



# DE LA SALLE UNIVERSITY

## College of Science

Department of Physics



### SCIENVP/LBYENVP – General Education Course on Understanding Energy and the Environment Issues with Physics (Lecture and Laboratory)

Prerequisite:

Prerequisite to:

Instructor: \_\_\_\_\_

Contact details: \_\_\_\_\_

Consultation Hours: \_\_\_\_\_

Class Schedule and Room: \_\_\_\_\_

#### Course Description

This is a general education (GE) course on energy and the environment designed for students of the College of Computer Studies (CCS), College of Education (CED), College of Liberal Arts (CLA), College of Business, and School of Economics (SOE). The course provides the students an insight on how energy is generated, the different sources of energy, and its effect on the environment. Misconceptions on the different topics will be drawn out, sorted, and resolved through the lecture and laboratory activities. The course utilizes the student's imagination, intuition, and the creativity in analyzing and discovering the various laws and principles that govern the physical world.

#### Learning Outcomes

On completion of this course, the student is expected to present the following learning outcomes in line with the Expected Lasallian Graduate Attributes (ELGA)

ELGA	Learning Outcome
Critical and Creative Thinker	LO1: Create varied materials that will Identify the basic physical quantities about the different sources of energy and how these sources of energy affect the environment.
Effective Communicator	LO2: Implement several tasks in a laboratory experiment and actively participate and give valuable relevant contributions in collaborative activities. Interpret, present, and explain the results of their laboratory activities and present solutions in a logical and organized manner.
Lifelong Learner	LO3: Apply the concepts learned on real-life environmental problems and propose solutions to pressing environmental concern. Acknowledge and respect the intellectual work of others by citing sources of information accordingly as they present and explain their results.
Service-Driven Citizen	LO4: Volunteer and share the knowledge learned in energy and environmental issues for the under-privilege

#### Final Course Output

As evidence of attaining the above learning outcomes, the student is required to submit the following during the indicated dates of the term

Learning Outcome	Required Output	Due Date
LO1: Create varied materials that will Identify the basic physical quantities about the different sources of energy and how these sources of energy affect the environment.	Draft of concept and theme of the Creative Output, Assignment, Home work, Long Exam	Week 3
LO2: Implement several tasks in a laboratory experiment and actively participate and give valuable relevant contributions in collaborative activities. Interpret, present, and explain the results of their laboratory activities and present solutions in a logical and organized manner.	Project plan or time table for the creative output, perform skill building exercise, prepare laboratory Worksheets, Performance Output, and Reports, paper and oral presentation	Week 5-13 2,3,4 5, 6, 7, 8, 10, 11, 12 5, 6, 7, 8,10,11, 12 6, 7, 8, 10, 11, 12, 13
LO3: Apply the concepts learned on real-life environmental problems and propose solutions to pressing environmental concern. Acknowledge and respect the intellectual work of	Final output (advocacy video/play/multimedia presentation on the conventional and alternative sources of energy, e.g. research paper on the effect of number of vehicles on the amount of air pollution), Reaction paper	Week 13

others by citing sources of information accordingly as they present and explain their results. LO4: Volunteer and share the knowledge learned in energy and environmental issues for the under-privilege	on field trip, museum visit, science center, world trade visit, movie critique  Outreach project in SCIENVP/LBYENVP	Week 13
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### Rubric for assessment

#### **Rubric for Final Product (Group Presentation), Final Product (Play), Final Product (Advocacy Video)**

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Understanding of topic 25%	The topic is clearly understood, the topic in-depth, and information is presented forcefully and convincingly	The topic is clearly understood, the topic in-depth, and information is presented with ease	The main points of the topic are clearly understood and presented with ease	No adequate understanding of the topic
Presentation Style 25%	Consistently used gestures, eye contact, tone of voice, and level of enthusiasm in a way that kept the attention of the audience	Used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience	Sometimes used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience	A presentation style that did not keep the attention of the audience
Information 25%	All information presented in the debate was clear, accurate, and thorough	Most of information presented in the debate was clear, accurate, and thorough	Most of information presented in the debate was clear, accurate, but was not usually thorough	Information had several inaccuracies or was usually not clear
Use of Facts/ Statistics 25%	Every major point was well supported with several relevant facts, statistics and/or examples	Every major point was adequately supported with relevant facts, statistics and/or examples	Every major point was supported with facts, statistics, and/or examples, but the relevance of some was questionable	Every point was not supported

#### **Rubric for Laboratory Activities**

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Laboratory Performance 25%	Did more than his/her fair share of the work. Led the group to getting the work done on time	Did significant amount of work. Responsible for getting the work done on time	Did almost as much work as the other members of the group	Did generally less than other members of the group
Laboratory Techniques 25%	Very good lab skills and proper techniques. Enthusiastic worker.	Evidence of average laboratory skills. Works willingly	Fair laboratory techniques	Poor laboratory techniques
Laboratory Safety Management 25%	Excellent attention to lab safety and waste management	Above average attention to lab safety and applied appropriate waste management.	Occasional display of interest in lab safety and waste management	Paid no attention to lab safety. Poor waste management
Laboratory Exercises or Discussion of Results	Excellent worksheet completion. Answered	Above average completion of worksheet. Most questions	Partially completed worksheet. Some questions	Incomplete or no worksheet

