Instructor: Trey Holik  
Email: eddie.holik@angelo.edu  
Phone: 325-486-5452  
Office: VIN121

Online Office Hours: MTWRF 9a-9:30a; MWF 9:30a-10a; TR 11a-12p  
Online Office: https://tinyurl.com/DrHolikOnlineOffice

Course Information

Course Description
An introduction to special relativity, interactions with electromagnetic radiation and matter, quantum mechanics, atomic physics, nuclear physics, and particle physics.

Prerequisite and Co-requisite Courses
Physics 2326/2126 or equivalent; and Mathematics 2414 or equivalent.

Prerequisite Skills
Microsoft Office.

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

1. Demonstrate factual knowledge in science.
2. Use mathematical problem solving skills to evaluate quantitative information and arguments.
3. Comprehend scientific reasoning and logical thinking.
4. Demonstrate technical and analytic skills and knowledge of laboratory methods.

*This is your first REAL physics class, you will learn how to think clearly and write solutions, to think critically and scientifically journal, and to develop life patterns to properly ingest the beauty of physics.
Course Delivery

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

Required Texts and Materials

Required: “Modern Physics” (2nd or 3rd edition) by K. Krane
Two standard lab notebooks (any ruling or gridding acceptable)

Optional: “An Introduction to Error Analysis” (2nd edition) by J. Taylor
“Mathematical Handbook of Formulas and Tables” Schaum’s outlines

Technology Requirements

Smartphone, computer access with Microsoft Office.

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.

Written communication via email: All private communication will be done exclusively through your ASU email address. Check frequently for announcements and policy changes. In your emails to faculty, include the course name and section number in your subject line.

Virtual communication: Office hours and/or advising may be done with the assistance of the telephone, Collaborate, Skype, etc.

Grading

Evaluation and Grades

Final grades are based upon tests, homework, quizzes, and laboratory reports / presentations, weighted as follows:

1. Laboratory reports / presentations: 30%
2. Three Test: 30%
3. Homework / quizzes: 25%
4. Comprehensive final exam 15%
Without experiment, there is no physics. Nature is awesome and full of surprises and would be unknown without experiment. I promise you that you will one day be bragging that you completed the proverbial ‘Millikan oil drop experiment.’

**Attendance and late work policy**

You will learn more if we meet face-to-face as much as possible. I want your first upper level physics class to be as advantageous to you as possible. Therefore, until COVID says otherwise, students are expected to attend all lectures. With that said, I will record lectures for those who miss. Attendance is not a part of your grade. Please stay home if feeling ill at all. Staying home will not effect your grade as long as you stay on top of material. Reading assignments and homework will typically be made prior to each lecture. **A commitment to reading the assigned text before the material is covered in lecture is critical to success in PHYS 3461.**

Do NOT get behind. I have traditionally been very lenient with due dates but mixing online and face-to-face mandates more rigidity. You will have at least one week to complete each assignment which is plenty of time even if contracting an illness. Late work is accepted with a letter grade penalty per day which is a steep penalty.

Use of electronic devices other than a calculator during tests is not allowed. All electronic devices should be turned off during class. Tests may not be made up unless in the event of a university-excused absence, in which case it is the student’s responsibility to schedule a time to make-up the missed test. Any form of cheating (which includes plagiarism) will result in a grade of F for the course.

**Homework requirements**

Although working together is encouraged, each student’s paper should reflect the student’s individual style. The purpose of homework is to practice the methods and concepts discussed in the lecture and textbook. Your solution strategy should incorporate these methods, not others you may have learned elsewhere. Try describing in a sentence or two what you must do to solve the problem. Give some considerable thought to this strategy before beginning the solution. It will save time!

The following requirements should be met for each assignment.

1. **A problem statement.** You may copy the problem statement from the text. This should include a relevant, clearly labeled diagram.

2. **A well-organized solution.** Include all steps of algebra and calculus needed to arrive at the solution. Avoid two columns. Clearly indicate the reasoning you used to solve the problem. This should include brief written statements as well as equations. The equations should use the labeled values in the diagram. Use subscripts liberally. The solutions should follow a recognizable strategy. It should not include random equations which are not related by explanations.
3. **Answers should be clearly indicated** by underlining or drawing a box around them.
4. **Neatness counts.** This is a finished document, not a rough draft.

You will not receive full credit for any problems for which explanations are omitted and organized work is not shown.

**Laboratory Requirements**

A separate lab syllabus will be distributed at lab. In summary, all experimental information from seven labs (prelab work, procedure, raw data, analysis, results, and conclusion) will be captured in lab notebooks and will be 70% of the laboratory grade. The other 30% of your lab grade will be from three various-format reports. The formats include a formal lab report, a poster, a publication, a memo, and a presentation.

