LIFE AND PHYSICAL SCIENCES
STUDENT LEARNING OUTCOME ALIGNMENT FORM

Course Prefix/Number: Physics 2425
Course Title: Fundamentals of Physics I
Brief Course Description: A comprehensive course with emphasis placed on the capacity to utilize the fundamental concepts of mechanics and thermodynamics in the solution of problems.

Foundational Component Area: Life and Physical Sciences. Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.

*Choose <u>at least</u> one Core SLO from the Core Objective.

Core Objective	ASU SLO	Course SLO	Assignment	Assessment Method
Critical Thinking	CT1: Gather, analyze, evaluate, and synthesize information relevant to a question or issue.	SLO1: Students will be able to state a question, gather information, collect and analyze data, identify assumptions, develop a hypothesis, and evaluate results to arrive at an answer to a question.	Hands-on activities done in class or experiments completed in lab in which students collect and analyze data and draw conclusions from the results.	AACU Critical Thinking VALUE Rubric *
Communication	CS1: Develop, interpret, and express ideas through effective written communication.	SLO2: Students will be able to effectively discuss laboratory data and results in a written report.	A written report of laboratory activities.	AACU Written Communication VALUE Rubric *

Empirical & Quantitative Skills	EQS1: Manipulate and analyze numerical data and arrive at an informed conclusion.	SLO3: Students will be able to present data numerically, perform mathematical calculations, and quantitatively analyze data to draw plausible conclusions.	Presentation and analysis of numerical data collected during in-class activities.	AACU Quantitative Literacy VALUE Rubric*
Teamwork	TW2: Work effectively with others to support and accomplish a shared goal.	SLO4: Students will be able to engage team members, support a constructive team climate, and keep the team focused on the task at hand.	Hands-on activities done in class or experiments completed in lab in which students work together in groups to complete the experiment.	AACU Teamwork VALUE Rubric *

Association of American Colleges & Universities, *Valid Assessment of Learning in Undergraduate Education (VALUE)*, information & rubrics available at: http://aacu.org/value-rubrics

CRITICAL THINKING VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	**Milestones**		**Benchmark**
	4	3	2	1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

WRITTEN COMMUNICATION VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Written communication is the development and expression of ideas in writing. Written communication involves learning to work in many genres and styles. It can involve working with many different writing technologies, and mixing texts, data, and images. Written communication abilities develop through iterative experiences across the curriculum.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone 4	**Milestones** 3	2	**Benchmark** 1
Context of and Purpose for Writing *Includes considerations of audience, purpose, and the circumstances surrounding the writing task(s).*	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Genre and Disciplinary Conventions *Formal and informal rules inherent in the expectations for writing in particular forms and/or academic fields (please see glossary).*	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices	Demonstrates consistent use of important conventions particular to a specific discipline and/or writing task(s), including organization, content, presentation, and stylistic choices	Follows expectations appropriate to a specific discipline and/or writing task(s) for basic organization, content, and presentation	Attempts to use a consistent system for basic organization and presentation.
Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.

QUANTITATIVE LITERACY VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone 4	**Milestones** 3	2	**Benchmark** 1
Interpretation *Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)*	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. *For example, accurately explains the trend data shown in a graph and makes reasonable predictions regarding what the data suggest about future events.*	Provides accurate explanations of information presented in mathematical forms. *For instance, accurately explains the trend data shown in a graph.*	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. *For instance, accurately explains trend data shown in a graph, but may miscalculate the slope of the trend line.*	Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means. *For example, attempts to explain the trend data shown in a graph, but will frequently misinterpret the nature of that trend, perhaps by confusing positive and negative trends.*
Representation *Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)*	Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.	Competently converts relevant information into an appropriate and desired mathematical portrayal.	Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate.	Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate.
Calculation	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.)	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.	Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.	Calculations are attempted but are both unsuccessful and are not comprehensive.
Application / Analysis *Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis*	Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for competent judgments, drawing reasonable and appropriately qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for workmanlike (without inspiration or nuance, ordinary) judgments, drawing plausible conclusions from this work.	Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is hesitant or uncertain about drawing conclusions from this work.
Assumptions *Ability to make and evaluate important assumptions in estimation, modeling, and data analysis*	Explicitly describes assumptions and provides compelling rationale for why each assumption is appropriate. Shows awareness that confidence in final conclusions is limited by the accuracy of the assumptions.	Explicitly describes assumptions and provides compelling rationale for why assumptions are appropriate.	Explicitly describes assumptions.	Attempts to describe assumptions.
Communication *Expressing quantitative evidence in support of the argument or purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized)*	Uses quantitative information in connection with the argument or purpose of the work, presents it in an effective format, and explicates it with consistently high quality.	Uses quantitative information in connection with the argument or purpose of the work, though data may be presented in a less than completely effective format or some parts of the explication may be uneven.	Uses quantitative information, but does not effectively connect it to the argument or purpose of the work.	Presents an argument for which quantitative evidence is pertinent, but does not provide adequate explicit numerical support. (May use quasi-quantitative words such as "many," "few," "increasing," "small," and the like in place of actual quantities.)

