PHYSICS 5C
Topics

revision 8/26/19

"Plans are useless, but planning is essential."
　　—Dwight D. Eisenhower

Lectures will be held **Tue/.Thu**. 9:30–11 am (2 LeConte). Discussion sections are currently scheduled for Tue. 4–6 pm (122 Barrows) and Wed. 2–4 pm (136 Barrows)

Week 1:　　**Course Logistics and Overview**
　　　　　　　　course policies; thermatic overview

Week 2:　　**Segue from Classical to Quantum: Waves**
M 09/02　　　*NATIONAL HOLIDAY* (Labor Day)
　　　　　　　　wave equation; polarization ; double-slit experiment

　　　　　　　　(*discussion sections will meet beginning in* <u>*Week 2*</u>*….*)

Week 3:　　**Birth of Quantum Mechanics**
　　　　　　　　photoelectric effect; Compton scattering; blackbody radiation;
　　　　　　　　Bohr model of Hydrogen

Week 4:　　**matter waves**
　　　　　　　　complex exponentials**;** deBroglie waves; Davisson-Germer and
　　　　　　　　Franck-Hertz; dispersion relations; phase and group velocity

Week 5:　　**1D**, **time-independent Schrodinger equation**
　　　　　　　　particle-in-a-box; harmonic oscillator; sketching solutions; Bohr-
　　　　　　　　Sommerfeld quantization rules

Week 6:　　**more on Schrodinger wave mechanics**
　　　　　　　　superposition; Born rule; operaors and expectation values;
　　　　　　　　stepwise potentials;; reflection and tranmission

Week 7:　　**time-dependence**
　　　　　　　　time-dependent Schrodinger equation, Fourier transforms; wave packets

Week 8:　　**yet more quantum mechanics**
　　　　　　　　spin and polarization; 3D Schrodinger equation; angular momentum and
　　　　　　　　hydrogen atom

　　　Midterm #1　　<u>tentatively scheduled for 7:00 – 9:10 pm, Wednesday 10/16</u>

Week 9:   **fundamentals of thermodynamics**

       energy, pressure, temperature; states and processes
       heat capacity; thermometry and calorimentry

Week 10:   **Laws of thetmodynamcis**

       Three (or four) laws of thermodynamics. entropy;
       exact versus inexact differentials; reversible and irreversible processes

Week 11:   **ideal gases**
       ideal gas equations of state and processes; kinetic theory; Maxwell-Boltzmann
       distribution; van der Waals equation of state and non-ideal gases.

Week 12:   **cyclic processes and heat engines**
M 11/11   *NATIONAL HOLIDAY (Veteran's Day)*
       Carnot cycle, otto *cycle, Rankine cycle, etc; engines and refrigerators*
       efficiency and coefficient

Week 13:   **phase diagrams and phase changes**
       phases, phase transformaions, phase diarams, coexistence
       triple point and critical points; latent heat; super-heating and cooling

   Midterm #2   7:00–9:10 pm Wednesday 11/16**,**

   Both midterms are scheduled during additional evening sessions to allow extra time….

Week 14:   **statistical mechanics**
       microstates and macrostates; statistical descriptios

W 11/27   *Thanksgiving Recess (no work)*
F   11/29   *Thanksgiving Recess* (perhaps some dissipation)

Week 15:   **more statistical mechanics**
       statistical notions of temperature and entropy
       canonical ensemble; partition function; blackbody radiaiotn

Week 16:   **RRR Week** (we **will** meet during both lecture and discussion sections)

       people's choice: Maxwell's demon, EPR paradox, many-worlds, etc.

Week 17:   **EXAM PERIOD**

T 12/17   3:00–6:10 pm   FINAL EXAMINATION (2 LeConte)

The final exam will definitely be cumulative, but will tend to emphasize material subsequent to the midterms as well as key themes, ideas, tools, and models from throughout the semester.
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FT   = French & Taylor
G   = Goodstein
BB   = Blundell and Blundell
F   = Feynman Lectures
S   = Shankar

Specific required, recommended, and suggested reading will be listed on weekly problem sets, Electronic reading all other reading will be posted or distributed online via *bCourses*.
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This syllabus is tentative and subject to revision based on our perceived progress, backgrounds of and feedback from students, or my whim or random fluctuation