2010 SUMMER CLASS (3cr) - How to Use a Table Top Scanning Electron Microscope in the K-12 Classroom

June 21st through July 1st 13:00-15:50 MTWRF Health and Science School, Beaverton, OR

$240 for 3 credits (some stipends available, contact PSU-Center for Science Education)

Instructors: Sherry Cady (PSU-CSE) and Keith Gross (Lake Oswego HS)

Course description: The recent introduction of easy-to-use table-top scanning electron microscope (SEM) models priced for the educational market have given K-12 school districts unparallelled curriculur opportunities in the fields of STEM, Creative Writing, and the Arts. In this course, teachers will learn in an authentic high school setting how to use the Phenom, a table top SEM originally marketed by FEI, a local electron microscope manufacturer located in Hillsboro, Oregon. A proven strategy for supervising student use of the tool in inquiry-based projects, even in large classrooms, will be illustrated. Teachers will aquire the ability to develop lesson plans that bring the tool into their exisiting curriculum in a meaningful way. The SEM can be used to tackle a wide-range of sophisticated science projects that meet the new 2010 Oregon Science Standards for Inquiry and a wide variety of state and national content standards. Teachers will learn the capabilities and limitations of the Phenom, and develop data collection, data analysis, and image interpretation skills.

Course Objectives: ✶Operate the tool properly and safely (and know how to supervise student use) ✶Use image analysis software to make simple measurements of digital images ✶Understand what types of samples are amenable to SEM examination ✶ID the basic types of data that the SEM can produce ✶ID complementary types of data that must be acquired with other instruments ✶Develop creative scientific questions that lead naturally to experimental design ✶ID topical content standards that can be addressed with an SEM study

2010 SUMMER CLASS (3cr) - Astrobiology, Magnified & Scanning Electron Microscope Use in the K-12 Classroom

July 19th through July 23rd 09:00-15:50 MTWRF Portland State University, Room 69 Cramer Hall

PSU Summer Session Tuition + $50 Lab Fee

Instructor: Sherry Cady, Editor-in-Chief of ASTROBIOLOGY, Portland State University

Course description: This professional development course for K-12 teachers focuses on microscopy training and technique development as part of an authentic research experience in the interdisciplinary field of astrobiology. Teachers who have taken the beginning table-top SEM course – "Learning How to Use a Table Top SEM" – can use this course as an opportunity to work on research-based projects relevant to NASA's space missions to Mars. Table-top scanning electron microscope (SEM) models provide an ideal opportunity to find evidence of microbial life and learn how it affects its environment. Bacteria range in size from only a few tenths to several micrometers (10^{-6} m) in diameter, and they are rarely visualized with the naked eye. Because bacteria can alter crystal, nanomineral, and rock formations in a myriad of ways, the search for life on Mars involves the search for evidence of it at submicroscopic scales. In addition to aquiring beginning-to-advanced technical skills in optical and scanning electron microscopy, teachers will acquire a basic understanding of fundamental concepts in astrobiology, extreme ecosystems, and ecosystem ecology.

Course Objectives: ✶Operate different types (biological and geological) optical light microscopes ✶Operate and supervise student use of the Phenom, a Table Top SEM ✶Gain hands-on experience with authentic research samples ✶Learn how astrobiology concepts can be woven into K-12 STEM curriculum ✶Teachers who took the PSU Summer Session course–"Teachers Afield, Astrobiology in Yellowstone"–will characterize them in this class