

Electron Microprobe Training Syllabus:

The following 'Training Syllabus' is intended to facilitate the training of students to a level of competence that would allow them to use the microprobe independently, in an efficient manner. Each session will run for about 2-to-4 hours, depending on individual needs and availability, and the timing is flexible to accommodate students' schedules. It is mandatory for students to read the reference documents, "Things to Know Before You Get to the Probe Lab" and "Data Reduction Guide" prior to receiving training. In order to make more efficient usage of the training time, students are required to familiarize themselves with the basic operating theory of the electron microprobe by reading the appropriate PowerPoint presentations assembled on the University of Wisconsin's Geology Department website (<http://www.geology.wisc.edu/~johnf/g777/777Lectures2016.html>). The training will occur over 3 sessions, generally, as follows:

First Session – Preparatory Techniques, Basic Imaging and Lab Safety Review

- A. *Carbon-coater usage* – handling of samples, sample preparation and cleaning, setting up of the coater, brief explanation of operational theory, operational procedures, how to check suitability of the coating
- B. *Sample Change Procedure*- explanation of operational rationale, mounting of samples in holders, electrical grounding of samples and checking of ground status, operational procedure
- C. *Basic SEM Controls, Imaging and Photography*- basic controls of the SEM (physical controls and software orientation) how to take images using secondary-, back-scatter- and topographic-electron techniques, photographing of images, maximizing quality of images
- D. *Lab Safety Review* – safety hazards of carbon-coater, electron microprobe and chemicals

Resource material – At the above website, "Week 10 – Specimen preparation, coating", "Week 1 – Electron -specimen interactions", "Week 2 – Electron -optical column", "Week 5 – Image Acquisition".

Second Session – EDS (Energy Dispersive Spectroscopy) and Basic WDS (Wavelength Dispersive Spectroscopy) Techniques

- A. *EDS – Noran System 7 Software (NS7) Introduction*- use of NS7 software as reconnaissance tools, point and area semi-quantitative analysis, spectral imaging/compositional X-ray mapping (low resolution), X-ray linescans, imaging tools
- B. *Basic WDS – Probe for EPMA Software (Pfe) Introduction*-How to start the Pfe program, software navigation and explanation of rationale, selection of points, optical focusing of samples, storing of analytical points, starting an analytical run, quality assurance, how to reduce data into an Excel format

Resource material – At the above website, "Week 3 – EDS", "Week 7 – WDS 1 :Spectrometers, crystals, detectors, PHA:", "Week 8 WDS II – More on spectrometers and spectra...."

Third Session – Advanced WDS Techniques and Basic Trouble-shooting

- A. *PfE Advanced Software Usage* – Starting the PfE system from scratch, adjusting analytical conditions manually, peak searching and updating, calibration using standards, wavescans, quality control, advanced methods of point-storage, X-ray compositional mapping using the JEOL software
- B. *Common Problems* -discussion of the most common problems encountered while operating the microprobe and how to solve them, shutdown procedure, re-starting procedure

Resource material – At the above website, “Week 9 – Standards”, “Week 9 – Quant: ZAF Matrix Corrections”