TEAMWORK VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

Definition

Teamwork is behaviors under the control of individual team members (effort they put into team tasks, their manner of interacting with others on team, and the quantity and quality of contributions they make to team discussions.)

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone 4	**Milestones** 3	2	**Benchmark** 1
Contributes to Team Meetings	Helps the team move forward by articulating the merits of alternative ideas or proposals.	Offers alternative solutions or courses of action that build on the ideas of others.	Offers new suggestions to advance the work of the group.	Shares ideas but does not advance the work of the group.
Facilitates the Contributions of Team Members	Engages team members in ways that facilitate their contributions to meetings by both constructively building upon or synthesizing the contributions of others as well as noticing when someone is not participating and inviting them to engage.	Engages team members in ways that facilitate their contributions to meetings by constructively building upon or synthesizing the contributions of others.	Engages team members in ways that facilitate their contributions to meetings by restating the views of other team members and/or asking questions for clarification.	Engages team members by taking turns and listening to others without interrupting.
Individual Contributions Outside of Team Meetings	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project. Proactively helps other team members complete their assigned tasks to a similar level of excellence.	Completes all assigned tasks by deadline; work accomplished is thorough, comprehensive, and advances the project.	Completes all assigned tasks by deadline; work accomplished advances the project.	Completes all assigned tasks by deadline.
Fosters Constructive Team Climate	Supports a constructive team climate by doing all of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.	Supports a constructive team climate by doing any three of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.	Supports a constructive team climate by doing any two of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.	Supports a constructive team climate by doing any one of the following: • Treats team members respectfully by being polite and constructive in communication. • Uses positive vocal or written tone, facial expressions, and/or body language to convey a positive attitude about the team and its work. • Motivates teammates by expressing confidence about the importance of the task and the team's ability to accomplish it. • Provides assistance and/or encouragement to team members.
Responds to Conflict	Addresses destructive conflict directly and constructively, helping to manage/resolve it in a way that strengthens overall team cohesiveness and future effectiveness.	Identifies and acknowledges conflict and stays engaged with it.	Redirecting focus toward common ground, toward task at hand (away from conflict).	Passively accepts alternate viewpoints/ideas/opinions.

Physics 2425: Fundamentals of Physics I, Fall 2017
MWF 9:00-9:50, VIN 162

PROFESSOR:	Dr. David Bixler
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DESCRIPTION:
A comprehensive course with emphasis placed on the capacity to utilize the fundamental concepts of mechanics and thermodynamics in the solution of problems. Prerequisite: Credit for or parallel registration in Mathematics 2313.

STUDENT LEARNING OUTCOMES:
Upon completion of Physics 2425, students will have an increased understanding of the fundamental concepts, theories and physical laws relevant to the broad topical areas of mechanics, thermodynamics, and waves.

Core Assessment:
CT1: Students will be able to state a question, gather information, collect and analyze data, identify assumptions, develop a hypothesis, and evaluate results to arrive at an answer to a question.
CS1: Students will be able to effectively discuss laboratory data and results in a written report.
EQS1: Students will be able to present data numerically, perform mathematical calculations, and quantitatively analyze data to draw plausible conclusions.
TW2: Students will be able to engage team members, support a constructive team climate, and keep the team focused on the task at hand.
These Student Learning Outcomes will be assessed using AACU VALUE Rubric-evaluated components of in-class activities and lab reports.

MATERIALS:
The textbooks for this course are available online for free. I will primarily be following Volume 1 and the first part of Volume 2 of the OpenStax text, available here:
https://openstax.org/details/books/university-physics-volume-1
https://openstax.org/details/books/university-physics-volume-2

Other online textbook resources include:
http://www.anselm.edu/internet/physics/cbphysics/downloadsl/cbPhysicsIa18.pdf
https://archive.org/details/ost-physics-lm

You will also need A Scientific Calculator.

COMMENTS:
Angelo State University expects its students to maintain complete honesty and integrity in their academic pursuits. Students are responsible for understanding the Academic Honor Code, which is contained in both print and web versions of the Student Handbook.

