February 9, 2021
MSE 2103 topics

- The fundamental forces in nature

- Atoms, isotopes, bonds, and all that...

- Alpha, beta and gamma decays

- The concept of half-life

- Radioactive decay as geological clock

- The math behind radioactive decay – this is a science class after all :)

- Lines of evidence for a 4.6 billion year old Earth

- Fine, Earth is 4.6 billion years old; but what about the Sun?
  - chemical reactions, fossil fuel burning?
  - radioactive decay?
  - gravitational contraction?
  - … or something else?

- $E = mc^2$

Example problems:

- ^{137}Cs has a half-life of 30.17 years as it decays into ^{137}Ba. Jow much Cs is left after 50 years? How much Ba is produced after 75 years?

- ^{238}U has a half-life of ~4.5 billion years. A rock from lunar highlands shows that 45% of the original uranium decayed into lead. How old is that rock?

- Determine the half-life of ^{40}K if you know that there is ~9% of primordial potassium left in an asteroid that is ~4.5 billion years old.