

ELECTRON MICROSCOPY  
BIOLOGY 741 FALL 2006  
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### LECTURE/DISCUSSION SCHEDULE

SESSION	DATE	TOPIC
1	30 Aug & 1 Sept	Introduction, History, Resolution, Information Content, LM & EM, Optics, & Safety - Chapters 1 & 21
2	6 September	Vacuum System & Electron Beam - 180-188, 163-173
3	13	Transmission Electron Microscope Chapter 6
4	20	Scanning Electron Microscope Chapter 7
5	27	Ultramicrotomy Chapter 4
6	4 October	Preparation of Biological Materials for Transmission Electron Microscopy - Chapter 2
	11	<b>NO LECTURE</b> - Fixing Specimens in the Laboratory
	18	<b>EXAM 1</b>
7	25	The Electron Micrograph & Its Interpretation Chapters 8, 19, & 20
8	1 November	Preparation of Biological Materials for Scanning Electron Microscopy - Chapter 3
9	8	Ultramicrotomy, Staining, & Contrast - Chapters 4 & 5
10	15	Cytochemistry & Autoradiography - Cpts 9, 10, 12, 17, & 11
11	29	Freeze-Fracture and Intermediate & High Voltage EM Chapters 14 & 16
12	6 December	Quantitative and Analytical Electron Microscopy Chapters 13 & 15
13	13	Scan Probe Microscopy and Review
	15	<b>EXAM 2</b> (10:00-11:30) to be held in Room 245

All reading assignments from: Bozzola & Russell 1999. Electron Microscopy

Session 1	Chapter 19 - Interpretation of Electron Micrographs
Introduction	Normal tissue - 444-453
History - 11-12, chapter 1	Artifacts - 453-475
Resolution & magnification - 6, 150-151, 155, 212	Chapter 20 - Biological Ultrastructure - 478-614
Information content	
LM & EM optics - 163	Session 8
Safety - chapter 21	Chapter 3 - Specimen Preparation for SEM
	General preparation - 51
Session 2	Air drying - 58
Vacuum System & Electron Beam	Critical point drying - 54-56
Vacuum system - 180-188	Freeze-drying - 56-58
Electron gun & electron beam - 163-173	Replication/casting - 61-63
	Specimen coating - 65-68, 135-145
Session 3	Other
Chapter 6 - Transmission Electron Microscope	Session 9
Electromagnetic radiation & resolution - 151-156	Chapters 4 & 5 Ultramicrotomy, Staining, & Contrast
Alignment of the TEM - 188-191	Problems of microtomy - 106-109
Contrast - 192-193	Staining of sections - 122-130
Magnification & calibration - 197-198	Other
Resolution - 199-200	
Astigmatism - 466, 472	Session 10
Other	Chapter 9 - Immunocytochemistry
Session 4	Introduction & theory - 264-266
Chapter 7 - Scanning Electron Microscope	Molecular probes & labeling strategies - 266-267
Intro. & management of the electron beam - 204-213	Finder strategies - 268-273
Interaction of electron beam with the specimen - 213-214, 370-371, 380	Other
Signal processing & signal-to-noise ratio - 214-219	Chapter 10 - Enzyme Cytochemistry
Imaging other types of specimen signals - 225-233	Introduction & theory - 284
Alignment of the SEM - 234-236	Necessary conditions for success - 284-287
Magnification & calibration - 236-238	Examples - 287-289
Resolution - 212-213, 236-238	Cpts 12 & 17 - Misc. Localization Techniques & Tracers
Other	Other forms of probes & theory - 312, 408-409
Session 5	Examples - 410-413
Chapter 4 - Ultramicrotomy	Chapter 11 - Autoradiography/Radiography
Trimming of the block - 76-79	Autoradiography and radioactive decay - 294-296
Preparation of the knife - 82-88	How to perform autoradiography - 296-302
Use of the ultramicrotome - 97-103	
Handling sections - 90-92, 103-106	Session 11
Other	Chapter 14 - Freeze Fracture Replication
Session 6	Introduction & theory - 344-347
Chapter 2 - Specimen Preparation for TEM	How to produce a replica - 347-351
Fixation - 19-34	Other
Wash, dehydration & transitional solvent - 34-35	Chapter 16 - Intermed. & High Voltage EM - 398-404
Embedding & curing embedment - 36-43	
Rapid tissue processing protocols - 44	Session 12
Other	Chapter 13 - Quantitative Electron Microscopy
Session 7	Quantitative electron microscopy - 322-325
Chapter 8 - The Electron Micrograph	Other
Photographic principles - 242-246	Chapter 15 - Analytical Electron Microscopy
Photographic negatives - 246-250	Analytical electron microscopy - 370-385
Photographic presentation - 256-260	Source of the analytical signal - 380
Other	Electron diffraction - 386-390
	Other
	Session 13
	Scan Probe Microscopy & Review