This course presents a survey of the principles of classical macroscopic thermodynamics with an introduction to statistical mechanics with some kinetic theory. These principles can be applied to a wide range of thermodynamic systems. PHY 430 may be taken for graduate credit.

**COURSE OBJECTIVES:** Explore the basic concepts of thermodynamics which can be used for solving many classes of problems in such diverse fields as chemistry, biology, geology, meteorology, environmental science, engineering, low-temperature physics, solid state physics, astrophysics, and cosmology.

**COURSE CONTENT:** The concept of temperature and temperature scales, equations of state, the three laws of thermodynamics and their consequences, thermodynamic potentials and introduction to kinetic theory and statistical mechanics

**STUDENT LEARNING OUTCOMES:** By the end of the course, a successful student will be able to:
- Understand fundamental concepts and definitions of thermodynamics such as temperature, equation of state, entropy, thermodynamic potentials, etc.
- Know and apply the laws of thermodynamics to simple systems.
- Derive the equation of state for an ideal gas using kinetic theory.

**PROGRAM LEARNING OUTCOMES:**
1. **Knowledge:** The student will demonstrate knowledge and comprehension of the basic and applied fields of physics
2. **Problem Solving:** The student will develop independent problem solving skills
3. **Lab Work:** The student will develop good experimental technique, including proper setup and care of equipment, conducting experiments and analyzing results in order to observe physical phenomena, assess experimental uncertainty, and make meaningful comparisons between experiment and theory.
4. **Written Communications:** The student will develop effective written communication skills by clear and concise problem solving, well-structured laboratory reports, and accepted formatting of research papers.
5. **Oral Communications:** The student will develop effective oral communication skills in oral presentations of problem solution, seminars, and oral presentations at scientific meetings.
6. **Professional Development:** The student will discover the protocols of the professional physicist by attending meetings or giving papers.

**CONCEPT / READING QUIZZES (100):** Every week or so you can expect a concept quiz in class. This quiz will be over one or more fundamental physics concepts we are discussing or have recently discussed in lecture, previously assigned homework problem or textbook example problem. These quizzes will not necessarily be announced in advance. Since you should be in class every day, this will not be a problem. The average of the concept quizzes will count a maximum of 100 points toward the final grade.
HOMEWORK (100): “Problems worthy of attack prove their worth by hitting back.” Piet Hein (1905-1996). Throughout the semester problems will be assigned which are intended to illustrate the principles covered in the lecture. These problems represent the minimum number that the student should work in order to obtain some understanding of the concepts and will count 100 points toward your final grade.

EXAMS (300): There will be three exams as at appropriate times after completing the chapters below. These exams will consist of several problems and proofs. Part or all of the exam may be take-home. In class exams will be given in room 318 at 8:00 a.m.

- EXAM #1 Chapters 1-2
- EXAM #2 Chapters 3-4
- EXAM #3 Chapters 5-7

The student is expected to know and understand the equations required for the exams. These exams will count a maximum of 120 points each toward the final grade. Students will have four days after an exam is returned to discuss any possible errors made in the grading thereafter no changes will be made in the grade. The student is expected to be present for all exams.

FINAL EXAM (100): The Final Exam will be comprehensive with emphasis on Chapters 6-8. The Final will be worth a maximum of 100 points toward the final grade and will be given Monday May 13, 2019 from 8:00 a.m. to 10:00 a.m..

FINAL GRADE (600): The maximum total points possible will be 800 and a final grade will be assigned according to the following:

- 540-600 A
- 480-539 B
- 420-479 C
- 360-419 D
- 000-359 F

ATTENDANCE: You are expected to attend every class. If you have more than three unexcused absences, your grade will be decreased by one letter grade. If you arrive more than 10 minutes late you will be marked as tardy and three tardy marks count as an absence.

If you become ill or have a restroom emergency during the lecture, please excuse yourself quietly. If you need to study for another class, the library is available. If you need to nap, that is best done at home – not in the classroom.

SUGGESTIONS FOR MAKING A GOOD GRADE:
- Read your textbook.
- Attend classes regularly and punctually.
- Do your homework yourself.
- Review both lecture and laboratory material daily (Don’t cram; would you attempt a month’s worth of nutrition in a single meal?).
- Participate fully in lab exercises.
- Develop and practice good note taking skills.
- Ask questions in class.

ACADEMIC INTEGRITY (A-9.1): Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one’s paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

COURSE ASSESSMENT: The lecture part of the course requirements and method of evaluation are set by the individual instructor for the course. The method of evaluation is frequently based on outside exercises (homework) and scores from in-class and/or take-home examinations.

WITHHELD GRADES SEMESTER GRADES POLICY (A-54): Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

STUDENTS WITH DISABILITIES: To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.