

Department of Physics

Introduction

The Department of Physics is the oldest Science Department imparting scientific knowledge at the Postgraduate level, here at GCU. We take pride in the contributions of Ravian Physicists towards the prosperity and national security of Pakistan. The old students of the department occupy positions of eminence at national organizations of science and technology, like the Pakistan Atomic Energy Commission (PAEC), Kahuta Research Laboratories (KRL) and many are serving abroad. Our alumni have received 45 Civil Awards, which is the highest number of Civil Awards won by physicists from any educational or research institution in Pakistan. Keeping in view this history of excellence, we hope that the new graduates will keep up the traditions of the department by outshining other institutions in the years to come.

Academic Programmes

The Department of Physics offers following degree programmes:

1. BSc (Hons) in Physics
2. BSc (Hons) in Electronics
3. MPhil in Physics
4. PhD in Physics

Research Programmes

The department is actively engaged in carrying out theoretical as well as experimental research.

Facilities

For the success of above mentioned Programmes, all necessary facilities are provided in the department. We have a highly qualified faculty, modern research laboratories, State-of-the-Art Seminar Hall, up-to-date library, internet facility, etc.

Research Laboratories

There are several well equipped research laboratories to carry out research work in Plasma Physics and Technology, Nano-materials, Concrete and Ceramic, Materials Science, Electronic Control Systems and Radiation Physics. These laboratories are publishing their research work in international journals.

Theoretical Research

Groups are actively engaged in the research problems related to Theoretical Plasma Physics, Space Plasmas, Laser Matter Interaction, Particle Physics and Radiation Physics.

Research Groups

The Department has the following Research Groups:

1. Theoretical Plasma Physics
2. Experimental Plasma Physics
3. Materials Science and Nano-technology
4. Nuclear Structure and Data Analysis
5. Intense LASER-atom Interaction
6. Particle Physics
7. Control System
8. Semiconductor device Fabrication and modeling
9. M.E.M.S. (Micro Electro Mechanical systems)

Salam Chair in Physics

Salam Chair in Physics was established by the Federal Government of Pakistan in 1999 and named after Dr. Abdus Salam, the Nobel Laureate (1979), the Old Ravian (1942-46) and later Professor of Mathematics (1951-54). The Chair was set up

to promote and enhance research activity in Physics at GCU Lahore. Dr. G. Murtaza (SI) HEC Distinguished National Professor is currently the Salam Chair Professor.

Future Prospects

A Higher Degree in Physics opens up new avenues of development for students. They can become scientists, researchers, teachers, etc.

BSc (Hons) Physics		
Year-I		
Semester-I		
Course Code	Course Title	Credit Hours
PHY-1101	Mechanics	2
PHY-1101P	Lab-I	1
Semester-II		
Course Code	Course Title	Credit Hours
PHY-1201	Waves and Oscillations	2
PHY-1201P	Lab-II	1
Year-2		
Semester-III		
Course Code	Course Title	Credit Hours
PHY-2201	Electricity and Magnetism	2
PHY-2101P/ PHY-2201P	Lab-III/ Lab-IV	1
PHY-2202	Geometrical and Physical Optics	2
Semester-IV		
Course Code	Course Title	Credit Hours
PHY-2203	Modern Physics	2
PHY-2101P / PHY-2201P	Lab-III/ Lab-IV	1
PHY-2101	Heat and Thermodynamics	2
Year-3		
Semester-V		
Course Code	Course Title	Credit Hours
PHY-3101	Quantum Mechanics-I	3
PHY-3102	Mathematical Methods – I	3
PHY-3106	Classical Mechanics-I	3
PHY-4102	Computational Physics	3
PHY-3103	Electromagnetic Theory-I	3
PHY-4102P	Lab – V	3



Semester-VI		
Course Code	Course Title	Credit Hours
PHY – 3201	Mathematical Methods-II	3
PHY – 3202	Electromagnetic Theory– II	3
PHY – 3206	Classical Mechanics-II	3
PHY – 3204	Quantum Mechanics – II	3
PHY – 4104	Statistical Physics	3
PHY- 3205P	Lab – VI	2

Year-4

Semester-VII		
Course Code	Course Title	Credit Hours
PHY – 4101	Solid State Physics I	3
PHY – 4103	Atomic & Molecular Physics	3
PHY – 3203	Nuclear Physics	3
PHY –	Elective-I	3
PHY –	Elective-II	3
PHY – 4299	Research Project	3