25%	questions convincingly	answered correctly.	answered correctly	
<b>Rubric for Reaction Paper / Essay /Laboratory Written reports</b>				
<b>Criterion</b>	<b>Excellent (4)</b>	<b>Good (3)</b>	<b>Satisfactory (2)</b>	<b>Needs Improvement (1)</b>
Organization 30%	Manuscript is well-organized and structured.	Manuscript is organized but lacks certain key elements.	Manuscript show organization but has several portions that are not relevant.	Manuscript is disorganized and the flow of information and arguments are confusing.
Scientific Accuracy 30%	Scientific explanations or facts presented/cited are 100% accurate.	Scientific explanations or facts presented/cited show some inaccuracies.	Scientific explanations or facts presented/cited show a significant number of inaccuracies	Scientific explanations or facts presented or cited are all misconceptions
Presentation of Arguments or Explanations 40%	Arguments and explanations presented are clear, valid, and convincing.	Arguments presented are clear, valid, and convincing but has several flaws.	The arguments and explanations presented only partially addressed the problem.	The arguments and explanations presented do not in anyway address the problem.
<b>Rubric for Energy Poster</b>				
<b>Criterion</b>	<b>Excellent (4)</b>	<b>Good (3)</b>	<b>Satisfactory (2)</b>	<b>Needs Improvement (1)</b>
Pictures (relevance) 30%	All pictures are related to the topic and make it easier to understand.	All pictures are related to the topic and most make it easier to understand.	All pictures are related to the topic.	Pictures do not relate to the topic.
Understanding of topic 40%	All pictures are correctly labeled of the type of energy being depicted on the picture.	Most pictures are correctly labeled of the type of energy being depicted on the picture.	Some pictures are correctly labeled of the type of energy being depicted on the picture.	Pictures are not correctly labeled of the type of energy being depicted on the picture.
Attractiveness 30%	The poster is exceptionally attractive in terms of design, layout, and neatness.	The poster is attractive in terms of design, layout and neatness.	The poster is acceptably attractive though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.

### Additional Requirements

Long Exams, Final Exam, Physics Fieldtrip, Alternative Classes, Library Work, Physics Seatwork, Outreach Project, Community Volunteer, and other requirements prescribed in the course.

Grading System			
SCIENVP:		<b>Scale:</b>	
Activities	40 %	96-100%	4.0
Exams (2)	30 %	90-95%	3.5
Teacher's Evaluation	5 %	84-89%	3.0
Final Project	25 %	78-83%	2.5
<b>TOTAL:</b>	<b>100%</b>	72-76%	2.0
LBYENVP:		66-71%	1.5
Laboratory Performance and Worksheets	25%	60-65%	1.0
Laboratory Written Reports	25%	<60%	0.0
Skill Exam	15%		
First Long Exam	15%		
Teacher's Evaluation	5%		
Final Examination	15 %		
<b>TOTAL</b>	<b>100%</b>		
<b>Passing Grade: 60%</b>			

Learning Plan			
LEARNING OUTCOME	TOPIC	WEEK NO.	LEARNING ACTIVITIES
LO1	Class Orientation Energy and its Uses	1	Lecture on Energy
LO1	<b>Work, Energy, and Power</b>	2 -5	Assign the students to make a poster showing "The Historical Perspective on the Use of Energy"
LO2	<ul style="list-style-type: none"> <li>Different forms of energy</li> <li>Work, Conservation of Mechanical Energy and Power</li> </ul>		Discuss the assigned poster
LO1	<ul style="list-style-type: none"> <li>Sources of Energy</li> </ul>		Concept Mapping
LO2	<b>Laboratory Activities:</b> Skill building activities: Familiarization with the use of SPARK and PASCO sensors (Scientific Inquiry)	2	Poster (Students create a poster from cut-outs on newspapers/ magazines showing the different types of energy and the transformation of energy)
LO1, LO2	Skill Building Quiz	3	Research and group discussions on different sources of energy used by different countries and issues arising from this.
LO2	<b>Experiment 1</b> Familiarization with graphs using Work and Kinetic Energy Experiment	4	Demonstration on how electricity is generated creative output  Laboratory results and analysis experiments 1 and 2  Written reports on experiments 1 and 2 (hydroelectric power)
LO2, LO3	<b>Experiment 2</b> Experiment on	5	Electric Bill/ Carbon Footprint

