Lecture 19, Mar 3, 2022

Elastic Behaviour

- $F = -\dfrac{\mathrm{d}U}{\mathrm{d}r}$ where $U(r)$ is the potential between atoms with respect to interatomic distance
- $\left.\dfrac{\mathrm{d}U}{\mathrm{d}r}\right|_{r=r_0} \propto E$
- Young's modulus E is *independent of structure* in the linear region, i.e. it only depends on the atoms of the solid
  - Note this is only applicable to metals
  - e.g. E for carbon steel ranges from 190 to 210GPa; all steels have about the same stiffness, but some steels are stronger than others
- When a material is stretched beyond its elastic range, it will recover elastically with the same Young's modulus but won't return to the original length