Physics 214. January 1980 session.

1. Introduction, scope of course, texts, marking. Film "Universe"
2. Planetary radar applications, good and bad targets, backscatter factor, gain, planetary distances, $T^2 \propto r^3$, masses.
3. Sizes, masses, mean densities, oblateness. Terrestrial and Jovian planets. Doppler Effect.
4. Lost - AHB ill in bed!
5. Rotation from sunlight and radar Doppler, figure of a rotating planet, evidence for dense planetary interiors; seismic waves
6. Models of Earth interior; core-mantle models of other terrestrial planets; radiation definitions; planetary spectra
7. Radiative equilibrium models; planetary temperatures; heat transfer and internal heat sources; Earth heat balance
8. Planetary heat trap; scale height, exponential atmosphere; Earth, Mars, Venus P(h) data; atmospheric compositions
9. Earth CO_2 anomaly; escape velocity; exosphere; criterion for escape τ; composition segregation in atmosphere.
10. Temperature segregation in atmosphere; filters and membranes; Earth as organism; nonthermal escape from Mars; radiometric dating; Earth, Moon, meteo
11. Organisation of motions and composition in S.S.; Milky Way layout; stellar distances and masses; $L_* \propto M_*^3$
12. Stellar equilibria + lifetimes; interstellar cloud conditions and equilibria; Jeans criterion; cloud contraction/fragmentation; star formation
13. Rotation + conservation of angular mtm; disk formation, mechanical/thermal equilibrium; Cameron-pine model; T(r)
14. Equilibrium condensation sequence; terrestrial densities; terrestrial/Jovian condens^n; problems/simplifications; pebble formation
15. Gravitational accumulation of planetesimals, asteroidal bodies; magic; accretion onto protoplanets; feeding zones; Jupiter effect
16. Accretion rates and times; review of stages/timescales of S.S. growth; dissip^n of gas disk - drag and atmosphere argts., T Tauri bro
17. Magnetic magic broom; argon in Earth atm^n; review of plan. heating mechanisms; cratering; rot^n of planets; accretion, core and radioactive heating
18. Differentiation of Earth; convinced drift and reformism; outgassing of atmosphere; Earth's atmosphere as 'oddball'
19. Biological terminology; prokaryote/eukaryote; heterotroph/autotroph; evidence of the fossil record for evolution in pre-Cambrian
20. Paleobiology and evidence for primitive atmosphere and conditions on early Earth; antiquity and development of early life
21. Prebiotic syntheses of amino and fatty acids, sugars; polymerisation, proteinoids, microspheres, coacervates; hydrophobicity and genetic code
22. O_2, N_2 and CO_2 cycles on Earth; Hart evolution; Mars expectations — distance versus smell mass as evolution factors
23. Mars - topography, surface conditions at Viking sites and poles, dust storms, mineralogy and atmospheric composition
24. Mars - evidence for dense past atmosphere, CO_2/H_2O sinks, the Martian channels.
25. Mercury - topography and rotation; Venus - surface features, composition, atmospheric composition and structure; clou (Hart "zone")
26. Venus - evolution vs. Earth/; evidence for molten core in past, chemical condens. equil. vs. mass effect on oxidised ci
27. Moon - surface topography, radiometric dating and composition, cratering history, internal structure, tidal evolution
28. Limits to life on Earth, Antarctic biology
29. Viking biology missions and conclusions
30. Mars cratering and erosional history, internal evolution and chronology. Climatic change scenarios
31. Theories of lunar origin. Intro. to Jupiter and outer planets.
32. Jupiter. Pioneer results, biozones and life-limiting factors. Galilean satellites, Europa ocean?
33. Saturn and beyond. Titan as "sub-planetary body" and low-temperature biosphere.
34. Stellar mass spectrum, lifetime consequences for organic evolution, chemistry of galaxy and "good stars"
35. Extrasolar planets, astrometry,
36. SETI prospects, concluding discussion