STU DY G UIDE FOR E XAM 2 (NOV. 15, 2001)

TO PICS COVERED:

A. Formation Theories  (of the Milky Galaxy)
   ELS model: rapid, “monolithic” collapse of a slowly rotating protogalaxy:
      - halo stars form quickly, gas falls into the disk; evidence from stellar kinematics
   Searle-Zinn (SZ) model: accretion of halo stars from infalling small satellite galaxies
      - evidence from the globular clusters
   the Sagittarius dwarf galaxy: an example of satellite-galaxy accretion in progress today

B. The Local Group of Galaxies
   Milky Way (MW) and Andromeda (M31), giant spirals, each with their own satellite system
   most common galaxy type (by far): dwarf spheroidals
   interaction of the MW with the Magellanic Clouds
   the “thick disk” as a possible fossil of an earlier accretion event
   possible future interaction/merger of the Milky Way and Andromeda

C. General Properties of Galaxies
   morphological classification methods
   Hubble “tuning fork” and updates: where do the S0’s fit in?
   deVaucouleurs’ Hubble “t” index, -5 (E) to +11 (Irr)
   Morgan system: central concentration correlates with average spectral type
   properties that correlate with t: bulge/disk ratio, gas fraction (M_gas/M_total); color
   other galaxy types: dwarf spheroidals, low-surface-brightness spirals, cD’s
   quantitative measurements: “photometric” profiles, surface brightness vs. r
      - de Vaucouleurs’ r^{1/4} law; King profile; exponential law e^(-r/ro)

D. Disk Galaxies (Spirals and S0’s)
   rotation curves: trace v(r), convert to M(<r) and ρ(r); flat or rising at large r
   spiral structure: arm classes (“grand design” vs. flocculent); spiral structure as
      a density wave, possible causes including bars, shearing effects, tidal interactions
   Tully-Fisher relation, width of HI 21 cm radio line v correlates with total L

E. Elliptical Galaxies
   not just oblate (or prolate) rotators; probably “triaxial”
   photometric fine structure: isophotal “twists,” outer “shells,” boxy/disky isophotes
   correlation of a_4 parameter (boxy/disky) with luminosity, (v/σ)*, radio flux, etc.
   global relationships: Faber-Jackson (L, σ), “fundamental plane” for E galaxies
      merger hypothesis; modern observational support for this idea

READINGS:

Sparke & Gallagher: ch. 1 - sect. 1.3 (pp. 32-39)  Possible Review Problems
   p. 135, top sentence
   ch. 4 – all except 4.1.4, 4.3.2
   ch. 5 – all except 5.1.1, 5.2.1, 5.4.3;
   ch. 6 – pages 231-256
Elmegreen: chs. 5 and 7