

NANO 703/703L
Final - Study Guide

The final exam content is cumulative over the semester.

Topics not covered on previous exams are listed below.

19. Amplitude Contrast

- Contrast definition
 - Mass-thickness contrast
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20. Phase Contrast

- Weak-phase object approximation; positive/negative phase contrast
 - Origin of lattice fringes
 - Signatures of phase contrast
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21. Thickness and Bending Effects

- Column approximation
 - Thickness and bending contours
 - Absorption in dynamical theory
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22. Planar Defects

- Twins, stacking faults, antiphase boundaries
 - Scattering matrix
 - Boundary conditions on electron wave across planar defect
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23. High-Resolution Imaging

- The TEM as a linear system; impulse response (transfer) function $h(u)$
 - Contributions to $h(u)$: Aperture function $A(u)$ and phase function $\chi(u)$
 - Influence of defocus and spherical aberration on phase
 - Contrast transfer function $T(u)$; importance for weak-phase objects
 - Scherzer defocus and resolution
 - Attenuation (envelope, damping) terms
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24. Image Simulation

- Influence and measurement of C_s and Δf
 - Multislice method, propagator
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26. Quantitative EDX

- Factors influencing intensity
 - Absorption correction
 - k-factors and zeta (ζ)-factors
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Lab

11: TEM Dark-Field Imaging

11: Scanning TEM and EDX

12: TEM Sample Prep – Ultramicrotome