests

With a background in engineering and physics, research experience in neuroscience, and industrial and clinical experience in brain stimulation, I am prepared to teach a wide range of introductory and advanced courses in biomedical engineering. Most closely to my expertise would be courses in neural engineering, medical devices, medical imaging, electromagnetism, and electrical engineering. Example courses include BME 111: Introduction to Physiology, BME 101: Introduction to Biomedical Engineering, BME 301: Electrical Fundamentals of Biomedical Engineering, BME 210: Processing Fund for Biol Signa, BME 372: Electronics of Medical Devices, BME 471: Principles of Medical Imaging, BME 661: Neural Engineering, BME 668: Medical Imaging Systems.

To support the growth of the neural engineering program at the Department, I would also be interested in developing a course, for example, covering peripheral nerve and brain stimulation techniques, such as transcranial magnetic stimulation, deep brain stimulation, vagus nerve stimulation, transcranial/peripheral electric stimulation, magnetic seizure therapy, electroconvulsive therapy, photobiomodulation, and ultrasound stimulation. This course would cover these techniques' fundamental principles, technology, applications, and future directions.