



DE LA SALLE UNIVERSITY

College of Science

Department of Physics



SCIMATP – General Education Course on New Materials – Physics Track

Prerequisite:

Prerequisite to:

Instructor: _____

Contact details: _____

Consultation Hours: _____

Class Schedule and Room: _____

Course Description

This is a General Education (GE) course on new materials used in modern technologies designed for students in the College of Computer Studies (CCS), College of Education (CED), College of Liberal Arts (CLA), College of Business (COB), and School of Economics (SOE). The course provides the students with an insight on the structure, properties, processing, and performance of new materials. Misconceptions on the different topics will be drawn out, sorted, and resolved through the various hands-on activities and group discussion. The course utilizes the students' imagination, intuition, and 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: Classify materials according to their properties and provide real-world examples of the applications of said materials. Describe the thermal, electrical, optical, mechanical, and magnetic properties of the various classifications of materials.
Effective Communicator	LO2: Explain the physical laws and principles involved in the operation of modern devices, such as superconductors, nanomaterials, fiber optic cables, and lasers. Apply the ideas and concepts learned in preparing a multi-media presentation/projects on the application of new materials.
Lifelong Learner	LO3: Appreciate the role that technology and new materials play in improving the standard of living. Understand how technology and new materials contribute towards environmental preservation and sustainable development.
Service-Driven Citizen	LO4: Volunteer and share the knowledge in physics 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: Classify materials according to their properties and provide real-world examples of the applications of said materials. Describe the thermal, electrical, optical, mechanical, and magnetic properties of the various classifications of materials.	Assignment, home work, Long Exam. Create a product/device/technology based on a specific material Activity Sheets Reaction paper	Week 1, 3, 6, 9
LO2: Explain the physical laws and principles involved in the operation of modern devices, such as superconductors, nanomaterials, fiber optic cables, and lasers. Apply the ideas and concepts learned in preparing a product/project/mult-media	Paper and Oral presentation of assigned product/project/new material, Group presentation	Week 2, 4, 7, 10

<p>presentation on the application of new materials. LO3: Appreciate the role that technology and new materials play in improving the standard of living. Understand how technology and new materials contribute towards environmental preservation and sustainable development. LO4: Volunteer and share the knowledge in physics for the under-privilege</p>	<p>Final output (product based/ video/ /multimedia presentation on the material used in the product/device/technology)</p>	<p>Week 13, 14</p>
	<p>Outreach Project in SCIMATP</p>	<p>Week 11, 12</p>

Rubric for assessment

Rubric for SCIMATP Classroom Activities

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Performance 30%	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
Skills 30%	Very good skills Enthusiastic worker.	Evidence of average skills. Works willingly	Fair Skills	Poor Skills
Discussion of Results 40%	Excellent worksheet completion. Answered questions convincingly	Above average completion of worksheet. Most questions answered correctly.	Partially completed worksheet. Some questions answered correctly	Incomplete or no worksheet

Rubric for Reaction Paper / Essay / Written reports

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
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.

Rubric for Final Product

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Creativity 30%	Very Creative/ Innovative	Product Improvement	Product is Functional	Product does not work
Product explanation 40%	Very good product description, very easy to understand	With product discussion but not easy to understand	Without product discussion but functional	Without product discussion and not functional
Presentation	Product	The product is	The product is	The product is

LO1	Crystal Structures of Materials	4	Assignment Quiz
LO2			Lecture on the Powerpoint Presentation on the Overview of Materials Science (Historical Perspectives) Discuss Crystal Structures in relation to materials. Perform activity on crystal structures by building models or drawing crystal structures using graphing paper with scale Assignment/Quiz
LO1	Classification of Materials	5	Discuss classification of materials and physical properties and its applications. Discuss new materials and advance materials.
LO2			Assignment: Research on other new materials and its applications and present in class Visit National Museum and research on the Philippine History of Materials Quiz EXAM 1
LO1	Thermal Property of Materials	6-7	Heat and Heat Measurements/ Transfer Temperature and Expansion Coefficient of Linear Expansion Specific Heat of Solids Latent Heat Conservation of energy
LO2	Classroom Activity on Thermal Properties of Materials		Basic Calorimetry Demo Activities on: Specific heat of Solids, Linear Expansion of Metals, Latent Heat of Fusion, Latent Heat of Vaporization
LO3			Reaction Paper: When Safety Measures are Not Met: The Marcopper Incident and the Lafayette Incident Quiz Assignment

