Graduate Catalogue

Physics Department
College of Science
De La Salle University

William Hall, 7th Floor
1004 Manila, Philippines
Tel Nos.: (+632)536-0229 (direct line)
(+632)524-4611 loc. 450 (trunk line)
http://www.dlsu.edu.ph/academics/colleges/cos/physics/default.asp
email:physchair@dlsu.edu.ph
URL:www.dlsu.edu.ph

Revision date: August 05, 2015

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DE LA SALLE UNIVERSITY PREAMBLE, VISION-MISSION AND CORE VALUES

Preamble

De La Salle University in Manila the Philippines is an internationally recognized Catholic university established by the Brothers of the Christian Schools in 1911. Inspired by the charism of St John Baptist de La Salle, the University community, together and by association, provides quality human and Christian education by teaching minds, touching hearts and transforming lives.

Vision-Mission

A leading learner-centered research university, bridging faith and scholarship in the service of society, especially the poor.

Core Values

Faith (religio)

DLSU is committed to nurturing a community of distinguished and morally upright scholars that harmonizes faith and life with contemporary knowledge in order to generate and propagate new knowledge for human development and social transformation.

Service (mores)

DLSU is committed to being a resource for Church and Nation and being socially responsible in building a just, peaceful, stable and progressive Filipino nation.

Communion (cultura)

DLSU is committed to building a community of leaders, competent professionals, scholars, researchers and entrepreneurs, who will participate actively in improving the quality of life in Philippine society within the perspective of Christian ideals and values.

COLLEGE OF SCIENCE OVERVIEW, VISION-MISSION, PHILOSOPHY, AND GOALS

Overview

The thrust of the College of Science is to develop an academic community of whole persons who are intellectually, socially, spiritually responsive to the needs of nation and of the Filipinos, using the instrument of science. These values are manifested in the different science disciplines through its various programs and services. The role of Science and Technology, is emphasized in the curricular offerings with research and development as a necessary input.

Vision - Mission

The College of Science is committed to the development of a community of competent scientists, harnessing their knowledge, skills, values and expertise towards being a resource for the Nation and Church especially in the service of the poor.

Philosophy

Advances in Science and Technology are a necessary drive and support toward economic development. A sustainable progress thus requires a pool of competent scientists who are excellent researchers and educators, and are truly practicing Christians committed to value of respect for humanity.

Goals

1. Enhance capability to offer world class science and mathematics instruction and research through:
    a. a significant increase in the number of PhD Degree holders by hiring and by supporting the professional development of faculty members,
    b. the acquisition of more advanced equipment/instruments,
    c. the formation of research teams/ groups that will optimize research capability and increase research outputs/publications,
    d. the training of junior faculty and graduate/undergraduate students as research assistants, and
    e. the fostering of linkages with academic and research institutions abroad.
2. Increase the pool of skilled human resources for scientific, industrial, business, and environmental establishments by offering more courses that are responsive to the current needs of Philippine society and the Asia-Pacific Region.
3. Hire more faculty members who are experts in the identified fields of specialization; and offering more training programs which emphasize skills development.

PHYSICS DEPARTMENT VISION-MISSION, GOALS AND OBJECTIVES

Vision- Mission

The De La Salle University Physics Department is committed to develop lifelong learners who are logical, analytical, creative and critical thinkers appreciative of God's Creation. The Department envisions itself as an advocate of effective educational practices in Physics. The quest for nature's fundamental laws is accompanied by a concerted search for relevant applications benefiting Philippine society.

Goals

The Department aims to:

- develop students into graduates
  - imbued with Lasallian values,
  - concerned with the sustainability of the environment,
  - with an outlook and abilities for lifelong learning
  - able to provide service and leadership in the scientific community and in society in general.
- provide an engaging learning environment that will mold students to become Christian achievers for God and country.
- adhere to ethical and professional standards in research and scholarship.
- nurture a culture of research that is dynamic and responsive to the needs of society.

Objectives

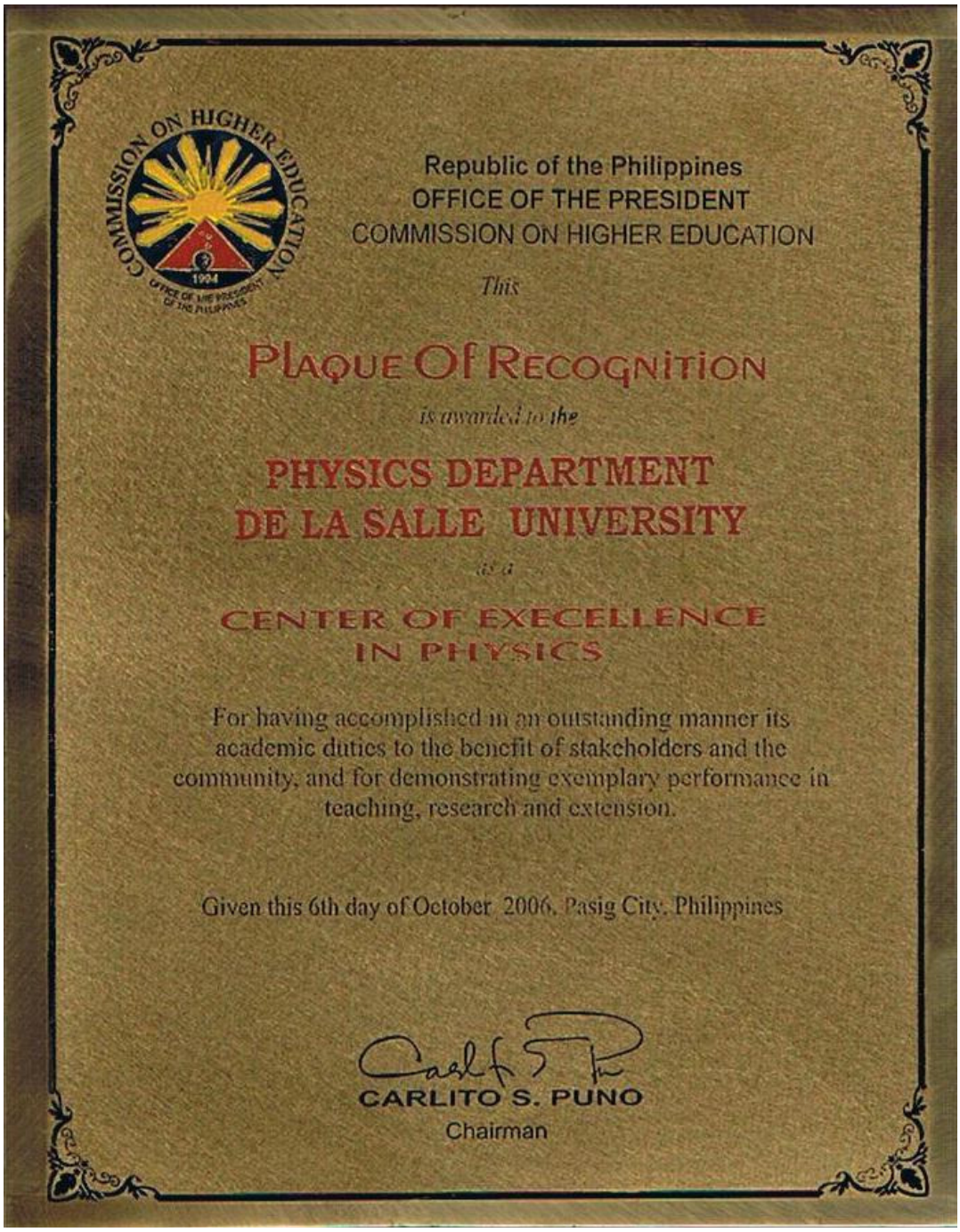
To produce physics graduates well-prepared for careers in research, academe, health, industry, business and government.

To provide opportunities for professional growth of faculty members and staff through research, advanced studies and continuing education.

To offer academic programs that are up-to-date and relevant to the needs of the community.

To upgrade continually the laboratory and research facilities for effective instruction, quality research and support for the industry.

PLAQUE OF RECOGNITION AS CHED CENTER OF EXCELLENCE



Republic of the Philippines
OFFICE OF THE PRESIDENT
COMMISSION ON HIGHER EDUCATION

This

PLAQUE OF RECOGNITION

is awarded to the

PHYSICS DEPARTMENT
DE LA SALLE UNIVERSITY

as a

CENTER OF EXECELLENCE
IN PHYSICS

For having accomplished in an outstanding manner its academic duties to the benefit of stakeholders and the community, and for demonstrating exemplary performance in teaching, research and extension.

Given this 6th day of October 2006, Pasig City, Philippines

CARLITO S. PUNO
Chairman

CHED MEMORANDUM ORDER AS CENTER OF EXCELLENCE IN PHYSICS

Republic of the Philippines
OFFICE OF THE PRESIDENT
COMMISSION ON HIGHER EDUCATION

CHED MEMORANDUM ORDER [CMO]
No. 15
Series 2011

SUBJECT : EXTENSION OF THE DESIGNATION OF CENTERS OF EXCELLENCE AND CENTERS OF DEVELOPMENT IN SCIENCE AND MATHEMATICS

In accordance with the pertinent provisions of Republic Act No. 7722 otherwise known as the "Higher Education Act of 1994" and pursuant to CEB Resolution No. 122-2011 dated June 13, 2011 and for the purpose of harmonizing quality assurance projects of the Commission, including that of centers of excellence and centers of development [COE/COD] projects, the designation of COEs/CODs in Science and Mathematics is hereby extended.

Background:

In 2006, the Commission approved the designation of forty [40] higher education institutions [HEIs] as COEs/CODs in Science and Mathematics for a period of five [5] years. The designation of the identified centers shall expire by July until September 2011. Considering that some centers have yet to receive from the Commission the remaining balance of the COE/COD Funds as approved under the CHED COE/COD Project and considering further that on-going activities for scholarship programs, faculty development programs and research projects will be disrupted and discontinued due to the expiration of the term of designation of these centers, the Commission deemed it proper to extend the designation of the COEs/CODs in Science and Mathematics until such time that the harmonization of quality assurance on COEs/CODs has been completed and that new COEs/CODs are identified.

The following HEIs and programs are hereby extended as centers of excellence/centers of development in science and mathematics:

Designation	Discipline	Higher Education Institution
COE	Biology	1. University of the Philippines – Los Baños
COE	Biology	2. De La Salle University – Manila
COE	Biology	3. University of the Philippines - Diliman
COE	Biology	4. Mindanao State University – Iligan Institute of Technology
COE	Biology	5. University of Santo Tomas
COD	Biology	6. Central Luzon State University – Nueva Ecija
COD	Biology	7. University of the Philippines of the Visayas - Iloilo
COD	Biology	8. Silliman University – Dumaguete City
COD	Biology	9. Central Mindanao University - Bukidnon
COD	Biology	10. Ateneo de Manila University – Quezon City
COD	Biology	11. University of San Carlos - Cebu

Higher Education Development Center Building, C.P. Garcia Ave., UP Campus, Diliman, Quezon City, Philippines
Web Site: www.ched.gov.ph Tel. Nos. 441-1177, 385-4391, 441-1169, 441-1149, 441-1170, 441-1216, 392-5296

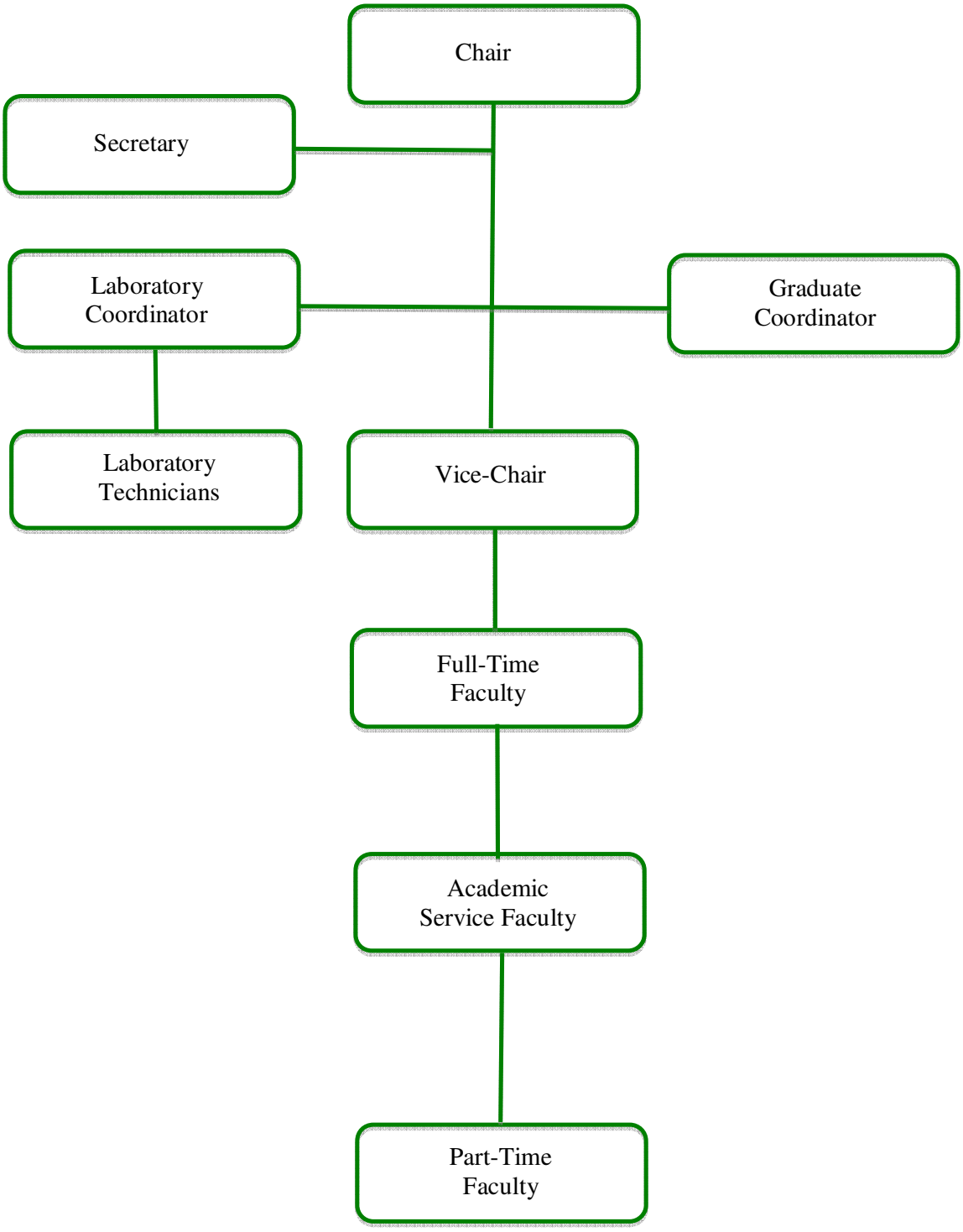
Designation	Discipline	Higher Education Institution
COE	Chemistry	12. University of the Philippines – Los Baños
COE	Chemistry	13. University of San Carlos – Cebu City
COE	Chemistry	14. University of the Philippines - Diliman
COE	Chemistry	15. Ateneo De Manila University – Quezon City
COE	Chemistry	16. De La Salle University – Manila
COE	Chemistry	17. Mindanao State University- Iligan Institute of Technology
COE	Chemistry	18. University of Santo Tomas - Manila
COD	Chemistry	19. Central Luzon State University – Nueva Ecija
COD	Environmental Science	20. Ateneo de Manila University – Quezon City
COE	Geology	21. University of the Philippines – Diliman
COE	Marine Science	22. University of the Philippines – Diliman
COD	Marine Science	23. University of the Philippines of the Visayas - Iloilo
COD	Marine Science	24. Mindanao State University- Naawan
COE	Mathematics	25. University of the Philippines – Los Baños
COE	Mathematics	26. Mindanao State University - Iligan Institute of Technology
COE	Mathematics	27. Ateneo De Manila University – Quezon City
COE	Mathematics	28. De La Salle University – Manila
COE	Mathematics	29. University of the Philippines – Diliman
COD	Mathematics	30. Central Mindanao University - Bukindnon
COD	Mathematics	31. Mindanao University of Science & Technology- Cagayan de Oro [Formerly: Mindanao Polytechnic State College]
COD	Mathematics	32. University of the Philippines – Baguio City
COE	Molecular Biology	33. University of the Philippines – Diliman
COE	Physics	34. De La Salle University – Manila
COE	Physics	35. University of the Philippines – Diliman
COE	Physics	36. Ateneo de Manila University – Quezon City
COD	Physics	37. University of San Carlos - Cebu
COD	Physics	38. Mindanao State University - Iligan Institute of Technology
COE	Statistics	39. University of the Philippines – Diliman
OCD	Statistics	40. University of the Philippines – Los Baños

This CMO shall take effect immediately. All CHED Regional Offices are hereby informed of this Order accordingly.

