B156 Bricks Without Straw: Providing a Forensic Laboratory Experience in the Age of COVID-19

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Learning Overview: After attending this presentation, attendees will understand how to create virtual forensic science laboratories by relying on previously recorded data files and photomicrographs, as well as instructional videos posted online.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating that meaningful forensic science laboratory exercises can be carried out online.

In the spring semester 2020, the COVID-19 pandemic forced the university to end in-person classes and to conduct all instruction online. The prohibition against in-person instruction continued in the fall 2020 semester. Several courses normally offered by the Department of Forensic Sciences in fall semesters have laboratory exercises. Several options were considered: deferring these courses to the spring 2021 semester; deferring the laboratories only to a later semester; or replacing the existing laboratories with virtual laboratories. The last option was adopted.

The virtual laboratories were required to be self-contained or to utilize material likely to be present in the home or easily acquired. The laboratories could make use of computer files acquired in previous laboratory exercises or files generated by course instructors especially for the course. Students could view videos showing sample preparation and instrument operation and then be presented with data and asked to interpret them.

FORS 6005 Fundamental of Forensic Science II focuses on laboratory disciplines such as the analysis of controlled substances, the analysis of trace evidence, and DNA profiling. The laboratory exercises for this course normally consist of a microscopy laboratory on the Becke line phenomenon and the identification of natural and man-made fibers, a gas chromatography/mass spectrometry laboratory on the identification of controlled substances, and a DNA-profiling laboratory in which the students obtain their own Short Tandem Repeat (STR) profiles. These laboratory exercises were replaced by the following virtual laboratories: (1) a Becke line laboratory using photomicrographs of glass particles mounted in immersion media with differing refractive indices; (2) a polarized light microscopy laboratory using photomicrographs of natural and man-made fibers (with crossed polars, and crossed polars with a first-order compensator); (3) a laboratory on the gas chromatography/mass spectrometry analysis of ignitable liquid residues using files from the National Center for Forensic Science (http://ilrc.ucf.edu/); and(4) a laboratory on the interpretation of DNA STR profiling using data files from previous classes.

FORS 6238 Forensic Chemistry I covers basic microscopy, forensic analysis of glass, and the forensic analysis of soil. The laboratory exercises in this course cover Köhler illumination, Becke line phenomenon, refractive index measurements, glass fractography, determination of soil colors, identification of clay minerals using Attenuated Total Reflectance/Fourier Transform Infrared (ATR/FTIR), polarized light observation of interference figures, and the use of X-ray powder diffractometry to identify minerals. These were replaced with the following virtual laboratories: (1) a Becke line laboratory using photomicrographs of glass particles mounted in immersion media with differing refractive indices; (2) a glass fractography laboratory in which the students were required to perform fracture matches and to determine the direction of force that fractured a glass pane; (3) a soil color determination laboratory in which the students were given questioned and known soil samples and were required to compare their dried colors; (4) an ATR/FTIR laboratory in which the students were required to compare the spectrum of a questioned clay sample with a set of known spectra in order to find a match; and (5) two X-ray diffraction laboratories in which students were given data files for bulk soil samples and clay fraction samples and required to identify the minerals present in each.

Instructional videos of sample preparation and instrument operation were made available to students. The data files used were collected in previous years during laboratory exercises. The students were required to submit reports embodying their interpretation of the data presented in each exercise.

The virtual laboratory format permitted the instructor to meet the pedagogical goals for the courses, even in the absence of in-person laboratory instruction. This format excited greater student interest in the content of the laboratories as shown by the email exchanges about them between students and instructor.

Online Instruction, Virtual Laboratories, Forensic Science Education

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