

# PHYS 3332.010

## Thermal and Statistical Physics

---



**Instructor: Eddie 'Trey' Frank Holik III**

Email: [eddie.holik@angelo.edu](mailto:eddie.holik@angelo.edu)

Phone: 325-486-5452

Office: VIN 121

**Office Hours:** MTWRF 11:00a-12:00p

## Course Information

### Course Description

A study of thermodynamics and statistical methods in physics with applications from classical and quantum physics.

### Prerequisite and Co-requisite Courses

Physics 2326/2126, and credit for or parallel registration in Physics 3301.

### Prerequisite Skills

Ability to use Blackboard, a scientific calculator, and proficiency in calculus are expectations of this course.

### Student Learning Outcomes

Upon completion of this course, students will be able to:

- Gain a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories) and
- Learn appropriate methods for collecting, analyzing, and interpreting numerical information.

### Course Delivery

This course is a face-to-face course with learning resources and supplemental materials posted in Blackboard.

## Required Texts and Materials

There is no required text for this course. Students desiring a text may refer to opensource texts available in Blackboard. A student of this institution is not under any obligation to purchase a textbook from a university-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

## Technology Requirements

To successfully complete this course, students need to use a scientific calculator, Blackboard, and complete the IDEA student ranking of instruction.

## Communication

Faculty will respond to email and/or telephone messages within 24 hours during working hours Monday through Friday. Weekend messages may not be returned until Monday.

## Grading

### Evaluation and Grades

Course grades will be determined as indicated in the table below.

Assessment	Percent of Total Grade
Homework	30%
Exams 1 & 2	20%* (10% each)
Exam 3	15%*
Group presentation	20%
Participation	15%
Total	100%

\*If beneficial, Exam 3 grade will replace lowest of Exams 1 – 2. Replaced exam grade must be higher than 50% to be replaced. Missed Exams or Exam grades lower than 50% will not be replaced.

## Grading System

Course grades will depend on completing course requirements and meeting the student learning outcomes.

The following grading scale is in use for this course:

A = 90% +

B = 80% – 89.99%

C = 70% – 79.99%

D = 60% – 69.99%

F = Less than 59.99% (Grades are not rounded up)

## **Assignment and Activity Descriptions**

Homework assignments will be given through Bb and may be turned in at the beginning of class. Late homework will receive zero credit. Detailed instructions for the presentation project will be in Blackboard.

## **General Policies Related to This Course**

All students are required to follow the policies and procedures presented in these documents:

- [Angelo State University Student Handbook](#)<sup>1</sup>
- [Angelo State University Catalog](#)<sup>2</sup>

## **Academic Integrity**

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the university's [Statement of Academic Integrity](#)<sup>3</sup> (Page 97).

## **Accommodations for Students with Disabilities**

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at [ADA@angelo.edu](mailto:ADA@angelo.edu). For more information about the application process and requirements, visit the [Student Disability Services website](#).<sup>4</sup> The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dr. Dallas Swafford

Director of Student Disability Services  
Office of Student Affairs  
325-942-2047  
[dallas.swafford@angelo.edu](mailto:dallas.swafford@angelo.edu)  
Houston Harte University Center, Room 112

## **Incomplete Grade Policy**

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#)<sup>5</sup> for more information.

## **Plagiarism**

Plagiarism is a serious topic covered in ASU's [Academic Integrity Statement](#)<sup>6</sup> in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality. Resources to help you understand this policy better are available at the [ASU Writing Center](#).<sup>7</sup>

## **Student Absence for Observance of Religious Holy Days**

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 [Student Absence for Observance of Religious Holy Day](#)<sup>8</sup> for more information.

## **Title IX at Angelo State University**

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault,

sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Miller, J.D. You may submit reports in the following manner:

Online: [Incident Reporting Form](#)<sup>9</sup>

Face to Face: Mayer Administration Building, Room 210

Phone: 325-942-2022

Email: [michelle.miller@angelo.edu](mailto:michelle.miller@angelo.edu)

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit the [Title IX website](#).<sup>10</sup>

## Information About COVID-19

Please refer to ASU's [COVID-19 \(Coronavirus\) Updates](#)<sup>11</sup> web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

## Modifications to the Syllabus

This syllabus, including grade evaluation and course schedule, is subject to modification on potentially short notice based on developing circumstances.