**Grading System**

Course grades will be dependent upon completing course requirements and meeting the student learning outcomes.

The following grading scale is in use for this course:

- A = 90.00-100 points
- B = 80.00-89.99 points
- C = 70.00-79.99 points
- D = 60.00-69.99 points
- F = 0-59.99 points (Grades are not rounded up)
<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Krane Ch. &amp; Sec.</th>
<th>Lab (Wednesday at 2p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 17</td>
<td>Classical Relativity</td>
<td>Ch1, Ch2 §1</td>
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<tr>
<td>Aug 19</td>
<td>Michelson-Morley and Einstein’s Postulates</td>
<td>Ch2 §2-3</td>
<td>Data Collection/Analysis Techniques</td>
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<tr>
<td>Aug 21</td>
<td>Consequences of Einstein’s Postulates</td>
<td>Ch2 §4</td>
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<tr>
<td>Aug 24</td>
<td>Lorentz Transforms and Simultaneity</td>
<td>Ch2 §5-6</td>
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<tr>
<td>Aug 26</td>
<td>Relativistic Dynamics (PART 1)</td>
<td>Ch2 §7-8</td>
<td>LAB #0 Lab Notebook Demonstration</td>
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<tr>
<td>Aug 28</td>
<td>Relativistic Dynamics (PART 2)</td>
<td>Ch2 §8-9</td>
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<tr>
<td>Aug 31</td>
<td>Particle Properties of Waves (PART 1)</td>
<td>Ch3 §1-2</td>
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<tr>
<td>Sep 2</td>
<td>Particle Properties of Waves (PART 2)</td>
<td>Ch3 §2-4</td>
<td>LAB #1</td>
</tr>
<tr>
<td>Sep 4</td>
<td>Particle Properties of Waves (PART 3)</td>
<td>Ch3 §4-6</td>
<td>LAB #1 Notebook Due BEFORE class</td>
</tr>
<tr>
<td>Sep 7</td>
<td>Labor Day Holiday</td>
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<tr>
<td>Sep 9</td>
<td>Wave Properties of Particles (PART 1)</td>
<td>Ch4 §1-3</td>
<td>LAB #2</td>
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<tr>
<td>Sep 11</td>
<td>Wave Properties of Particles (PART 2)</td>
<td>Ch4 §3-5</td>
<td>LAB #2 Notebook Due BEFORE class</td>
</tr>
<tr>
<td>Sep 14</td>
<td>Wave Properties of Particles (PART 3)</td>
<td>Ch4 §5-7</td>
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</tr>
<tr>
<td>Sep 16</td>
<td>Review Exam 1</td>
<td>Chapters 1 - 4</td>
<td>EXAM 1</td>
</tr>
<tr>
<td>Sep 18</td>
<td>Exam 1 Solved</td>
<td></td>
<td>Lab PHYS. REV. LET. Due</td>
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<tr>
<td>Sep 21</td>
<td>The Schrödinger Equation</td>
<td>Ch5 §1-2</td>
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<tr>
<td>Sep 23</td>
<td>Interpretation and Solutions (PART 1)</td>
<td>Ch5 §3-4</td>
<td>LAB #3</td>
</tr>
<tr>
<td>Sep 25</td>
<td>Interpretation and Solutions (PART 2)</td>
<td>Ch5 §3-4</td>
<td>LAB #3 Notebook Due BEFORE class</td>
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<tr>
<td>Sep 28</td>
<td>The Simple Harmonic Oscillator</td>
<td>Ch5 §5</td>
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<tr>
<td>Sep 30</td>
<td>Steps and Barriers</td>
<td>Ch5 §6</td>
<td>LAB #4</td>
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<tr>
<td>Oct 2</td>
<td>Rutherford Model</td>
<td>Ch6 §1-3</td>
<td>LAB #4 Notebook Due BEFORE class</td>
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<td>Oct 5</td>
<td>Bohr Model (PART 1)</td>
<td>Ch6 §3-5</td>
<td>No Lab</td>
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<tr>
<td>Oct 7</td>
<td>Bohr Model (PART 2)</td>
<td>Ch6 §3-5</td>
<td>Labs 1 – 4 Corrections due</td>
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<td>Oct 9</td>
<td>Experimental Evidences (PART 1)</td>
<td>Ch6 §6-8</td>
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<td>Oct 12</td>
<td>Experimental Evidences (PART 2)</td>
<td>Ch6 §6-8</td>
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<tr>
<td>Oct 14</td>
<td>Review Exam 2</td>
<td>Chapters 5 - 6</td>
<td>EXAM 2</td>
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<tr>
<td>Oct 16</td>
<td>Exam 2 Solved</td>
<td></td>
<td>Lab POSTER Due</td>
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<tr>
<td>Oct 19</td>
<td>Hydrogen Atom (PART 1)</td>
<td>Ch7 §1-3</td>
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<tr>
<td>Oct 21</td>
<td>Hydrogen Atom (PART 2)</td>
<td>Ch7 §1-3</td>
<td>LAB #5</td>
</tr>
<tr>
<td>Oct 23</td>
<td>Probability Densities</td>
<td>Ch7 §4-6</td>
<td>LAB #5 Notebook Due BEFORE class</td>
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<tr>
<td>Oct 26</td>
<td>Spin, Notation, and Effects</td>
<td>Ch7 §7-9</td>
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<tr>
<td>Oct 28</td>
<td>Many-Electron Atoms</td>
<td>Ch8 §1-3</td>
<td>LAB #6</td>
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<td>Oct 30</td>
<td>Element Properties and X-rays</td>
<td>Ch8 §4-6</td>
<td>LAB #6 Notebook Due BEFORE class</td>
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<td>Nov 2</td>
<td>X-rays and Lasers</td>
<td>Ch8 §6-7</td>
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<tr>
<td>Nov 4</td>
<td>Exam 3 review</td>
<td>Chapters 7 - 8</td>
<td>EXAM 3</td>
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<td>Nov 6</td>
<td>Exam 3 Solved</td>
<td></td>
<td></td>
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<tr>
<td>Nov 11</td>
<td>Solid State Physics</td>
<td>Chapter 11</td>
<td>Lab presentations</td>
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<tr>
<td>Nov 13</td>
<td>Nuclear Physics</td>
<td>Chapters 12 - 13</td>
<td></td>
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<tr>
<td>Nov 16</td>
<td>Particle Physics</td>
<td>Chapter 14</td>
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<tr>
<td>Nov 18</td>
<td>Cosmology</td>
<td>Chapter 15</td>
<td>Final Exam Review</td>
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<td>Nov 20</td>
<td>Comprehensive Final Exam, Fri. 10:30a</td>
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</tbody>
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General Policies Related to This Course