PATRICIA B. LICUANAN, Ph.D.
Chairperson

Quezon City, Philippines, June 28, 2011

PHYSICS DEPARTMENT ORGANIZATIONAL CHART FOR AY2014-2015



PHYSICS DEPARTMENT PERSONNEL

Complete names of administrators / ASF / ASP / CAP and other members of the staff	Their respective dates of appointment in the present position	Their employment status (i.e., full-time or contractual)
A. TEACHING STAFFS		
A.1 FULL-TIME FACULTY		
Dr. Gil Nonato C. Santos	Chair – AY 2014-2015 Full Professor 3	Full Time Permanent
Ma. Carla F. Manzano	Vice Chair – AY 2014-2015 Assistant Professor 7	Full Time Permanent
Dr. Romeric F, Pobre	Graduate Program Coordinator – AY 2014-2015 Full Professor 4 Head Instrumentation/Optics Lab	Full Time Permanent
Dr. Robert C. Roleda	VCA, Associate Professor 6 (Head Theory Group – Finance/Economics)	Full Time Permanent
Dr. Maria Cecilia D. Galvez	Physics Laboratory Coordinator, Full Prof. 4 (Head Earth Lab)	Full Time Permanent
Dr. Edgar A. Vallar	Faculty, Assoc. Prof. 4	Full Time Permanent
Mr. Ermys B. Bornilla	Faculty, Asst. Prof. 5	Full Time Permanent
Dr. Nelson B. Arboleda	RASD Director, Pioneering Faculty (STC), Full Prof. 1	Full Time Permanent
Dr. Melanie Y. David	Faculty, Asso. Prof. 7, (Head CMD)	Full Time Permanent
Dr. Richard R. Hartmann	Faculty, Asso. Prof. 4	Full Time
Dr. Michelle T. Natividad	Faculty, Asso. Prof. 2, (Library Head)	Full Time Permanent
Dr. Shirley T. Palisoc	Faculty, Full Prof. 5 (Head Matsci. Lab)	Full Time Permanent
Dr. Christopher T. Que	Faculty, Asso. Prof. 5	Full Time
Dr. Emmanuel T. Rodulfo	Faculty, Full Prof. 2 (Head Theory Group)	Full Time Permanent
Dr. Jade R. Dungao	Faculty, Asso. Prof. 1 (Head Biomedical RG)	Full Time Permanent
Dr. Michael P. Delmo	Faculty, Asso. Prof. 4	Full Time
Dr. Al Rey C. Villagracia	Faculty, Assoc. Prof. 2	Full Time Permanent
Dr. Christopher Anthony G. Carbonell, MD	Faculty, Asst. Prof. 1	Full Time
Bro. Joseph Scheiter	Faculty, Visiting Professor (PLC Head)	Full Time

Complete names of administrators / ASF / ASP / CAP and other members of the staff	Their respective dates of appointment in the present position	Their employment status (i.e., full-time or contractual)
A.2 ACADEMIC SERVICE FACULTY		
Mr. Norberto T. Alcantara	ASF II-7 (General Physics /STRC)	Full Time Permanent
Ms. Prane Mariel B. Ong	ASF II-3 (General Physics /STRC)	Full Time Permanent
Ms. Gwen Castillon	ASF II-3 (General Physics/STRC/STC)	Full Time
A.3 PART-TIME FACULTY		
Dr. Reuben Quiroga	Faculty, Prof. Lect. 4	Part Time
Mr. Raymund B. Bolalin	Faculty, Asst. Prof. Lec. 1	Part Time
Mr. Raphael Constandine H. Bongay	Faculty, Lecturer/TA	Part Time
Mr. Abel F. Ole	Faculty, Lecturer 6	Part Time
Mr. Ma. Katrina S. Vargas	Faculty, Lecturer 7	Part Time
B. NON-TEACHING STAFFS		
B.1 SECRETARY		
Ms. Corazon R. Siscar	Secretary CAP	Permanent
B.2 LABORATORY TECHNICIAN		
Mr. Hector Padrigo	Lab Technician CAP	Permanent
Mr. Reynaldo Coria	Lab Technician CAP	Permanent
Mr. Roy Soriano	Lab Technician CAP	Permanent
Mr. Julius Lopez	Lab Technician CAP	Permanent

ROSTER OF FACULTY MEMBERS TEACHING IN GRADUATE SCHOOL

Dr. Nelson B. Arboleda Jr.
Full Professor 1, Pioneering Faculty STC
Ph.D. in Engineering in Applied Physics
Osaka University, Japan
Specialization: Surface and Interface Physics, Theoretical / Computational Physics

Mr. Ermys B. Bornilla
Assistant Professor 5
M.S. in Physics
University of the Philippines-Diliman, Philippines
Specialization: Condensed Matter

Dr. Christopher Anthony G. Carbonell. M.D.
Assistant Professor 1
Doctor of Medicine, Diplomate in Nuclear Medicine
St. Luke's College of Medicine, Philippines
Specialization: Nuclear Medicine

Dr. Melanie Y. David
Associate Professor 7
Ph.D. in Engineering in Precision Science and Technology and Applied Physics
Osaka University, Japan
Specialization: Nanoscale Materials Modeling, Theoretical/Computational Physics

Dr. Michael P. Delmo
Associate Professor 4
Doctor of Science in Chemistry
Kyoto University, Japan
Specialization: Condensed Matter Physics, Experimental Physics, Materials Physics

Dr. Jade R. Dungao
Associate Professor 1
Doctor of Philosophy (Nuclear Engineering and Management)
University of Tokyo, Japan
Specialization: Nuclear Management Engineering, Computational Physics

Dr. Ma. Cecilia D. Galvez
Full Professor 4
Ph.D. major in Physics
University of the Philippines-Diliman, Philippines
Specialization: LIDAR

Dr. Richard Hartmann
Associate Professor 4
Ph.D. in Physics
University of Exeter, UK
Specialization: Theoretical Physics of Nanostructured Materials

Dr. Michelle T. Natividad
Associate Professor 3
Ph.D. in Physics
De La Salle University, Philippines
Specialization: Surface and Interface Physics, Theoretical / Computational Physics

Dr. Shirley T. Palisoc
Full Professor 5
Ph.D. in Materials Science
Okayama University, Japan
Specialization: Materials Science

Dr. Romeric F. Pobre
Full Professor 4
Ph.D. major in Physics
University of the Philippines-Diliman, Philippines
Specialization: Optics and Instrumentation Physics

Dr. Christopher T. Que
Associate Professor 5
Ph.D. in Engineering
Osaka University, Japan
Specialization: Terahertz Spectroscopy

Dr. Reuben V. Quiroga
Professorial Lecturer 4
Ph.D. major in Physics
University of the Philippines-Diliman, Philippines
Specialization: Solid State Physics

Dr. Emmanuel T. Rodulfo
Full Professor 2
Ph.D. major in Physics
University of the Philippines-Diliman, Philipppines
Specialization: Theoretical Physics

Dr. Robert C. Roleda
Associate Professor 6
Ph.D. major in Physics
University of the Philippines-Diliman, Philippines
Specialization: Elementary Particle Physics

Dr. Gil Nonato C. Santos
Full Professor 3
Ph.D. major in Materials Science and Engineering
University of the Philippines-Diliman, Philippines
Specialization: Nanostructured Materials Science and Engineering

Bro. Joseph Scheiter, FSC
Visiting Professor
Ph.D. in Education
University of Santo Tomas, Philippines
Specialization: Physics Education Research

Dr. Edgar A. Vallar
Associate Professor 4
Ph.D. in major Physics
University of the Philippines-Diliman, Philippines
Specialization: LIDAR

Dr. Al Rey C. Villagracia
Associate Professor 2
Ph.D. in Physics
De La Salle University, Philippines
Specialization: Theoretical / Computational Physics, Complex Systems

GRADUATE DEGREE PROGRAMS

The Physics Department is one of four departments under the College of Science, the others being Biology, Chemistry and Mathematics. It was founded in 1968 when what was then the Department of Science was split into three. The College of Science is itself an outgrowth from the College of Arts and Science in 1982. The department is today recognized as one of three Centers of Excellence in Physics in the country by the Commission of Higher Education, acknowledged for the quality of its graduates from the Bachelor, Master and Doctorate programs in Physics.

The first graduate program offered by the department was Master of Science in Physics in 1982, which eventually ushered the Doctorate of Philosophy in Physics in 1995 and the Master in Physics, a Non-Thesis graduate programs in 2004. The graduate programs are primarily designed for those graduate students whose intention is to search for the fundamental laws of nature with a traditional career path in academe and research. Students are therefore principally trained for advanced studies. The department however recognizes that knowledge and methods of physics can offer innovative solutions to the problems of other fields. This attribute at the same time offers prospects for employment particularly in information and communication technology, electronics and semiconductor industry, the health sector through medical instrumentation, environmental science, complex systems, visual arts forensics and even in the distant fields of finance and economics. With these in mind, the department offers three graduate degree programs to meet different demands of the Philippine society:

- Master in Physics (Non-Thesis Master's Degree Program) (NTM-PHY)
- Master of Physics (MS Degree Program) (MS-PHY)
- Doctor of Philosophy in Physics (Regular and Straight PhD Degree Programs) (PhD-PHY)

There are at present **25** students in the Master of Physics program, **1** student in Master in Physics, and **7** students in the Doctorate of Philosophy in Physics.

The Graduate Physics program carries a total academic load that ranges from 36 to 63 units, depending on the graduate level. Out of this, 6 to 15 units are basic courses, 3 to 18 units are major or core courses, 3 to 21 units are in the specialization or cognate courses, 3 units are seminar courses, and 6 to 12 units are thesis or dissertation courses. All students are required to attend seminars and colloquia for two terms, and a year-long thesis or dissertation project during their final year of study. The full details of the program are shown in the coming sections.

CHED PERMITS

Master in Physics (Non-Thesis Master's Degree Program) (NTM-PHY)

Republic of the Philippines
Office of the President
COMMISSION ON HIGHER EDUCATION
NATIONAL CAPITAL REGION

June 18, 2004

Mr. Edwin P. Santiago
Registrar
De La Salle University System
2401 Taft Ave.
Manila

Dear Mr. Santiago:

This is to acknowledge receipt, contents noted and made as a matter of record the offering of the following programs effective School Year 2004-2005 with the information that by virtue of CHED Memorandum Order No. 32, s.2001, your institution was granted autonomous status and one of the benefits to be enjoyed is the privilege to offer a new course/program in the undergraduate/graduate level/s without securing permit/authority from the CHED:

1. Master in Biology
2. Master in Chemistry
3. Master in Mathematics
4. Master in Physics
5. Master in History
6. Master in Political Science
7. Master in Psychology
8. Master in Sociology
9. Master in Economics

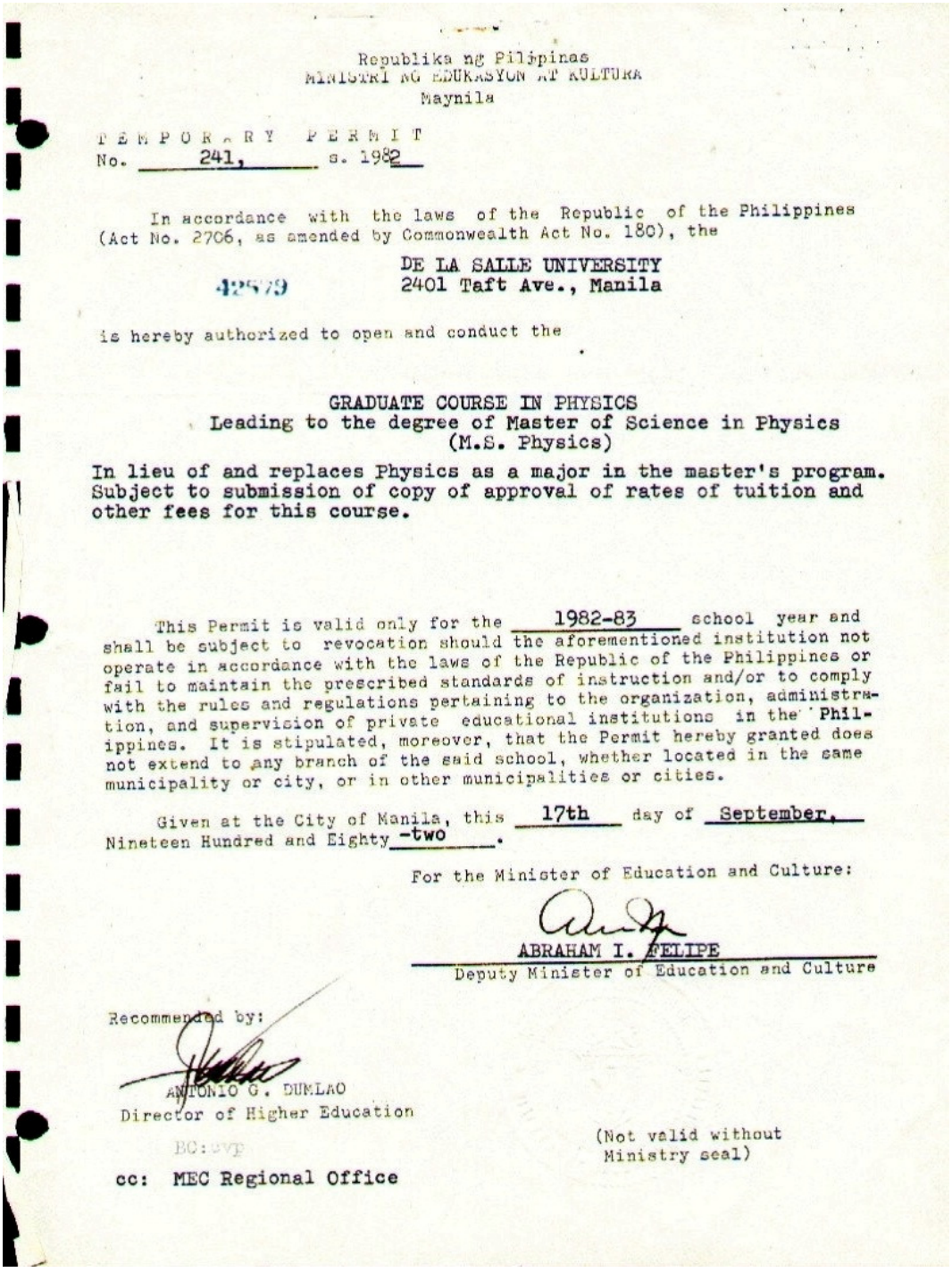
Please be reminded that in operating the said programs, your institution should ensure that all the minimum requirements prescribed by CHED are complied with.

Very truly yours,

AMELIA A. BIGLETE
Director IV

E17/Sherwin/acknowledge rev.cur./De La Salle University(nine masteral programs)

6th Floor, Pacific Corporate Center, 131 West Avenue, Quezon City
Tel. Nos. 373-55-51/52/53 Telefax: 373-5552 E-mail: chedncr@info.com.ph



Republika ng Pilipinas
MINISTRI NG EDUKASYON AT KULTURA
Maynila

TEMPORARY PERMIT
No. 241, s. 1982

In accordance with the laws of the Republic of the Philippines (Act No. 2706, as amended by Commonwealth Act No. 180), the

DE LA SALLE UNIVERSITY
2401 Taft Ave., Manila

42579

is hereby authorized to open and conduct the

GRADUATE COURSE IN PHYSICS
Leading to the degree of Master of Science in Physics
(M.S. Physics)

In lieu of and replaces Physics as a major in the master's program. Subject to submission of copy of approval of rates of tuition and other fees for this course.

This Permit is valid only for the 1982-83 school year and shall be subject to revocation should the aforementioned institution not operate in accordance with the laws of the Republic of the Philippines or fail to maintain the prescribed standards of instruction and/or to comply with the rules and regulations pertaining to the organization, administration, and supervision of private educational institutions in the Philippines. It is stipulated, moreover, that the Permit hereby granted does not extend to any branch of the said school, whether located in the same municipality or city, or in other municipalities or cities.

Given at the City of Manila, this 17th day of September, Nineteen Hundred and Eighty-two.

For the Minister of Education and Culture:

ABRAHAM I. FELIPE
Deputy Minister of Education and Culture

Recommended by:

ANTONIO G. DUMLAO
Director of Higher Education

BC:avp

(Not valid without Ministry seal)

cc: MEC Regional Office

Republika ng Pilipinas
(Republic of the Philippines)
MINISTRI NG EDUKASYON AT KULTURA
(MINISTRY OF EDUCATION AND CULTURE)
Maynila

GOVERNMENT RECOGNITION
No. 121, s. 1983 39255

By virtue of the authority in me vested by Act 2706, as amended by Commonwealth Act 180, I, Onofre D. Corpuz, Minister of Education and Culture do hereby grant, effective June 14, 1983 to the DE LA SALLE UNIVERSITY
2401 Taft Ave., Manila

GOVERNMENT RECOGNITION

for the

GRADUATE COURSE IN PHYSICS
Leading to the degree of Master of Science in Physics
(M.S.)

It is provided, however, that the Minister of Education and Culture reserves the right to satisfy himself, either personally or through accredited representatives, of the fact that the instruction and the conditions affecting instruction in this course, comply with all the requirements of the Ministry of Education and Culture.

In the case of failure on the part of the above-named school to observe and maintain any of the required standards of the Ministry of Education and Culture affecting the course herein approved, the authority hereby granted may be revoked and cancelled, the records of the students who have actually attended the said course may be taken over and kept in the files of the Ministry of Education and Culture, and the guaranty bond submitted by the said school declared forfeited in accordance with the provisions of Section 8 of Act 2706.

It is stipulated, moreover, that the authority hereby granted does not extend to any branch of the said school, whether located in the same municipality or city, or in other municipalities or cities, nor to any other course, grade, or curriculum year.

The foregoing Recognition supersedes and cancels all previous records of Government approval affecting the course or separate parts of the course herein recognized.

Given at the City of Manila, Philippines, this 14th day of September, Nineteen Hundred and Eighty-three

O.D. Corpuz
ONOFRE D. CORPUZ
Minister of Education and Culture

Recommended by:

ANTONIO G. DUMLAO
Director of Higher Education

(Not valid without Ministry seal)

cc: MECS Regional Office

Doctor of Philosophy in Physics (PHD-PHY)

COMMISSION ON HIGHER EDUCATION
OFFICE OF THE PRESIDENT OF THE PHILIPPINES

TEMPORARY PERMIT

NO. 042 S. 1995

In accordance with the provision of Republic Act No. 7722, otherwise known as the Higher Education Act of 1994, the

DE LA SALLE UNIVERSITY
2401 Taft Avenue, Manila

is hereby authorized to open and conduct the

I-Yr. Doctor of Philosophy in Physics

This permit is valid only for the 1995-1996 school year and shall be subject to revocation should the aforementioned institution not operate in accordance with the laws of the Republic of the Philippines or fail to maintain the prescribed standards of instruction and/or comply with the rules and regulations pertaining to the organization, administration, and supervision of private/public educational institutions in the Philippines. It is stipulated, moreover, that the permit hereby granted does not extend to any branch of the said school whether located in the same municipality or city, or in other municipalities or cities.

Given at Pasig City, Metro Manila, this 20th day of June, Nineteen Hundred and Ninety Five.

MONA D. VALISNO
Managing Commissioner

(Not valid without seal)

MASTER IN PHYSICS (NON-THESIS MASTER'S DEGREE PROGRAM)

PROGRAM DESCRIPTION/ SPECIFICATION

1. Awarding Institution	De La Salle University
2. College/School	College of Science
3. Program accredited by/assessed by	Granted 5-years accreditation by the Philippine Association of Schools, Colleges, and Universities (PAASCU) from 2013-2018; Recognized Level IV status by the Federation of Accrediting Agencies of the Philippines (FAAP) Commission on Higher Education – Center of Excellence in Physics
4. Name of Final Award	Master in Physics
5. Program Title	Master in Physics

6. Goals and Objectives of the Program:

The program leading to the degree of Master in Physics aims to hone the skills of college physics teachers and produce graduates who have concrete understanding of the fundamental physical principles and techniques, with a capacity for quantitative and technical analysis. It is hoped that this will enable the graduates of the program to be critical thinkers able to conduct intelligent valuation of text and materials that they use in physical teaching. It is further hoped that graduates of the program understand the scope of applicability of physical theories and laws are able to relate physical theories and concepts to practical situations. Graduates of the program are also expected to incorporate findings in physics education research to enhance physics teaching effectiveness.

7. Program Learning Outcomes (LO):

The Program Learning Outcomes focus on the knowledge, skills and attributes that graduates should acquire and demonstrate in their course of studies and internships as evidence of accomplishing the school's vision-mission. These Program Outcomes also reflects the graduate capacity's for lifelong learning and transfer of knowledge in the workplace. Below is the list of Program Learning Outcomes,

LO1 : Critical and Creative Thinker

- 1.1 Grasp fundamental knowledge of mathematics, classical mechanics, electricity and magnetism, modern physics, thermodynamics and statistical mechanics.
- 1.2 Apply scientific reasoning, mathematical, computational and experimental methods in understanding physics problems.
- 1.3 Articulate how recent developments in Physics can promote awareness.

