Applied Health Physics Topics:

I. Statistics and other mathematics
   a. pdf's and cdf's
   b. binomial, Poisson, Gaussian
   c. error propagation
   d. pdf transforms – Monte Carlo
   e. linked ODE's – Laplace transforms, STELLA, et al.
   f. special functions – Bessel, F1's, E1, E2, etc.; Method of Forbenius

II. Operational quantities and units
   a. Quality factors (radiation weighting factors)
   b. Dose equivalent (equivalent dose)
   c. Effective dose (effective dose equivalent)
   d. Ambient dose equivalent
   e. Others

III. Instrumentation and Measurements
   a. Electronics
   b. Counting
      i. Plastic scintillators
      ii. Proportional counters
      iii. Geiger-Mueller counters
      iv. Gas-flow counters
      v. Alpha spectrometers
      vi. NaI(Tl) detectors and spectrometers
      vii. HPGe and spectrometers
      viii. Pulse shape discrimination
   c. Dosimetry
      i. Film
      ii. Thermoluminescence dosimetry (TLD)
      iii. Optically stimulated luminescence (OSL)
      iv. Ion chambers
      v. Others
   d. Portable survey instruments

IV. Regulations
   a. Guidance from ICRP and NCRP
      i. Foundations for recommendations
      ii. Risk-based recommendations
      iii. Detriment and aggregated detriment
   b. 10CFR20 and 10CFR835 regulations
   c. ALARA considerations
   d. Radiation exposure limits
   e. Quality vs. energy and type – RBE review
   f. TEDE and other concepts

g. Special definitions: Skin, lens of eye, planned special exposures, declared pregnant female, etc.
h. DOT, EPA, and other federal agencies

V. Internal Dosimetry
a. Stochastic and deterministic radiation effects
b. Tissues at risk and tissue weighting factors
    i. ICRP Publication 30
    ii. ICRP Publication 60
c. Calculation of organ-averaged absorbed dose
d. Calculation of committed dose equivalent
e. Model for the respiratory system
    i. ICRP Publication 30
    ii. ICRP Publication 66
f. Model for the gastrointestinal tract
g. Model for the skeleton
h. Submersion in a noble gas cloud
i. Metabolic models for elements
j. Dose to the embryo/fetus
k. Reference Man
l. Limitations of approach
m. Practical applications in controlling the workplace
n. Practical applications in evaluating intakes

VI. Operational Radiation Safety (e.g., from NCRP Report No. 127)
a. General guidance on establishing a program
    i. Selection and training of staff
    ii. Responsibilities
    iii. Radiation safety committee
    iv. Training of users
b. Personnel monitoring
    i. Occupationally exposed workers
    ii. Special exposure groups
c. Air monitoring
    i. Impactors, how they operate, and how to interpret their data
    ii. General particle monitoring, collection by filtration
d. Radiation surveys
e. Contamination surveys
f. Area monitoring
g. Bioassay program
h. Respiratory protection
i. Environmental monitoring
j. Accident monitoring
k. Criticality monitoring
l. Record-keeping
m. Waste disposal

n. Emergency planning and response

VII. Other topics
a. Aerosol physics
    i. Interpretation of aerosol properties as they apply to respiratory penetration
    ii. Size dependence of aerosol transport properties and implications for environmental removal or transport
b. Meteorological transport
    i. Use and limitations of Sutton's equations
    ii. Inferring source strength from remotely measured decay product and *vice versa* via Sutton's equation
c. Shielding design
d. Neutron dosimetry
e. Space radiation
f. Radioactive waste management
g. Environmental radiation
    i. Natural background
    ii. TENRE
    iii. NORM/NARM