

Review for Exam 1:

1. The nature of electromagnetic radiation: dual nature of electromagnetic radiation; electromagnetic spectrum; main radiometric quantities (energy, flux (or irradiance), and intensity (or radiance)).

*Lecture 2, Eqs.[2.1]-[2.6] ; Table 2.2*

2. Introductory survey of remote sensing: types of platform, passive and active remote sensing, orbits, resolutions.

*Lecture 3*

3. Concepts of a blackbody. Planck function. Main radiation laws. Brightness temperature. Sun as an energy source. Solar constant.

*Lecture 4, Eqs.[4.1], [4.4 ] and equations in the frames*

4. Emission and reflection from the ocean and land surfaces. Concept of the refractive index. Specular, diffuse and Lambertian reflectance.

*Lecture 5, equations in the frames*

5. Basic properties of atmospheric gases. Structure of molecules and associated dipole moment. Basic principles of molecular emission/absorption. Spectral line shapes: Lorentz profile and Doppler profile. Gas absorption coefficient and transmission function. Absorption spectra of radiatively active atmospheric gases.

*Lectures 6-7, Eqs.[7.1],[7.2],[7.4]*

6. The Beer-Bouguer-Lambert law.

*Lecture 9, Eqs.[9.1], Lecture 10, Eq.[10.1]*

7. Basic properties of atmospheric aerosols and clouds. Scattering and absorption by aerosols and cloud drops: concepts of scattering and absorption efficiencies and cross sections, volume extinction, scattering and absorption coefficients; scattering phase function and single scattering albedo.

*Lectures 8-9, Eqs.[9.2]-[9.3],[9.12]-[9.16]*

8. Molecular Scattering. Rayleigh scattering phase function. Scattering cross section of air molecules and optical depth due to molecular scattering

*Lecture 9, Eqs.[9.4]-[9.9]*