Physics

Course Description:

Students will explore the principles and concepts of physics and the solution to problems. The course is divided into five major units: Data Interpretations and Graphical Analysis, Mechanics, Wave Motion, Electricity and Magnetism, and other issues in Modern Physics. Appropriate and effective reading and writing strategies will be integrated into all aspects of the curriculum. This is a college preparatory laboratory science course.

Prerequisite: Algebra II or Integrated Algebra and Data Analysis (concurrently or previously)

Textbook: *Physics: Principles and Problems*

Demonstrating Competency:

To demonstrate competency of Physics, you will need to successfully complete 4 of the following tasks. The task in Group A is a requirement for all students. Two of the remaining three selections must come from Group B. The fourth selection may come from Group B or Group C.

Task A

- A written exam consisting of 80 multiple choice questions, two short answer essays and one extended response essay.

Task B

- Scientific Research Paper (10-12 pages) on a topic covered in the Ohio Academic Science Content Standards for the course.
- Scientific Journal Review (2-5 pages) on a topic covered in the Ohio Academic Science Content Standards for the course (must be a different topic than the research paper)
- Portfolio / Media Presentation (30-40 minutes) that includes a speaking component. This presentation will be on a topic (or topics) covered the Ohio Academic Science Content Standards for the course (must be a different topic than the research paper and/or book review)
- Science Fair Project on a topic covered the Ohio Academic Science Content Standards for the course (must be a different topic than the research paper and/or journal review)

Group C

- Advancing to the state competition for any science based competition in Ohio. (Science Fair, Invention Convention, STEM ect.)
- Receive a score in the eightieth national percentile on the ACT or SAT.

Scoring Guidelines for Demonstration of Mastery:

Group A: Written Exam = 25% (M.C. questions= 50%, short answer = 25%, extended response = 25%)
Group B Selection 1 = 25%
Group B Selection 2 = 25%
Group B or C Selection 3 = 25%

Grading Scale:
90%-100% = A
80%-89% = B
70%-79% = C
60%-69% =D
Below 60% = F

Research Paper Rubric

CATEGORY	4 – Above Standards	3 – Meets Standards	2 – Approaching Standards	1 – Below Standards
Thesis Statement	The thesis statement identifies the argument of the paper and outlines the main points to be discussed.	The thesis statement identifies the argument of the paper.	The thesis statement outlines some or all of the main points to be discussed but does not identify the argument of the paper.	The thesis statement does identify the argument of the paper AND does not preview what will be discussed.
Evidence and Examples	All of the evidence and examples are specific, relevant and explanations are given that show how each piece of evidence supports the author's position.	Most of the evidence and examples are specific, relevant and explanations are given that show how each piece of evidence supports the author's position.	At least one of the pieces of evidence and examples is relevant and has an explanation that shows how that piece of evidence supports the author's position.	Evidence and examples are NOT relevant AND/OR are not explained.
Accuracy	All supportive facts and statistics are reported accurately.	Almost all supportive facts and statistics are reported accurately.	Most supportive facts and statistics are reported accurately.	Most supportive facts and statistics were inaccurately reported.
Sequencing	Arguments and support are provided in a logical order that makes it easy and interesting to follow the author's train of thought.	Arguments and support are provided in a fairly logical order that makes it reasonably easy to follow the author's train of thought.	A few of the support details or arguments are not in an expected or logical order, distracting the reader and making the essay seem a little confusing.	Many of the support details or arguments are not in an expected or logical order; distracting the reader and making the essay seem very confusing.
Sources	All sources used for quotes, statistics and facts are credible and cited correctly.	All sources used for quotes, statistics and facts are credible and most are cited correctly.	Most sources used for quotes, statistics and facts are credible and cited correctly.	Many sources are suspect (not credible) AND/OR are not cited correctly.
Grammar & Spelling	Author makes no errors in grammar or spelling that distracts the reader from the content.	Author makes 1-2 errors in grammar or spelling that distract the reader from the content.	Author makes 3-4 errors in grammar or spelling that distract the reader from the content.	Author makes more than 4 errors in grammar or spelling that distracts the reader from the content.

