Course Narrative for Foundational Studies Course Proposal
Physics 101: Introduction to the Physical Sciences

We live in a world that is shaped by science and technology. There are few aspects of our lives that are not, in some way, influenced by science. Many pressing social problems as well as the solutions to these problems are inextricably linked with science and its application.

Physics 101 includes discussions of the fundamentally interdisciplinary nature of science. Physics 101 emphasizes the development of skills and abilities associated with scientific inquiry. It focuses upon the development of critical thinking and problem-solving skills, and requires that the student utilize mathematical reasoning appropriate for a well-prepared college student.

Through the investigation of a series of current issues such as renewable energy, nuclear power, and the search for extraterrestrial life students develop skills and abilities in the application of scientific principles through observation, inference, experimentation, and classification. Students also explore the construction of scientific explanations through the interpretation of data, critical thinking, and logic that links evidence to explanation. Students explore the formulation of scientific models while recognizing that valid alternative explanations may exist after skeptical review. Students gain experience in communicating ideas through written assignments and classroom discussion.

With the Foundational Studies Science and Laboratory learning objectives in mind, Physics 101 uses current issues to reinforce the concepts and to show the relevance of science and its many influences on many aspects of their daily lives, and issues on a global scale. Science will be presented as a human endeavor to understand, in a rational and logical framework, the physical universe we inhabit. The knowledge gained through the development of a logical understanding of the laws of science have implications for philosophy, religion, political policy and medical applications. The course will encourage an appreciation of science and the fundamental role that it plays in the phenomena that we observe in our everyday lives and to spark student curiosity about science beyond the confines of their experiences as university students.

The primary function and role of Physics 101 as a Foundational Studies course is to help students achieve a higher level of scientific literacy. Scientific literacy can be described as the knowledge and understanding of scientific concepts and processes required for participation in civic and cultural affairs, economic productivity, and personal decision making. Scientific literacy provides an individual with the tools to formulate answers to questions derived from curiosity about everyday experiences. It also encompasses the ability to describe, explain, and predict natural phenomena. It allows students to read with understanding articles about science in the popular press and engage in social conversation about the validity of scientific conclusions. Students who have gained a degree of scientific literacy can identify scientific issues underlying national and local political issues and express positions that are scientifically and technologically informed. Scientific literacy confers the capacity to pose and evaluate arguments based upon evidence and to apply conclusions from such arguments appropriately.

Student performance will be assessed by the extent to which they are able to master fundamental scientific concepts and explain them clearly and concisely, in mathematical, oral, and written formats. Students will be expected to employ critical thinking in the solution of scientific and technological problems that challenge our global society.

PHYSICS 101 SYLLABUS

Instructor: Dr. Joseph West
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Phone: x-2037
email: Joseph.West@indstate.edu
Office Hours: M 9:00-11:00 am, T 2:00-4:00 pm, and by appointment.

Class Time: T, R 12:30 pm – 1:45 pm, Location: S-138.
Co-Requisite: Concurrent enrollment PHYS 101L laboratory
Text: James Trefil and Robert Hazen, Physics Matters

Purpose and Objectives

This course constitutes an introduction to ideas common to the physical sciences with an emphasis on their application in physics. The course and its associated laboratory satisfy the Science and Laboratory requirement of the Foundational Studies Program (and the GE 2000: Scientific and Mathematical Studies-Foundation course requirement). Physics 101 is intended to develop critical thinking skills through the application of the basic tenets of physics and the scientific method to novel situations. The course includes an examination of the role of science in society with a focus on understanding current scientific issues at the level presented in the media and political debates.

There is no physics prerequisite for this course. However, it is expected that students have an adequate understanding of high school algebra and elementary geometry. Mathematics provides the foundation of the discipline.

Foundational Studies Program Objectives (PO)

