Physical Gas Dynamics (AE/ME 6137)  
Syllabus

Instructor: J.L. Rovey, 194 Toomey Hall, Phone: 341-4613, email: roveyj@mst.edu  
Class Time:  TTh 9:30-10:15AM, Comp. Sci. 209  
Office hours:  1-4PM Mon, 1-2 & 3-5 Weds or by appointment.

Text:  Vincenti & Kruger, Introduction to Physical Gas Dynamics

References:
Vincenti & Kruger, Introduction to Physical Gas Dynamics  
Gombosi, Gaskinetic Theory  
Bird, Molecular Gas Dynamics  
Chapman & Cowling, The Mathematical Theory of Non-Uniform Gases  
Hanna, Quantum Mechanics in Chemistry  
Herzberg, Spectra of Diatomic Molecules  
Hirschfelder, Curtiss & Bird, Molecular Theory of Gases & Liquids  
Incropera, Introduction to Molecular Structure & Thermodynamics  
Levine & Bernstein, Molecular Reaction Dynamics

Grading:
A  90% and above  
B  80 - 89 %  
C  70 - 79 %  
F  below 70%

Weightages:
Homework, 6 assignments, 5% each  30%  
1 mid-term exam  30%  
Final Exam (Date TBD)  40%

Notes:
• There are NO make-up exams or quizzes.  
• The final exam is cumulative (it covers everything).  
• Homework will be due on Thursday at the beginning of class.  No Late Homework accepted.

Communication:
Please check your email daily.  I also plan to use CANVAS to post HW, handouts, announcements, etc.  http://canvas.mst.edu

Academic Dishonesty:  http://registrar.mst.edu/academicregs/index.html
Page 30 of the Student Academic Regulations handbook describes the student standard of conduct relative to the University of Missouri System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism or sabotage (http://registrar.mst.edu/academicregs/index.html). Additional guidance for faculty, including the University’s Academic Dishonesty Procedures, is available on-line at http://ugs.mst.edu. Other
informational resources for students regarding ethics and integrity can be found online at http://ugs.mst.edu/academicintegrity/studentresources-ai

**Classroom Egress Maps:**
Please familiarize yourselves with the classroom egress maps posted on-line at: http://designconstruction.mst.edu/floorplan/

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To request accommodations or assistance, please self-identify with Disability Support Services (DSS), 203 Norwood Hall. For more information or to register for services, contact DSS at (573) 341-6655 or by email at dss@mst.edu.
I. Introduction

II. Introduction to Kinetic Theory
   a. Particle Model, V&K 1-7
   b. Macroscopic Quantities, V&K 7-15
   c. Internal Energy
   d. Molecular Collisions, V&K 12-15
   e. Molecular Transport Processes, V&K 15-23
   f. Molecular Magnitudes

III. Kinetic Theory Analysis
   a. Velocity Distribution Function, V&K 27-41, 328-332
   b. Boltzmann Equation
   c. Equilibrium VDF or Maxwellian VDF, V&K 42-47
   d. Equilibrium Collision Rate, V&K 48-54
   e. Equilibrium Mean Free Path, V&K 52-5
   f. Nonequilibrium Analysis

IV. Internal Atomic/Molecular Structure (Quantum Mechanics)
   a. Quantum Mechanics
   b. Schrodinger Eqn.
   c. Solution of Schrodinger Eqn.
   d. Atomic Structure
   e. Structure of Diatomic Molecules

Mid-Term EXAM

V. Statistical Mechanics
   a. Statistical Counting Methods, V&K 86-99
   b. Distribution of Energy States, V&K 101-112
   c. Relation to Thermodynamics, V&K 112-120
   d. Partition Functions, V&K 120-130
   e. Reacting Systems, V&K 139-150

VI. Chemical Rate Processes, V&K 152-176
   a. Equilibrium Processes
   b. Finite Rate Processes, V&K 210-232