suited for his respective course considering their backgrounds and teaching styles. The asbestos analysis course using the PLM required a strong foundation in optics that became tedious at times. The classroom instruction was not as in-depth as that of an optical mineralogy course due to the need to practice techniques and conduct real world sample work, but could have been enough to overwhelm a novice without the proper instructor. This is where Peter Cooke entered. *A patient teacher who is fundamentally sound in his theory, he was capable of* seeing the glazing over of a student's eyes . . . and quickly responded with a different perspective to aid in grasping multiple theories. The course, while not particularly pleasant due to the extended lecturing, was well worth the enhancement of basic optical mineralogy application and fiber identification.

The mineral grain identification course presented less of lecturing style instruction and more of hands-on learning under the scope, looking at morphology and inclusions, performing conoscopic observations, learning about source identification by characteristics. When the class seemed to be dragging, John Delly would reveal a novel or interesting application of the microscope – or the specimen for that matter. There seemed to be too little time, but the course was enjoyable and I walked away with plenty of new skills and a greater understanding of the subject matter. The hotstage and polymorph course was history incarnate. Little time was spent on the theory of the microscope, but through the week Walter McCrone lead the class through a personal tour of the development of hotstage (and coldstage) work, from his own work in explosives, circa the 1940's (which mysteriously became declassified during the course), the liquid crystalline form of Intal, DDT, hydrates and various other fusion preparations. This course was not one for the novice. Given Dr. McCrone's vast experience and a prerequisite course in PLM, it was presumed that the students understood the basics and more (including phase diagrams). No time was wasted on formalities - one immediately dug into previous and current applications as if they were a daily routine. Without my formal education including chemistry, materials science, phase diagrams, and heat transfer, I would have been a little frustrated.

The last course I attended was on pollen and spore identification, and like the other courses, the instructor's enthusiasm in this field was only equaled by his skill. The course itself included collecting samples and preparing reference slides to take back to the office, which took away from the time that might have been better spent on more instruction via slides and the monitor linked to the instructor's scope. Like the rest of the courses, the applications of the field (R&D, forensics, drug source locating, geologic dating, indoor air quality) were well presented and discussed by the instructor. I acquired a sense of security in my skills, along with an appreciation of my (and any microscopist's) limitations after this course.

As these courses are both for, and attended by, professionals in the workplace, their focus is application. This is not to say that the philosophy and theories are abandoned. The instructors gently probe the students (anywhere from 4-16 in number) the first day and a half to gauge their level of understanding, and from then on quickly fill the voids where necessary. Given that many of the courses were originally 2-weeks each, this is understandable. This is also a disadvantage in that each time I discovered there was far too much material to learn *in the allotted time.*

An oftentimes overlooked benefit of these courses is the other students. At MCRI I've met and learned from other microscopists: a DNA expert, a Ph.D chemist, military lab scientists, and even a visiting artist. In addition, the instructors welcomed, appreciated, and at times solicited questions and practical advice from the students. Three times I have taken problems to these courses and had them solved. One solution I used in a court case as part of the identification of soil, and a second I used in an air quality investigation at a hospital.

In addition to the camaraderie of the students (and instructors), I was pleased with the reference materials (a thick binder) acquired from these courses, which I have used many times during my work. The fact that I'm planning to attend two more of McCrone's courses within the next year is the best indicator of my overall satisfaction.

John Mackenzie's Digital Imaging Course at North Carolina State University

by John Fournelle, UW-Madison Geology,
Electron Microprobe Lab

John Mackenzie runs a 5 day summer school course in Raleigh NC, officially listed as BIT697V. I participated in the class this past July. There were 20-25 students, mostly graduate students from NCSU, with a few outsiders like myself. It is essentially a practical guide to collection, storage and elementary processing of (microscopic) images. He focuses on the nitty gritty of topics such as resolution of printers (including tricks to yield higher quality output on some HP laser printers), scanners, cameras, data storage, image formats.

A significant aspect of the course revolves around usage of Adobe Photoshop, and some essential/simple (but not widely known) features it has to help improve the grayscale presentation of images. Mackenzie is great lecturer, is very knowledgeable and has an easygoing manner. He evangelizes his message to "Kick the brightness/contrast habit" and to utilize the gamma function in Photoshop as a better way to bring out the features in ones images.

The class day was divided into 3 hour morning lectures and then 3 hour afternoon computer labs with Photoshop exercises.

Mackenzie is Coordinator of the Electron Microscopy Center at NCSU. He also runs a highly compressed version of this course at various microscopic meetings, and is scheduled to do so at the upcoming Scanning 99 meeting in Chicago.

NCSU also hosts a distinct (and highly praised, I am told) Image Processing shortcourse taught by John C. Russ, author of the CRC Image Processing Handbook – cost: $750 with economical dorm accommodations available.

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