1. **Locate, critically read, and evaluate information to solve problems:** Problem solving is central to the discipline. Most homework assignments will require that students complete a number of problems. Students must learn to read critically, to recognize the relevant information provided, and to determine what information (e.g. equations, physical constants) must be gathered from other sources to solve the problem.
2. **Critically evaluate the ideas of others:** Some topics covered in Physics 101 involve a critical evaluation of public policy decisions. Controversies associated with the development of physics, public funding of science, and nuclear power and weapons will be considered.
3. **Apply knowledge and skills within and across the fundamental ways of knowing:** The course will provide students with a basic background in physics. A number of social issues and the history of the development of physics will be considered.
4. **Demonstrate an appreciation of human expression through literature and fine and performing arts:** This objective is not considered in this course.
5. **Demonstrate the skills for effective citizenship and stewardship:** Basic knowledge of science is essential for individuals to act as informed citizens because a large number of medical, environmental, and technological issues are based on science. Students will consider issues associated with the public funding of science, with the application of nuclear technologies in health and in military conflicts, and with the implications of the discovery of extraterrestrial intelligence.
6. **Demonstrate an understanding of diverse cultures within and across societies:** This objective is not considered in this course.
7. **Demonstrate the skills to place their current and local experience in a global, cultural, and historical context:** This objective is not considered in this course.
8. **Demonstrate an understanding of the ethical implications of decisions and actions:** Many scientific and technological issues are inextricably linked to moral and ethical questions. For example, is it ethical for us to use nuclear power to lessen our energy dependence when doing so yields large quantities of waste that will have to be dealt with for centuries to come?
9. **Apply principles of physical and emotional health to wellness:** This objective is not considered in this course.
10. **Express themselves effectively, professionally, and persuasively both orally and in writing:** Physics 101 uses Personal Response System (PRS) technology on a daily basis to facilitate the discussion and evaluation of problems and scenarios in the classroom. Students will ask questions of their peers and defend their own

responses. Furthermore, Physics 101 students will complete two "SETI" writing assignments pertaining to on-going efforts to communicate with life forms elsewhere in our universe. Additional writing experience will be gained in the Physics 101L laboratory.

Science and Laboratory Learning Objectives (LO)

1. **Articulate how data are acquired and how hypotheses and theories are constructed:** Students learn, through numerous examples, that observations lead to data, that data lead to the formulation of hypotheses, and that hypotheses are tested by performing experiments. Students learn the importance of recognizing that all scientific knowledge is tentative and open to revision. The laboratory component of the course examines directly a number of ways in which data can be acquired.
2. **Use the scientific method to formulate and test hypotheses:** A significant portion of Physics 101 focuses on applications of the scientific method. Observations made in the physics laboratory yield hypotheses that are tested through additional experimentation. In some cases, hypotheses are presented to students who are asked to test its validity based on additional data presented in graphical form.
3. **Apply scientific theories to predict the nature and behavior of new systems, environments, or scenarios:** Theories in physics are often best represented in mathematical form, as with, for example, Newton's equations of motion. Students will use equations in problem-solving activities to predict the behaviors of numerous systems.
4. **Articulate how current issues in science and technology intersect with populations, institutions, and societies:** A large fraction of the course is devoted to the study of current issues in science and society. Portions of the text cover such topics as energy and power, seismic waves and the use of ultrasound in medical imaging, and applications of nuclear power, nuclear medicine, and nuclear weapons.

Skill and Applied Learning Requirements (SALR)

1. **Help students develop critical thinking skills:** Students are required to use critical thinking skills in all aspects of the course. To be able to describe a situation in mathematical language requires critical thinking. In addition, the essay questions, and the SETI projects all require the students to utilize and exercise their critical thinking skills.
2. **Help students develop information literacy skills:** The SETI3 assignment requires students to utilize references to support their responses to a number of questions relating to humans and our society. Students must critically assess the quality of the sources they use.
3. **Include a graded writing component:** The SETI assignments are all graded writing assignments. In addition, exams will include short answer and essay questions. Additional writing will be completed for the lab reports for the Physics 101L laboratory.

Course Format

Complete all reading assignments before coming to class. We will frequently use the Personal Response System (PRS) for a reading check at the beginning of the class period. There will be ample time for you to ask questions during lecture. The class period will frequently end with a quiz. The problems on the quiz will be shorter than, but similar to, those that can be expected on tests and the final exam. Much of the work for this class will require basic mathematical skills (i.e. algebra).

Attendance

Attendance will be tracked by means of the homework assignments and the PRS. You are responsible for all announcements and information provided to the class, both written and oral, for every day, including those for which you are absent.

Homework

Homework assignments are usually due at the beginning of each class meeting. All work should be shown, and all work should be turned in on standard lined filler paper. Each problem is worth 6 points. One point is earned by showing the full set of given information for the problem. Two additional points will be awarded ("all or nothing") for a "reasonable attempt" at the problem. Note: these two points are a judgment call, and will not be altered upon review. Finally, up to three points are earned by showing work and obtaining a correct answer. A correct answer by itself will get no credit. A maximum of three problems will be graded from each homework set. Each homework set is worth a total of 20 pts, with the last two points being awarded for turning in the set.