LO2 : Effective Communicator

- 2.1 Act as effective conduits of Physics in delivering concepts and understanding.

2.2 Effectively communicate orally and in writing the observations and analysis of data acquired from the conduct of experiment.

2.3 Communicate information, ideas problems and solutions, both, orally and in writing, to other scientists, decision makers and the public.

LO3 : Reflective Lifelong Learner

3.1 Acknowledge and respect the intellectual work of others by citing sources of information accordingly.

3.2 Commit to the integrity of data.

3.3 Appreciate the limitations and implications of science in everyday life.

LO4 : Service-Driven Citizen

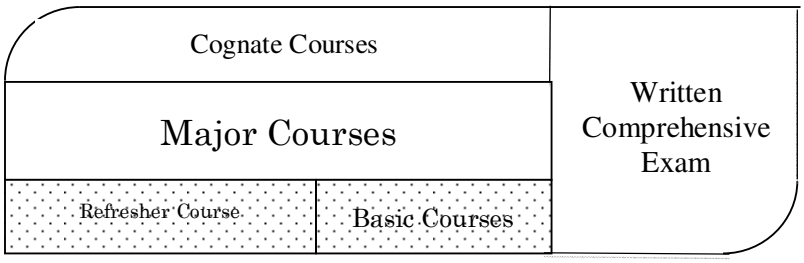
4.1 Design solutions responsive to community needs.

4.2 Actively participate and give valuable and relevant contributions in collaborative activities.

4.3 Design and perform safe and responsible techniques and procedures in laboratory or field practices.

8. Program structure

The program structure for the Master in Physics graduate program can be rendered as follows:



Courses are structured into the following categories: (1) the Refresher course in physics and mathematics; (2) the Basic courses; (3) the Major courses; (4) the Cognate courses; and (5) capstone written comprehensive exams.

Refresher course in physics and mathematics prepare students for their Basic and Major physics courses and it is at this stage that the foundations for critical thinking are laid through mathematical reasoning, and basic computational, analytical, problem-solving and experimental skills are groomed. The Basic physics courses taken gives an overview of physics as a discipline and a glimpse of what students may expect in the Major physics courses.

The Major physics courses are typical of physics curricula worldwide, and comply with government mandate through CHED Memorandum No.12 Series of 2011. Engagement in the disciplinal methods and principles of core physics courses begins the process of elevating the deductive, analytical and synthetic skills to a rank characteristic of physics graduates. Whilst this group of courses is primarily aimed towards a more profound understanding of physics, the decisively unique analytical, reasoning and problem solving skills brought forth are precisely the same skill set that would be of tremendous value when interfaced with other disciplines.

The Major laboratory courses not only develop empirical skills but foster an aptitude for systematic

unbiased observation that is valuable for lifelong learning.

Cognate course prepare students for advanced topics in physics. They are also fertile ground for integrating core concepts and methods of physics, enhancing synthesis skills, and projecting the powerful techniques and ideas of physics to its allied fields.

On the whole, the unique problem-solving skills in the discipline of physics built through the Basic and Major are enhanced with the Cognate course. Refresher course in mathematics bring in the skills required for the core courses and provide an overview of the four core areas of physics – classical mechanics, electromagnetism, quantum mechanics, and statistical mechanics. Written comprehensive exams in these core areas would ensure in achieving the minimum skill set for this program.

9. Admission criteria or requirements to the program

a. Graduate of a science, engineering or education program, who is teaching or hopes to teach introductory physics in the tertiary level. Applicants are expected to have taken calculus in the undergraduate level. Those who do not satisfy this requirement will be asked to take a refresher course.

b. Admission documents and interview:
   - DLSU Application and Admission form
   - Three letters of recommendation (DLSU Forms)
   - Official transcript of records
   - 5 copies of 1 ½ x 1 ½ pictures
   - Interview

10. Other requirements (thesis, practicum, assessments, etc.)
Written comprehensive examinations in four (4) areas: mechanics, electricity and magnetism, thermodynamics and statistics mechanics, wave mechanics and optics. Presentation and submission of an exposition paper are the major requirement for Seminar in Physics.

PROGRAM CHECKLIST/ FLOWCHART

FULL-TIME

Year	Term 1	Term 2	Term 3
1	▪ Basic 1 ▪ Basic 2 ▪ Basic 3 ▪ Refresher (non-credit)	▪ Basic 4 ▪ Major 1 ▪ Major 2 (Lab)	▪ Major 3 ▪ Major 4 ▪ Major 5 (Lab)
2	▪ Major 5 ▪ Major 6 ▪ Major 7 (Lab)	▪ Basic 5 ▪ Cognate	▪ Written Comprehensive Exam

PART-TIME

Year	Term 1	Term 2	Term 3
1	▪ Basic 1 ▪ Refresher (non-credit)	▪ Basic 2 ▪ Basic 3	▪ Basic 4 ▪ Major 1
2	▪ Major 2 ▪ Major 3 (Lab) ▪ Major 4 (Lab)	▪ Major 4 ▪ Major 5	▪ Major 6 ▪ Major 7 (Lab)
3	▪ Basic 5 ▪ Cognate	▪ Written Comprehensive Exam	

List of Courses:

Basic	15	units
Cognate	3	units
Major	18	units
Thesis	0	units
Total	**36**	**units**

REFRESHER Course

PHY500M – Calculus for Physics
3 units

BASIC Courses

PHY551M – History and Philosophy of Science and Mathematics
3 units
PHY557M – Teaching of College Physics
3 units
PHY501M – Mathematical Methods for Physics
3 units
PHY503M – Newtonian Mechanics
3 units
PHY559M – Seminar in Physics
3 units

MAJOR Courses

PHY505M – Classical Mechanics
3 units
PHY507M – Electricity and Magnetism
3 units
PHY510M – Physics Laboratory 1: Mechanics
1 unit
PHY511M – Physics Laboratory 2: Thermodynamics & Electricity
1 unit
PHY512M – Physics Laboratory 3: Optics and Modern Physics
1 unit
PHY515M – Thermodynamics and Statistical Mechanics
3 units
PHY519M – Wave Mechanics and Optics
3 units
PHY521M – Modern Physics
3 units

WRITTEN COMPREHENSIVE EXAMINATIONS

PHY531W – WCE in Newtonian Mechanics
0 unit
PHY507W – WCE in Electricity and Magnetism
0 unit
PHY509W – WCE in Wave Mechanics and Optics
0 unit
PHY515W – WCE in Thermodynamics and Statistical Mechanics
0 unit

COGNATE Courses

PHY523M – Advanced Modern Physics
3 units
PHY693M – Experimental Methods in Physics
3 units
PHY647M – General Relativity
3 units

Draft Date: May 2011
Revision Date: August 2, 2015

CURRICULUM MAP

Course Code	Course Title	Program Learning Outcomes											
		LO1			LO2			LO3			LO4		
		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
PHY500M	Calculus for Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY551M	History and Philosophy of Science	X	X	X	X	X	X	X	X	X	X	X	X
PHY557M	Teaching of College Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY501M	Mathematical Methods for Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY503M	Newtonian Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY599M	Seminar in Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY505M	Classical Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY507M	Electricity and Magnetism	X	X	X	X	X	X	X	X	X	X	X	X
PHY510M	Physics Laboratory 1 : Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY511M	Physics Laboratory 2 : Thermodynamics and Electricity	X	X	X	X	X	X	X	X	X	X	X	X
PHY512M	Physics Laboratory 3 : Optics and Modern Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY515M	Thermodynamics and Statistical Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY519M	Wave Mechanics and Optics	X	X	X	X	X	X	X	X	X	X	X	X
PHY521M	Modern Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY531W	Written Comprehensive Exam in Newtonian Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY507W	Written Comprehensive Exam in Electricity and Magnetism	X	X	X	X	X	X	X	X	X	X		X
PHY508W	Written Comprehensive Exam in Wave Mechanics and Optics	X	X	X	X	X	X	X	X	X	X		X
PHY515W	Written Comprehensive Exam in Thermodynamics and Statistical Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY523M	Advanced Modern Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY693M	Experimental Methods in Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY647M	General Relativity	X	X	X	X	X	X	X	X	X	X	X	X

Draft Date : January 30, 2015
Revision Date : August 2, 2015

COURSE DESCRIPTIONS

PHY500M Calculus for Physics
3 units
Differentiation; product and sum rules of derivatives; geometric interpretation of derivatives; derivatives of trigonometric, logarithmic and exponential functions; integration; sum rules of integration; integration as anti-differentiation; geometrical interpretation of integrals; power rule and integrals of trigonometric and exponential functions; integration by parts; multiple integration.
Pre-requisite to: PHY501M

PHY501M Mathematical Methods for Physics
3 units
Vector algebra. Vector differentiation and integration. Second derivatives of vectors. Gauss' and Strokes' Theorems. Matrices and determinants. Tensor algebra.

Soft Pre-requisite: PHY500M
Pre-requisite to: PHY505M, PHY507M, PHY508M, PHY509M, PHY515M and PHY523M

PHY503M Newtonian Mechanics
3 units
Rectilinear motions. Projectile and circular motions. Newton's Laws. Forces. Gravity. Work and Energy. Impulse and Momentum. Torque. Rotational motion.
Pre-requisite to: PHY505M

PHY505M Classical Mechanics
3 units
Lagrangian and Hamiltonian formulations. Central Forces. Harmonic Oscillators. Non-imertial Frames. Dynamics of Rigid Bodies.
Pre-requisite: PHY503M

PHY507M Electricity and Magnetism
3 units
Maxwell Equations. Electrostatics in vacuum. Boundary value problems and special techniques. Magnetostatics. Electrodynamics.

PHY507W Written Comprehensive Exam in Electricity and Magnetism
0 unit
Pre-requisite : PHY507M

PHY509W Written Comprehensive Exam in Wave Mechanics and Optics
0 unit
Pre-requisite : PHY519M

PHY510M Physics Laboratory 1 : Mechanics
3 units
Measurement and significant figures; errors; graphs and equations; uniform acceleration; projectile motion; composition of concurrent forces; coefficient of friction; Atwood's machine; centripetal force; conservation of mechanical energy; conservation of linear momentum.

PHY511M Physics Laboratory 2 : Thermodynamics and Electricity
3 units
Coefficient of linear expansion; specific heat of solids; heat of fusion; hear of vaporization; mechanical equivalent of heat; using the multimeter; electric field; Ohm's Law; resistors in series and parallel; Kirchhoff's Rules; emf, terminal voltage and internal resistance; construction of voltmeter and ammeter.

PHY512M Physics Laboratory 3 : Optics and Modern Physics
3 units
Standing waves, resonance; reflection and refraction; Image formation with mirrors; converging lens; light and color diffraction; photoelectric effect; e/m; radioactivity.

PHY515M Thermodynamics and Statistical Mechanics
3 units
Temperature. Ideal gases. Gas processes. The Second Law. Heat engines. Introduction to statistical methods. Statistical description of systems of particles. Statistical thermodynamics.

PHY515W Written Comprehensive Exam in Thermodynamics and Statistical Mechanics
0 unit
Pre-requisite : PHY515M

PHY519M Wave Mechanics and Optics
3 units
Mechanical waves; electromagnetism waves; reflection; refraction; interference; diffraction; polarization; lasers.

PHY521M Modern Physics
3 units
Special Theory of Relativity, Postulates of quantum mechanics, the Schrödinger equation and its applications to harmonic oscillators and central forces.

Pre-requisite to: PHY523M

PHY523M Advanced Modern Physics
3 units
Quantum mechanics of the hydrogen atom; many-electron atoms; molecules; the solid state; nuclear structure; nuclear transformations; elementary particles.

Pre-requisite : PHY521M

PHY531W Written Comprehensive Exam in Newtonian Mechanics
0 unit
Pre-requisite : PHY505M

PHY551M History and Philosophy of Science and Mathematics
3 units
Ancient and Medieval Science. The Scientific Revolution. The Industrial Revolution. Rationalism and Empiricism. The Workings of Science. Theory and Experiment. Confirmation and Acceptance. Ontological and Epistemological Status of Theories and Theoretical Entities. Scientific Changes. Science and Culture.

PHY557M Teaching of College Physics
3 units
Learning Theories. Test Construction. Results and Implications from Physics Education Researches. Reforms in Physics Education.

PHY559M Seminar in Physics
3 units
Attendance in physics seminar and colloquia. Presentation and submission of an expository paper in physics.

PHY647M General Relativity
3 units
A course covering descriptive statistics, basic rules of probability, discrete probability, distributions, normal distribution, sampling distributions, confidence intervals and tests of hypotheses for means, difference of means and variances, t and chi-squar distribution and proportion.

PHY693M Experimental Methods in Physics
3 units
A course on the basic experimental techniques in physics and practical work on vacuum systems.

Draft Date : May 2011
Revision Date : August 2, 2015

MASTER OF PHYSICS (MS-PHYSICS DEGREE PROGRAM)

PROGRAM DESCRIPTION/ SPECIFICATION

1. Awarding Institution	De La Salle University
2. College/School	College of Science
3. Program accredited by/assessed by	Granted 5-years accreditation by the Philippine Association of Schools, Colleges, and Universities (PAASCU) from 2013-2018; Recognized Level IV status by the Federation of Accrediting Agencies of the Philippines (FAAP) Commission on Higher Education – Center of Excellence in Physics
4. Name of Final Award	Master of Physics
5. Program Title	Master of Physics

6. Goals and Objectives of the Program:

The Master of Science in Physics program aims to develop competent manpower to fill the demands of industry and academe. At the end of the program, the students should have acquired a deeper understanding of the fundamental principles and concepts in physics. This would enable them to make creditable contributions to the research and development programs of industries involved in solid state physics, materials science, semiconductor physics, laser remote sensing, computational physics, and instrumentation.

7. Program Learning Outcomes (LO):

The Program Learning Outcomes focus on the knowledge, skills and attributes that graduates should acquire and demonstrate in their course of studies and internships as evidence of accomplishing the school's vision-mission. These Program Outcomes also reflects the graduate capacity's for lifelong learning and transfer of knowledge in the workplace. Below is the list of Program Learning Outcomes,

LO1 : Critical and Creative Thinker

1.1 Grasp a clear understanding of the fundamental laws of Physics that can provide a deeper mathematical insight on how nature interacts.

1.2 Apply scientific reasoning, mathematical, computational and experimental methods in understanding physical problems and consequently provide practical solutions.

1.3 Articulate how recent developments in Physics can open opportunities for research.

LO2 : Effective Communicator

2.1 Act as effective conduits of Physics in understanding the physical world.

2.2 Effectively communicate orally and in writing the observations and analysis of data

acquired from the research design.

2.3 Communicate information, ideas problems and solutions in public forum and in abstracted and refereed journals.

LO3 : Reflective Lifelong Learner

3.1 Acknowledge and respect the intellectual work of others by citing properly the sources of information based from well accepted format.

3.2 Commit to the integrity and fidelity of data in the implementation of research design.

3.3 Appreciate the limitations and implications of science in the conduct of research studies.

LO4 : Service-Driven Citizen

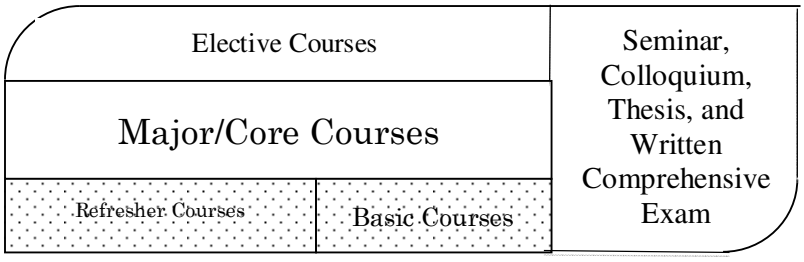
4.1 Implement and plan simple and practical solutions responsive to community needs.

4.2 Actively participate in collaborative engagements that can provide valuable and relevant resources and practices for community justice.

4.3 Design and perform safe, responsible, and acceptable methodologies in laboratory or field research work.

8. Program structure

The program structure for the Master of Physics graduate program can be rendered as follows:



Courses are structured into the following categories: (1) the Bridge courses in physics and mathematics; (2) the Basic courses in physics; (3) the Major or Core courses in physics; (4) the Cognate courses; (5) capstone written comprehensive exam.

Bridge courses in physics and mathematics prepare students for their Basic and Major physics courses and it is at this stage that the foundations for critical thinking are laid through mathematical reasoning, and basic computational, analytical, problem-solving and experimental skills are groomed. The Basic physics courses taken gives an overview of physics as a discipline and a glimpse of what students may expect in the Major physics courses.

The Major physics courses are typical of physics curricula worldwide, and comply with government mandate through CHED Memorandum No.12 Series of 2011. Engagement in the disciplinal methods and principles of core physics courses begins the process of elevating the deductive, analytical and synthetic skills to a rank characteristic of physics graduates. Whilst this group of courses is primarily aimed towards a more profound understanding of physics, the decisively unique analytical, reasoning and problem solving skills brought forth are precisely the same skill set that would be of tremendous value when interfaced with other disciplines.

The special technical skills in computer programming and in experimental methods that are of great

worth to the practice of physics are at the same time the skill sets that add significantly to the employability of the MS-Physics graduates in the sectors of information technology and electronics industry. The laboratory courses not only develop empirical skills but foster an aptitude for systematic unbiased observation that is valuable for lifelong learning.

Elective courses prepare students for specific career paths in government, industry and health sector. They are also fertile ground for integrating core concepts and methods of physics, enhancing synthesis skills, and projecting the powerful techniques and ideas of physics to its allied fields.

On the whole, the unique problem-solving skills in the discipline of physics built through the Basic and Major are balanced with the Cognate courses. Refresher course in mathematics bring in the skills required for the core courses and provide an overview of the four core areas of physics – classical mechanics, electromagnetism, quantum mechanics, and statistical mechanics. Key concepts and principles that encompass all four make them into a coherent whole that launches into applications in the specialization areas of materials science, biomedical instrumentation, computational materials design, complex systems, optoelectronics materials design, terahertz spectroscopy, nanotechnology, visual arts forensics, environmental physics, and in method-wise extensions to finance and economics. Written comprehensive exams in these core areas would ensure in achieving the minimum skill set for this program.