	Transformation		Draft of the concept and theme behind the creative output and project plan or time table for the
LO1	<b>Exam 1</b>	6	
LO1	<b>Thermal Energy</b>	7 - 9	Video about the Thermal Energy
LO2	<ul style="list-style-type: none"> <li>• Thermal properties</li> <li>• Specific heat, Latent heat, Thermal Expansion</li> <li>• Heat Engine and Efficiency</li> </ul>		Group discussions
LO1			Essay/report on the role of specific heat capacity and latent heat on weather.
	<b>Laboratory Activities:</b>		
LO2	<b>Experiment 3</b> Thermal Energy	7	Case study: Effects of water on environment
LO2	<b>Experiment 4</b> Specific heat – Land vs Water	8	Draft of a final output (advocacy video/play/multimedia presentation on the conventional and alternative sources of energy, research paper on the effect of number of vehicles on the amount of air pollution)
LO2	<b>Experiment 5</b> Heat of Fusion/Heat of Vaporization	9	Laboratory results and analysis on experiments 3, 4, and 5  Written reports on experiments 3, 4, and 5
LO1	<b>Methods of Heat Transfer</b>	10	Group discussions  Essay/report about the Physics of the Greenhouse Effect
	<b>Laboratory Activities:</b>		
LO2	<b>Experiment 6</b> Heat Transfer by Conduction	10	Laboratory results and analysis on experiments 6 and 7
LO2	<b>Experiment 7</b> Heat Transfer by Radiation		Written reports on experiments 6 and 7
LO1	<b>Dynamics of the Atmosphere</b> <b>Global Warming</b>	11-12	Film Viewing: An Inconvenient Truth, The 11 <sup>th</sup> Hour Climate Gate Essay/Reflection Paper about the film

LO2	<b>Laboratory Activities:</b>  <b>Experiment 8</b> Incoming Solar Radiation and Seasons	11	Final presentation of the different sources of energy used by different countries and issues arising from this
LO2	<b>Experiment 9</b> Weather in Terrarium	12	Exposure/Field trip  Laboratory results and analysis on experiments 8 and  Written reports on experiments 8 and 9
LO2	<b>Group Presentation:</b> Final Output	13	Class Evaluation/Analysis of Group Final output
LO4			Physics Outreach Project
LO1	Final Exam	14	

### References

1. Bloomfield, L.A. (2006). *How Things Work: The Physics of Everyday Life* (3rd Edition), John Wiley and Sons.
2. Cummings, K., Laws, P., Redish, E., and Cooney, P. (2004). *Understanding Physics* (1st Edition). John Wiley and Sons.
3. Cutnell, J. and Johnson, K. (2010). *Physics*, (8th Edition). John Wiley and Sons.
4. Serway, R. and Beichner, R. (2008). *Physics for Scientist and Engineers* (7th edition). Cengage Learning Inc.

### Online Resources

- DOE Portal Retrieved September 20, 2012 from <http://www.doe.gov.ph/>
- Science Joy Wagon (1998) *Work Down on Three Masses* Retrieved September 20, 2012 from <http://www.regentsprep.org/Regents/physics/phys02/workmas/default.htm>
- <http://www.iit.edu/~smile/physinde.html>
- Funstanding (1998). *Funderstanding Roller Coaster*. [Online] Retrieved September 20, 2012 from <http://www.funderstanding.com/k12/coaster/>
- Explorelearning. *Energy of a Pendulum Gizmo* Retrieved September 20, 2012 from: <http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=390&ExploreLearning>
- The Physics Classroom (2004). *Energy, Work, Power*. Retrieved September 20, 2012 from: <http://www.physicsclassroom.com/Class/energy/energtoc.html>
- Freudenrich, Craig. *HowStuffWorks: How Ozone Pollution Works* Retrieved September 20, 2012 from: <http://health.howstuffworks.com/ozone-pollution1.htm>
- Australian Bureau of Meterology. *BOM-Ozone Lesson* Retrieved September 20, 2012 from: [http://www.bom.gov.au/lam/Students\\_Teachers/ozanim/ozoanim.shtml](http://www.bom.gov.au/lam/Students_Teachers/ozanim/ozoanim.shtml)
- United States Environment Protection Agency (2003). *Ozone: Good Up High, Bad Nearby* Retrieved September 20, 2012 from: <http://www.epa.gov/oar/oagps/gooduphigh/>

### Class Policies

- This is a general education course. Students of the College of Computer Studies (CCS), College of Education (CED), College of Liberal Arts (CLA), College of Business, and School of Economics (SOE) are qualified to take this course.
- The final examination covers the entire course syllabus. This may be held before or during the Final Examinations Week (Week 14), subject to the discretion of the faculty member.
- The theme/topic for the group presentation would be given by the faculty member to the class at least a meeting before actual group presentation.

- It is the responsibility of the student to be mindful of his/her absences/tardiness and performance in class.
- Specific class policies on attendance, make-up quizzes, academic honesty, grading system, dress code, classroom management, and others not mentioned above, are to be discussed by the faculty member on the first day of classes.

Approved by:



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Name and Signature  
Chair, Department of Physics