Scientific Journal Review Rubric

CATEGORY	4 – Above Standards	3 – Meets Standards	2 – Approaching Standards	1 – Below Standards
Summary	The article is very detailed and succinctly summarized – 3 key points of the article are touched upon. The article summary takes up no more than one third of the total assignment.	The article is succinctly summarized – only 2 key points of the article are touched upon. The article summary takes up no more than one third of the total assignment.	The article is summarized, but some sub points are addressed along with main points. The summary is not succinct. Often the summary takes up more than 1/3 of the total assignment.	The article summary is unclear or overly detailed. Often well over half of the assignment is taken up by the summary.
Critique	All strengths and weaknesses that are central to the article are addressed. The discussion of strengths and weaknesses take up the majority of the assignment.	Most strengths and weaknesses that are central to the article are addressed. The discussion of strengths and weaknesses take up the majority of the assignment.	Strengths and weaknesses that are peripheral to the article are addressed. The discussion of strengths and weaknesses takes up most of the assignment	Strengths and weaknesses are addressed peripherally, weakly, or not at all. The discussion of strengths and weaknesses take up only a small part of the assignment
Article Choice	Article selected is current (<5 years), topic is scientific. Article does not require any additional research. All supportive facts and statistics are reported accurately.	Article selected is current (<5 years), topic is scientific. Article requires some additional research. Almost all supportive facts and statistics are reported accurately.	Article is scientific but work is outdated (>5 years), or the article's scientific nature is questionable or article is not scientific. Most supportive facts and statistics are reported accurately.	Article is scientific but work is outdated or the article's scientific nature is questionable or article is not scientific. Most supportive facts and statistics were inaccurately reported.
Organization	Paper is very well organized, has a very clear intro, body and conclusion. The purpose of the paper is clear from the very beginning and the name and author of the article is made clear early in the paper	Paper is well organized, has a an intro, body and conclusion. The purpose of the paper is clear from the beginning and the name and author of the article is made clear early in the paper	Paper is organized, has an intro, body and conclusion. The purpose of the paper becomes clear within the paper and the name and author of the article is mentioned within the paper.	Paper is not well organized, has an unclear or non-existent intro, body and conclusion. The purpose of the paper is unclear and the name and author of the article is not stated or stated late.
Mechanics Requirements	MLA and page length (2-5 pages) requirements are met and there are no grammatical errors or typos.	MLA and page length (2-5 pages) requirements are met and there are few grammatical errors or typos.	MLA and page length (2-3 pages) requirements are met and there are 1-4 grammatical errors or typos.	MLA and page length (2-3 pages) requirements are not met. There are 5+ grammatical errors or typos.

Multimedia Project Assessment Rubric

CATEGORY	4 – Above Standards	3 – Meets Standards	2 – Approaching Standards	1 – Below Standards
Content	Components of the project cover the topic in depth and with details examples. Subject knowledge is excellent.	Includes essentials knowledge about the topic. Subject knowledge appears to be good.	Includes essentials knowledge about the topic but there are 1-2 factual errors.	Content is minimal or there are several factual errors.
Format	Makes excellent use of color, font, graphics, effects etc. to enhance the presentations. A professional and academic presentation.	Makes good use of color, font, graphics, effects etc. to enhance the presentations. A professional and academic presentation employed most of the time.	Makes use of color, font, graphics, effects etc. but occasionally these distract from the presentation content.	Makes use of color, font, graphics, effects etc. but occasionally these often distract from the presentation content.
Organization	Content is well organized using headings or bulleted lists to group related material.	Uses headings or bulleted lists to organize, but the overall organization seems flawed.	Content is logically organized for the most part.	There is no clear or logical organizational structure.
Author's Voice/Awareness of Audience	Uses appropriate, sophisticated, precise vocabulary. There is a clear sense of audience.	Uses many effective and appropriate words. A sense of audience is evident.	Uses some effective and appropriate words. There is a sense of audience.	Uses few or no correct or effective words. There is little or no sense of audience.
Mechanics of essays and other writing	No misspellings or grammatical errors.	Three or fewer misspellings or grammatical errors.	Four misspellings or grammatical errors.	More than four misspellings and grammatical errors.
Sources	Source information collected for all graphics, facts and quotes. All documented in MLA format.	Source information collected for all graphics, facts and quotes. Most documented in MLA format.	Source information collected for all graphics, facts and quotes, but not documented in MLA format.	Very little source information was collected.
Technical Competence	Documentary video and PowerPoint presentation demonstrate competency in technology. A professional look. Operation of equipment runs smoothly.	Documentary video and PowerPoint presentation demonstrate competency in technology. A mostly professional look. Operation of equipment runs smoothly.	Documentary video and PowerPoint presentation lack a sense of professionalism. There are several incidents of equipment malfunctions.	Documentary video and PowerPoint presentation are poorly organized and executed. There are multiple incidents of equipment malfunctions.