9. Admission criteria or requirements to the program

a. Graduate of a science, engineering or education program, who is teaching or hopes to teach introductory physics in the tertiary level or expect to practice applied physics in government, industry and health sector. Applicants are expected to have taken mathematical methods in physics, classical mechanics, electricity and magnetism, quantum mechanics, statistical mechanics in the undergraduate level. Those who do not satisfy this requirement will be asked to take bridging courses.

b. Admission documents and interview:
   - DLSU Application and Admission form
   - Three letters of recommendation (DLSU Forms)
   - Official transcript of records
   - 5 copies of 1 ½ x 1 ½ pictures
   - Interview

10. Other requirements (thesis, practicum, assessments, etc.)
Each student should have a minimum grade of ***50%*** percentile score in all four areas: classical mechanics, classical electrodynamics, quantum mechanics, and statistical mechanics to pass the written comprehensive examination. Presentation and submission of an exposition paper are the major requirement for Seminar in Physics.

PROGRAM CHECKLIST/ FLOWCHART

FULL-TIME:

Year	Term 1	Term 2	Term 3
1	▪ Classical Mechanics 1 ▪ Classical Electrodynamics 1 ▪ Philosophy of Science ▪ Research Apprenticeship 1	▪ Quantum Mechanics 1 ▪ Classical Electrodynamics 2 ▪ Statistical Mechanics ▪ Research Apprenticeship 2	▪ Quantum Mechanics 2 ▪ Elective 1 ▪ Elective 2 ▪ Research Apprenticeship 3
2	▪ Comprehensive Exam	▪ Physics Thesis	

PART-TIME:

Year	Term 1	Term 2	Term 3
1	▪ Classical Mechanics 1 ▪ Classical Electrodynamics 1	▪ Quantum Mechanics 1 ▪ Statistical Mechanics	▪ Quantum Mechanics 2 ▪ Elective 1
2	▪ Philosophy of Science ▪ Elective 2	▪ Classical Electrodynamics 2 ▪ Graduate Seminar ▪ Graduate Colloquium	▪ Comprehensive Exam
3	▪ Physics Thesis		

List of Courses:

Basic	9	units
Elective	3	units
Major	18	units
Thesis	6	units
Total	**36**	**units**

REFRESHER Courses

PHY501M – Basic Mathematical Methods of Physics
3 units
PHY507M – Basic Electricity and Magnetism
3 units
PHY513M– Basic Quantum Mechanics
3 units
PHY515M – Basic Statistical Mechanics
3 units
PHY517M– Basic Experimental Methods of Physics
3 units

BASIC Courses

PHY551M – History and Philosophy of Science and Mathematics
3 units
PHY619M – Fundamentals of Statistics and Statistical Mechanics
3 units
PHY850M – Research Apprenticeship and Seminar 1
1 unit
PHY852M – Research Apprenticeship and Seminar 2
1 unit
PHY854M – Research Apprenticeship and Seminar 3
1 unit
PHY901M – Graduate Seminar
1 unit
PHY903M – Graduate Colloquium
2 units

MAJOR Courses

PHY601M – Classical Mechanics 1
3 units
PHY605M – Classical Electrodynamics 1
3 units
PHY607M - Classical Electrodynamics 2
3 units
PHY609M – Quantum Mechanics 1
3 units
PHY611M – Quantum Mechanics 2
3 units

WRITTEN COMPREHENSIVE EXAMINATIONS

PHY601W – WCE in Classical Mechanics
0 unit
PHY605W – WCE in Classical Electrodynamics
0 unit
PHY609W – WCE in Quantum Mechanics
0 unit
PHY619W – WCE in Statistical Mechanics
0 unit

ELECTIVE Courses

PHY603M - Classical Mechanics 2
3 units
PHY613M - Advanced Quantum Mechanics 1
3 units
PHY621M - Statistical Mechanics 2
3 units
PHY625M – Solid State Physics 1
3 units
PHY627M - Solid State Physics 2
3 units
PHY632M – Experimental Methods in Physics B
3 units
PHY639M - Computational Methods of Physics
3 units
PHY643M - Elementary Particle Physics
3 units
PHY647M - General Relativity
3 units
PHY651M - Laser Physics
3 units
PHY655M - Mathematical Methods of Physics A
3 units
PHY657M - Mathematical Methods of Physics B
3 units
PHY659M - Mathematical Methods of Physics D
3 units
PHY661M - Mathematical Methods of Physics C
3 units
PHY667M - Nuclear Physics
3 units
PHY673M - Semiconductor Physics
3 units

PHY679M - Quantum Field Theory
3 units
PHY683M - Quantum Electronics
3 units
PHY693M – Experimental Methods in Physics A

3 units
PHY699M - Atomic and Molecular Physics 1
3 units
PHY701M - Atomic and Molecular Physics 2
3 units
PHY717M - Condensed Matter Physics
3 units
PHY721M – Classical & Quantum Field Theory
3 units

RESEARCH and THESIS Courses

PHY870M – Directed Research with Laboratory
0 unit
PHY876M to PHY884M – Physics Thesis 1 to 9
6 units

Draft Date: May 2011
Revision Date: August 2, 2015

CURRICULUM MAP

Course Code	Course Title	Program Learning Outcomes											
		LO1			LO2			LO3			LO4		
		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
PHY501M	Basic Mathematical Methods for Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY507M	Basic Electricity and Magnetism	X	X	X	X	X	X	X	X	X	X	X	X
PHY513M	Basic Quantum Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY515M	Basic Statistical Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY517M	Basic Experimental Methods in Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY551M	History and Philosophy of Science	X	X	X	X	X	X	X	X	X	X	X	X
PHY619M	Fundamentals of Statistics and Statistical Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY850M	Research Apprenticeship and Seminar 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY852M	Research Apprenticeship and Seminar 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY854M	Research Apprenticeship and Seminar 3	X	X	X	X	X	X	X	X	X	X	X	X
PHY901M	Graduate Seminar	X	X	X	X	X	X	X	X	X	X	X	X
PHY903M	Graduate Colloquium	X	X	X	X	X	X	X	X	X	X	X	X
PHY601M	Classical Mechanics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY605M	Classical Electrodynamics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY607M	Classical Electrodynamics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY609M	Quantum Mechanics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY611M	Quantum Mechanics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY601W	Written Comprehensive Exam in Classical Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY605W	Written Comprehensive Exam in Classical Electrodynamics	X	X	X	X	X	X	X	X	X	X		X
PHY609W	Written Comprehensive Exam in Quantum Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY619W	Written Comprehensive Exam in Statistical Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY603M	Classical Mechanics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY613M	Advanced Quantum Mechanics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY621M	Statistical Mechanics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY625M	Solid State Physics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY627M	Solid State Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY632M	Experimental Methods in Physics B	X	X	X	X	X	X	X	X	X	X	X	X
PHY639M	Computational Methods of Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY643M	Elementary Particle Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY647M	General Relativity	X	X	X	X	X	X	X	X	X	X	X	X
PHY651M	Laser Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY655M	Mathematical Methods of Physics A	X	X	X	X	X	X	X	X	X	X	X	X
PHY657M	Mathematical Methods of Physics B	X	X	X	X	X	X	X	X	X	X	X	X

Course Code	Course Title	Program Learning Outcomes											
		LO1			LO2			LO3			LO4		
		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
PHY659M	Mathematical Methods of Physics C	X	X	X	X	X	X	X	X	X	X	X	X
PHY661M	Mathematical Methods of Physics D	X	X	X	X	X	X	X	X	X	X	X	X
PHY667M	Nuclear Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY673M	Semiconductor Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY679M	Quantum Field Theory	X	X	X	X	X	X	X	X	X	X	X	X
PHY683M	Quantum Electronics	X	X	X	X	X	X	X	X	X	X	X	X
PHY693M	Experimental Methods in Physics A	X	X	X	X	X	X	X	X	X	X	X	X
PHY699M	Atomic and Molecular Physics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY701M	Atomic and Molecular Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY717M	Condensed Matter Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY721M	Classical & Quantum Field Theory	X	X	X	X	X	X	X	X	X	X	X	X
PHY870M	Directed Research with Laboratory	X	X	X	X	X	X	X	X	X	X	X	X
PHY876M	Physics Thesis 1 –Thesis Proposal	X	X	X	X	X	X	X	X	X	X	X	X
PHY877M	Physics Thesis 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY878M	Physics Thesis 3	X	X	X	X	X	X	X	X	X	X	X	X
PHY879M	Physics Thesis 4	X	X	X	X	X	X	X	X	X	X	X	X
PHY880M	Physics Thesis 5	X	X	X	X	X	X	X	X	X	X	X	X
PHY881M	Physics Thesis 6	X	X	X	X	X	X	X	X	X	X	X	X
PHY882M	Physics Thesis 7	X	X	X	X	X	X	X	X	X	X	X	X
PHY883M	Physics Thesis 8	X	X	X	X	X	X	X	X	X	X	X	X
PHY884M	Physics Thesis 9 – Thesis Final Defense	X	X	X	X	X	X	X	X	X	X	X	X

Draft Date : January 30, 2015
Revision Date : August 2, 2015

COURSE DESCRIPTIONS

PHY501M Basic Mathematical Methods for Physics
3 units
Vector algebra. Vector differentiation and integration. Second derivatives of vectors. Gauss' and Strokes' Theorems. Matrices and determinants. Tensor algebra.

PHY507M Basic Electricity and Magnetism
3 units
Maxwell Equations. Electrostatics in vacuum. Boundary value problems and special techniques. Magnetostatics. Electrodynamics.

PHY509M Basic Modern Physics
3 units
Special Theory of Relativity, Postulates of quantum mechanics, the Schrödinger equation and its applications to harmonic oscillators and central forces.

PHY513M Basic Quantum Mechanics
3 units
Special Theory of Relativity, Postulates of quantum mechanics, the Schrödinger equation and its applications to harmonic oscillators and central forces.

PHY515M Basic Statistical Mechanics
3 units
Temperature. Ideal gases. Gas processes. The Second Law. Heat engines. Introduction to statistical methods. Statistical description of systems of particles. Statistical thermodynamics.

PHY517M Basic Experimental Methods in Physics
3 units
Basic concepts and laws in mechanics in a laboratory setting and activities to develop basic laboratory skills.

PHY551M History and Philosophy of Science and Mathematics
3 units
Ancient and Medieval Science. The Scientific Revolution. The Industrial Revolution. Rationalism and Empiricism. The Workings of Science. Theory and Experiment. Confirmation and Acceptance. Ontological and Epistemological Status of Theories and Theoretical Entities. Scientific Changes. Science and Culture.

PHY601M Classical Mechanics 1
3 units
Introduction to dynamical systems, Hamilton dynamics, variational principles, canonical transformations, Hamilton Jacobi theory, advanced linear dynamics, and classical field theory.
Prerequisite to : PHY603M

PHY601W Written Comprehensive Exam in Classical Mechanics
0 unit
Pre-requisite : PHY601M

PHY603M Classical Mechanics 2
3 units
Methods of non-linear dynamics, chaotic dynamical systems, strange attractors, routes to chaos, solitary waves and solitons, the methods of inverse scattering, kinks and vortices.
Prerequisite : PHY601M

PHY605M Classical Electrodynamics 1
3 units
The microscopic Maxwell equations; electrostatics in vacuum and in dielectrics; stationary currents and magnetostatics; conservation theorems for the electromagnetic waves; and wave guide and resonant
cavities.

Prerequisite to: PHY607M

PHY605W Written Comprehensive Exam in Classical Electrodynamics
0 unit
Pre-requisite : PHY607M

PHY607M Classical Electrodynamics 2
3 units
Electromagnetic multipole radiation; principles of special relativity; covariant formulation of electrodynamics; radiation from moving charges; bremsstrahlung; relativistic dynamics of charges and fields; classical electron theory; and magnetohydrodynamics.

Prerequisite : PHY605M

PHY609M Quantum Mechanics 1
3 units
Linear vector spaces and representation theory; general formulations; simple quantum mechanical systems; quantum dynamics; and path integral methods.

Prerequisite to : PHY611M

PHY609W Written Comprehensive Exam in Quantum Mechanics
0 unit
Pre-requisite : PHY611M

PHY611M Quantum Mechanics 2
3 units
Symmetries, stationary-state perturbations theory; time-dependent perturbation theory; collision theory.
Prerequisite: PHY609M

PHY613M Advanced Quantum Mechanics
3 units
Formal scattering theory; relativistic quantum mechanics; Feynman calculational techniques and Feynman graphs.
Prerequisite : PHY611M

PHY619M Fundamental Statistics and Statistical Mechanics 1
3 units
A course on the application of probability and statistical ideas to systems is particles in equilibrium. The basic notions to derive macroscopic thermodynamics on the basis of a microscopic description. Among the topics covered are the canonical distribution, micrononical distribution, Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein statistics, strongly interacting systems, fluctuations and kinetic theories.
Prerequisite to : PHY621M

PHY619W Written Comprehensive Exam in Statistical Mechanics
0 unit
Pre-requisite : PHY515M

PHY621M Statistical Mechanics 2
3 units
Elementary transport theory; Onsager's relations; Wiener Khinchin theorem; fluctuation dissipation theorem; Linear response theory; response theory; thermodynamics stability criteria far from equilibrium; and examples of non-equilibrium phase transitions.

Prerequisite : PHY619M

PHY625M Solid State Physics 1
3 units
Fundamental principles of the physics of solids. Topics include periodic structure, lattice waves, electron states, static properties of solids, and dynamics of electrons in solids.

Prerequisite : PHY601M, PHY605M, and PHY619M
Prerequisite to : PHY627M

PHY627M Solid State Physics 2
3 units
Transport and optical properties of solids, Fermi surface, magnetism, superconductivity, amorphous and disordered systems.

Prerequisite : PHY625M

PHY632M Experimental Methods in Physics B
3 units
A course on the advanced experimental techniques in physics and practical work on the synthesis and characterization of nanomaterials.

Prerequisite : PHY693M

PHY639M Computational Methods of Physics
3 units
A course on numerical methods, introduction to linear and dynamics programming, principles of simulation and modeling, computer languages for numerical solutions and algebraic manipulations.

PHY643M Elementary Particle Physics
3 units
Space-time properties of particles; classification of particles and their symmetries; and properties of particles and their interactions.

Prerequisite : PHY611M

PHY647M General Relativity
3 units
Manifolds, modern differential geometry and tensor analysis; basic principles of general relativity; Einstein's field equations and their mathematical properties; exact solutions; linearized theory; variational principles and conservation laws; equations of motion; gravitational waves; and experimental tests.

PHY651M Laser Physics
3 units
Einstein's theory of light-matter interaction; rate equation; density matrix formalism of quantum mechanics; Maxwell Schrodinger equation, Maxwell Bloch equations; steady state behavior and instabilities of single-mode lasers; optical bistability; multimode laser operation and multimode instabilities; and coherent pulse propagation.

Prerequisite : PHY611M

PHY655M Mathematical Methods of Physics A
3 units
Selected advanced methods in partial differential equations and integral equations such as Hilbert space methods, Green-function methods, approximation methods, variation methods, and optimization methods.

PHY657M Mathematical Methods in Physics B
3 units
A course on group theory and its applications to physics, including such topics as abstract groups, group representation, the symmetric, permutation, and other finite groups; topological groups, Lie groups, the rotation, Lorenz and other important Lie groups of physics, and various physical applications of group theory.

PHY659M Mathematical Methods of Physics C
3 units
Selected advanced topics in topology, differential geometry, and related areas of mathematics that are important in contemporary theoretical physics.

PHY661M Mathematical Methods in Physics D
3 units
Selected advanced topics in functional analysis, operator algebras, and related areas of mathematics that are important in contemporary theoretical physics.

PHY667M Nuclear Physics
3 units
Nuclear Structure; self-consistent fields; shell model; single particle excitations and vibrations, linearization methods; theory of deformed nuclei, pairing in nuclei; and quasi-particles.

Prerequisite : PHY609M

PHY673M Semiconductor Physics
3 units
A course on semiconductor physics covering such topics as transport properties, carrier diffusion processes, scattering processes, quantum effects in transport phenomena, and optical properties of semiconductors.

Prerequisite : PHY625M

PHY679M Quantum Field Theory
3 units
Lagrangian field theory; field quantization; Feynman path integral in field theory; renormalization; dimensional regularization and its application to lambda phi to the 4th theory.

Prerequisite : PHY613M

PHY683M Quantum Electronics
3 units
An introductory graduate course on quantum electronics covering such topics as quantization of lattice vibration, quantization of electromagnetic fields, the propagation of optical beams, optical resonators, laser oscillation and laser systems.

Prerequisite : PHY609M

PHY693M Experimental Methods in Physics A
3 units
A course on the basic experimental techniques in physics and practical work on vacuum systems.

Prerequisite to : PHY632M

PHY699M Atomic and Molecular Physics 1
3 units
Quantum mechanical treatment of the structure and interactions of atoms and molecules; complex atomic spectra; Hartee Fock Slater methods; vector coupling; multiplet theory and Racal methods; transition probabilities and selection rules; molecular rotations and vibrations; and group theoretic methods in molecular physics.

Prerequisite : PHY611M
Prerequisite to : PHY701M

PHY701M Atomic and Molecular Physics 2
3 units
Topics to be selected from rotational, vibrational and electronic spectra of molecules; molecular orbitals; techniques of nuclear magnetic resonance, microwave, electron spin resonance, infrared, Raman, optical and ultraviolet spectroscopy; applications to stellar spectra; and introductions to the theory of atomic collisions.
Prerequisite : PHY699M

PHY717M Condensed Matter Physics
3 units
It is an introductory course on the quantum-mechanical treatment of the physics of solids and quantum liquids. It begins with discussions on collective excitations and quasiparticles, develops computational methods such as the Hartree-Fock approximation and the random phase approximation that are appropriate for fermions, the Bogoliubov theory and the Debye model that are appropriate for bosons, develops the one-electron theory to treat metals, insulators and semiconductors, and ends with discussions on density functional theory.
Prerequisite : PHY601M, PHY605M, PHY609M, and PHY619M

PHY721M Classical & Quantum Field Theory
3 units
A first course on field theory covering canonical transformations, Lagrangian and Hamiltonian formulations for continuous systems and fields, special theory of relativity, dynamics of relativistic particles, electromagnetic fields, Klein-Gordon equation, Dirac equation, canonical quantization, path integration, perturbation theory, renormalization, symmetries and gauge fields, and spontaneous symmetry breaking.
Prerequisite : PHY601M, PHY607M, and PHY611M

PHY851M Research Apprenticeship and Seminar 1
1 unit
A research course where students are required to work as apprentice of a research group of the department. Students are also required to attend seminars of the research group.

PHY853M Research Apprenticeship and Seminar 2
1 unit
A research course where students are required to collaborate in research work of a research group of the department.

PHY854M Research Apprenticeship and Seminar 3
1 unit
A research and seminar course where students are required to collaborate in research work of a research group of the department. Students are also required to give a seminar related to his research work.

PHY876M – PHY884M Physics Thesis 1 to 9
6 units
Conduct of an original research under the supervision of an adviser. The course requires the presentation and oral defense of the results of an approved research problem before a panel of examiners as well as the submission of the final bound copies of the thesis.

PHY901M Graduate Physics Seminar 1
1 unit
A graduate seminar course whereby each student is required to attend physics colloquia and conduct a colloquium, discussing various ways on how to prepare multimedia presentations.