## Course Schedule

Day	Fitzpatrick	Topic	HW	Due
17-Jan	Holiday			
19-Jan	Syllabus			
21-Jan	§1.1 - §1.9	Thermo	online	
24-Jan	§2.1 - §2.4	Probability	2.4, 2.6	HW1
26-Jan	§2.5 - §2.7	Binomial Distribution	2.7	
28-Jan	§2.8 - §2.10	Gaussian Distribution	2.10, 2.11	
31-Jan	§3.1 - §3.3	Particle Probabilities	3.1	HW2
2-Feb	§3.4 - §3.6	H-Theorem		

4-Feb	§3.7 - §3.8	Density of States		
7-Feb	§4.1 - §4.3	Heat and Work		
9-Feb	§4.5, Review	Differentials		
11-Feb	Math Base	Exam 1		
14-Feb	§5.1 - §5.2	Thermal Interaction		
16-Feb	§5.3	Temperature		
18-Feb	§5.4 - §5.5	General Interactions		
21-Feb	§5.6 - §5.9	Entropy		
23-Feb	§5.10 - §6.1	Laws of Thermo		
25-Feb	§6.2 - §6.5	Classical Ideal Gas / Specific Heat		
28-Feb	§6.5 - §6.8	Atmosphere		
2-Mar	§6.9 - §6.12	Internal and Free Energy		
4-Mar	§6.13 - §6.16	Free Expansion of Gas		
7-Mar	§6.17 - §6.18	Thermal Cycles		
9-Mar	Review			
11-Mar	Classical	Thermodynamics Exam 2		
14-Mar	Holiday			
16-Mar	Holiday			
18-Mar	Holiday			
21-Mar	§7.1 - §7.2	Canonical Formalism		
23-Mar	§7.3	Spin Paramagnetism		
25-Mar	§7.4 - §7.5	Mean Values		
28-Mar	§7.6 - §7.7	Partition Function		
30-Mar	§7.8	Gibb's Paradox		
1-Apr	§7.9	Paramagnetism		
4-Apr	§7.15, §7.17	Ferromagnetism		
6-Apr	§7.12 - §7.14	Statistical Specific Heat		
8-Apr	§8.1 - §8.3	Symmetry in Quantum		
11-Apr	§8.4 - §8.5	Fermi-Dirac Statistics		
13-Apr	§8.6, §8.12	UV Catastrophe		
15-Apr	Holiday			
18-Apr	§8.7	Bose-Einstein Statistics		
20-Apr	§8.8 - §8.9	Maxwell-Boltzmann Statistics		
22-Apr	§8.10 - §8.11	Quantum Ideal Gas		
25-Apr	§8.13 - §8.14	Black Body Radiation		
27-Apr	§8.15	Chemical Potential / Conduction		
29-Apr	§8.17 - §8.19	Stellar Evolution		
2-May	§8.20	Bose-Einstein Condensates		
4-May	Project will	shift Chapter 8 materials		
6-May	Review			
9-May	Statistical	Thermodynamics, Mon. @ 10:30am		

- 
- 1 <https://www.angelo.edu/current-students/student-handbook/>
  - 2 <https://www.angelo.edu/academics/catalog/>
  - 3 <https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=97>
  - 4 <https://www.angelo.edu/current-students/disability-services/>
  - 5 <https://angelo.policystat.com/policy/10659448/latest/>
  - 6 <https://www.angelo.edu/live/files/27603-student-handbook-2020-21#page=97>
  - 7 [https://www.angelo.edu/current-students/writing-center/academic\\_honesty.php](https://www.angelo.edu/current-students/writing-center/academic_honesty.php)
  - 8 <https://angelo.policystat.com/policy/10659368/latest/>
  - 9 <https://www.angelo.edu/incident-form>
  - 10 <https://www.angelo.edu/title-ix>
  - 11 <https://www.angelo.edu/covid-19/>