Preliminary Schedule of Topics to be Covered – Fall 2020

1. Composition Space and Reaction Space
   - Modern approaches to mineral chemistry
   - Brief review of matrix algebra
   - Algebraic and thermodynamic treatment of phase equilibria
   - The Gibbs Method for $P-T-t$ determination

2. The Periodic Table
   - Abundance and distribution of the elements
   - Systematic examination of the groups and periods
     - Large-ion-lithophile elements (K, Rb, Cs, Ca, Sr, Ba)
     - Transition metals (Sc → Zn)
     - Ga-Al & Ge-Si variations
     - High-field-strength elements (Zr, Nb, Hf, Ta, Th, U)
     - The REE (rare-earth elements)

3. Isotopes and Trace Elements
   - Rb-Sr, Sm-Nd, and U-Th-Pb systematics
   - Trace-element partitioning and distributions
   - Modeling of petrologic processes (fractionation and melting)

4. Discriminant Diagrams & Spiderwebs

5. Multivariate Statistics
   - Brief Review of Simple Statistics
   - Principal Component Analysis
   - Cluster Analysis & Discriminant Analysis
   - Methods of Aitchison

6. Additional Numerical Procedures
   - Mixing rules and properties
   - Niggli Numbers and Pearce Element-Ratio plots
   - Mass-transfer processes and Isocon plots

7. Evolution of the Crust
   - Archaean tonalite-trondjhemite-granodiorite (TTG) terranes
   - Proterozoic massif anorthosites and related rocks
   - Granitic rocks in space & time
   - Granulites & the lower crust
   - Sedimentary rocks and Earth history