PHY903M Graduate Physics Seminar 2
2 units
A graduate seminar course whereby each student is required to attend physics colloquia and conduct a colloquium, discussing extensively a recent development in physics.

Draft Date : May 2011
Revision Date : August 2, 2015

DOCTOR OF PHILOSOPHY in PHYSICS
(Straight and Regular PhD-PHYSICS DEGREE PROGRAM)

PROGRAM DESCRIPTION/ SPECIFICATION

1. Awarding Institution	De La Salle University
2. College/School	College of Science
3. Program accredited by/assessed by	Granted 5-years accreditation by the Philippine Association of Schools, Colleges, and Universities (PAASCU) from 2013-2018; Recognized Level IV status by the Federation of Accrediting Agencies of the Philippines (FAAP) Commission on Higher Education – Center of Excellence in Physics
4. Name of Final Award	Doctor of Philosophy in Physics
5. Program Title	Doctor of Philosophy in Physics

6. Goals and Objectives of the Program:

The Doctor of Philosophy in Physics program is designed to provide students with advanced graduate training in physics, which will prepare them for scientific careers in academe, as well as industry. The strength of the department lies in solid-state physics, semiconductor physics, materials science, theoretical physics, laser remote sensing, computational physics, and instrumentation. Learner-centered, project-oriented inquiry-based elective courses will be put together according to a particular interest topic.

7. Program Learning Outcomes (LO):

The Program Learning Outcomes focus on the knowledge, skills and attributes that graduates should acquire and demonstrate in their course of studies and internships as evidence of accomplishing the school's vision-mission. These Program Outcomes also reflects the graduate capacity's for lifelong learning and transfer of knowledge in the workplace. Below is the list of Program Learning Outcomes,

LO1 : Critical and Creative Thinker

1.1 Acquire a clear perspective of Physical laws in the formulation of new mechanisms in nature at different scales and aspects of interactions.

1.2 Attain simple, novel, and innovative solutions to high impact and pervasive issues using scientific reasoning, mathematical, computational and experimental methods in Physics.

1.3 Contextualize and calibrate recent developments in Physics to other disciplines.

LO2 : Effective Communicator

2.1 Manifest the relevance of Physics in all walks of life.

2.2 Effectively deliver in words and action the accurate and precise assessment learned from the research studies to public forum and ISI and/or SCOPUS listed journals.

2.3 Provide clear and relevant explanation of the possible mechanisms in understanding the prevailing natural issues to stakeholders, decision makers and the public.

LO3 : Reflective Lifelong Learner

3.1 Recognize and cite accurately the research work of other stakeholders by following the citation standards of the international academic community.

3.2 Practice transparency and integrity in gathering and storing measurements taken from calibrated equipment.

3.3 Appreciate and respect the limits of measurement on how science can interpret the different interactions of nature.

LO4 : Service-Driven Citizen

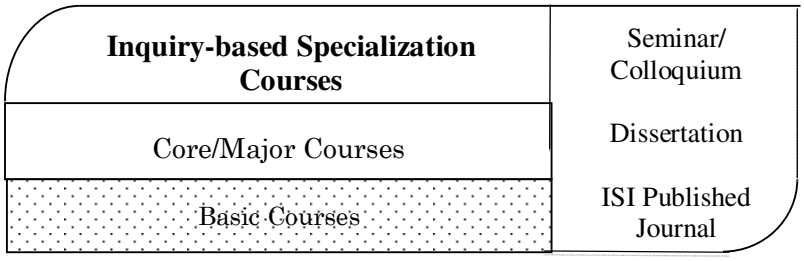
4.1 Convey clear understanding and efficient delivery of appropriate actions responsive to community needs.

4.2 Actively engage the community with valuable and shared resources.

4.3 Plan and implement regulated professional practices in laboratory or field-work set by the government.

8. Program structure

The program structure of Doctor of Philosophy in Physics graduate program can be rendered as follows:



Courses are structured into the following categories: (1) the Basic courses in physics; (2) the Core or Major courses in physics; (3) the Inquiry-based Specialization courses; (4) capstone ISI published journal and dissertation .

Basic and Major physics courses prepares the students for critical thinking that are laid through mathematical reasoning, and basic computational, analytical, problem-solving and experimental skills are groomed. The Basic physics courses taken gives an overview of physics as a discipline and a glimpse of what students may expect in the Major courses.

The Major physics courses are typical of physics curricula worldwide, and comply with government mandate through CHED Memorandum No.13 Series of 2011. Engagement in the disciplinal methods and principles of core physics courses begins the process of elevating the deductive, analytical and synthetic skills to a rank characteristic of physics graduates. Whilst this group of courses is primarily aimed towards a more profound understanding of physics, the decisively unique analytical, reasoning

and problem solving skills brought forth are precisely the same skill set that would be of tremendous value when interfaced with other disciplines.

The special technical skills in computer programming and in experimental methods that are of great worth to the practice of physics are at the same time the skill sets that add significantly to the employability of the PhD-Physics graduates in the sectors of information technology and electronics industry. The laboratory courses not only develop empirical skills but foster an aptitude for systematic unbiased observation that is valuable for lifelong learning.

Inquiry-based elective courses prepare students for specific career paths in government, industry and health sector. They are also fertile ground for integrating core concepts and methods of physics, enhancing synthesis skills, and projecting the powerful techniques and ideas of physics to its allied fields.

On the whole, the unique problem-solving skills in the discipline of physics built through the Basic and Major are specialized with the elective courses. Basic courses in physics bring in the skills required for the core courses and provide an overview of the four core areas of physics – classical mechanics, electromagnetism, quantum mechanics, and statistical mechanics. Key concepts and principles that encompass all four make them into a coherent whole that launches into applications in the specialization areas of materials science, biomedical instrumentation, computational materials design, complex systems, optoelectronics materials design, terahertz spectroscopy, nanotechnology, visual arts forensics, environmental physics, and in method-wise extensions to finance and economics.

8.1 Regular and Straight PhD Programs

The department currently offers PhD-Physics programs in two modes. Only graduates of MS-Physics programs are accepted to the Regular PhD program. Graduates of other types of Master's degree (e.g. MA, MST, MAT, Med, MP), graduates of Master's degree in allied fields, and those with only Bachelor's degree can enter the PhD program only through the Straight PhD mode.

The program requirements of the two modes are:

Regular PhD Program	Straight PhD Program
30 units of course work	48 units of course work
3 units of Seminar	3 units of Seminar
No Qualifying Exam Required	Qualifying Exam (Written Comprehensive Exam in 4 areas)
Candidacy Exam	Candidacy Exam
Dissertation	Dissertation

Those who want to enter the Straight PhD program are first accepted in the MS-Physics program. The student is subsequently upgraded to the straight PhD program only after passing the PhD criteria for the written comprehensive examinations – that is, passed all areas with high pass marks in at least two areas.

The distribution of courses in terms of units is:

Types of Courses	No. of Units	
	Regular Program	**Straight Program**
Basic	6	9
Major	3	18
Specialization/Elective	21	21
Seminar	3	3
Dissertation	12	12
Total	45	63

The Basic and Major courses are:

Basic		
	History and Philosophy of Science and Mathematics	PHY551D
	Fundamentals of Statistics and Statistical Mechanics	PHY619D
	Computational Methods of Physics	PHY639D
Major		
	Classical Mechanics I	PHY601D
	Classical Electrodynamics 1	PHY605D
	Classical Electrodynamics 2	PHY607D
	Quantum Mechanics 1	PHY609D
	Quantum Mechanics 2	PHY611D
	Classical and Quantum Field Theory	PHY721D

Students in the Straight PhD program are required to take all these courses. Those entering the Regular PhD program would have earned an MS in Physics and are therefore expected to have taken most of the above subjects. Those with asterisks are courses that are mandated for MS-Physics by the CHED Technical Panel in Physics. As such, those who enter the regular PhD program will typically have to take the following Basic and Major Courses:

History and Philosophy of Science and Mathematics	PHY551D
Computational Methods of Physics	PHY639D
Classical and Quantum Field Theory	PHY721D

If the student has however, already taken one or more of the subjects listed above when in the MS-Physics program, any of those subjects may be replaced by any of the following which he/she has not yet taken when in MS program:

Solid State Physics 1
a Methods course (Mathematical, Computational, Experimental)

8.2 Inquiry-based Specialization Courses

In the past, specialization courses are prescribed by the Academic Adviser, and these are topical in nature (e.g. Condensed Matter Physics, Laser Physics, Particle Physics, etc.) The small number of PhD student and the University's class size policies however present us from offering such courses as regular classes. Faculty members of the Graduate programs thus end up handling two, three or even more special classes. Considering the level of sophistication of these courses, these require extensive additional preparation (beyond the maximum of three prescribed in the Faculty Manual). Moreover, because students enroll only a few days before classes start, the faculty members assigned to handle these courses do not have the occasion to prepare ahead.

The burden on faculty handling these specialization courses could be alleviated with a paradigm shift in the way these courses are delivered. At present, inquiry-based courses are offered instead of the usual topic-based courses, pedagogy shifts from being teacher-centered to learner-centered. With a performance-based assessment, this could at the same time offer an opportunity for more meaningful learning experiences on the part of the students. The faculty in the setting will act as a mentor, guiding the student instead of giving lectures.

9. Admission criteria or requirements to the

9.1 Straight PhD program

a. No direct admission to the straight program. Applicants will initially be accepted to the MS Physics program.
b. Upon completion of 18 units of core courses, an MS Physics student may be provisionally accepted to the straight PhD program provided that student must have a grade point average of 2.75 or above, with no grade below 2.5.
c. Submission of a paper describing the student's intended area of study/specialization.
d. A student is officially admitted to the straight PhD program only after passing the written comprehensive exam in four core areas (classical mechanics, classical electrodynamics, quantum mechanics, and statistical mechanics) – that is, passed all areas with high pass marks in at least two areas.
e. Upon admission to the PhD program, the student will be assigned an academic adviser, who will draw up a study plan for the student, subject to the approval of the graduate committee of the department.

9.2 Regular PhD program

Graduate of Master of Physics (MS Physics) program, who is teaching or hopes to teach physics in the graduate school or expect to practice applied physics in government, industry and health sector.

9.3 Admission documents and interview:

- DLSU Application and Admission form
- Three letters of recommendation (DLSU Forms)
- Official transcript of records
- 5 copies of 1 ½ x 1 ½ pictures
- Interview

10. Other requirements (dissertation, ISI or SCOPUS listed international published journal)

All PhD students are required to publish in an ISI or SCOPUS listed international journal before they can graduate. Presentation and submission of an exposition paper are the major requirement for Seminar in Physics.

REGULAR PHD PROGRAM CHECKLIST/ FLOWCHART

FULL-TIME

Year	Term 1	Term 2	Term 3
1	▪ Basic 1 ▪ Expository Studies 1 ▪ Investigative Studies 1 ▪ Graduate Seminar 1	▪ Basic 2 ▪ Expository Studies 2 ▪ Investigative Studies 2	▪ Major ▪ Expository Studies 3 ▪ Exploratory Studies 1 ▪ Graduate Seminar 2
2	▪ Exploratory Studies 2 ▪ Candidacy Examination	▪ Dissertation	
3	▪ Dissertation		

PART-TIME

Year	Term 1	Term 2	Term 3
1	▪ Basic 1 ▪ Expository Studies 1 ▪ Graduate Seminar 1	▪ Basic 2 ▪ Expository Studies 2	▪ Expository Studies 3 ▪ Investigative Studies 1
2	▪ Investigative Studies 2 ▪ Graduate Seminar 2	▪ Major ▪ Exploratory Studies 1	▪ Exploratory Studies 2 ▪ Candidacy Examination
3	▪ Dissertation		
4	▪ Dissertation		

List of Courses:

Basic	6	units
Major	3	units
Specialization /Elective	21	units
Seminar	3	units
Dissertation	12	units
TOTAL	**45**	**units**

BASIC Courses

PHY551D – History and Philosophy of Science and Mathematics
3 units
PHY619D – Fundamentals of Statistics and Statistical Mechanics
3 units
PHY639D – Computational Methods of Physics
3 units

MAJOR Courses

PHY721D – Classical & Quantum Field Theory
3 units

SEMINAR Courses

PHY901D – Graduate Physics Seminar 1
1 unit
PHY903D – Graduate Physics Seminar 2
2 units

RESEARCH and DISSERTATION Courses

PHY920D–Directed Research with Laboratory
0 unit
PHY976D to PHY987D–Physics Dissertation 1 to 12
12 units

INQUIRY-BASED SPECIALIZATION Courses

PHY731D – Expository Studies in Condensed Matter Physics 1
3 units
PHY732D – Expository Studies in Condensed Matter Physics 2
3 units
PHY733D – Expository Studies in Condensed Matter Physics 3
3 units
PHY734D – Investigative Studies in Condensed Matter Physics 1
3 units
PHY735D – Investigative Studies in Condensed Matter Physics 2
3 units
PHY737D – Exploratory Studies in Condensed Matter Physics 1
3 units
PHY738D – Exploratory Studies in Condensed Matter Physics 2
3 units
PHY741D – Expository Studies in Photonics 1
3 units
PHY742D – Expository Studies in Photonics 2
3 units
PHY743D – Expository Studies in Photonics 3
3 units
PHY744D – Investigative Studies in Photonics 1
3 units
PHY745D – Investigative Studies in Photonics 2
3 units
PHY747D – Exploratory Studies in Photonics 1
3 units
PHY748D – Exploratory Studies in Photonics 2
3 units
PHY751D – Expository Studies in Chemical Physics 1
3 units
PHY752D – Expository Studies in Chemical Physics 2
3 units
PHY753D – Expository Studies in Chemical Physics 3
3 units
PHY754D – Investigative Studies in Chemical Physics 1
3 units
PHY755D – Investigative Studies in Chemical Physics 2
3 units
PHY757D – Exploratory Studies in Chemical Physics 1
3 units
PHY758D – Exploratory Studies in Chemical Physics 2
3 units

Draft Date: May 2011
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STRAIGHT PHD PROGRAM CHECKLIST/ FLOWCHART

FULL-TIME

Year	Term 1	Term 2	Term 3
1	▪ Basic 1 ▪ Major 1 ▪ Major 2 ▪ Graduate Seminar 1	▪ Basic 2 ▪ Major 3 ▪ Major 4	▪ Major 5 ▪ Expository Studies 1 ▪ Investigative Studies 1 ▪ Graduate Seminar 2
2	▪ Written Comprehensive Exam	▪ Basic 3 ▪ Expository Studies 2 ▪ Investigative Studies 2	▪ Major 6 ▪ Expository Studies 3 ▪ Exploratory Studies 1
3	▪ Exploratory Studies 2 ▪ Candidacy Examination	▪ Dissertation	
4	▪ Dissertation		

PART-TIME

Year	Term 1	Term 2	Term 3
1	▪ Basic 1 ▪ Expository Studies 1 ▪ Graduate Seminar 1	▪ Basic 2 ▪ Expository Studies 2	▪ Expository Studies 3 ▪ Investigative Studies 1
2	▪ Investigative Studies 2 ▪ Graduate Seminar 2	▪ Major ▪ Exploratory Studies 1	▪ Exploratory Studies 2 ▪ Candidacy Examination
3	▪ Dissertation		
4	▪ Dissertation		

List of Courses:

Basic	9	units
Major	18	units
Specialization /Elective	21	units
Seminar	3	units
Dissertation	12	units
TOTAL	**63**	**units**

BASIC Courses

PHY551D – History and Philosophy of Science and Mathematics
3 units
PHY619D – Fundamentals of Statistics and Statistical Mechanics
3 units
PHY639D – Computational Methods of Physics
3 units

MAJOR Courses

PHY601D – Classical Mechanics I
3 units
PHY605D – Classical Electrodynamics I
3 units
PHY607D – Classical Electrodynamics II
3 units
PHY609D – Quantum Mechanics I
3 units
PHY611D – Quantum Mechanics II
3 units
PHY721D – Classical & Quantum Field Theory
3 units

SEMINAR Courses

PHY901D – Graduate Physics Seminar I
1 unit
PHY903D – Graduate Physics Seminar II
2 units

RESEARCH and DISSERTATION Courses

PHY920D–Directed Research with Laboratory
0 unit
PHY976D to PHY987D–Physics Dissertation 1 to 12
12 units

INQUIRY-BASED SPECIALIZATION Courses

PHY731D – Expository Studies in Condensed Matter Physics 1
3 units
PHY732D – Expository Studies in Condensed Matter Physics 2
3 units
PHY733D – Expository Studies in Condensed Matter Physics 3
3 units
PHY734D – Investigative Studies in Condensed Matter Physics 1
3 units
PHY735D – Investigative Studies in Condensed Matter Physics 2
3 units
PHY737D – Exploratory Studies in Condensed Matter Physics 1
3 units
PHY738D – Exploratory Studies in Condensed Matter Physics 2
3 units
PHY741D – Expository Studies in Photonics 1
3 units
PHY742D – Expository Studies in Photonics 2
3 units
PHY743D – Expository Studies in Photonics 3
3 units
PHY744D – Investigative Studies in Photonics 1
3 units
PHY745D – Investigative Studies in Photonics 2
3 units
PHY747D – Exploratory Studies in Photonics 1
3 units
PHY748D – Exploratory Studies in Photonics 2
3 units
PHY751D – Expository Studies in Chemical Physics 1
3 units
PHY752D – Expository Studies in Chemical Physics 2
3 units
PHY753D – Expository Studies in Chemical Physics 3
3 units
PHY754D – Investigative Studies in Chemical Physics 1
3 units
PHY755D – Investigative Studies in Chemical Physics 2
3 units
PHY757D – Exploratory Studies in Chemical Physics 1
3 units
PHY758D – Exploratory Studies in Chemical Physics 2
3 units