Semester-VIII

Course Code	Course Title	Credit Hours
PHY – 4201	Experimental Techniques	3
PHY – 4203	Solid State Physics – II	3
PHY – 4105P	Lab-VII	3
PHY – 4299	Research Project	3

Elective Courses

Course Code	Course Title	Credit Hours
PHY-4204	Particle Physics	3
PHY-4205	Plasma Physics	3
PHY-4206	Material Science	3
PHY-4207	Cosmology and Relativity	3
PHY-4208	Laser Physics	3
PHY-4209	Simulation	3
PHY-4210	Fluid Mechanics	3
PHY-4211	Special and General Relativity	3

BSc (Hons) Electronics

Year- I (Semester I)

Course Code	Course Title	Credit Hours
ELE-I 101	Circuit Analysis	2
ELE-I 101P	Circuit Analysis	1

Semester II

Course Code	Course Title	Credit Hours
ELE- I201	Basic Electronics and Circuits	2
ELE- I201P	Basic Electronics and Circuits	1



Year-2		
Semester III		
Course Code	Course Title	Credit Hours
ELE-2101	Analog Devices and Circuits I	2
ELE-2101P	Analog Devices and Circuits I	1
ELE-2102	Modern Physics	3

Semester IV

Course Code	Course Title	Credit Hours
ELE-2202	Analog Devices and Circuits II	3
ELE-2202P	Analog Devices and Circuits II	1
ELE-3104	Digital Electronics	2
ELE-3104P	Digital Electronics	1

Year-3

Semester V

Course Code	Course Title	Credit Hours
ELE-3101	Algorithm & Programming	3
ELE-3102	Quantum Mechanics	3
ELE-3103	Mathematical Methods-I	3
ELE-3105	Transducers & Instrumentation	3
ELE-3105P	Transducers & Instrumentation	1
ELE-3106	EMT-I	3

Semester VI

Course Code	Course Title	Credit Hours
ELE-3201	Signal & System	3
ELE-3202	EMT-II	3
ELE-3203	Power Electronics	3
ELE-3203P	Power Electronics	1
ELE-3204	Microprocessor, Micro Controller and Programming	3
ELE-3204P	Microprocessor, Micro Controller and Programming	1
ELE-3205	Electronic Communication	3
ELE-3205P	Electronic Communication	1

Year-4

The Students have to select two Elective Courses in semester VII & VIII

Semester VII

Course Code	Course Title	Credit Hours
ELE-4101	Digital Signal Processing	3
ELE-4101P	Digital Signal Processing	1
ELE-4102	Microprocessor Interfacing Techniques	3
ELE-4102P	Microprocessor Interfacing Techniques	1
ELE-	Elective-I	3
ELE-	Elective-II	3
ELE-4299	Project/internship	3



Elective Courses list for Semester VII		
Course Code	Course Title	Credit Hours
ELE-4103	Artificial Intelligence	3
ELE-4104	Digital Circuits Design by VHDL	3
ELE-4105	Microwave Electronics	3
ELE-4106	Optical Electronics	3
ELE-4107	Medical Electronics	3
ELE-4108	Object Oriented Programming & Data Structure	3

Semester-VIII		
Course Code	Course Title	Credit Hours
ELE-4201	Control Systems	3
ELE-4201P	Control Systems	1
ELE-4202	Industrial Electronics & Robotics	3
ELE-4202P	Industrial Electronics & Robotics	1
ELE-	Elective-III	3
ELE-	Elective-IV	3
ELE-4299	Project / Internship	3

Elective Courses list for Semester VIII		
Course Code	Course Title	Credit Hours
ELE-4203	Machine Learning & Evolution	3
ELE-4204	Image Processing	3
ELE-4205	Data Communication & Networks	3
ELE-4206	Embedded System Design	3
ELE-4207	Biomedical Instrumentation	3
ELE-4208	GUI Programming	3
ELE-4209	Solid State Electronics	3

Note: Courses can be shuffled in the last four semesters according to the availability of teachers



MPhil - Physics		
Year-I		
Year I covers 24 credit hours of teaching. Students will opt four courses in each semester. Courses can be placed in semester I or II according to the availability of the teaching faculty.		

