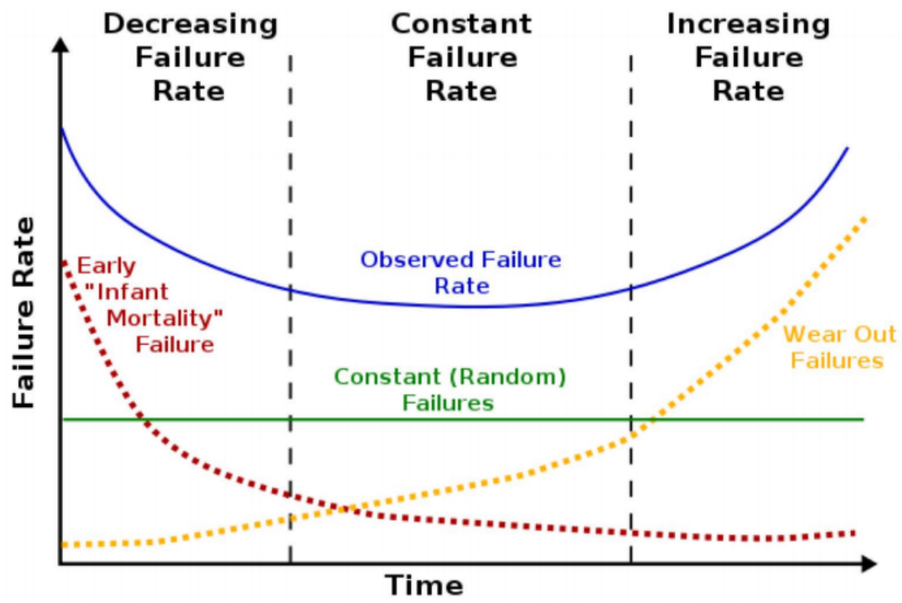
Week 8: Introduction - Equipment failure

- The Bathtub Curve
  - a failure distribution built from 3 common types of failure • early failure, random failure, wear-out failure



- early (‘infantile’) failure: root cause is a manufacturing fault. Compromised component rapidly fails.
  - Manufacturers can attempt to eliminate such components by ‘burn in’ – running component for a period of time before selling them (common for military components, less common for commercial components)
- random failure: no common root cause, just a random failure. Approximately constant probability over time of such a failure
- wear-out failure: occurs because component has reached or exceeded their designed lifespan
- Mean Time Between Failure (MTBF) & Mean Time To Failure (MTTF)
  - **MTBF (https://en.wikipedia.org/wiki/Mean_time_between_failures)** is technically for repairable components, while **MTTF (https://en.wikipedia.org/wiki/Mean_time_between_failures)** for non-repairable ones but product documentation may use them interchangeably
- MTTF/MTBF:
  - (total test time * number of components tested)/ total number of failures
  - say we had 13500 hard disks tested for 1000 h and 9 failed
  - (1000 h * 13,500)/ 9 = 1,500,000 h (MTBF ~171 years)
  - *Doesn’t mean an individual drive is expected to last 171 years!*
  - If you have 1000 drives working 24/7, expect a failure about every 1,5000,000/1000 = 1,500 h (~62 days)
  - Distribution of failure important and can make MTBF inaccurate