Draft Date: May 2011
Revision Date: August 2, 2015

CURRICULUM MAP

Course Code	Course Title	Program Learning Outcomes											
		LO1			LO2			LO3			LO4		
		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
PHY551D	History and Philosophy of Science	X	X	X	X	X	X	X	X	X	X	X	X
PHY619D	Fundamentals of Statistics and Statistical Mechanics	X	X	X	X	X	X	X	X	X	X	X	X
PHY901D	Graduate Seminar	X	X	X	X	X	X	X	X	X	X	X	X
PHY903D	Graduate Colloquium	X	X	X	X	X	X	X	X	X	X	X	X
PHY601D	Classical Mechanics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY605D	Classical Electrodynamics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY607D	Classical Electrodynamics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY609D	Quantum Mechanics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY611D	Quantum Mechanics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY601W	Written Comprehensive Exam in Classical Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY605W	Written Comprehensive Exam in Classical Electrodynamics	X	X	X	X	X	X	X	X	X	X		X
PHY609W	Written Comprehensive Exam in Quantum Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY619W	Written Comprehensive Exam in Statistical Mechanics	X	X	X	X	X	X	X	X	X	X		X
PHY639D	Computational Methods of Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY693D	Experimental Methods in Physics	X	X	X	X	X	X	X	X	X	X	X	X
PHY721D	Classical & Quantum Field Theory	X	X	X	X	X	X	X	X	X	X	X	X
PHY731D	Expository Studies in Condensed Matter Physics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY732D	Expository Studies in Condensed Matter Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY733D	Expository Studies in Condensed Matter Physics 3	X	X	X	X	X	X	X	X	X	X	X	X
PHY734D	Investigative Studies in Condensed Matter Physics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY735D	Investigative Studies in Condensed Matter Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY737D	Exploratory Studies in Condensed Matter Physics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY738D	Exploratory Studies in Condensed Matter Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY741D	Expository Studies in Photonics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY742D	Expository Studies in Photonics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY743D	Expository Studies in Photonics 3	X	X	X	X	X	X	X	X	X	X	X	X
PHY744D	Investigative Studies in Photonics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY745D	Investigative Studies in Photonics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY747D	Exploratory Studies in Photonics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY748D	Exploratory Studies in Photonics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY751D	Expository Studies in Chemical Physics 1	X	X	X	X	X	X	X	X	X	X	X	X

Course Code	Course Title	Program Learning Outcomes											
		LO1			LO2			LO3			LO4		
		1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
PHY752D	Expository Studies in Chemical Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY753D	Expository Studies in Chemical Physics 3	X	X	X	X	X	X	X	X	X	X	X	X
PHY754D	Investigative Studies in Chemical Physics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY755D	Investigative Studies in Chemical Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY757D	Exploratory Studies in Chemical Physics 1	X	X	X	X	X	X	X	X	X	X	X	X
PHY758D	Exploratory Studies in Chemical Physics 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY901D	Graduate Seminar	X	X	X	X	X	X	X	X	X	X	X	X
PHY903D	Graduate Colloquium	X	X	X	X	X	X	X	X	X	X	X	X
PHY920D	Directed Research with Laboratory	X	X	X	X	X	X	X	X	X	X	X	X
PHY976D	Physics Dissertation 1 – Thesis Proposal	X	X	X	X	X	X	X	X	X	X	X	X
PHY978D	Physics Dissertation 2	X	X	X	X	X	X	X	X	X	X	X	X
PHY979D	Physics Dissertation 3	X	X	X	X	X	X	X	X	X	X	X	X
PHY980D	Physics Dissertation 4	X	X	X	X	X	X	X	X	X	X	X	X
PHY981D	Physics Dissertation 5	X	X	X	X	X	X	X	X	X	X	X	X
PHY982D	Physics Dissertation 6	X	X	X	X	X	X	X	X	X	X	X	X
PHY983D	Physics Dissertation 7	X	X	X	X	X	X	X	X	X	X	X	X
PHY984D	Physics Dissertation 8	X	X	X	X	X	X	X	X	X	X	X	X
PHY985D	Physics Dissertation 9	X	X	X	X	X	X	X	X	X	X	X	X
PHY986D	Physics Dissertation 10	X	X	X	X	X	X	X	X	X	X	X	X
PHY987D	Physics Dissertation 11	X	X	X	X	X	X	X	X	X	X	X	X
PHY987D	Physics Dissertation 12 – Dissertation Final Defense	X	X	X	X	X	X	X	X	X	X	X	X

Draft Date : January 30, 2015
Revision Date : August 2, 2015

COURSE DESCRIPTIONS

PHY551D History and Philosophy of Science and Mathematics
3 units
Ancient and Medieval Science. The Scientific Revolution. The Industrial Revolution. Rationalism and Empiricism. The Workings of Science. Theory and Experiment. Confirmation and Acceptance. Ontological and Epistemological Status of Theories and Theoretical Entities. Scientific Changes. Science and Culture.

PHY601D Classical Mechanics 1
3 units
Introduction to dynamical systems, Hamilton dynamics, variational principles, canonical transformations, Hamilton Jacobi theory, advanced linear dynamics, and classical field theory.

Prerequisite to : PHY603M

PHY601W Written Comprehensive Exam in Classical Mechanics
0 unit
Pre-requisite : PHY601M

PHY605D Classical Electrodynamics 1
3 units
The microscopic Maxwell equations; electrostatics in vacuum and in dielectrics; stationary currents and magnetostatics; conservation theorems for the electromagnetic waves; and wave guide and resonant
cavities.
Prerequisite to: PHY607M

PHY605W Written Comprehensive Exam in Classical Electrodynamics
0 unit
Pre-requisite : PHY607M

PHY607D Classical Electrodynamics 2
3 units
Electromagnetic multipole radiation; principles of special relativity; covariant formulation of electrodynamics; radiation from moving charges; bremsstrahlung; relativistic dynamics of charges and fields; classical electron theory; and magnetohydrodynamics.
Prerequisite : PHY605M

PHY609D Quantum Mechanics 1
3 units
Linear vector spaces and representation theory; general formulations; simple quantum mechanical systems; quantum dynamics; and path integral methods.
Prerequisite to : PHY611M

PHY609W Written Comprehensive Exam in Quantum Mechanics
0 unit
Pre-requisite : PHY611M

PHY611D Quantum Mechanics 2
3 units
Symmetries, stationary-state perturbations theory; time-dependent perturbation theory; collision theory.
Prerequisite: PHY609M

PHY619D Fundamental Statistics and Statistical Mechanics 1
3 units
A course on the application of probability and statistical ideas to systems is particles in equilibrium. The basic notions to derive macroscopic thermodynamics on the basis of a microscopic description. Among the topics covered are the canonical distribution, micrononical distribution, Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein statistics, strongly interacting systems, fluctuations and kinetic theories.
Prerequisite to : PHY621M

PHY619W Written Comprehensive Exam in Statistical Mechanics
0 unit
Pre-requisite : PHY515M

PHY639D Computational Methods of Physics
3 units
A course on numerical methods, introduction to linear and dynamics programming, principles of simulation and modeling, computer languages for numerical solutions and algebraic manipulations.

PHY693D Experimental Methods in Physics A
3 units
A course on the basic experimental techniques in physics and practical work on vacuum systems.

PHY721M Classical & Quantum Field Theory
3 units
Canonical transformations, Lagrangian and Hamiltonian formulations for continuous systems and fields, special theory of relativity, dynamics of relativistic particles, electromagnetic fields, Klein-Gordon equation, Dirac equation, canonical quantization, path integration, perturbation theory, renormalization, symmetries and gauge fields, and spontaneous symmetry breaking.
Prerequisite : PHY601M, PHY607M, and PHY611M

PHY731D Expository Studies in Condensed Matter Physics 1
3 units
The student surveys the general area of his/her interest in Condensed Matter Physics, work out the standard problems of the field, and at the end of the course, submit a review paper.

PHY732D Expository Studies in Condensed Matter Physics 2
3 units
The student surveys related topics to his/her area of interest in Condensed Matter Physics, discover and thresh out the relationships, and at the end of the course, submit a review paper.

PHY733D Expository Studies in Condensed Matter Physics 3
3 units
The student conduct a comprehensive study of the literature on the specific topic of his/her interest in Condensed Matter Physics, and at the end of the course, submit a review paper.

PHY734D Investigative Studies in Condensed Matter Physics 1
3 units
The student conducts a study similar to what has already been done in the specific topic of his/her interest in Condensed Matter Physics, and at the end of the course, submit a research paper.

PHY735D Investigative Studies in Condensed Matter Physics 2
3 units
The student conducts a study extending what has already been done in the specific topic of his/her interest in Condensed Matter Physics, and at the end of the course, submit a research paper.

PHY737D Exploratory Studies in Condensed Matter Physics 1
3 units
The student explores new directions for research in the specific topic of his/her interest in Condensed Matter Physics, and at the end of the course, submit a research paper.

PHY738D Exploratory Studies in Condensed Matter Physics 2
3 units
The student explores new grounds for research in the specific topic of his/her interest in Condensed Matter Physics, and at the end of the course, submit a research paper.

PHY741D Expository Studies in Photonics 1
3 units
The student surveys the general area of his/her interest in Photonics, work out the standard problems of the field, and at the end of the course, submit a review paper.

PHY742D Expository Studies in Photonics 2
3 units
The student surveys related topics to his/her area of interest in Photonics, discover and thresh out the relationships, and at the end of the course, submit a review paper.

PHY743D Expository Studies in Photonics 3
3 units
The student conduct a comprehensive study of the literature on the specific topic of his/her interest in Photonics, and at the end of the course, submit a review paper.

PHY744D Investigative Studies in Photonics 1
3 units
The student conducts a study similar to what has already been done in the specific topic of his/her interest in Photonics, and at the end of the course, submit a research paper.

PHY745D Investigative Studies in Photonics 2
3 units
The student conducts a study extending what has already been done in the specific topic of his/her interest in Photonics, and at the end of the course, submit a research paper.

PHY747D Exploratory Studies in Photonics 1
3 units
The student explores new directions for research in the specific topic of his/her interest in Photonics, and at the end of the course, submit a research paper.

PHY748D Exploratory Studies in Photonics 2
3 units
The student explores new grounds for research in the specific topic of his/her interest in Photonics, and at the end of the course, submit a research paper.

PHY751D Expository Studies in Chemical Physics 1
3 units
The student surveys the general area of his/her interest in Chemical Physics, work out the standard problems of the field, and at the end of the course, submit a review paper.

PHY752D Expository Studies in Chemical Physics 2
3 units
The student surveys related topics to his/her area of interest in Chemical Physics, discover and thresh out the relationships, and at the end of the course, submit a review paper.

PHY753D Expository Studies in Chemical Physics 3
3 units
The student conduct a comprehensive study of the literature on the specific topic of his/her interest in Chemical Physics, and at the end of the course, submit a review paper.

PHY754D Investigative Studies in Chemical Physics 1
3 units
The student conducts a study similar to what has already been done in the specific topic of his/her interest in Chemical Physics, and at the end of the course, submit a research paper.

PHY755D Investigative Studies in Chemical Physics 2
3 units
The student conducts a study extending what has already been done in the specific topic of his/her interest in Chemical Physics, and at the end of the course, submit a research paper.

PHY757D Exploratory Studies in Chemical Physics 1
3 units
The student explores new directions for research in the specific topic of his/her interest in Chemical Physics, and at the end of the course, submit a research paper.

PHY758D Exploratory Studies in Chemical Physics 2
3 units
The student explores new grounds for research in the specific topic of his/her interest in Chemical Physics, and at the end of the course, submit a research paper.

PHY901D Graduate Physics Seminar 1
1 unit
A graduate seminar course whereby each student is required to attend physics colloquia and conduct a colloquium, discussing various ways on how to prepare multimedia presentations.

PHY903D Graduate Physics Seminar 2
2 units
A graduate seminar course whereby each student is required to attend physics colloquia and conduct a colloquium, discussing extensively a recent development in physics.

PHY977D – PHY988D Physics Dissertation 1 to 12
12 units
Conduct of an original research under the supervision of an adviser. The course requires the presentation and oral defense of the results of an approved research problem before a panel of examiners as well as the submission of the final bound copies of the dissertation.

Draft Date : May 2011
Revision Date : August 02, 2015

PHYSICS DEPARTMENT RESEARCH FACILITIES

Since its establishment in 1968, the De La Salle University Department of Physics has been continuously engaged in both basic and applied researches in physics. Faculty of the Department and its students continue to pursue advanced scientific investigations in vast areas of physics that includes: theoretical and experimental solid state physics, theoretical condensed matter physics, computational physics and materials design, complex systems applied to physical problems and economics, materials science, quantum field theory, theoretical particle physics, gravitation, nuclear and biomedical physics, optics, atmospheric physics and physics education. Because of this wide range of research interests, the Department is divided into the following eight (8) key research groups that are equipped with state of the art laboratories and information technology facilities:

1. Solid State Physics Research Group (SSPRG)
2. Computational Materials Design Research Group (CMDRG)
3. Materials Science Research Group (MSRG)
4. Theoretical Physics Research Group (TPRG)
5. Biomedical Physics Research Group (BPRG)
6. Optics and Instrumentation Research Group (OIRG)
7. LIDAR Group (LIDAR)
8. Physics Education Research Group (PERG)

These research groups offer abundant opportunities in the principal research areas to graduate students and encourage keen participation among undergraduate students. Apart from working closely with their colleagues in physics, the faculty and students of the Department have also been involved in a number of cross-departmental research projects that inspire collaboration among different colleges of the university.

A. The Solid State Physics Research Group

The Solid State Physics Research Group maintains a state-of-the-art laboratory facility that provides students with hands-on training in materials synthesis, processing, and characterization.

Scanning Electron Microscope (SEM)

The Solid State Physics Research Group is in-charge with the JEOL 5300 scanning electron microscope (SEM) equipped with secondary and backscatter electron detectors, and an X-ray detector for energy dispersive spectroscopy (EDS) measurements.

The instrument operates at high vacuum and has a large specimen chamber and ample stage motion to examine specimens.

Gold Coater

The Solid State Physics Laboratory is in-charge with the gold coating equipment. Biological and other non-conducting materials are coated with gold using

Differential Thermal Analysis (DTA)

The Solid State Physics Research Group is in-charge in the use of a Differential Thermal Analyzer that measures temperature difference between a sample and a reference material as a function of temperature and is capable of operating to 1600 °C. DTA is used to investigate phase transitions with an endothermic (e.g. melting) or exothermic (e.g. solidification) reaction, particularly useful for the phase diagram study.

Hall Effect Measurement System (HMS)

The Solid State Physics Research Group is in-charge with the Hall Effect Measurement System (HMS). It is capable of measuring Hall coefficient, Hall voltage, resistance, resistivity, magnetoresistance, I-V curves, carrier concentration and mobility.

The HMS measures most compound semiconductor materials including pHEMTS, SiGe, SiC, InAs, InGaAs, InP, AlGaAs, HgCdTe, and ferrites; low resistance materials including metals, transparent oxides, dilute magnetic semiconductors, and TMR materials; and high resistance materials including semi-insulating GaAs and GaN, CdTe, and photodetectors.

High Vacuum System (HVS)

The Solid State Physics Research Group has a model VE-100 that extends the technology of the VE-90 by the addition of a 3 kW e-Gun evaporation source while retaining the thermal evaporation source. It simply provides thin film coating--of *virtually any material*-- quickly, cleanly and efficiently in a compact, dedicated system. Additional crucibles are included to assist in uninterrupted multi-coating operations, and the addition of a bell jar collar allows the user to introduce manipulators, additional electrical or water feedthroughs, and thin film instrumentation. Ion beam deposition is also included for etching purposes.

Liquid Nitrogen Plant

The College of Science under the management of the Solid State Physics Research Group has a fully automatic 40 liter per day Liquid Nitrogen Plants (LNP's). A nitrogen generator separates nitrogen from the other components of the air, without any moving parts. The LNPs require only electrical power and compressed air to produce LN2.The 98% pure nitrogen flows into a 35-210 liter dewar, where it is liquefied at the cold end of either our AL60-300 Cryorefrigerator. The liquid level in the dewar is automatically controlled and observable at all times to the operator.

The LN2 is easily transferred from the dewar using the low loss, vacuum insulated extraction valve and line conveniently located on the dewar.

X-ray Diffractometer (XRD)

The Solid State Physics Research Group has X-ray diffraction equipment that is used to determine the identity of crystalline solids based on their atomic structure.

Glass Blowing Facility

The Solid State Physics Laboratory has a glass blowing facility for developing glass chambers, reactors, diffusion pumps, and other set-up that involves glassware.

Femtolyte Lasers

IMRA Femtolyte laser
The Solid State Physics Group has a Femtolite Laser capable of performing Terahertz Measurements

B. The Computational Materials Design Group (CMDRG)

The CMDRG or the Computational Materials Design Research Group employs computational tools to predict and elucidate the properties and behavior of materials by theoretical modeling or computer simulation from a fundamental, *ab initio perspective*. Our group consists of faculties and students from De La Salle University and collaborators from Osaka University.

The High Performance Computing Laboratory (HPCL) - Ubasan @ DLSU is shown below,

C. Materials Science Research Group (MSRG)

The Materials Science research group focuses on the synthesis, fabrication and characterization of thin films, high Tc superconductors, and semiconductors. The lab utilizes Raman spectroscopy, X-ray diffraction and scanning electron microscopy for the characterization of the fabricated materials. Some of the group's equipment are shown below:

Raman Spectrometer

Spin Coater

Chemical Fume Hood

Furnace 4800

D. The Theoretical Research Group (TRP)

The Theoretical Physics Group of the De La Salle University Physics Department conducts basic and applied researches in theoretical physics

The Theoretical Physics Room at 7th Floor of William Hall building functions as a nucleus for theoretical and interdisciplinary researches. Collaborations amongst researchers from within the university, colleagues from other universities in the Philippines, and researchers from foreign research institutions, are encouraged. In the Theoretical Physics Room, we have initiated and nurtured our collaborations with other research institutions and partners in the industry.

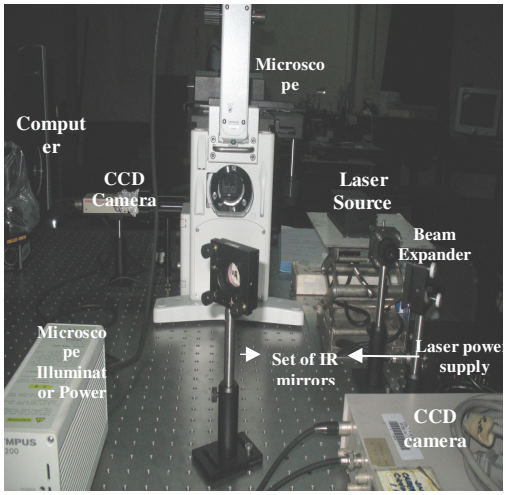
E. Biomedical Physics Research Group

Biomedical Physics Research Group (BMPRG) is the only research group in the DLSU Physics Department which uses both numerical and experimental methods to conceptualize, design, and verify the effectiveness of nanomaterials in biomedical imaging applications. The group uses computational tools like Monte Carlo N-Particle (MCNP) in assessing the dose distribution and dosimetric evaluation in in-vitro systems. The research interests of the group are as follows, but not limited to:

- design and simulation of modalities available to treat cancer
- evaluate numerically the available techniques used in medical imaging
- developing nanomaterials for biomedical applications
- nanomaterials characterization and development for therapy and imaging applications

F. Optics and Instrumentation Research Group (OIRG)

Optics and Instrumentation Research Group endeavours to formulate appropriate physical design and solution to various interfaces of current technologies (*i.e. nano-technology, bio-technology*, and *laser-technology*). It facilitates discovery and innovation in Physics by cultivating multi-disciplinary strategies to address scientific problems in our ever changing society. It is also all-inclusive in style as it incorporates theoretical, computational, and experimental approach of conducting research like developing an optical trapping system (see figure) to facilitate molecular interaction studies. It currently focuses on unique applications of Physics in Sports Science, Molecular Science, Materials Science, Medicine, and Cultural Heritage.



