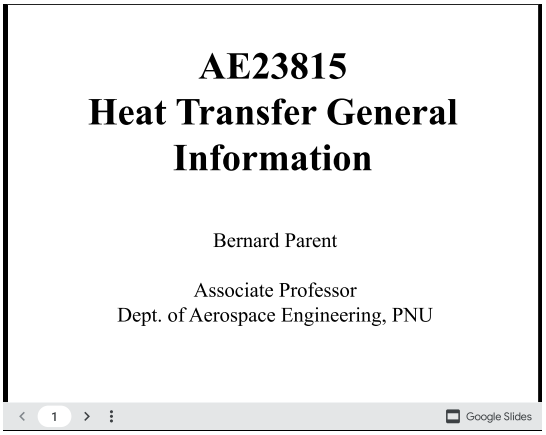
Heat Transfer Syllabus

Course Objectives, Policies, and Grading



Course Calendar — Weekly Schedule

1. Derivation of Fourier's law and the heat equation. Conduction heat transfer in solids.
2. Radiation heat transfer. Derivation of Kirshoff's law. Black and gray body. Surface emissivity and absorptivity. Basic concepts of convection heat transfer. Assignment #1
3. Conduction in solids with heat generation and in composite solids. Derivation of resistance analogy for conduction and convection. Contact resistance. Assignment #2.
4. Shape factors. Derivation of fin efficiency for rectangular cross-section fins. Efficiency charts for circular and triangular fins. Assignment #3.
5. Transient conduction (unsteady conduction). Lumped capacity analysis. Exact solutions of semi-infinite solids. Heisler charts. Multidimensional transient heat conduction. Assignment #4.
6. Design problem involving the cooling of an electrical cable on an aircraft. Design problem set #1. Example problems in preparation for the midterm exam.
7. Midterm break
8. Energy equation of a constant-density fluid. Convective heat transfer within Couette flow. Assignment #5.
9. External convection heat transfer (heat transfer within boundary layers on external surfaces of bodies). Assignment #6.
10. Tube banks and natural convection heat transfer. Assignment #7.
11. Internal convection heat transfer (heat transfer due to fluid flow within pipes and ducts, fully developed flow). Assignment #8.
12. Phase change heat transfer. Design Problem Set #2.
13. Review problems for the final exam.
14. Final Exam