

**Harry S Truman College**  
**One of the City Colleges of Chicago**

**COURSE SYLLABUS**  
**Fall 2013**

**Course Title and Section:** Physics 237 PQR

**Credit Hours:** 5

**Contact Hours:** 8

**Class Meeting Times:** MW 5:45 – 9:35 pm, Room: 3833, main building

**INSTRUCTOR:** Dr. Kai Cai

**E-MAIL:** kcai@ccc.edu

**PHONE:** 773-907-4347

**OFFICE:** Main building 3834

**OFFICE HOURS:** Mon & Wed 4:30 – 5:35pm, Tue 3:30 - 5:00 pm, Thu 3:30 – 5:30pm, and by appointment via email

**COURSE WEBSITE:** ccc.blackboard.com

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**Course Description: Engineering Physics III: Heat, Light and Modern Physics**

Similar to Physics 233; emphasizes practical and theoretical problems involving the use of calculus. Primarily for students majoring in engineering or physical sciences. Writing assignments, as appropriate to the discipline, are part of the course. **Prerequisites:** Grade of C or better in Math 207 and Physics 235, and eligibility for English 101 or Consent of Department Chairperson.

**This Course is Expected to Serve:** students majoring in physical sciences or engineering who have already taken calculus and learned at least mechanics and waves (calculus-based) in Physics 235.

**Textbooks and Materials:**

**Text:** *Fundamentals of Physics* by Halliday, Resnick, and Walker (9<sup>th</sup> edition), published by John Wiley & Sons, ISBN: 978-0-470-46908-8; Binder-ready version ISBN: 978-0-470-56473-8; 10<sup>th</sup> edition ISBN: 978-1-118-23072-5 (Extended edition)

Student Companion Site:

<http://bcs.wiley.com/he-bcs/Books?action=index&itemId=0470469080&bcsId=5586>

**Supplementary Textbooks (not required):**

1. (*Sears & Zemansky's*) *University Physics* by Young & Freedman, 12th (or latest) edition
2. *College Physics*, 8<sup>th</sup> (or latest) edition by Serway & Vuille

**Other materials:**

A computer with internet access is needed to check course Blackboard site and finish assignments. Students without home internet access may use free WiFi and computers with internet access at Truman, other CCC campuses and all Chicago Public Libraries.

A scientific calculator (with complex functions such as  $e^x$ , log, and sin) and a notebook are also needed.

Recommended videos: see Blackboard > External Links

**Course Objectives:**

1. To enable student understanding of the concepts of temperature, heat, the kinetic theory of gases, thermodynamics, and heat engines.
2. To develop analytic understanding of electromagnetic waves, geometric and wave optics.
3. To develop the phenomenological understanding of the special theory of relativity, blackbody radiation, the Compton and photoelectric effect, quantum mechanics, the physics of the nucleus, radioactive decay, and properties of the solid state.
4. To explore applications of the above concepts in a laboratory.
5. To apply habits and skills of scientific thought to personal and social problems
6. To stimulate the student to further interest in physics and other related fields

**General Education Objectives:**

A student who successfully completes the course will demonstrate competence in four areas:

1. Knowledge of course content;
2. Critical thinking;
3. Writing; and
4. The use of technology as a learning resource

**Student Learning Outcomes:**

After completing the course, the student should be able to model and analyze real world physical systems and apply this knowledge to:

1. Solve quantitative and qualitative problems involving:
  - a. Temperature conversion
  - b. Thermal expansion

- c. Ideal gas law
  - d. Heat exchange and calorimetry
  - e. Heat transfer and thermal conductivity
  - f. First and second laws of thermodynamics and heat engines
2. Solve quantitative and qualitative problems involving:
    - a. Snell's Law
    - b. Brewster's Law
    - c. Mirrors and Lenses
    - d. Polarization
    - e. Young's double slit
    - f. Thin films
    - g. Single slit diffraction
    - h. Diffraction gratings
    - i. Spectroscopy
  3. Solve quantitative and qualitative problems involving:
    - a. Lorentz transformations
    - b. Mass energy equivalence
    - c. Relativistic Doppler effect
    - d. Photoelectric effect
    - e. Compton effect
    - f. Schroedinger equation
    - g. Particle in a box
    - h. The hydrogen atom
    - i. Nuclear binding energy
    - j. Radioactive decay
    - k. Nuclear reaction energies
    - l. Solid state physics

**Method of Instruction:** Lectures, problem-solving sessions, demonstrations, video presentations, collaborative learning activities. Writing is incorporated in the form of lab reports.

**Grade breakdown:**

Homework: 150 points (19%)

Labs & reports: 80 points (10%)

Quizzes: 100 points (12.5%)

Class participation: in-class exercises, group discussions and presentations, class attendance, etc.: 150 points (19%)

Midterm exams: 200 points (25%)

Final exam: 120 points (15%)

Note: there may be small adjustments.