Optical Trapping System

G. LIDAR Group

The LIDAR Research Group is one of the research groups in the De La Salle University (DLSU) Physics Department. The group is composed of individuals with a fervent desire of contributing towards the protection of the Earth's fragile environment. LIDAR, the acronym for Light Detection And Ranging or laser remote sensing, is one of the most sensitive and real-time techniques that is used to study the environment. The main task of this unit is to examine the environment (air, water, land) by harnessing its' interaction with light along with utilizing a host of passive and active sensors that may also serve as correlative sources of information. This will also lead to the establishment of multi-platform measurements. Thus, the researches conducted by the group are aimed at obtaining more in-depth information on the environment. Whenever possible, instruments will be built or adapted to the Philippine setting in order to create a network of instruments that will yield not only baseline information on the environment but also provide continuous monitoring.

Middleton SP02 Sunphotometer

The sunphotometer used is the Middleton SP02, which composed of four silicon photodiodes (368, 500, 675 and 862 nm) with bandpass filters (10-nm bandwidth) and 5º field-of-view. It has a maximum output voltage of +4.5VDC full-scale. It operates at the rooftop of the STRC building, DLSU, Manila (14°33.967'N, 120°59.518'E) for 5 weeks using a customized sun-tracking system. Four 30-meter network cables and two 30-meter 3-line power cords were used to connect the tracking system to the DAQ system located on the LIDAR Laboratory (Rm.313).

The tracking and acquisition are done through a data acquisition card. Its 8 digital I/O lines are used to control the motors and data were acquired using its 12-bit analog inputs, which can acquire from ±0.05 to ±10.0 VDC. Ordinary network cables were used to connect to the driver box of the stepper motors and output lines of the sunphotometers.

Low-Volume Air Sampler

The Airmetrics MiniVol™ Portable Air Sampler is an ambient air sampler for particulate matter and non-reactive gases. The patented low flow technology used in the MiniVol™ was developed jointly by the U. S. Environmental Protection Agency (EPA) and the Lane Regional Air Pollution Authority in a n effort to address the need for portable air pollution sampling technology.

While not a reference method sampler, the MiniVol™ gives results that closely approximate reference method air quality data. Both accurate and precise, the battery operated, lightweight MiniVol™ is ideal for sampling at remote sites or areas without power. In addition, the low cost of the sampler allows a network of MiniVols™ to be deployed at a fraction of the cost for a similar reference station network.

The MiniVol™ features a 7-day programmable timer, a constant flow control system, an elapsed time totalizer, rechargeable battery packs, and all-weather PVC construction. The MiniVol™ can be configured to sample for just particulate matter, just gases, or both simultaneously.

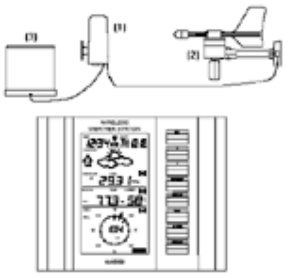
The MiniVol™ Portable Air Sampler is basically a pump controlled by a programmable timer which can be set to make up to six "runs" within 24 hours or throughout a week. When used outdoors it may be hung from a bracket mounted on a variety of structures—utility poles, trees, fence posts, etc.

Particulate Matter (PM) Sampling Mode

In the particulate matter (PM) sampling mode, air is drawn through a particle size separator and then through a filter medium. Particle size separation is achieved by impaction. Critical to the collection of the correct particle size is the correct flow rate through the impactor. For the MiniVol™, the actual volumetric flow rate must be 5 liters per minute (5 lpm) at ambient conditions. To assure a constant 5 lpm flow rate through the size separator at differing air temperatures and atmospheric pressure s, the sampler must be adjusted for each sampling project.

The WS-2315 Weather Station

The WS-2315 Weather Station (Figure below) measures the indoor environment of its surrounding area and receives weather data from the following three outdoor sensors:



1) Thermo-Hygro Sensor
2) Wind Sensor
3) Rain Sensor

The received data is continuously updated to bring you the latest weather information on the base station's LCD. The outdoor thermo-hygro sensor is the main data communication unit since both the wind and rain sensors are connected to the thermo-hygro sensor for operating power and rely on it to communicate to the base station. Weather data sent from the thermo-hygro sensor can be done by wireless 433MHz transmission (up to 100ft in open space) or by cable connection.

Using the enclosed 6.5ft computer cable and CD-ROM, you can install the Heavy Weather software to your PC and access the latest weather information from your PC and upload up to 175 sets of recorded weather data received by the base station. Recorded data can be used to generate statistics and charts onto your spreadsheets (175 sets of data is stored in the base even if the PC is switched OFF). The software itself does not set any limits as to how many data sets can be transferred to PC.

Features of the base station

- Receives and displays the WWVB radio controlled time and date
- Display of extensive weather data, in all cases with programmable alarm functions for certain weather conditions as well as records of all minimum and maximum values along with time and date of their recordings
- Indoor and outdoor temperature displays in degrees Fahrenheit or Celsius (user selectable)
- Indoor and outdoor relative humidity displays
- Air pressure reading in inHg or hPa, absolute or relative (user selectable)
- Detailed display of rainfall data in 1 hour, 24 hours, total since last reset (user selectable in mm or inch)
- Wind speed in mph, km/h, m/s, knots or Beaufort (user selectable)
- Wind direction display with LCD compass as well as numerical (e.g. 225°) and abbreviated characters (e.g. SW)
- Wind chill temperature display
- Dew point temperature display
- Weather forecast display by weather icons (sunny, cloudy, rainy)
- Weather tendency indicator
- Storm warning alarm
- LED back light
- Simultaneous display of all weather data with individual settings by the user
- COM port for easy connection to your PC
- All the weather data from the base station and up to 175 sets of weather history data with user adjustable measuring intervals can be recorded and uploaded to your PC

H. Physics Education Research Group (PERG)

The Physics Education Research Group is a combined effort of the Physics Department and College of Education's Graduate Science Education Department to study the learning and teaching of physics at all levels from elementary school to the graduate level. Our program focuses include both qualitative and quantitative research and adaptation to local Philippine needs.

Physics Education Research Group (PERG) employs teaching laboratories at the 4th floor of St. Joseph building for its research. Displayed below are some actual researches done in these laboratories.

PHYSICS DEPARTMENT POLICIES, OFFICE FORMS AND DOCUMENTS

Permit to Overstay in Campus

De La Salle University

PERMIT TO OVERSTAY IN CAMPUS

(Valid for at most 2 consecutive nights only)

TO : SECURITY OFFICER

THRU: _____
Associate Vice Chancellor for Campus Development

FROM: _____
Chairperson, _____ Department

THRU: _____
Dean, College of _____

For the purpose of _____, the following faculty/student(s) of the

_____ department is/are authorized to stay in _____
(Bldg./Room)

on _____ and _____ from _____ to _____
(date) (date) (time) (time)

By seeking authorization to overstay, the student(s)/faculty named below acknowledge that clinic hours are from 7:00am to 9:30pm on Monday to Friday and from 7:00am to 7:00pm on Saturday.

	NAME	ID NO.	DEGREE PROGRAM (for students only)	Contact Number(s)
1.				
2.				
3.				
4.				
5.				
6.				
7.				

(use another sheet if necessary)

The Faculty In-Charge/Responsible:

_____ _____ _____
(Printed Name) (Signature) (Designation)

Thesis Adviser: _____ _____
(Printed Name) (Signature)

Borrower's Form

Request to Borrow

Date _____
Borrower's Name _____
ID No. _____
Adviser's Name _____

List of Equipment:

_____
_____
_____
_____
_____

Dates of Usage _____
Where will the equipment be stationed?

_____
==========

Borrower's Commitment:
I will be accountable to any damage incurred in the equipment and will return the equipment promptly and in the same working condition it was borrowed.

_____
Signature of Borrower
==========

Approved by:

_____
Physics Laboratory Coordinator

Remarks:

_____
_____
_____

Physics Department, College of Science

De La Salle University - Manila

Policies and Practices of the Physics Department

FOREWORD

Welcome to De La Salle University – Physics Department. We hope that this guide will orient you to the way we do things and ease your way to becoming part of the community of physicists on this miniscule (4 hectares or so) locality of the universe.

Table of Contents

1. *Class Hours*

- One trimester consists of 14 weeks. Final exams are scheduled on the 14th week.
- Lecture classes are normally held in one-hour sessions on MWF schedule or one-and-a-half-hour sessions on TH (T stands for Tuesday and H for Thursday). There is a 10-minute break between classes to allow students and faculty to move from one class to another. Classes starts at 7 am on MWF and 8 am on TH. Graduate classes are typically held weeknights and on Saturdays.
- Laboratory classes are held on a 3-hour period. You will be paid 2 units for a 3-hour lab class while students get 1 unit credit.
- Wednesday 1240-1430 is designated the university break, and is time reserved for student activities, you may not hold classes (alternative, make-up or exams) during the period.

2. *Class Sizes*

- Minimum class size is 15 for undergraduate, 8 for master's and 6 for PhD courses. If class size is less than minimum, it is either dissolved or converted to special class. Only on exceptional cases are they retained as regular class.
- Compensation for regular classes are based on the number of units while for special classes, you will be paid 60% of what all your students paid (without exceeding what you would have earned if the class is considered a regular class) – released at the end of the term.
- Typically, special classes are held on consultation basis. For "good-sized" special classes however, the chair/vice chair will ask you to meet the class regularly.
- Maximum class size for freshmen blocks is 43, and 40 for upper-class sections. When class size exceeds maximum, you will be paid special-class rate for the extra students at the end of the term. Class sizes however do not exceed 45.

3. *Teaching Load*

- Teaching load are assigned according to seniority (rank), with full-time faculty taking precedence over part-timers.
- Part-time faculty are asked for their available schedule. Full-time faculty must accept the load assigned to them (Chair and vice chair will always strive to give a reasonable schedule).
- Maximum teaching load for part-timers is 12 units. Regular load for full-timers is 12, but they may get deloading for research and administrative work.
- From time-to-time, full-timers may be given an overload, but this cannot exceed 3 units. Compensation for overload is based on a per unit rate.
- Typical number of preparations is 3. Full-time faculty may however be assigned a 4th preparation, for which a premium is given.
- Regular graduate classes are given a premium equivalent to 1/6 of the units.

4. *Pigeonholes, Cabinets and Work Area*

- Each faculty is assigned three pigeonholes. The one outside are for course cards, the one in the front the office are meant for student reports, and the one at the back is for correspondences and sensitive documents.

- Each full-time faculty is assigned a desk and an amount of storage space. The work area of part-time faculty are on the long desks at the front-end of the office (opposite secretary's desk). Each part-time faculty is assigned a slot in the cabinet near their work area.

5. *Faculty Attendance*

- Full-time faculty are required a 40-hour residency but part-timers are expected to report only for their classes, consultation hours and pertinent university / college / department activities. Class preparation, research and consultancy are included in the 40-hour residency, and these may be done off campus. Overall, a full-time faculty is required to spend 25 hours of their "residency" in campus.
- Faculty attendance is checked by staff from the Registrar's Office. Report of absence/tardiness is given to you, and to the department chair. Please report discrepancies in the attendance report directly to the Registrar's office by returning the Absence Report with your clarification.
- Habitual absenteeism/tardiness is sufficient ground for non-rehiring of part-time faculty and non-renewal of probationary full-time faculty. Permanent faculty may be reprimanded for habitual absenteeism, and repeated reprimands can lead to termination.
- For more details, please consult the Primer on Faculty Attendance on the intranet.

6. *Make-Up/Substitution*

- You are expected to make up for ALL absences. Make-up form or *faculty attendance form* (Form No. F-01 in pink form) must be submitted to the Registrar Front Desk at least a day before the make-up schedule. You can download the e-form from the web site with URL -> http://www.dlsu.edu.ph/offices/registrar/pdf/default.asp
- If you have un-made-up absence in a trimester, the trimester will not be counted towards the number of terms of service, for the purpose of promotion / reclassification.
- Before scheduling make-up class for laboratory, please check availability of rooms with the laboratory technicians. Make-up for laboratory classes should be scheduled within the regular working hours, and should not entail overtime for the technicians.
- If you anticipate an absence, you may fill up a make-up form ahead of time. You may also ask the department chair/vice-chair to assign a substitute, especially for extended absences.

7. *Conduct in Class*

- De La Salle University operates on a trimestral system. As such, every session counts. You are expected to conduct classes from the first meeting onwards. Please make sure that students understand the Course Syllabus and Policies at the start of the trimester.
- You must make full use of class hour and not dismiss your classes early. Nor should your classes be dismissed late, as another class will most likely be using the room next.
- Do not admit students who are not in your class list. According to the university's legal counsel, a student who attended class for at least 6 weeks will be entitled to a grade, whether enrolled or not.

- As a courtesy to your fellow faculty, please do not forget to erase the board at the end of your class.
- Students are required to have their cell-phones turned off during class. It is therefore imperative that you refrain from using your cell phone during class, including lab classes (especially texting).

8. *Syllabi*

- Departmental syllabi are prepared for most service courses. You are supposed to follow these.
- For major courses, faculty assigned must prepare the syllabus before the start of the term and submit an electronic copy to the chair through email. Syllabus must include the approved minimum content requirement for the course.
- Copies of course syllabi may be downloaded through the network neighborhood from pcsys2433\syllabi.
- Questions regarding the conduct of the course should be addressed to the course coordinator for the trimester.
- Photocopying/mimeographing of syllabi are charged to the Registrar's office.

9. *Course Materials*

- Textbooks and manuals are prescribed by the department for most service courses. You should adopt the same material.
- Recommendations of textbooks for adoption are made by the course core group and approved in departmental meetings.
- Textbooks for major courses are determined by the faculty assigned.
- The department tries to secure complimentary copies of textbooks for faculty use. It is however not obliged to do so. In the old days, faculty used to buy their own books and there is no reason why you should not do so now if complimentary books are not available. The department does not buy books for the exclusive use of a faculty.
- Laboratory manuals may be borrowed from the physics supply room, and should be returned at the end of the term.
- The department maintains a small library from books donated by friends and publishers. These books are for faculty use only. Please do not forget to log in when borrowing and do not forget to return borrowed items.
- Some solutions manuals and test banks are available with the chair. Borrowers must make sure that the test banks are secure and are not accessible to students.
- Some transparencies are available in the steel cabinet opposite the secretary's desk. Please do not forget to return them after use.
- Preparation of transparencies is not funded by the department. You will typically have to shoulder the cost unless you get funding from the College Research Fund for a materials development project.
- Cost of reproducing instructional materials should be shouldered by the students.

10. *Preparing for Class*

- You are advised to go to your classroom before class-time, and not leave the office when the class-time starts.

- If you are teaching laboratory classes, it is advisable that you first do the experiments yourself ahead of class time. You may go to the physics supply room and get the technicians' assistance.
- Demonstration equipment may be borrowed from the physics supply room for use in either lecture/laboratory classes.
- All classrooms are equipped with overhead projectors. You may however need to check ahead of class time if the one in your room is functioning.
- There are big television sets that can be used for video viewing, and powerpoint presentations (if you borrow a data converter). One multimedia projector is also reserved for the department at the library. Reservations can be made at the IMS (first floor of the library, intercom 624).

11. *Classroom Management*

- Unacceptable student behaviors are listed in the Student Manual. You may send a student to the Discipline Office for any misconduct.
- Students caught cheating are typically given either a zero for the exam, a grade of 0.0 for the course and/or reported to the Discipline Office, depending on the judgement of the faculty.

12. *Student Consultation*

- Full-time faculty are required to have 10 hours of consultation a week for every 12-unit load. Part-timers are expected to have at least 15 minutes of student consultation per week for each class.
- Student consultation are held on the long table near the front-door of the office (near secretary's desk).
- Area at the back of the office (J-402) is the theory room. If the theory group is not using it, you may use it for small meetings or special classes. In consideration of the theory group, please refrain from using the area for student consultation.

13. *Alternative Classes*

- From time-to-time, you may conduct your class outside class hours and outside your classroom by engaging in activities related to the subject (e.g. field trips, film-showing).
- When conducting class outside class hour, or in another classroom, transfer of class form (same as make-up form) must be submitted at least a day before.
- When conducting out-of-campus or overnight activities, students must be asked to submit waiver forms. Take note though that waiver forms do not relieve you of your legal responsibilities for the students' welfare off-campus/overnight. While they serve no legal purpose, they are a good way of ensuring that parents at least know about the off-campus/overnight activity.

14. *Laboratory Safety*

- Laboratory safety procedures must be discussed with student at the beginning of the trimester.

- Laboratory instructors should not leave students alone while doing the activities. You must stay in the laboratory as long as students are in the room, as you are accountable for unfortunate incidents that may happen.
- In case of unfortunate incidents, first aid kits are available in the laboratory rooms and the supply room. Ask the assistance of the laboratory technicians.
- Lock the laboratory doors after you dismiss your class.

15. *Long Examinations*

- The decision to have departmental exams (including finals) is arrived at through the consensus of ALL faculty handling the course on the particular trimester.
- The department shoulders the reproduction cost of long examinations only. Final examination reproduction cost is charged to the Registrar's Office.
- Multiple-Choice answer sheets for 30- and 50-items are available in the steel cabinet opposite the secretary's desk.
- Photocopying is usually done for one-class exams and mimeographing for multiple-class exams.
- You may ask the secretary to type and collate your exam, but allowances should be made for the other responsibilities of the secretary. The secretary may also be asked to do the photocopying/mimeographing errands.
- For documentation purposes, electronic copy of all examinations must be submitted to the chair via email.

16. *Final Examinations*

- Only a few select courses (e.g. seminar courses) are allowed to have no final exam. Final Exams however need not be written, they can be oral or practical.
- The schedule for final exams is prepared by the vice-deans of the different colleges. It is possible that some students will have conflicts in their final exam schedules. In such cases, the following prioritization scheme applies:

  A. departmental over non-departmental exams

  B. if not resolved by A, part-time faculty over full-time faculty

  C. if still not resolved by B, seniority (faculty rank)

  D. if still unresolved, age of faculty

- Exemption of students from final exams is <u>not</u> practiced for engineering, science and computer studies students. For liberal arts and business students, guidelines for exemption must be clearly articulated at the beginning of the trimester.

17. *Proctoring*

- Assignment of proctoring for final exams is based on your teaching load. During final exams, other faculty may be asked to proctor for your class, and similarly, you may be asked to proctor in the classes of other faculty.
- Those who proctor during departmental exams will have reduced proctoring load during the finals. To ensure this, course coordinators will furnish the chair/vice-chair with the list of those who proctored during departmental exams.

- If your assigned proctoring schedule conflicts with your other schedule, be sure to communicate this to the chair/vice-chair/course coordinator right away so adjustments can be made. Failure to proctor assigned class is a grave offense.