Regular work on the homework sets is VITAL to your success in a science course! The goal is to develop a deep understanding of the concepts of the course. I consider it to be very helpful if you WORK IN GROUPS of three or four on the homework. Discussing, explaining, and defending a solution is probably the very best way to learn the concepts covered. This does NOT mean that you should copy the work of your colleges! Identical homework sets will receive scores of zero, and repeated instances will be considered to be cases of academic dishonesty. Your two lowest homework scores will be dropped. NO LATE HOMEWORK WILL BE ACCEPTED.

Writing Assignments
The writing assignments consist of the "SETI" series of activities. These will require you to consider the larger issues of science and public policy. Details of the writing assignments are included later in the syllabus.

Quizzes
A short quiz, with 15 minutes allowed for work, will be given at the end of some class periods. The quizzes will each be worth a total of 30 points, and are meant to be good review problems, as well as good practice problems for the tests. The lowest quiz score will be dropped. NO MAKEUP QUIZZES WILL BE GIVEN.

Tests
We will have three in-class tests during the semester and a final examination. Each test is worth 200 points, and the exam of lowest score will be dropped. This course is a General Education course, so essay questions can be expected on the exams. Tests are listed in the assignments below. NO MAKEUP TESTS WILL BE GIVEN.

The Personal Response System (PRS)
We will use the PRS in class as a means of reinforcing conceptual reasoning and understanding. Credit awarded for questions posed to the class in PRS format will be added to the homework grade as BONUS points. For each PRS answer that is correct, you receive one bonus point. For each answer that is NOT correct, you receive half (½) of a bonus point. For NO ANSWER, you receive NOTHING. The use of the PRS will not be explained in class ahead of time. The multiple choice format and conceptual type questions will make up a significant portion of each of our tests

Courtesy
Turn off cell phones in class. Use your laptop only as directed by the instructor. Do not sleep, read newspapers, magazines, or materials for other courses. Arrive on time and remain in the room until class is dismissed.

Grading
For all homework and quiz problems and for all test problems requiring you to show your work, a numerical answer by itself will receive NO CREDIT. The method of solution must be shown, and it must be correct to receive full credit. Partial credit will be given for work shown. No work is needed on the multiple choice questions.

Academic Integrity
Plagiarism and other forms of cheating will not be tolerated. Depending of the nature of the assignment and the seriousness of the offense, penalties range from no credit given for the assignment to a failing grade in the course to suspension or expulsion as determined by Student Judicial Programs. The Student Guide to Academic Integrity can be found at: http://web.indstate.edu/academicintegrity/studentguide.pdf

American with Disabilities Act Statement
Indiana State University seeks to provide effective services and accommodation for qualified individuals with documented disabilities. If you need an accommodation because of a documented disability, you are required to register with Disability Support Services at the beginning of the semester. Contact the Director of Student Support Services. The telephone number is 237-2301 and the office is located in Gillum Hall, Room 202A. The Director will ensure that you receive all the additional help that Indiana State offers. If you will require assistance during an emergency evacuation, notify your instructor immediately. Look for evacuation procedures posted in your classrooms.

Laptop Usage

Laptop Usage Forbidden: While the University has chosen to require laptops of its students, the University also recognizes and respects the right of faculty to conduct their classes as they deem appropriate. In this course, no laptop may be used in class. Failure to comply with this direction is a violation of the Code of Student Conduct.

Academic Freedom

"Teachers are entitled to freedom in the classroom in discussing their subject, but they should be careful not to introduce into their teaching controversial matter which has no relation to their subject." The preceding comes from the American Association of University Professors statement on academic freedom. Though the entire statement speaks to many issues, it is this portion on the conduct of the course that is most relevant. For the purpose of Foundational Studies courses this means that course instructors have the right to conduct their class in a fashion they deem appropriate as long as the material presented meets the learning objectives laid out by the entire faculty. See: http://www.aaup.org/AAUP/pubsres/policydocs/contents/1940statement.htm

Course Grade and Grading Scale

The final grade for the course will be based on the following set of possible total points.

Homework Total	200
Quiz Total	200
Tests	600
Total	1000

Grading Scale

A^+ 99-100	A 94-97	A^- 90-93
B^+ 87-89	B 84-86	B^- 80-83
C^+ 77-79	C 74-76	C^- 70-73
D^+ 67-69	D 64-66	D^- 60-63
F Below 60		

Assignments (All from "Problems." Due on day listed)

1. T. Jan. 9. No assignment. Intro, Chapter 1, and PRS
Chapter 1: Science: A way of knowing
It is the goal of science to understand the physical laws by which the universe operates, presuming that it does operate according to a set of laws. The Scientific Method has been the successful method of determining those laws. Other "ways of knowing" or other strategies for determining those laws, or collections of proposed laws that do not seem to work consistently (such as pseudoscience) are also addressed . Knowing the rules by which the universe works has practical benefits in the form of the application of science to the development of technology and a great deal of influence on the structure of society. This comes at a price, however, and one must balance many needs in society, so that a serious issue for society is to determine an appropriate level of funding for science.