Portfolio Assessment Rubric

CATEGORY	4 – Above Standards	3 – Meets Standards	2 – Approaching Standards	1 – Below Standards
Assembly of Artifacts	All portfolio artifacts are present and in the correct order. There is a clear understanding of the assembly of the artifacts.	All portfolio artifacts are present, but a few are not in the correct order. There is a general understanding of the assembly of the artifacts.	One key artifact of the portfolio is missing.	Several key artifacts of the portfolio assembly are missing.
Format	Makes excellent use of color, font, graphics, effects etc. to enhance the presentations. A professional and academic presentation.	Makes good use of color, font, graphics, effects etc. to enhance the presentations. A professional and academic presentation employed most of the time.	Makes use of color, font, graphics, effects etc. but occasionally these distract from the presentation content.	Makes use of color, font, graphics, effects etc. but occasionally these often distract from the presentation content.
Organization	Content is well organized using headings or bulleted lists to group related material.	Uses headings or bulleted lists to organize, but the overall organization seems flawed.	Content is logically organized for the most part.	There is no clear or logical organizational structure.
Mechanics of essay and other writings	No misspellings or grammatical errors.	Three or fewer misspellings or grammatical errors.	Four misspellings or grammatical errors.	More than four misspellings and grammatical errors.
Sources Oral Presentation	Source information collected for all graphics, facts and quotes. All documented in MLA format. Well rehearsed with smooth delivery that holds the audience attention.	Source information collected for all graphics, facts and quotes. Most documented in MLA format. Well rehearsed with smooth delivery that holds the audience attention most of the time.	Source information collected for all graphics, facts and quotes, but not documented in MLA format. Delivery is not smooth, but able to hold the audience attention most of the time.	Very little source information was collected. Delivery is not smooth and audience is lost most of the time.

Science Laboratory Experiment Rubric

CATEGORY	4 – Above Standards	3 – Meets Standards	2 – Approaching Standards	1 – Below Standards
Problem and Hypothesis	Problem is new, meaningful, well researched. Hypothesis is clearly stated in the "IF...THEN" format.	Problem is meaningful, and well researched. Hypothesis is clearly stated.	Problem is somewhat addressed and somewhat researched. Hypothesis is unclear.	Problem is not stated and research is unclear. Hypothesis is not stated.
Background Research	Research is thorough, specific, has many examples. All ideas are clearly explained. History, biology, and pros and cons are fully addressed.	Research has many specifics and some examples. Most ideas are explained. Student mostly addresses the history, biology, and pros and cons.	Research has little specifics and one example. Two or less ideas are explained. Student doesn't address all areas: history, biology, and pros and cons.	Research has no specifics and one example. No ideas are explained. Student doesn't address all areas: history, biology, and pros and cons.
Experimental Design/ Materials/ Procedure	Procedure is detailed, appropriate, thorough. Steps of procedure are listed and sequential, all materials are listed. Safety issues have been addressed.	Procedure is appropriate, thorough. Steps of procedure are listed and mostly sequential, most materials are listed. Safety issues may have been addressed.	Procedure is appropriate. Steps of procedure are mostly listed. Most materials are listed. Safety issues were not addressed.	Procedure is inadequate. Steps of procedure are mostly listed. Few materials are listed. Safety issues were not addressed.
Variables/Controls/ Sample size	Variables have been identified, controls are appropriate, in place, and explained. Sample size is appropriate and explained.	Variables have been identified, controls are appropriate and in place. Sample size is appropriate.	Variables have somewhat been identified, controls are somewhat known. Sample size is not appropriate.	Missing one variable or control. Sample size is not considered.
Data Collection	Proper use of the Metric System. Adequate number of trials/sample size. Appropriate use of photos/charts/graphs to display data.	Use of the Metric System. Adequate number of trials/sample size. Some use of photos/charts/graphs to display data.	Use of the English System. Poor number of trials/sample size. Poor use of photos/charts/ graphs to display data.	Use of the English System. Poor number of trials/sample size. No use of photos/charts/ graphs to display data.

Analysis	Conclusions are supported by the data. Sources of error have been considered. Explanation is made for how or why the hypothesis was supported or rejected. Experimental meaning is conveyed and reflection of what was learned and how it could be made better is made.	Conclusions are supported by the data. Some sources of error have been considered. Explanation is made for how or why the hypothesis was supported or rejected. Reflection of what was learned and how it could be made better is made.	Conclusions are not supported by the data. A few sources of error have been considered. Explanation is attempted for how or why the hypothesis was supported or rejected. Reflection of what was learned and how it could be made better is poor.	Conclusions are not supported by the data. No sources of error have been considered. Explanation is not attempted for how or why the hypothesis was supported or rejected. Reflection of what was learned and how it could be made better is not made.
Visual Display Poster Board	Board is neat, Attractive and creative. Spelling and grammar are correct. Graphs and charts are properly labeled.	Board is neat and attractive. Spelling and grammar are mostly correct. Graphs and charts are mostly labeled.	Board is fair. Spelling and grammar have many mistakes. Graphs and charts are unclear.	Board is poor. Spelling and grammar have many mistakes. Graphs and charts are missing.
Presentation	Student speaks loudly and clearly, using appropriate grammar and is able to present background knowledge in a succinct manner.	Student speaks clearly, using good grammar and is able to present background knowledge in a clear manner.	Student speaks using moderate grammar and is able to present background knowledge in a somewhat clear manner.	Student did not speak. Grammar is poor and background knowledge is unclear.
Works Cited	Six references are cited in MLA format and referenced throughout the paper and presentation.	Five references are cited and referenced throughout the paper and presentation.	Four references are cited and referenced throughout the paper and presentation.	Three or less references are cited and referenced throughout the paper and presentation.