LO1	Electrical and Magnetic Property of Materials	8-9	Discuss basic Electricity. Electric Current Resistance A Model for Electrical Conduction Resistance and Temperature Electrical Power Current, Resistance, and Voltage Resistors in Series and Parallel Demo Activity: Color coding of resistors, Ohm's Law, Resistors in series and parallel Activity: Meralco Bill Discuss magnetism. Magnetic domains Paramagnetic Ferromagnetic Diamagnetic Materials Demo Activity: Magnetism, Solenoid Discuss basic principle of motors and generators transformers Research: Nanotechnology and its application Quiz
LO2	Classroom Activity on Electricity		
LO3			
LO2	Classroom Activity on Magnetism		
LO1	Mechanical Property of Materials	10	Announce the requirement for the outreach project in Physics and final product to be submitted in the 14 th week Discuss Force, Push, Pull, Friction, Pressure, Stress, Strain, Young's Modulus of Elasticity, plasticity, fracture, ductility, Strength of Materials Demo Activity: Strength of Materials Building the tallest structure from a single bond paper Demo Activity: Force, Friction Quiz Research: Strongest and expensive materials
LO2	Classroom activity on mechanical property of material		
LO3			
LO1	Optical Property of Materials	11	Discuss the concept of Light and Color Reflection and Refraction Index of refraction Speed of light Electromagnetic

LO2	Classroom Activity on Light		Waves Interference Demo Activity: Reflection of Light Index of Refraction Microscopy Research: Fiber Optics, DVD and Blu Ray Discs, Laser Devices Visit the DLSU Museum / National Museum of Arts/ Metropolitan Museum and report on the Philippine Art Work And its preservation Research on the use of Color and optical illusion in Marketing Products Quiz EXAM2
LO3			
LO1	Deteriorative Property of Materials	12-13	Discuss Failure of Materials What causes Failure of Materials Junk State of Materials Research on Products that Fail, Product Recall, and solutions made Research on building structures that fail because of natural disasters Research on Materials Recovery Facility Report Research in class Outreach Project in SCIMATP
LO3			
LO4			
LO1, LO2, LO3		14	Submission of Final product

References

1. Bloomfield, Louis (2009) *How Things Work: The Physics of Everyday Life*, John Wiley and Sons, Inc.
2. Callister, William Jr. (2005) *Material Science and Engineering: An Introduction (7th ed.)*, John Wiley and Sons, Inc.
3. Hewitt, Paul (2005) *Conceptual Physics (7th ed.)*, Addison Wesley
4. Jones, E., Childers, R. (2001), *Contemporary college physics (3rd edition)* Boston: Mc-Graw Hill Companies, Inc.
5. Serway, R. (1996), *Physics for scientists and engineers with modern physics (4th edition)*. Chicago: Saunders College Publishing.

Online Resources

IVLE, Integrated Virtual Learning Environment, is DLSU's resource for course materials. See ivle.dlsu.edu.ph and your professor's suggestions. You must login using your My.LaSalle account username and password.

Physlets at University of Colorado, Boulder. www.phet.colorado.edu

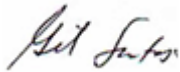
Physlets at Davidson College, <http://webphysics.davidson.edu/applets/applets.html>
"Physlet physics: interactive illustrations, explorations, and problems for introductory physics" by Christian, Wolfgang. Upper Saddle River, N.J.: Prentice Hall, Pearson Education, c2004.
Location: Circulation, 3rdFlr. QC30 .C47 2004; CD02355

Physlets at Boston University, <http://physics.bu.edu/~duffy/classroom.html>. Mechanics and Heat are in the first semester set. Electricity & magnetism is in the second semester set.

Class Policies

- This is a general education course. However, only 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.
- Final Examination is subject to the discretion of the Instructor.
- The topic for the group presentation will be given by the Instructor 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:



Name and Signature
Chair, Department of Physics