Program objectives addressed: PO-2, PO-3
Course objectives addressed: LO-1
Skill and Applied Learning Requirements addressed: SALR-1

2. R. Jan. 11 Read Chpt 2, Review Math (Units)
Chapter 2: The Language of Science
In chapter one, the ambitious goal of finding the laws by which the physical universe operates was given as a goal for this course. It seems that the rules by which the universe operates are quantitative in nature. As such, we need to learn the language of the universe, which seems to be mathematics and the idea of fundamental units (length, time, mass…). We wish to quantify nature, so that we can more fully describe and understand the physical world.

Course objectives addressed: LO-1, LO-2, LO-3

3. T. Jan. 16. Read Chpt 3, Review Math (Position, Velocity, and Acceleration)

4. R. Jan. 18 Read Chpt 3 again.
Chapter 3: Motions in the Universe
If the physical universe can be described mathematically, then there is an underlying assumption that events following those laws are predictable. People have sought to predict events in their environment for centuries. Examples include the uses of ancient astronomy (Stonehenge). The early attempts were not founded on laws of science, but instead rules based on observations. New observations often require science to adapt to the new information, and can bring it into conflict with established ideas about the universe. We consider the birth of mechanics and experimental science as advanced by Galileo Galilei. His observations, made with a relatively simple new device, lead him on a path to the Heresy trial of Galileo. Our primary goal is to introduce a mathematical way of describing the motion of objects, in particular to establish the mathematical relationships between the position, velocity and acceleration of an object.

Program objectives addressed: PO-1, PO-3
Course objectives addressed: LO-1, LO-2, LO-3

5. T. Jan. 23 Read Chapter 4, Newton's Laws of Motion
SETI1 = 30 homework points.

6. R. Jan. 25 Read Chapter 4 Again.
Chapter 4: Isaac Newton and the Laws of Motion
While chapter 3 introduced the mathematical description of the motion of objects, the real quest of science is to make predictions about behavior, and to explain that behavior with a coherent, logical set of rules (a theory or law). Here we introduce what is perhaps the most fundamental set of laws of science, Newton's Three Laws of Motion (Classical Mechanics)

Course objectives addressed: LO-1, LO-2, LO-3
Skill and Applied Learning Requirements addressed: SALR-1

7. T. Jan. 30 Read Chapter 5
Chapter 5: The Law of Universal Gravitation
When combined with the Three Laws of Motion, ever better observations of the motion of the planets lead Newton to determine the nature of another law of nature, the universal law of gravity, by which the motion of all stars and planets can be explained (until one starts talking about black holes). The combination of the laws of gravity and motion are able to explain centuries of human observation of the motion of the planets in a way that Stonehenge could never match. With the laws of motion and of gravity, is there "free will?" It seems as if we might be living in a "clockwork universe:" Can there be predictability AND free will, or can you only have one or the other?

Program objectives addressed: PO-2, PO-3
Course objectives addressed: LO-1, LO-2, LO-3
Skill and Applied Learning Requirements addressed: SALR-1

8. R. Feb. 1 **Test I, Motion, forces, and gravity.**

9. T. Feb. 6 Read Chapter 8
Chapter 8: Kinetic and Potential Energy
From the laws of motion, new relationships can be developed to understand the universe. Another view of the motion of objects is through the ideas of Work, Energy and Power. These are ideas that are very relevant to modern society, as it utilizes various types of energy to perform work. What are those sources, and what limits are placed on them by the laws of the universe? A great deal of what can be accomplished is dictated by the law of Conservation of Energy and the Work-Energy Theorem

Course objectives addressed: LO-1, LO-2, LO-3, LO-4
Skill and Applied Learning Requirements addressed: SALR-1

10. R. Feb. 8 Read Chapter 6

11. T. Feb. 13 Read Chapter 6 again
Chapter 6: Conservation of Linear Momentum
Starting from the laws of motion, one can also introduce a new idea that is especially useful in describing many situations one sees in every day life. Conservation of Linear Momentum allows one to predict the results of collisions and, when combined with the work-energy theorem of chapter 8, illustrates the Nature of Conservation Laws.