**Your final grade will be determined according to the following scale:**

- A 86% -100%
- B 76% - 85%
- C 65% - 75%
- D 55% - 64%
- F < 55%

**Definition / Statement of Active Pursuit of the Course:**

District and College attendance policies are listed in the college catalog and the Student Policy Manual: <http://www.ccc.edu/departments/Documents/studentpolicymanual.pdf>

At midterm all professors must submit a grade that reflects the performance of each student. Students will be dropped from the class for lack of active participation for any of the following reasons:

- 1) 50% of lectures
- 2) 50% of homework
- 3) 50% of quizzes and exercises
- 4) 50% of Tests

**A student who is not actively participating in any one of the items listed above will be notified on GradeFirst or via email and can be dropped at the midterm and receive a grade of ADW.**

**“No Show” Policy:** If a student registered for the course before the start time of the first class period, but 1) did not attend the first 2 classes, or 2) attended only 1 of the first 3 classes and failed to notify the instructor of his or her intentions to continue the class, the Registrar’s Office will remove the student from the course.

**Lectures:**

It is important that you attend all lectures. Some lectures may include extra materials which may appear in exams. To avoid disruptions, students are expected to arrive on time and to remain in class for the entire duration, and actively participate in the class activities. If you are late, sit near the door quietly and come to the podium only during the break. Students are expected to read the assigned/relevant topics on the textbook before each session and take careful notes in the lectures. Cell phones or similar electric devices should not ring or make noise anytime while class is in session. Side conversations are prohibited. Students who impede the learning of others may be asked to leave for the remainder of the lecture or laboratory and may be subject to disciplinary action.



### Homework Assignments:

It is important that you do assigned reading each week, monitor the course Blackboard site for announcements and new discussion posts, etc. Most homework will be assigned weekly, and to be submitted online at wileyplus.com by the following week. The exact due date for each of the homework will be announced in class when assigned and posted on the WileyPLUS website, which can be connected via a link on Blackboard. Late work will be accepted and receive only partial credit (typically you lose 20% each day after the deadline). The instructor will not offer any assistance with late homework assignments. A waiver of the late penalty given extenuating circumstances will be considered on a case-by-case basis provided appropriate documentation.

### Laboratory:

All students are required to perform about six lab experiments. Each experiment will be performed by groups of two or three students, but lab reports are required to be submitted individually, which could differ by the way to present and interpret data, style, etc. Details will be provided for each lab experiment. Unless otherwise noticed, the lab reports are generally due in one week from the date of the experiment. Students are expected to preview the lab setup (if available) before each lab session. Due to equipment availability, NO make-up labs will be given.

### Quizzes:

There will be announced and unannounced quizzes approximately once a week, except for the weeks of midterms and final. A grade of zero will be entered for a missed quiz. NO make-up quiz will be given. At the end of the semester, the lowest quiz score may be dropped.

### Exams:

There will be two midterm exams (100 points each) and one comprehensive final exam (120 points). The midterm tests will be given in the classroom during class time. Make-up exams will be given only under extreme circumstances and solely at the discretion of the instructor.

**During exams, students may not be allowed to use a cell phone as a calculator. Sharing of a calculator during an exam is also prohibited.**

### Student presentations and Blackboard discussions:

Each student is expected to present at least once during the semester, either individually or as a member of a group. Each student is expected to post at least two Blackboard discussion posts throughout the semester, with one of them being a news story. Both of these will be counted as parts of your class participation (see **Grade breakdown** on page 3).

### Attendance:

Each student must sign the attendance sheet at each class. Coursework missed due to illness or family reasons or religious observances will only be excused at the discretion of the instructor. It is the student's responsibility to notify the instructor ahead of time, if possible. The student may be requested to provide valid written documentation. Note absence does not

excuse a student from completing the course work, like homework or other assignments. If a student misses a class he or she should do the following: a) read the materials for the missed class and b) attempt to do the homework problems or other applicable assignments. If you miss over 1/2 of the classes before midterm, you will be dropped with an ADW. At the end of the semester, attendance record will be counted as a part of the participation points and accounts for about 5% of the overall grade. If you wish to withdraw from the class, it is your responsibility to do so officially by Monday, **November 18**. After the midterm, if you simply quit coming to class without dropping the course, you will receive a grade of F and lose your tuition.

Last day for student-initiated withdraw: November 18, 2013

**Academic integrity:** The City Colleges of Chicago is committed to the ideals of truth and honesty. In view of this, students are expected to adhere to high standards of honesty in their academic endeavor. Plagiarism and cheating of any kind are serious violations of these standards and will result, minimally, in the grade of “F” by the instructor.

**Student Conduct:** City Colleges of Chicago students are expected to conduct themselves in a manner which is considerate of the rights of others and which will not impair the educational mission of the College. Misconduct for which students are subject to College Discipline (e.g. expulsion) may include the following: (1) all forms of dishonesty such as stealing, forgery, (2) obstruction or disruption of teaching, research, administration, disciplinary proceeding, (3) physical or verbal abuse, threats, intimidation, harassment, and/or other conduct that threatens or endangers the health or safety of any person, and (4) carrying or possession of weapons, ammunition or other explosives.

