- **Course Number and Title:** A E 469. Hypersonic Aerothermodynamics
- **Catalog Description:** Challenges of hypersonic flight. Large Mach number approximations. High-temperature effects. Vibrational and chemical non-equilibrium. Viscous high-temperature flows; crosslisted with A E 569
- **Credit Hours:** 3 Credits (3)
- **Prerequisite(s) / Corequisite(s)** Pre-/Corequisite(s): AE 439
- **Required:** Elective for BSAE Degree
- **Course Availability:** Spring Semester
- **Instructor (Usual):** Dr. Andreas Gross (See https://mae.nmsu.edu/people/faculty.html)
- **Textbook:** John D. Anderson, *Hypersonic and High-Temperature Gas Dynamics* AIAA education series
- **Course Learning Objectives:** <u>After completing this course, a student should be able to:</u>
  1) Aware of challenges of hypersonic flight.
  2) Understand vibrational and chemical non-equilibrium effects.
  3) Understand governing equations for viscous high-temperature flows.
- **Topics Covered:**
  - Review of international programs (from different sources)
  - Shock and expansion wave relations (Chapter 2)
  - Viscous flow: Basic aspects, boundary layer results, and aerodynamic heating (Chapter 6)
  - Hypersonic Viscous interactions (Chapter 7)
  - High-temperature gas dynamics: Some introductory considerations (Chapter 9)
  - Some aspects of the thermodynamics of chemically reacting gases (Chapter 10)
  - Chemical and Vibrational Nonequilbrium (Chapter 13)
  - Kinetic theory revisited: Transport properties in high-temperature gases (Chapter 16)
  - Viscous high-temperature flows (Chapter 17)
  - Ground and flight tests (from different sources)
  - Heatshield material selection (from different sources)