Persons with disabilities which may warrant academic accommodations must contact the Student Life Office, Room 112 University Center, in order to request such accommodations prior to any accommodations being implemented.

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence.

Attendance is required and will be taken at all class meetings.

Homework will be assigned at every class meeting and will be due at the next meeting. Homework assignments are graded on a 10-point scale. In-class quizzes and activities will be administered at random. There are no make-ups for missed in-class quizzes or activities.

Four tests will focus on conceptual understanding and problem-solving skills; there are no make-up tests, except under very special circumstances. The final exam is comprehensive. Waves and Sound are only tested on the final.

The course grade will be calculated as follows: Tests 30%, Homework, Activities, and Quizzes 25%, Laboratory 25%, Final Exam 20%,

Physics 2425
Fall 2017 Schedule

DATE	TOPIC	TEXT CHAPTERS*
August 28	Introduction, Standards, Analysis	Volume 1, Chapter 1
August 30	Units, Estimates, Sig.Figs, Vectors, Coordinate Systems	Volume 1, Chapter 1, 2
September 1	Vector Components, Position, Velocity, Speed	Volume 1, Chapter 2, 3
September 4	**LABOR DAY HOLIDAY**	--
September 6	Acceleration, 1D Motion, Free Fall	Volume 1, Chapter 3
September 8	2D Motion	Volume 1, Chapter 4
September 11	Projectile Motion, Centripetal Acceleration	Volume 1, Chapter 4
September 13	Relative Velocity, Review	Volume 1, Chapter 4
September 15	**TEST 1**	--
September 18	Force, Mass and Newton's First Law, Diagrams	Volume 1, Chapter 5
September 20	Weight, Newton's Second and Third Law, Friction	Volume 1, Chapter 5
September 22	Analysis of Force Problems	Volume 1, Chapter 6
September 25	Forces in Uniform Circular Motion	Volume 1, Chapter 6
September 27	Work, Energy and the Work-Energy Theorem	Volume 1, Chapter 7
September 29	Potential, Conservative Forces, Energy Conservation	Volume 1, Chapter 8
October 2	Analysis of Energy Problems	Volume 1, Chapter 8
October 4	Linear Momentum, Conservation of Momentum	Volume 1, Chapter 9
October 6	Collisions in 1D and 2D	Volume 1, Chapter 9
October 9	Center of Mass, Rockets, Review	Volume 1, Chapter 9
October 11	**TEST 2**	--
October 13	Angular Position, Velocity, Acceleration, Torque	Volume 1, Chapter 10
October 16	Moment of Inertia, Analysis of Angular Motion	Volume 1, Chapter 10
October 18	Rotational Energy, Rolling Motion	Volume 1, Chapter 10
October 20	Angular Momentum	Volume 1, Chapter 11
October 23	Angular Momentum Conservation, Equilibrium	Volume 1, Chapter 11, 12
October 25	Statics, Elasticity	Volume 1, Chapter 12
October 27	The Law of Gravitation, Kepler's Laws	Volume 1, Chapter 13
October 30	Pressure, Pascal, Buoyancy and Archimedes	Volume 1, Chapter 14
November 1	Bernoulli's Equation, Review	Volume 1, Chapter 14
November 3	**TEST 3**	
November 6	Simple Harmonic Motion, The Pendulum	Volume 1, Chapter 15
November 8	Wave Motion, Waves on a String	Volume 1, Chapter 16
November 10	Sound Waves, The Doppler Effect	Volume 1, Chapter 17
November 13	Standing Waves, Resonance, Beats	Volume 1, Chapter 17
November 15	Temperature and Scales, Thermal Expansion	Volume 2, Chapter 1
November 17	Work, Heat, Thermal Energy, Specific Heat, Calorimetry	Volume 2, Chapter 1
November 20	Heat Transfer, Kinetic Theory, Molecular Motion	Volume 2, Chapter 1, 2
November 22	**THANKSGIVING HOLIDAYS**	--
November 24	**THANKSGIVING HOLIDAYS**	--
November 27	Adiabatic Processes, Ideal Gases, The First Law	Volume 2, Chapter 3
November 29	Heat Engines, Heat Pumps, Review	Volume 2, Chapter 4
December 1	**TEST 4**	--
December 4	The Second Law, Entropy, Carnot and Engine Cycles	Volume 2, Chapter 4
December 6	Engine Cycles, The Gasoline and Diesel Engines	Volume 2, Chapter 4
December 8	Comprehensive Review	--
December 13	**COMPREHENSIVE FINAL EXAM**	--

*Volume and Chapters refer to the OpenStax text.