Course objectives addressed: LO-1, LO-2, LO-3
Skill and Applied Learning Requirements addressed: SALR-1

12. R. Feb. 15 Read Chapter 14
SETI2 = 20 HW points.

13. T. Feb. 20 Read the rest of Chapter 14
Chapter 14: Vibrations and Waves
Waves are found throughout our daily lives, and the understanding of waves has important technological implications, from seismic waves, to radio waves, to sound waves used in ultrasonic imaging devices.

Program objectives addressed: PO-3
Course objectives addressed: LO-1, LO-2, LO-3, LO-4
Skill and Applied Learning Requirements addressed: SALR-1

14. R. Feb. 22 Read Chapter 15 Sound
Chapter 15: Sound
Sound is composed of waves of compressed and rarified air. Here we consider a wave that constitutes one of the most important methods that people use to observe and interact with each other and their environment. We will consider the mechanics of hearing and the human ear, some of the applications of ultrasound, and some of the

science behind music and voice print technology. Hopefully we will have a student demonstration of musical instruments.

Program objectives addressed: PO-3
Course objectives addressed: LO-1, LO-2, LO-3, LO-4
Skill and Applied Learning Requirements addressed: SALR-1

15. T. Feb. 27 **Test II: Conservation Laws and Waves**

16. R. March 1 Read Chapter 11
SETI2 Vote = 10 HW Points.
Read Chapter 11: Heat and Temperature
Attending school in Terre Haute, Indiana, one is necessarily aware of the effects of Heat and Temperature . We will talk about each of these as a distinct topic and also consider how energy is transferred between bodies (like you and the cold / hot air outside). The topic has importance on a global scale in the form of the effects of global warming and the greenhouse effect.

Program objectives addressed: PO-1, PO-2
Course objectives addressed: LO-1, LO-2, LO-3, LO-4

SPRING BREAK, MARCH 5 - 9

17. T. March 13 Read Chapter 12
Chapter 12: The First Law of Thermodynamics. Energy in the form of Heat must obey laws as well, and these have some serious implication for the power and efficiency of automobile engines, electrical power plants, and a great deal of the modern energy consuming world we live in. Here we introduce the first of these laws, the First Law of Thermodynamics. This law also applies to living organisms (trophic Levels), human dieting , and puts constraints on the age of the Earth (Lord Kelvin and the age of the Earth).

Program objectives addressed: PO-2, PO-3
Course objectives addressed: LO-1, LO-2, LO-3, LO-4
Skill and Applied Learning Requirements addressed: SALR-1

18. R. March 15 Read the rest of chapter 12 and start chapter 13

19. T. March 20 Read the rest of chapter 13
SETI3 = 60 HW Points.
Chapter 13: Entropy and the Second Law of Thermodynamics.
This law puts serious constraints on how efficiently one can produce and use energy to do work. In addition to applying to car engines and steam turbines, the law is universal and so must apply to living things. We will briefly consider some of the consequences of the Second Law, and especially the Second Law as it applies to the Theory of Evolution and Entropy.

Program objectives addressed: PO-2, PO-3
Course objectives addressed: LO-1, LO-2, LO-3, LO-4
Skill and Applied Learning Requirements addressed: SALR-1

20. R. March 22 **TEST III Thermodynamics**

MARCH 25, LAST DAY TO DROP CLASSES

21. T. March 27 Read Chapter 17
Chapter 17: Electromagnetic Interactions
A brief introduction to Coulomb's Law and an introduction to electric current. Applications discussed include the role of electric current in biological systems, especially early speculation on its connection to an intrinsic animating

force related to living things (Luigi Galvani and Life's Electric Force) and modern applications of electrical power and current in the form of batteries and electric cars

Program objectives addressed: PO-2, PO-3
Course objectives addressed: LO-1, LO-2, LO-3

22. R. March 29 Read Chapter 18
Chapter 18: Electric Circuits.
A more complete investigation of the role of electricity usage in the modern world, and methods that are available for generating electricity. A brief discussion of The "war" of AC vs DC electric current and its relationship to industry standards when new methods and / or products are introduced.

Program objectives addressed: PO-2
Course objectives addressed: LO-1, LO-2, LO-3, LO-4

23. T. April 3 Read Chapter 21
Chapter 21: Atomic Structure and Interactions. This marks a transition in the course as the first serious ideas of "modern" physics are introduced, following the historical development of the idea, and evidence for atoms. Some basic chemistry is introduced, as well as information concerning the structure of atoms, the idea of "elements," leading primarily to the Periodic Table, a classic example of scientific reasoning, and the scientific method. The historical development of the model of the atom is covered, including the Rutherford model of the atom, and the Bohr model of the atom. Quantum mechanics makes its first appearance, and some useful applications of the ideas, such as spectroscopy and lasers.

