OPTICS (PHYSIOLOGICAL): Ametropia

A. Refractive states: emmetropia, myopia, hyperopia, astigmatism, presbyopia, anisometropia
   1. Epidemiology, history and symptom inventory
   2. Observation and recognition of clinical signs, and techniques and skills including determination of:
      a. Interpupillary distance
      b. Visual acuity
      c. Corneal curvature and thickness
      d. Objective static and dynamic refractive status, including automatic refractive devices
      e. Standard subjective refraction procedures, including astigmatic dials, crossed cylinders, stenopaeic slit,
         fogging methods, bichroma, and accommodation balance (equalization) techniques
      f. Binocular subjective refraction procedures, including Turville Infinity Balance and vectographic
         (Polaroid) techniques
      g. Cycloplegic subjective and objective techniques
      h. Amplitude of accommodation
      i. Trial lenses
      j. PRA/NRA
      k. Add powers
      l. Refractive correction applications (e.g., LASIK)

B. Anomalies of Refraction: Aphakia, Pseudophakia, and Aniseikonia
   1. Epidemiology, history and symptom inventory
   2. Observation and recognition of clinical signs and phenomena associated with aphakia and pseudophakia:
      a. Magnification
      b. Field of view
      c. Spatial distortion
      d. Convergence demands
      e. Sensitivity to glare
      f. Techniques and skills for determining, evaluating and/or verifying:
         1. Types and characteristics of intraocular lenses and aphakic spectacle and contact lenses
         2. Intraocular lens power
         3. Special refraction techniques
         4. Aphakic lens prescriptions
   3. Observation and recognition of clinical signs, and techniques and skills associated with aniseikonia
      including:
      1. Detection of aniseikonia
      2. Measurement of aniseikonia

C. Schematic eye models
   1. Dioptic components
   2. Cardinal points, entrance and exit pupils
   3. Ametropia: far point, near point, correction
   4. Accommodation: amplitude and effectivity
   5. Astigmatism, including correction
   6. Retinal image size, spectacle magnification, and relative spectacle magnification

D. Dioptrics of the eye
   1. Characteristics of components (curvature, thickness, separation, refractive indices, and axial length)
   2. Reference angles and axes
   3. Catoptric (Purkinje) images
   4. Retinal image size
   5. Optical function of the pupil

E. Entoptic phenomena
   1. Characteristics and origin of various phenomena (involving the cornea, lens, and vitreous)
   2. Vascular and circulatory phenomena (Purkinje tree, capillary circulation)
3. Phenomena associated with central vision (Maxwell's spot, Haidinger's brushes)
4. Phenomena associated with retinal distention or other forms of retinal activity (Moore's lightning streaks, blue arcs of the retina, phosphenes)

F. Image quality
1. Aberrations (spherical, chromatic, coma, curvature, oblique astigmatism, distortion, wavefront sensing aberrometry)
2. Diffraction
3. Stray light
4. Point and line spread functions
5. Resolving power
6. Modulation transfer function (Fourier optics)

G. Radiation and the eye
1. Radiometry (radiant intensity, radiance, and irradiance)
2. Photometry (luminosity function, luminous intensity, luminance, and illuminance, Lambertian surfaces- cosine laws)
3. Spectral transmission of the ocular media
4. Retinal illuminance
5. Effects of incoherent radiation (e.g., infrared, visible, ultraviolet) on tissue
   a. Mechanisms of damage
   b. Wavelength, energy levels, thresholds for reactions
   c. Protective measures
6. Effects of coherent radiation (lasers) on tissue
   a. Mechanisms of damage
   b. Wavelength, energy levels, thresholds for reactions
   c. Ophthalmic applications (argon, excimer, YAG, helium neon, krypton, holmium)
   d. Protective measures