

Veterinary Pathobiology 8452 – Spring 2021
“Cell and Molecular Electron Microscopy”
Tommi A. White, Ph.D., Director - Electron Microscopy Core
DeAna G. Grant, Research Specialist - Electron Microscopy Core

Lecture topics (ca.9:00-10:00am)

01-25-2021	Introduction to Electron Microscopy
02-01-2021	The Electron Microscope: SEM, FIB, TEM
02-10-2021	Biological specimens in the electron microscope: Challenges - Fixation, Dehydration, Drying/Embedding
02-15-2021	Introduction to Ultrastructure (guest lecture by DeAna Grant)
02-22-2021	Vitrification, Environmental, <i>In situ</i>
03-01-2021	Immunocytochemistry, Elemental Analysis, Quantitation/Averaging, Correlative
03-08-2021	3DEM - Single particle reconstruction, Tomography, CryoFIB lamellae, Cryoliftout
03-15-2021	3DEM continued

Demonstrations of various EM methods at the EM Core (ca.10:00-10:50am)

01-25-2021	Tour and introduction to the EM Core, staff, policies, and instrumentation.
02-01-2021	SEM sample preparation (critical point drying, sputter coating)
02-10-2021	SEM demo (FEI Scios FIBSEM & Quanta 600 FEG)
02-15-2021	TEM demo (JEOL JEM & and FEI F30 Twin)
02-22-2021	TEM sample preparation (chemical fixation microwave assisted)
03-01-2021	Ultramicrotomy (2 µm thick and 75 nm thin sectioning)
03-08-2021	Negative staining
03-15-2021	Vitrification: high pressure freezing and plunge freezing

Other Important Dates

03-22-2021	TEST (lectures complete)
03-26-2021	Project discussions completed (Spring break)
04-05-2021	Sample Submission Deadline to EMC
04-30-2021	Project Completion
05-03-2021	Final Presentations (group 1)
05-10-2021	Final Presentations (group 2)
05-14-2021	Final Reports due by 5pm

Grading

- **Attendance** - will be taken at every lecture and demo. Lectures and Demos will be performed via Zoom (Meeting ID: [918 2786 3737](https://missouri.zoom.us/j/91827863737)) and your attendance/participation is required by showing your face on Zoom. Attendance will be worth 10 pts per session for a total of 160 points. Please provide notification to whiteto@missouri.edu if you will not be in lecture/demo on Monday by 5pm the Friday before.
- **Problem Sets** – will allow you to apply the knowledge gained in the lecture and allow you to find supporting evidence in the literature. These will be available in Canvas after the demos and due prior to the next lecture (1 week for completion). These will be worth 20 points each (7 x 20 points) for a total of 140 points.
- **Test** – a comprehensive test will be given through Canvas covering the basic concepts discussed in class. This test will be worth 100 points. You will have 1 hour to complete your test and it will be open note.
- **Final Presentation** – this presentation (15 minutes) should show what you learned through participating in this course. It a template will be provided and should give introduction, formulate a hypothesis, anticipated outcomes/pitfalls, the results, conclusions, discussion and future directions. This final presentation is worth 50 points.
- **Final Report** – A template will be provided showing the minimum allowed presenting the project performed as part of the course, summarizing the results presented in your final presentation. This final report is worth 50 points.

Failure to turn in work by designated due date will result in decreased scores (5% taken off per day late)

Suggested Texts

- “Electron Microscopy: Principles and Techniques for Biologists” Bozolla & Russell 1999
- “Cell and Tissue Ultrastructure” K. Lynne Mercer, 1993
- “Handbook of Cryo Preparative Methods for Electron Microscopy” Cavalier, Spohner, & Humbel 2009
- “Transmission Electron Microscopy: A Textbook for Material Science” Williams & Carter 2009
- “Three Dimensional Electron Microscopy of Macromolecular Assemblies” Joachim Frank, 1996
- “Caltech CryoEM Course” Grant Jensen’s YouTube Lectures - <http://cryo-em-course.caltech.edu/overview>

Contact Info

- Tommi White – whiteto@missouri.edu; 573-884-7338
- DeAna Grant – grantde@missouri.edu; 573-882-4777



Electron Microscopy Core

University of Missouri

573-882-8304 | @MizzouEMC