Course objectives addressed: LO-1, LO-2, LO-3
Skill and Applied Learning Requirements addressed: SALR-1

24. R. April 5 Read Chapter 26

25. T. April 10 Read the rest of Chapter 26
Chapter 26: The Nucleus of the Atom
Continuing the journey to the very small, we move to a close up of the center of the atom, the nucleus. In addition to the structure of the nucleus and its components, we also address radioactivity, applications of radioactivity, such as medical treatment. We will also discuss the large amounts of energy available from radioactive nuclei. This will include a discussion of producing energy from the nucleus, and the issue of nuclear waste if that form of energy is to be used on a large scale. The topic of not so peaceful application of nuclear processes to fission and fusion, nuclear weapons will also be addressed.

Program objectives addressed: PO-3, PO-8
Course objectives addressed: LO-1, LO-2, LO-3, LO-4
Skill and Applied Learning Requirements addressed: SALR-1

26. R. April 12 Read chapter 28

27. T. April 17 Read the rest of chapter 28

28. R. April 19 Watch something on the SciFi channel or rent your favorite Star Wars Episode
Chapter 28: Albert Einstein and the Theory of Relativity
We continue our survey of "modern" physics by considering the Theory of Relativity. Falling on the heals of the chapter concerning the nucleus, we introduce what is probably the most famous equation in all of physics: $E = mc^2$) again with some discussion of the unfortunate results this equation implies in the form of nuclear weapons. However, most of the time will be spent on the concepts of space, time, and observers, and what the theory of special relativity tells us about how the universe works. Course materials will be supplemented by class notes of the instructor addressing some of the less intuitive predictions of special relativity, including the practicality (or lack thereof) involved in interstellar travel, and the effects of traveling faster than the speed of light (violations of causality).

Program objectives addressed: PO-3
Course objectives addressed: LO-1, LO-2, LO-3, LO-4
Skill and Applied Learning Requirements addressed: SALR-1

29. T. April 24 Read chapter 29
Chapter 29: Cosmology
We finish the semester with a look at the universe as a whole. We consider the current best scientific knowledge about its beginning (the big bang) and its evolution since that time. We will also introduce the discovery of dark matter, and dark energy, and the implications of both of them on the evolution of the universe. In particular, we will emphasize the fact that science must incorporate new knowledge. Science, in fact, must seek out tests of existing theories in an attempt to find cases where that theory does not accurately describe the observations.

Program objectives addressed: PO-2, PO-3
Course objectives addressed: LO-1, LO-2, LO-3, LO-4

30. R. April 26 Review for final test. Atoms, nuclei, and modern physics.
CLASSES END APRIL 27
FINALS WEEK: APRIL 30 - MAY 4 **Final = Tuesday May 1, 1:00 pm**.

Writing Assignments

The writing assignments for this course stem from the mission of the SETI Institute. SETI, the Search for Extraterrestrial Intelligence, is a global exploratory effort that seeks evidence of life in the universe by looking for signatures of its technology. The current understanding of life's origin on Earth suggests that given a suitable environment and sufficient time, life will develop on other planets, particularly in other solar systems. Whether evolution will give rise to intelligent, technological civilizations is open to speculation. However, such a civilization could be detected across interstellar distances, and may actually offer our best opportunity for discovering extraterrestrial life in the near future.

Due Dates for SETI Assignments
All SETI assignments are to be submitted electronically to the instructor's email address by 11 pm (Terre Haute time) on the date the assignment is due. NO LATE ASSIGMENTS WILL BE ACCEPTED. You may turn in any writing assignment any time before it is due.

Guidelines for SETI1 and SETI3
These are to be turned in as Word document attachments to an email message to the instructor. The email subject and the title of the Word document should be "SETI1 JWest" and "SETI3 JWest", where "JWest" is substituted by your first initial and last name.

Your document should be double spaced in Times New Roman 12 point font with 1 inch margins.

The document should contain the following:

Title Page:

Assignment Name (e.g. SETI1 or SETI3)
Your name
The name of your instructor, Joseph West
The date the assignment is due
NO OTHER PAGES SHOULD HAVE YOUR NAME ON THEM.

Assignment Main Body:

The text of your writing assignment.

Guidelines for SETI2
SETI2 is to be submitted as an email message to your instructor with the subject "SETI2 JWest", where "JWest" is substituted by your first initial and last name. The body of the message should include your two questions for this assignment.