18. *Submission and Change of Grades*

- Submission and change of grades are done online. It is important that you secure your email account with the ITC as soon as you can.
- Double-check your entries on the online grading page before submitting. It is advisable that after entering the grades, you just save it and postpone submission until after your course card distribution schedule. On the deadline for submission of grades, all saved files will be deemed as submitted.
- In case of any errors in submitting grades, change of grade forms must be secured from your online web account. This requires signatures from Chair, Dean, VPAR and EVP, depending on how soon the change of grade form was submitted.

19. *Salaries and Clearances*

- Salaries for part-timers are given every two weeks, and for full-timers on the 10th and 25th of the month.
- For new faculty, salary for the first few weeks is based on the lowest level of the recommended rank until the hiring board convenes and determine the appropriate rank and level.
- New faculty should submit TIN and SSS numbers, and fill up tax information form at the Accounting office as soon as possible.
- Full-time faculty must open a savings account at UCPB Vito Cruz for the remittance of their salary.
- Temporary ID for new faculty can be secured from the EVP office.
- The last pay of part-time faculty is withheld until clearances from the department, library and University Registrar are released. To secure departmental clearance, (1) all borrowed items must be returned, and (2) computation of grades for all classes handled (preferably in electronic form) must be submitted to the chair.

20. *Supplies*

- Faculty are expected to be judicious in their use of department supplies.
- Chalk and erasers are provided by the Registrar's office. These are placed near the secretary's desk.
- Ballpens and pencils are provided by the department. You may ask the secretary for your supply. No definite allotment is provided for these items but you are expected to get only what you need for instruction.
- Bond paper and other supplies are generally for instructional and official correspondence use only. These are available inside the Chair's cubicle. You are expected to provide your own supplies for your studies, and for research, supplies may be obtained from your research group.

21. *Facilities*

- Research Labs are under the care of the respective research groups, permission to use must be secured from the corresponding research group head.
- Computer facilities in the office are for faculty use only. Considering that confidential files (like exams) are stored in their hard disks, please refrain from allowing your students or your friends to use the facilities.
- When computers or other laboratory equipment malfunction, please refrain from repairing them yourselves. Report the matter to the ASF's.
- Broken furniture (including blackboards), leaks, smell of gases, faulty wiring in the classrooms or the office should be reported to the physical facilities office at once (intercom 111). Malfunctioning audio-visual equipment must be reported to IMS (intercom 624). Faulty laboratory equipment to the technicians or ASF's.

22. *Overstay/Overnight*

- University facilities (except chapel) are closed on Sundays.
- Generally, you are not allowed to stay in campus after 10 p.m. If you need to stay late or stay overnight, you need to secure an overstay/overnight clearance, signed by the chair, dean and the AVP for Administration. You should keep your copy to show to the guards.
- Department and College administration is not responsible for people who are not with the unit. As such, overnight/overstay permit should include only the names of people belonging to the department (student, faculty, staff) – former faculty & staff, and alumni should be excluded. People belonging to the latter categories should submit a separate written request.

23. *Bringing equipment in and out of campus*

- If you are bringing your own equipment (e.g. computer) into the campus, be sure to fill up the necessary form at the gate. You will need to present this when you bring the item out.
- Department equipment are generally for use in-campus only. If however you need to bring an equipment out, you need to get the permission of the laboratory coordinator and chair, and fill up the necessary form.

24. *Faculty Development and Other Benefits*

- As faculty, you may enjoy certain benefits like scholarships for graduate studies. For details, please consult the faculty manual.

25. *Evaluation*

- Your teaching performance is evaluated by
    1. students, through the ITEO evaluation conducted around the 8th week of the trimester
    2. your peers, assigned by the chair from the pool of faculty. Typically, expect a senior faculty, and a faculty of about the same rank as you are to visit your class. Such visits are not announced.

3. department chair / vice-chair, on unannounced visits.
4. occasionally, the dean.

- Evaluation of teaching performance and attendance are major considerations in promotion/reclassification/renewal, so you should not avoid being evaluated.
- In consideration for your peers, those who are asked to do peer evaluation are urged to exert all effort to comply.
- An average rating (ITEO, Peer, and Chair) of 4.0 or above is required for promotion/reclassification.

26. *Involvement in Departmental Activities*

- As faculty of the physics department, you are part of the physics community of De La Salle University. Even if you are a part-time faculty, you are expected to participate in the department's activities if your schedule permits.

27. *Field Trips or Activities Outside DLSU Campus*

- Faculty member who initiated the field trip or activities outside DLSU campus should coordinate the schedule, the transportation, the security, and field-trip arrangements with the facility providers to ensure the safety of the students during the field trip.
- Faculty member/s is/are required to be present during the field trip event which includes transporting students to/from destination cite from/to DLSU campus.
- If the number of student participants exceeded the maximum allowable class size (around 42 students), extra facilitator/s is/are required to handle each student group with this size limit.
- All requests pertaining to field trip or activities outside DLSU campus should be approved by the Dean of the College of Science. The Dean would require a copy of syllabus that includes the field trip as part of the practical activity of the course.
- Faculty should not allow students to participate without filled-up waiver forms duly signed by the parent/s or guardians. [1]*In case the parent or guardian refuses to sign the waiver form (parents' permission form), then the student may be given a task to accomplish in lieu of the trip.*
- Faculty member should report any untoward incident/s to the proper authorities within the prescribed period set by the authorities.
- Faculty and students should comply with the safety rules and implementing guidelines of the facility providers (party that has control of the facilities).
- Proper attire should be followed during the field trip. Bringing alcoholic beverages and illegal drugs is strictly prohibited.

[1] Chairperson's Manual (section 4.7, last paragraph of page 31)

The Physics Written Comprehensive Examination

The purpose of the Physics Comprehensive Examination is to determine if the Master and Straight PhD student has acquired the knowledge expected of a Master's and Doctoral candidate to advance in the graduate physics program. The Graduate Program Coordinator assigns and form a review committee for the questions to be given in the comprehensive examination by the Physics Graduate Faculty.

Physics Comprehensive Requirement:

- Before a student is allowed to take the physics comprehensive examination, he/she must have passed the four core subjects Classical Mechanics I, Statistical Mechanics, Electrodynamics, Quantum Mechanics I with a grade of 2.0 or better. If the student does not meet the requirement, he/she must re-enroll the core subject to obtain the grade requirement.
- A student who takes the comprehensive examination must obtain a minimum of 50% grade for MS Physics and 75% for straight PhD in the four core subjects (Classical Mechanics I, Statistical Mechanics, Electrodynamics, Quantum Mechanics I) in order to advance to the graduate physics program.
- Students who do not satisfy the passing score for the core subject will be required to re-take the comprehensive examination for that core subject to achieve the passing score required. A maximum of three (3) re-takes are allowed for the said core subject. If the students fails to comply the re-take, he/she will be removed in the said program.

Master's and Straight Phd Degree Option

If a Master in Physics or Straight PhD Physics student has failed the comprehensive examination, the student may petition to the Department Chair or Graduate program Coordinator subject for approval to transfer to the Master of Science in Physics to a Master in Physics (Non-thesis Option) and straight PhD student to Master of Science in Physics. The student must complete all degree requirements for the Master in Physics (Non-thesis option) degree and Master of Science degree in Physics including the comprehensive examination.

Advancement to MS Thesis and PhD Candidacy Examination

Upon completion of the Comprehensive Examination, the Graduate Program Coordinator will notify the student through a letter that he/she will advance to his/her Master's Thesis proposal and candidacy examination for the Straight PhD program. For the regular PhD Physics Program, once the student satisfies the requirements for the PhD Physics program, he/she will be allowed to take the PhD Candidacy Examination (See policies and guidelines for the PhD candidacy Examination). After passing the Candidacy examination, the student will advance to the PhD Dissertation Proposal.

Master's Thesis and PhD Dissertation Proposal

After passing the Comprehensive Examination for the Master of Science in Physics and Straight PhD Physics, and Candidacy Examination for the Regular PhD Physics student, the student must present a Master's in Physics thesis and PhD Physics dissertation proposal to the Thesis/Dissertation Advisor and the Thesis/Dissertation panel members composed of 2 Graduate Physics Faculty of the Physics Department and 1 External Graduate Physics Faculty. The Master's thesis and PhD Dissertation Proposal should include a title/signature page, abstract, preliminary data, experimental design and methods including data acquisition and analyses, and expected results. A Gantt chart should also be included in the section before the list of cited references. When the Master's on Physics thesis and PhD Physics dissertation proposal is in final form, it is submitted to the thesis and Dissertation adviser and panel members three weeks before the said defense.

The grade of the student is Pass with minor revision, Pass with major revision and needs to be cleared by the Chair of the Panel and Fail. If the student fails, he/she is allowed to redefend depending on the comments of the adviser and panel members. If the student fails the third time, he/she will be removed in the said program.

The Master's Thesis and PhD Dissertation Panel members must sign the approved Master's Thesis and PhD Dissertation Proposal Form. This signed form is submitted to the Registrar's Office along with the receipt and thesis/dissertation proposal enrolment form, with the signatures of the Chair of the Physics Department.

Final Master's in Physics and PhD Physics Dissertation Defense

As part of the requirement of the Physics Graduate Program, the Master of Science in Physics and PhD student must publish their work in a reputable publication and presented in a scientific conference before the student defends his/her thesis/dissertation.

When the Master's on Physics thesis and PhD Physics dissertation is in final form, it is submitted to the thesis and Dissertation adviser and panel members one month before the said defense.

When all members of the panel agree, the final defense is scheduled. The request for scheduling of the final defense is submitted to the Physics Department at least one month prior to the defense and announce in the academic community. The student prepares for a one hour oral presentation and presents to the adviser and thesis/dissertation panel. The question and answer follows and the student must successfully defend the thesis/dissertation.

The grade of the students is Pass with minor revision, Pass with major revision and needs to be cleared by the Chair of the Panel, and Fail. If the student fails, he/she is allowed to redefend depending on the comments of the adviser and panel members. If the student fails the third time, he/she will be removed in the said program.

The Master's Thesis and PhD Dissertation Panel members and adviser must sign the approved Master's Thesis and PhD Dissertation final defense form. This signed form is submitted to the Registrar's Office along with the receipt and final thesis/dissertation enrolment form, with the signatures of the Chair of the Physics Department

The Registrar Office provides guidelines on the format of the Master's in Physics thesis and PhD Physics dissertation and all signature pages and forms for notification of the successful

completion of the degree requirements and also the submission of the thesis/dissertation to the library and the Physics Department.

Master's in Physics and PhD Dissertation Sample Evaluation Rubric

1. Rubric for Master's and PhD Physics Oral Presentation				
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

2. Rubric for submitted Master's thesis and PhD Dissertation (hardcopy)				
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 any way address the problem.

TEACHING LABORATORY POLICIES

I. General Policies

A. Smoking, eating, drinking and littering are prohibited in ALL physics laboratories.

B. Students are allowed to stay inside the lab only during lab classes. Only officially enrolled students are permitted inside the lab room during classes.

C. The Physics Stockroom is off limits to students.

D. Use all laboratory fixtures properly. Do not sit on tables and do not open cabinets or lockers unless there is an instruction to do so.

E. Turn off all electrical appliances in the lab if they are not being used. IF YOU ARE THE LAST PERSON TO LEAVE THE LAB, TURN OFF THE LIGHTS AND FANS, LOCK THE DOORS & CLOSE THE WINDOWS.

F. Computers in the physics labs are to be used only for purposes related to experiments performed in the lab. .

G. Maintain the cleanliness of the labs at all times. H. Always observe proper safety procedures in the lab.

II. Borrowing Procedures and Use of Equipment

A. All equipment necessary for physics experiments may be borrowed from the Physics Stockroom at SJ409.

B. Students must present an accomplished EQUIPMENT BORROWING FORM and his/her student 10 before any lab equipment is loaned. Equipment borrowing forms are available at SJ409.

C. Borrow only the equipment which are spe_ified in your experiment or are required by the lab instructor.

D. The borrower and his/her group are held responsible for all equipment borrowed from the Physics Stockroom. Refer to Section IV on the lab policies for breakage, damage or loss of lab equipment.

E. Equipment borrowed must be returned upon completion of the experiment.

III. Lab Safety

A. Students are advised to read all precautionary notes on all equipment before using them. All questions about the safety precautions on the equipment being used must be addressed to the lab instructor.

B. The lab instructor must first check the set-up for experiments requiring the use of electrical components before any of which are plugged in or turned on. In case of faulty equipment, inform the instructor immediately so that a replacement can be secured from the Physics Stockroom.

C. Experiments involving the use of boiling water, heaters and the like, must be performed close to the water sinks in the lab. Take note of the proper safety procedures that must be employed when performing such experiments.

D. Chemicals used in some experiments must be handled with utmost care. Return all used and unused chemicals to the Physics Stockroom as soon as the experiment is finished. Never throw the chemicals onto the water sinks or the trash bins.

E. All injuries, however minor, must be reported to the lab instructor.

F. In case of a minor injury, the instructor and/or the lab technicians may administer first aid. The student will be sent by the instructor to the university clinic accompanied by a person designated by the instructor.

G. If the instructor and/or the lab technicians feel they cannot administer the proper medical treatment, the student must be brought to the clinic immediately, if possible accompanied by a lab technician.

H. In case of fire, use the fire extinguisher located at the hallway.

H.1 Pull the Pin at the top of the extinguisher. The pin releases a locking mechanism and will allow you to discharge the extinguisher.

H.2 Aim at the base of the fire, not the flames. This is important - in order to put out the fire, you must extinguish the fuel.

H.3 Squeeze the lever slowly. This will release the extinguishing agent in the extinguisher. If the handle is released, the discharge will stop.

H.4 Sweep from side to side. Using a sweeping motion, move the fire extinguisher back and forth until the fire is completely out. Operate the extinguisher from a safe distance, several feet away, and then move towards the fire once it starts to diminish. Be sure to read the instructions on your fire extinguisher - different fire extinguishers recommend operating them from different distances. Remember: Aim at the base of the fire, not at the flames.

IV. Special Lab Experiments

A. Special or make-up experiments outside of regular class hours are discouraged.

B. In case of a special or make-up experiments outside of regular class hours, the student has to confirm the availability of the technicians, the equipment and of a lab room before scheduling one with his/her instructor. Special or make-up experiments must only be performed in a lab room.

C. Special or make-up experiments outside of regular class hours will be allowed only upon the approval of the lab instructor. NO SPECIAL OR MAKE-UP EXPERIMENTS will be allowed if the lab instructor cannot be present during the special or make-up experiment.

D. Lab technicians are not required to assist the student during the special or make up experiment.

V. Role of Laboratory Technicians

A. The lab technicians in SJ409 are responsible for the safe keeping and lending of all equipment used in the Physics Teaching Labs.

B. The lab technicians may be requested by the lab instructor to assist during a lab, experiment but they are not required to stay in the lab rooms.

C. Lab technicians are tasked to check the conditions of all equipment that are returned to them. In case of broken, lost or damaged equipment, the technicians are authorized to note down all information about the borrower which will be necessary for proper documentation.

VI. Breakage, Loss and Damage to Lab Equipment

A. Any incident of breakage, loss or damage to any lab equipment must be reported immediately to the lab instructor.

B. The borrower and his/her group members will be responsible for replacement or payment of the broken, lost or damaged equipment.

C. The cost of the damage to the equipment will be assessed by the lab coordinator and technicians and a billing statement will be forwarded to the borrower.

D. Students must pay for, repair or replace the broken, lost or damaged equipment on or before the 1st week of the trimester otherwise; he/she will not be cleared from the lab and will not be allowed to enroll in the following trimester. He/She will also not be given his/her final grade for that lab subject.

E. Once the equipment has been paid for, replaced or repaired, he/she will be issued a clearance by the lab coordinator.

VII. Use of Lab equipment for overnight experiments

A. Only faculty members of the Physics Department are allowed to use lab equipment for overnight experiments.

B. The lab coordinator and lab technicians must be informed in writing, using the appropriate forms, prior to the use of any equipment.

C. The equipment borrowed may only be used in either the Physics Teaching Labs or the STRC Physics Research Labs unless a permission to use the equipment outside the campus had been secured from the lab coordinator.

STRC PHYSICS LABORATORY GUIDELINES

The following guidelines must be followed when doing research at the Science and Technology Research Center Physics Research Laboratories:

AUTHORIZED USERS OF THE RESEARCH LAB

- Only physics students enrolled in their thesis are allowed to use the research laboratories
- The research student must also follow the rules set by each research laboratory

MATERIALS REQUISITION

- After defending their thesis proposal, students must immediately submit their "Materials Requirement", noted by the adviser, to the laboratory coordinator
- The physics laboratories provide a limited amount of chemicals and supplies for students enrolled in thesis course
- Thesis students may course their request for chemicals and supplies through the Academic Service Faculty. Materials requisition must be entered in the corresponding log book.

INSTRUMENT USAGE

- To use an instrument outside the physics teaching laboratory, the faculty or student must first fill up the Request to Borrow form. The prospective borrower must specify the dates of usage. All request are subject to the approval of the physics laboratory coordinator.
- After securing the approval of the laboratory coordinator, the student or faculty must present the Request to Borrow form to the ASF or technician in charge. Borrower must then fill up the Borrower's slip (Accounting Form No. P-102)
- Failure to return the equipment on time means suspension of borrowing privileges. Loan renewal can only be done after the technicians and ASF have had sufficient time to check the condition of the equipment.
- Fees will be collected for the use of specialized equipment.

BREAKAGES

- If the equipment is damaged or broken, the borrower must immediately report to the laboratory coordinator, who shall then conduct an investigation. The investigation report will be submitted to the department chair, who together with the laboratory coordinator shall determine accountability for the breakage and the corresponding action to be taken. A copy of the report shall be filed by the ASF accountable for the equipment.
- Broken or damaged equipment must be labeled immediately by the technician or ASF after it is reported.

OVERNIGHT

- Only thesis students with an overnight permit, and accompanied by a faculty, will be allowed to stay overnight in the research laboratory.

EATING AND DRINKING IN THE LABORATORY

- Eating and drinking are not allowed inside the research laboratories.

LAB GOWNS and GOGGLES

- Students must wear laboratory gowns and goggles when conducting an experiment

LABEL OF SET UP

- All set-ups and materials used in the research laboratory must be properly labeled. Unlabeled materials will be discarded or returned to the stockroom.

CLEANLINESS

- Maintain cleanliness in the research laboratories.

WASTE DISPOSAL

- Trash can and waste containers are available for the disposal of various forms of waste
- Chemical waste should be put in appropriate containers for proper disposal.

SHUTDOWN

- Before leaving, make sure that everything is in order; gas and water lines must be turned off and equipment used must be properly shutdown or unplugged.

TRANSITORY PROVISION

- All equipment borrowed before June 15 must be returned immediately for inventory.