



Master of Science in Physics

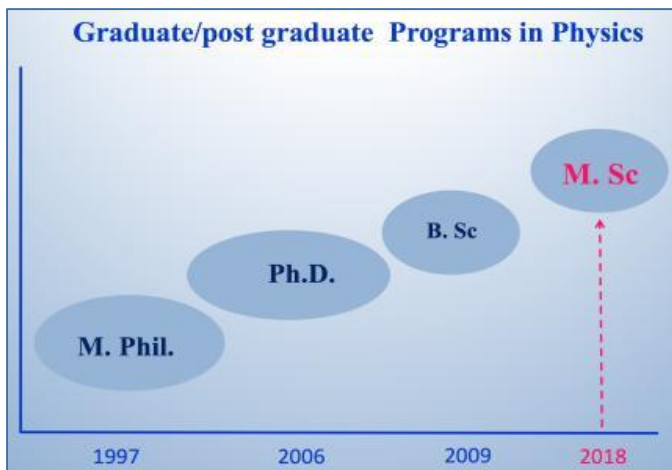
Department of Natural Sciences

School of Science

Kathmandu University

Introduction:

Department of Natural Sciences at the School of Science based in Dhulikhel is one of the four Departments under the School offering both basic and applied programs in the field of Physics, Chemistry, Biology and Mathematics. Our focus has been on both technical and professional level courses with proven quality through a consistent track record of graduate job placement as well as admission into post graduate studies abroad. We had introduced graduate level programs in Physics with M.Phil. in 1997 and Ph. D. in 2006, and Applied Physics (Undergraduate Program) in 2009.



Now that we have good numbers of students who have completed undergraduate level programs in Physics and seeking higher level education in the country, Department of Natural Sciences is introducing M.Sc. program in Physics effective from September 2018. This program is designed to give students an up to date knowledge of recent trends in Physics. The curriculum has been so designed as to impart skills to the students in the domains of theoretical, experimental and applied physics. The main objective of the program is to produce human resource with skill in teaching and potential in research. The department maintains close association with the other departments under school of science & engineering providing excellent opportunities for interdisciplinary study

and research. Low student to teacher ratio provides close interaction between students and faculty that facilitates responsiveness to the needs of each students. Students will have the opportunity to demonstrate skills appropriate to graduate-level physics, including conceptual problem-solving ability, proficiency in theoretical or experimental project design, and expertise in employing computer software. They will also have enough opportunity to develop their technical communication skill through writing and oral presentations as an integral part of the curriculum. This program also aims to gain regional and international recognitions by providing high quality of physics



Block-6: School of Science

education and research publications at technical reports, conference proceedings and peer reviewed journals.

Career Opportunity:

Our MSc graduates are prepared to start their career in various specialties of applied physics such as biophysics, plasma physics, medical physics, material science, areas such as optical or nuclear engineering, computer science, meteorology, photonics and nano materials. Additionally, entering into this program will also open the door to research positions in industrial or in the Governmental sectors, and for teaching positions at higher levels.

Current Status:

The Department has now 10 well qualified faculties who have been trained in teaching as well as research. Among them four faculties have Ph.D. and two with M.Phil. (Ph.D. in progress) with their specialization in different areas of Physics. Our laboratories offer facilities for general, advanced and specialized experiments in Physics. The general laboratory is meant for undergraduate students of Applied Science and engineering programs. The advanced laboratory is designed for students of Applied Physics. The specialized laboratory was established in 2005 which consists of research facilities in low temperature non-thermal plasma. This laboratory is first of its kind in Nepal. As of 2018, 3 Ph.Ds, 9 M.Phils. and dozens of undergraduate & graduate students have completed their research work in the laboratory. This laboratory has won national and international recognition through grants for conducting research in plasma physics and material science. At present, there are two Ph.Ds. two M.Phil. level scholars conducting their research work. In addition to that few M.Sc. level students from other institutions have also been using the facility for the Master's thesis in Physics.

Course Structure:

The course of the MSc in Physics program is designed to provide both theoretical and practical knowledge in various disciplines related to Physics. Students are required to complete a total of 16 courses of 51 credits along with 9 credit of dissertation in the final semester making a total of 60credits altogether.

The curriculum of MSc in Physics program is offered in four semesters are as follows:

Semester I

Course code	Course Title	Credit
PHYS 501	Mathematical Physics-I	3
PHYS 502	Classical Mech. & Relativity	3
PHYS 503	Quantum Mechanics-I	3
PHYS 504	Electrodynamics Theory	3
PHYS 511	Renewable Energy	3
PHYS 541	Lab-I	3
Total Credit		16

Semester II

Course code	Course Title	Credit
PHYS 505	Mathematical Physics-II	3
PHYS 506	Statistical Physics	3
PHYS 507	Quantum Mechanics-II	3
PHYS508	Condensed Matter Physics-I	3
PHYS 512	Biophysics	3
PHYS 542	Lab-II	3
Total Credit		16

Semester III

Course code	Course Title	Credit
PHYS 601	Condensed Matter Physics-II	3
PHYS 602	Atomic and Molecular Physics	3
PHYS 603	Optics & Photonics	3
PHYS 611	Plasma Physics	3
PHYS 612	Computational Physics	3
PHYS 641	Lab-III	3
Total Credit		16

Semester IV

Course code	Course Title	Credit
PHYS 63*	Electives	3
PHYS 699	Project Work	9
Total Credit		12

Elective Courses

Course code	Course Title	Credit
PHYS 631	Physics of Nanomaterial	3
PHYS 632	Particle Physics *	3
PHYS 633	Medical Physics	3
PHYS 634	High Performance Computing	3
PHYS 635	Engineering Physics	3
PHYS 636	Instrumentation	3
Total Credit		16

● Course of Applied Physics.