SETI1 Assignment

Program objectives addressed: PO-3, PO-10
Course objectives addressed: LO-4
Skill and Applied Learning Requirements addressed: SALR-1, SALR-3

Due January 23, 2010

In the SETI project (www.seti.org), scientists scan radio waves received from telescopes for a signal that might have originated with intelligent life elsewhere in the galaxy. In this writing assignment, address the following questions.

A) What sort of signal would convince you it originated, intentionally or unintentionally, from intelligent life, rather than from natural phenomena?

B) Suppose astronomers detect signals from another civilization. What effect do you think it would have on our society? What effect would it have on you?

C) Do you think there is life elsewhere in the universe? Do you think there is intelligent life elsewhere in the universe? Defend your answers. If you think there is life elsewhere in the universe, do you think it is likely we will ever have proof of its existence, and if so, how long do you think it will take?

Your responses to each of these questions should be as clear as possible and several sentences in length. Each question is worth 10 homework points.

SETI2 Assignment

Program objectives addressed: PO-3, PO-5, PO-8, PO-10
Skill and Applied Learning Requirements addressed: SALR-3

Due February 15, 2010

Assume that the SETI project confirmed contact with intelligent life three days ago. The aliens reside in a star system only 5 light years away. This will allow (slow) two-way communication. Everyone on Earth gets to submit two questions for the aliens. The only things we know about them is that they do not have the means to travel here, but they do have the technology necessary to send and receive radio signals in the form of text messages and images. They understand, or can translate most basic human languages, but we cannot assume that they are just like us.

The questions are submitted anonymously, but they are posted for all to see, and then the whole planet votes on the 20 questions to send. We will vote within class as well. All questions, pending editing for content, will be posted, and the class will vote to determine the three most popular questions. You will VOTE for FOUR. Students who submitted one of the top three questions, as determined by the class vote, will get **20 homework bonus points**.

Again, submit TWO questions, each of which must be less than 50 words long, but should be complete. Each question is worth 20 homework points.

The criteria for the vote will be:
1) The question is of most interest/importance to the planet.
2) There is some reasonable expectation that the aliens might know the answer (so, we will not ask them how to spin straw into gold).
3) It should be possible to answer the question in a reasonable amount of text (a couple of pages at most).
4) Do not make too many assumptions about similarities to us. (For example, asking about their favorite football team might not be relevant, as they might not watch football.)

You are allowed to discuss this question with anyone you like EXCEPT current and former members of this class.

SETI3 Assignment

Program objectives addressed: PO-10
Course objectives addressed: LO-4
Skill and Applied Learning Requirements addressed: SALR-1, SALR-2, SALR-3

Due March 20, 2010

(Students do not know what the assignment will be until it is handed out in class, which happens once the votes are tabulated for the SETI2 assignment. The questions here are from Fall 2006. They were the questions with the top three vote totals.)

Great minds think alike….two days after sending our message (and 10 years before we will get a reply) we received a new message with questions for the people of Earth. By coincidence, they are the same questions we just sent to the aliens. So, for 60 homework points, you are to compose answers for the following questions.

1. What is your basic physiology? That is, what do you breathe and eat? What do you look like, and what is your size?

2. Have you found evidence of a higher power? What are your religious beliefs, if any?

Include a reference page with your responses to these questions. You must use at least four reputable references (Wikipedia is not a reputable reference.)

Physics 101L Syllabus

Instructor:	Dr. Joseph West
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Office Hours:	M+W 9:00-10:00 am, W 2:00 – 4:00 pm, and by appointment

Class Time:	M 2:00 pm – 3:50 pm, Location: S-109
Co-Requisite:	Enrollment in PHYS 101
Text:	ISU Physics 101 Laboratory Manual

Purpose and Objective

Physics 101 and Physics 101L constitute an introduction to ideas common to the physical sciences, with an emphasis on physics. The course qualifies as the laboratory component of the Physics 101 Foundational Studies Science and Laboratory course (and GE 2000: Scientific and Mathematical Studies-Foundation). Successful completion of the course is intended to develop your critical thinking skills through the application of the basic tenets of the scientific method to novel situations.

Physics 101 is a Science and Laboratory Foundational Studies course. This course is intended for students who wish to have a general introduction to science with an emphasis on physics and assumes no previous coursework in physics. This course is not intended to prepare students to enroll in upper-level coursework in physics. It has been developed for students who wish to gain a broad-based understanding of the fundamental concepts of science with a concentration in physics.