Semester-I		
Course Code	Course Title	Credit Hours
PHY-7101	Plasma Physics	3
PHY-7103	Advanced Mathematical Techniques in Physics (Compulsory Course)	3
PHY-7104	Non-Linear Waves & Solitons	3
PHY-7105	CMOS Device and Technology	3
PHY-7203	Materials Science	3
PHY-7215	Statistical Physics	3
PHY-7216	Advanced Electromagnetic Theory (Compulsory Course)	3
PHY-7218	Nuclear Physics & Nuclear Data Applications	3

Semester II		
Course Code	Course Title	Credit Hours
PHY-7102	Metal Physics	3
PHY-7201	Atomic & Molecular Physics	3
PHY-7202	Advanced Plasma Physics & Controlled Fusion	3
PHY-7204	Nonlinear Dynamic & Chaos	3
PHY-7205	Experimental Techniques	3
PHY-7206	Atomic & Molecular Spectroscopy	3
PHY-7207	Relativistic Quantum Mechanics & Particle Physics	3
PHY-7208	Dielectric Materials	3
PHY-7209	Quantum Field Theory	3
PHY-7210	Nanostructures and Nanotechnology	3
PHY-7211	Magnetism and Magnetic Properties of Materials	3
PHY-7212	Plasma Processing of Materials	3
PHY-7213	Advanced Computational Physics	3
PHY-7217	Laser Materials Processing	3
PHY-7220	Intense LASER-Atom Interaction	3

Year-2		
Semester III&IV		
Course Code	Course Title	Credit Hours
PHY-7499	Thesis	12

PhD (Year-1)		
Courses can be arranged in different semesters according to the availability of faculty members. Only 18 credit hours will be selected by students on the recommendation of their supervisors.		

Course Code	Course Title	Credit Hours
PHY-8101	Electrodynamics of Continuous Media	3
PHY-8102	Classical Theory of Fields	3
PHY-8103	Fluid Mechanics	3
PHY-8201	Statistical Physics	3

Course Code	Course Title	Credit Hours
PHY-8202	Mechanics	3
PHY-8204	X-Rays Diffraction Methods	3
PHY-8205	Physics of Nano-Scale Materials and Nanotechnology	3
PHY-8206	Nonlinear Theory of Plasma Waves and Instabilities	3
PHY-8207	Advanced Microscopic Techniques	3
PHY-8208	Advanced Topics of Non linear Physics	3
PHY-8209	Space Physics	3
PHY-8210	Plasma Spectroscopy	3
PHY-8211	Dynamics of Ionospheric Plasma	3
PHY-8212	Nuclear Data for Science and Technology	3



Faculty

Department of Physics**Chairperson**

Prof. Dr. Riaz Ahmad

Professor

Prof. Dr. Salamat Ali

Associate Professor

Dr. Muhammad Nouman Sarwar Qureshi

Assistant Professor

Muhammad Imran

Dr. Abdul Ghaffar

Dr. Farah Aziz

Dr. Mazhar Hussain

Dr. Mubashra Hameed

Dr. Gohar Abbas

Dr. Zubia Kiran

Muhammad Atif

Dr. Islah ud Din

Dr. Fatima Binte Munir

Dr. Atif Shahbaz

Dr. Mubashra Hameed

Muhammad Altaf ur Rehman

Dr. Sajid Gillani

Lecturer

Saqib Jabbar

Muhammad Sarfaraz

Rabia Ahson

Sajid Ali

Sadia Sharif

Saba Khalid

Fozia Shaheen

Dilawar Ali

Muhammad Javed Iqbal

Muzamil Aftab

Electronics Program**In charge & Assistant Professor**

Dr. Ing. Ali Asif

Assistant Professor

Dr. Muhammad Waseem Ashraf

Lecturer

Muhammad Imran Awan

Faran Baig

Faheem Qasim

Zahoor Ahmad

Muhammad Yasir Noor

Visiting/Adjunct Faculty

Muhammad Akhtar Shahid

Muhammad Zafar Iqbal

Navaira Izhar

Abdul Mannan

Arooj Nusrat

Amna Fiaz

Nazish Yaseen

Salam Chair &**Distinguished National Professor**

Prof. Dr. G. Murtaza, SI

Assistant Professor

Dr. Zafar Iqbal