● Practical Courses

* Experts from CERN support in this course through online lectures.

Teaching Methods:

Kathmandu University's education places an emphasis on innovative modes of learning, involving the students in problem-solving techniques by facilitating them to apply their knowledge and effort towards real-world situations through field-based and practical learning sessions. Students will have an opportunity to tap their genuine potential and promote themselves in developing the learning skills for achieving the goal, attaining total educational behavior change. The min teaching tools are lectures, oral presentation, class discussions, field visits and case studies. Students will be motivated for group discussions, project presentation, seminar and workshop organization, research conduction, dissertation writing and presentation.



Evaluation:

Evaluation is based on continuous assessment. Students are evaluated through class participation, assignments, practical and project works, term papers, end-semester examination and defense of dissertation. At the end of each semester, students are awarded letter grades as per following grading system.

Grade	A	A-	B+	B	B-	C+	C	F
Grade Point	4.0	3.7	3.3	3.0	2.7	2.3	2.0	0

In order to complete M.Sc. degree, students are required to maintain a minimum of 3.0 Cumulative Grade Point Average (CGPA). No student is allowed to graduate with 'F' in any particular course. The maximum time allowed to complete the course is five-year from the date of admission into the program.

Eligibility for Admission:

To be admitted, prospective students of Master of Science in Physics program must:

- Have 16 years of schooling with undergraduate level major in Physics.
- Hold a certified Bachelor's degree in Physics or relevant from a recognized university with minimum of 50% marks in aggregate.
- Pass the screening process which will be conducted by the Department.
- Have an English proficiency of intermediate level or higher, and
- Provide CV and cover letter requesting the entry to the Master of Science in Physics program.

Admission:

Admission is based on the academic promise of applicants as indicated by their academic records, recommendations, score on screening process and personal interview.

The M.Sc. programs have an annual admission policy with students admitted in the fall semester (September). Application forms are available at the Office of the Head of the Department, Department of Natural Sciences, School of Science, Dhulikhel, Kavre, or online at the Kathmandu University website.

Facilities:

- KU library has a collection of more than 45,000 books, 160 national and international journals, 1100 CD-ROMS, 200 video and 75 audio cassettes.
- GIS lab and computer lab with all time e-mail and internet, and printing facilities.
- Separate hostels for boys, girls and research scholars.
- Canteen and sports facilities are available within the university



General Physics Lab



Plasma Physics Lab



KU Library

Research Activities:

With four Ph.D. holders among the faculty, the Department of Natural Sciences (Physics) is especially strong in the area of plasma physics and material science. Faculty members are directly or indirectly involved in different national and international grant-funded research. Research grant which were awarded are:

1. University Grants Commission (UGC) of Nepal for the Study of Refractive Index of Liquids (2004).
2. Third World Academy of Science (TWAS) for a project work on Fabrication and characterization of Al^{3+}/Er^{3+} ion doped thin films as anode materials for white light emitting diodes (2007 and Renewed in 2010).
3. International Foundation for Science (IFS) for a project work on Development of dielectric barrier discharge unit

for the purification of water (2008 and Renewed in 2011).

4. UNESCO Grant to conduct the Eleventh UNESCO workshop on Active Learning in Optics and Photonics, July 11-16, 2009, Kathmandu University, Dhulikhel, Kavre.
5. UNESCO Grant to conduct the sixteenth follow up workshop (2011).
6. Support from CERN to conduct regional workshop on High Energy Physics (2017).
7. Support from CERN to establish High Performance Computer is in progress.



South Asian High Energy Physics Detector Technology and Applications (SEPIA) Kickoff Workshop in partnership with CERN

on **20-21 June**
at **Kathmandu University, Dhulikhel, NEPAL**

Scientific Program & Contributions
A review of the status, operation of the present facilities, scientific experimental program and upgrades planned for the next few decades at CERN, along with an overview of societal applications of state-of-the-art technologies will be presented. The scientific community of the South Asian member countries are invited to present highlights of their ongoing experimental programs in collaboration with CERN and other scientific international megaprojects. Students from South Asian countries will have the opportunity to present talks and posters. One student each from these countries will be sponsored by CERN. The two-day program will consist of a festive plenary and poster sessions.
Workshop website: <https://indico.cern.ch/event/625575/>

International Organizing Committee
Charlotte Warakulle (CERN), Emmanuel Tsesmelis (CERN), Archana Sharma (CERN), Sivog Shreshtha (CERN/Ohio), Abha Eli Phoboo

Local Organizing Committee
Deepak Prasad Subedi (Chairperson), Raju Khanal, Jyoti Devkota, Ujjwal Man Joshi, Rajendra Adhikari, Navendra Fossel, Bharat Kumar Shrestha, Mahendra Nirmita, Rajesh Manandhar