

Syllabus

- Specimen Preparation
- Image Analysis
- Transmission Electron Microscope
- Specimen Fixation
- Embedding
- Coating
- Knives
- Ultramicrotomy
- Cryofixation & Cryosectioning
- Staining methods
- Freeze Fracture
- Digital Imaging (with Photoshop®)
- X-ray analysis
- Scanning Electron Microscope
- Confocal Microscope
- ImmunoEM
- Scanning Tunelling Electron Microscope
- Presentation (with Powerpoint®)

Recommended Reading

Textbook: Bozzola JJ and Russell LD. Electron Microscopy. 2nd Edn. Jones and Bartlett, Publishers. 1999.

Reference book: John C. Russ. The Image Processing Handbook. 3rd Edn, CRC Press, 1998.

Author: Anne Swan & Alan Jones, October 2005

For more information

Anatomy & Histology

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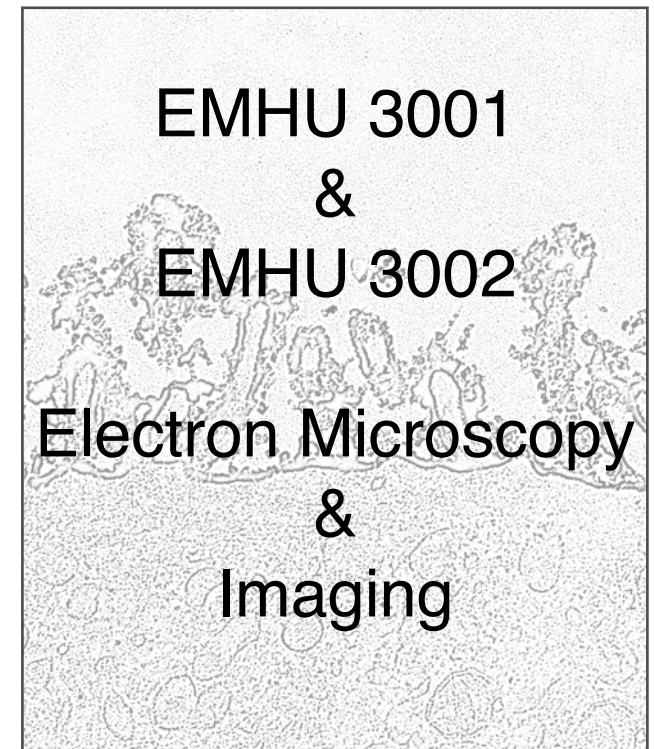
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Course Coordinator

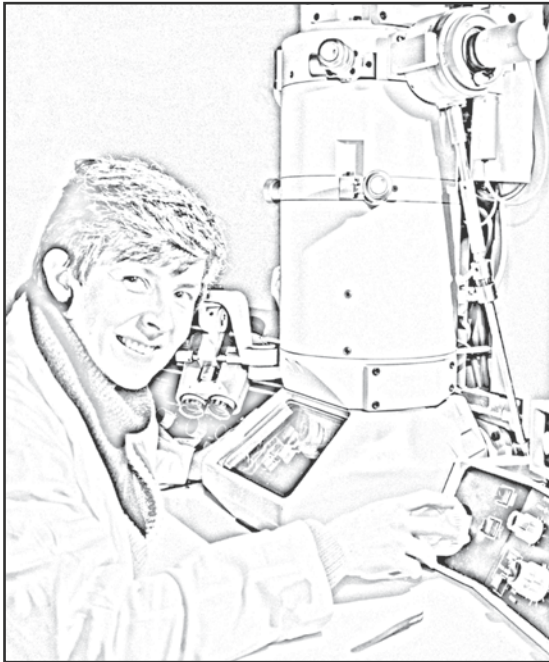
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School of Medical Sciences

Anatomy & Histology



The University of Sydney



Units Of Study

(6 Credit points each)

The course is run conjointly by Anatomy and Histology and the Electron Microscope Unit.

The EMHU3001 course will focus on the theoretical aspects of transmission and scanning electron microscopy, the preparation of biological samples for electron microscopy, digital imaging, and freeze-fracture. Immunological and other techniques required in modern research and hospital electron microscope laboratories will also be covered. Students will also receive theoretical training in laser scanning confocal microscopy including the use of fluorescent probes to visualize cellular organelles and cellular processes. Students will undertake a theoretical research project of their choice which is of relevance to the course, and undertake web based exercises.

The EMHU3002 course will provide hands-on training in the operation of transmission and scanning electron microscopes, processing biological samples for electron

microscopy, ultrathin sectioning, cryo-ultramicrotomy, freeze-fracture, electron diffraction, digital imaging, immunological and other techniques required in modern research and hospital electron microscope laboratories. Students will also learn the operation of laser scanning confocal microscopes, including the use of fluorescent probes to visualize cellular organelles and cellular processes.

Students will apply their knowledge to complete a project of their choice on electron microscopy of a biological sample, from fixation of the sample to interpretation of the resulting electron micrographs.

Prerequisites

EMHU3001: Prerequisites: At least 12 cp of Intermediate Science units from any of the following: Anatomy & Histology, Biochemistry, Biology, Chemistry, Mathematics, Microbiology, Molecular Biology & Genetics, Pharmacology, Physics, Physiology or Statistics. For BMedSc students: either 36 cp of Intermediate units including BMed (2501, 2503 & 2505) or 42 cp of BMed Intermediate units including (2801, 2802, 2803 & 2806)

EMHU3002: Prerequisites: 6 CP from ANAT2008 or 4 CP from ANAT2001 plus at least 6 or 8 CP respectively of Intermediate Science units of study. BMedSc as above.

Learning Goals & Outcomes

LEARNING GOALS:

These subjects will provide training in the theory and practice of operating transmission and scanning electron microscopes, processing biological samples for electron microscopy, ultrathin sectioning, digital imaging, immunological and other techniques required in modern research and hospital electron microscope laboratories. Students will also receive theoretical and practical training in laser scanning confocal microscopy including the use of fluorescent probes to visualise cell organelles and cellular processes. It is expected that students will combine both

units of study. It is not permitted to enrol in EHMU3002 without EMHU3001.

LEARNING OUTCOMES:

Students who have successfully completed these units will:

- Have a hands-on knowledge of the operation of transmission and scanning electron microscopes and laser scanning confocal microscopes and a sound understanding of their construction.
- Be able to trouble-shoot problems in operating the microscopes.
- Be able to process, stain and record electron micrographs of biological samples which the student has prepared.
- Be able to identify and correct a tissue preparation problem.
- Be able to interpret biological electron micrographs.
- Be able to apply their knowledge to completing a project on electron microscopy of a biological sample.

Students will be involved in a variety of learning situations designed to train them for future research and occupational requirements, including: note taking in lectures and tutorials, completion of exercises in the practical book, completion of a project in electron microscopy with Powerpoint® presentation to the group, critique of presentations by other students. In addition to attendance at formal sessions, students will need to take an active role in the learning process through extra reading, extra research based on published articles and websites, practical class activities and extra research for presentation of their own project.

Timetable

N.B. - Please check online timetable for latest details as times & locations vary