Laboratory Course Learning Objectives (LO)

1. **Engage in laboratory experience that reinforces and augments the theoretical content of the lecture course:** The laboratory topics selected for Physics 101L correspond directly to the major topics addressed in the Physics 101 lecture.
2. **Use the scientific method to formulate and test hypotheses:** In most of the experiments, students will be required to formulate a hypothesis regarding the outcome of the experiment before measurements are made. Analysis of the measurements will then test the hypothesis.
3. **Use the tools and techniques of the discipline to gather and analyze data:** Students will use modern probes and data acquisition equipment, usually interfaced with the computer, to collect data. Analysis of data will be completed using standard computer applications.
4. **Present the analysis and findings of the lab experience:** All laboratory reports will require that students present their analysis and findings in tabular and/or graphical form. Students will draw conclusions based on analysis of their data, and these conclusions will be expressed in writing in the report, generally in response to summary questions.

Skill and Applied Learning Requirements (SALR)

1. **Help students develop critical thinking skills:** The purpose of the physics laboratory is to improve students' understanding of the experimental process while illustrating concepts encountered in the lecture portion of the class. Students learn techniques of measurement and data analysis and develop your critical thinking skills.
2. **Help students develop information literacy skills:** These skills will be addressed in the Physics 101 lecture.
3. **Include a graded writing component:** All laboratory reports will require that students present their analysis and findings in tabular and/or graphical form. Students will draw conclusions based on analysis of their data, and these conclusions will be expressed in writing in the report, generally in response to summary questions. Students must convince the instructor, through writing, of the accuracy of their measurements and the validity of their conclusions.

Lab Reports

During the semester you will perform 13 lab experiments, one every week except the week of Martin Luther King Jr. Day. You will work in teams of two, and you may turn in an individual **or** a team lab report on each lab experiment performed. The report is due **at the beginning of the following lab session.** Each lab report is worth

50 points. Remember to put units on all of your answers and also to carry units through your calculations. **If you do not include units in your work, you will lose points.** Be sure to label all of your graphs (title and axes with units).

Academic Integrity

Plagiarism and other forms of cheating will not be tolerated. Depending of the nature of the assignment and the seriousness of the offense, penalties range from no credit given for the assignment to a failing grade in the course to suspension or expulsion as determined by Student Judicial Programs. The Student Guide to Academic Integrity can be found at: http://web.indstate.edu/academicintegrity/studentguide.pdf

American with Disabilities Act Statement

Indiana State University seeks to provide effective services and accommodation for qualified individuals with documented disabilities. If you need an accommodation because of a documented disability, you are required to register with Disability Support Services at the beginning of the semester. Contact the Director of Student Support Services. The telephone number is 237-2301 and the office is located in Gillum Hall, Room 202A. The Director will ensure that you receive all the additional help that Indiana State offers. If you will require assistance during an emergency evacuation, notify your instructor immediately. Look for evacuation procedures posted in your classrooms.

Laptop Usage

Laptop Usage Forbidden: While the University has chosen to require laptops of its students, the University also recognizes and respects the right of faculty to conduct their classes as they deem appropriate. In this course, no laptop may be used in class. Failure to comply with this direction is a violation of the Code of Student Conduct.

Academic Freedom

"Teachers are entitled to freedom in the classroom in discussing their subject, but they should be careful not to introduce into their teaching controversial matter which has no relation to their subject." The preceding comes from the American Association of University Professors statement on academic freedom. Though the entire statement speaks to many issues, it is this portion on the conduct of the course that is most relevant. For the purpose of Foundational Studies courses this means that course instructors have the right to conduct their class in a fashion they deem appropriate as long as the material presented meets the learning objectives laid out by the entire faculty. See: http://www.aaup.org/AAUP/pubsres/policydocs/contents/1940statement.htm

Attendance and Grades

Your final grade will be determined by the average of your laboratory scores after dropping the lowest score. There will be no make-up labs and you may NOT drop either of the last two laboratories. If you miss more than one lab, you will receive a grade of zero for the additional missed lab reports. Your grade is based on the percentage of total possible points earned

Grading Scale

A^+ 99-100	A 94-97	A^- 90-93
B^+ 87-89	B 84-86	B^- 80-83
C^+ 77-79	C 74-76	C^- 70-73
D^+ 67-69	D 64-66	D^- 60-63
F Below 60		

Schedule of Laboratory Experiments

As listed in the table of contents of the Physics 101 Laboratory Manual for spring 2010.

1) Introduction to the Physics Laboratory
2) Simple Motion
3) Forces
4) Conservation of Momentum
5) Conservation of Mechanical Energy
6) The Pendulum
7) Introduction to Waves
8) Sound Waves
9) Thermal Properties of Water
10) Electrical Resistors and Conductors
11) Basic Properties of Electric Circuits
12) Atomic Spectra
13) Radioactivity