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

- Angelo State University Student Handbook¹
- Angelo State University Catalog²

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.³

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. For more information about the application process and requirements, visit the Student Disability Services website.⁴ The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
325-942-2047
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 for more information.

Masks and Facial Coverings

As a member of the Texas Tech University System, Angelo State University has adopted the mandatory Facial Covering Policy to ensure a safe and healthy classroom experience. Current research on the COVID-19 virus suggests there is a significant reduction in the potential for transmission of the virus from person to person by wearing a mask/facial covering that covers the nose and mouth areas. Therefore, in compliance with the university policy students in this class are required to wear a mask/facial covering before, during, and after class. Faculty members may also ask you to display your daily screening badge as a prerequisite to enter the classroom. You are also asked to maintain safe distancing practices to the best of your ability. For the safety of everyone, any student not appropriately wearing a mask/facial covering will be asked to leave the classroom immediately. The student will be responsible to make up any missed class content or work. Continued non-compliance with the Texas Tech University System Policy may result in disciplinary action through the Office of Student Conduct.

Plagiarism

Plagiarism is a serious topic covered in ASU's Academic Integrity policy 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.

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 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 Boone, J.D. You may submit reports in the following manner:

Online: [www.angelo.edu/incident-form](http://www.angelo.edu/incident-form)
Face to face: Mayer Administration Building, Room 210
Phone: 325-942-2022
Email: michelle.boone@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: [www.angelo.edu/title-ix](http://www.angelo.edu/title-ix).

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1 [https://www.angelo.edu/student-handbook/](https://www.angelo.edu/student-handbook/)
2 [https://www.angelo.edu/catalogs/](https://www.angelo.edu/catalogs/)
3 [https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php](https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php)
4 [https://www.angelo.edu/services/disability-services/](https://www.angelo.edu/services/disability-services/)
5 [https://www.angelo.edu/content/files/14197-op-1011-grading-procedures](https://www.angelo.edu/content/files/14197-op-1011-grading-procedures)
6 [https://www.angelo.edu/student-handbook/](https://www.angelo.edu/student-handbook/)
7 [https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php](https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php)
8 [https://www.angelo.edu/dept/writing_center/academic_honesty.php](https://www.angelo.edu/dept/writing_center/academic_honesty.php)
9 [https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of](https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of)