**Compliance with the Americans with Disabilities Act (ADA):** It is the policy of the school to make reasonable accommodations for qualified students with disabilities, in accordance with the Americans with Disabilities Act (ADA). If you need accommodations to complete your course requirements, you must notify the Disability Access Center (more information below) in Student Services. You should also notify me within the first two weeks of class.

### Topical Outline (subject to adjustments):

<b>Class Meeting Dates/Weeks</b>	<b>Schedule</b>
Week 1 (August 26, 28)	Review: Math, Energy (Chapter 8); Chapter 18: Temperature, Heat, 1st Law of Thermodynamics
Week 2 (September 4)	No class on Sept.2 (Labor Day); Lab 1; Heat Transfer
Week 3 (September 9, 11)	Chapter 19: the Kinetic Theory of Gases, Ideal Gas Law; Lab 2
Week 4 (September 16, 18)	Chapter 20: the 2 <sup>nd</sup> Law of Thermodynamics
Week 5 (September 23, 25)	<b>Midterm Exam 1</b> (Chap.18-20); Chapter 33 (Electromagnetic Waves)
Week 6 (September 30, October 2)	Chapter 33 and Geometric Optics; Lab 3 (Reflection and Refraction)
Week 7 (October 7, 9)	Chapter 34; Lab 4: Spherical Mirrors and Lenses
Week 8 (October 14, 16)	Chapter 35-36 (Interference & Diffraction)
Week 9 (October 21, 23)	Chapter 35-36
Week 10 (October 28, 30)	<b>Midterm Exam 2</b> ; Chapter 37 (Relativity)
Week 11 (November 4, 6)	Chapter 37 (Relativity): Relativity Virtual Lab
Week 12 (November 11, 13)	Chapter 38 (Photons and Matter Waves); Lab 5 (Diffraction Grating)
Week 13 (November 19, 21)	Chapter 38-39
Week 14 (November 25, 27)	Chapters 40, 41
Week 15 (December 2, 4)	Chapters 42 – 44 (Nuclear Physics & Particle Physics)
Week 16 (December 9, 11)	Review & <b>Final Exam</b>

### Academic Support Services:

Numerous academic support services are available to students of Truman College. Some are: **Tutoring Center** - for students who need help with their assignments: Room 177, McKeon Building, 773-907-4785, <http://www.ccc.edu/colleges/truman/departments/Pages/Tutoring.aspx>

**Writing Center** - offers free writing assistance to Truman students enrolled in any credit course. Writing consultants, who are also professors at the college, provide feedback and instruction on any stage of the writing process in any class subject. Students can visit the Center to make half-hour or one-hour appointments with writing consultants for tutoring sessions on essays or other writing assignments, as well as placement test preparation, and writing workshops on various topics. The Writing Center is located in Room 1435 of the main building and is open Monday-Thursday from 9am to 7pm and Friday-Saturday from 11am to 2pm.

**Math Center** – Room 1220B, main building. Offers group math workshops etc.

**GradeFirst:** a “web-based student support tool”  
<http://www.ccc.edu/colleges/truman/menu/Pages/Grades-First.aspx>

**Student Success and Leadership Institute (SSLI)** - for students who need various other support services to achieve their educational goals: Room 1435, 773-907-4714.

**TRIO Student Support Services.** For low-income students, first generation college students, or students with disabilities who need academic support: Room 1435, 773-907-4797, [www.trumancollege.edu/trio](http://www.trumancollege.edu/trio). Registration is required at the start of each semester.

**Disability Access Center.** The Center verifies needs pursuant to the American Disabilities Act (ADA), determines student academic accommodations, and issues accommodation letters. Registration is required at the start of each semester. Room 1435 in the main building, 773-907-4725. <http://www.ccc.edu/colleges/truman/departments/Pages/Disability-Access-Center.aspx>

### **FERPA**

FERPA (Family Educational Rights and Privacy Act) is a federal law that protects the privacy of student educational records. Faculty cannot reveal information about students, or discuss student records over the phone or unsecure e-mail. CCC student e-mail meets FERPA requirements. See: [www.ed.gov/policy/gen/guid/fpc/ferpa/index.html](http://www.ed.gov/policy/gen/guid/fpc/ferpa/index.html).

**Please note: the instructor reserves the right to change this syllabus at any time.**

### **Truman College General Education Goals**

The student exhibits social and ethical responsibility and is aware of her or his place in the global community.

The student performs effectively in the workplace and has the ability to work and make effective use of a wide variety of current technologies.

The student communicates effectively in both written and oral formats.

The student demonstrates the ability to think critically, abstractly, and logically.

The student gathers, interprets and analyzes data.

The student demonstrates the ability to work independently.