

January 31, 2019
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 . How 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 $\sim 9\%$ of primordial potassium left in an asteroid that is ~ 4.5 billion years old.