
Profile Department of Physics

By Head of the Department

Joginder Singh, Assistant Professor

DEPARTMENT OF PHYSICS

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INTRODUCTION

The Department of Physics boasts a faculty of inspiring teachers and creative students, and equally accomplished alumni. The faculty in the Department of Physics strongly believe that desire may be the key to motivation, but it is determination and commitment to an unrelenting pursuit of our goals and excellence that enable us to attain success. As pointed out by Albert Einstein that “the supreme art of the teacher” is “to awaken joy in creative expression and knowledge”, the faculty of the Physics Department dedicate themselves to and strive for excellence in teaching and research. The Department is equipped with excellent infrastructure and the latest books in the field of Physics. Richard Feynmann had once said, “It doesn’t matter how beautiful your theory is, it doesn’t matter how smart you are, if it doesn’t agree with experiment, it is wrong.” Implementing this wisdom into practice, we ensure that apart from imparting a strong theoretical foundation, we also provide students with laboratories that are equipped with the latest facilities and instruments so that they can gain knowledge and expertise by conducting experiments on optics, electronics, mechanics, thermal physics, etc. The primary aim of the department is to provide high-quality learning in physics, grooming bright undergraduates who will push frontiers of knowledge in physics and its related disciplines through scholarly activities.

DATE OF ESTABLISHMENT: August 2016.

FACULTY MEMBERS

1. Prof. Joginder Singh (HOD)
2. Dr. Rahees Ahmed Zargar (Lecturer)

PROGRAMMES WITH PHYSICS

Different programmes offered by the department together with other subjects:

Programme	Level of study	Cut off marks at entry Level	Total Strength
B. Sc Semester-I	UG	45%	59
B. Sc Semester-II	UG	Not Applicable	
B. Sc Semester-III	UG	Not Applicable	30
B. Sc Semester-IV	PG	Not Applicable	
B. Sc Semester-V	PG	Not Applicable	20
B. Sc Semester-VI	UG	Not Applicable	

Different Combinations in UG with Mathematics

Physics, Chemistry, Maths
Physics, Geography, Maths
Physics, Computer Applications., Maths

FACULTY

Name of the teaching staff	Designation	qualification
Mr. Joginder Singh Dr. Rahees Ahmed Zargar	Assistant Professor	M.Sc., MPhil.
	Teaching Assistant	M. Sc. PhD. PDF

Profile of Faculty Members

- a. **Mr. Joginder Singh**
 - i. Specialization: Nuclear and Particle Physics.
 - ii. Experience in years : 14 years
 - iii. Age : 37 years
- b. **Dr. Rahees Ahmed Zargar**
 - i. Experience in years : 2 years
 - ii. Age : 28 years

FACILITIES AVAILABLE

Basic facilities available: One medium size Laboratory, One HOD room, one Lab Assistant Room, One Store and One Dark Room. One Computer system with internet facility and one Printer is available for teaching faculty.

BACHELOR DEGREE PROGRAMME IN PHYSICS (CBCS):

Semester	Course No.	Title	Credits	Name of Course
I	UPHTC-101	MECHANICS, OSCILLATION AND RELATIVITY	4	CORE
	UPHPC-102	Practicals	2	CORE
II	UPHTC-201	VECTOR CALCULUS, ELECTROSTATICS AND ELECTROMAGNETIC WAVES	4	CORE
	UPHPC-202	Practicals	2	CORE
				SKILL ENHANCEMENT
III	UPHTC-301	Electronics, Thermodynamics and Statistical Mechanics	4	CORE
	UPHPC302	Practicals	2	CORE
	UPHSE303	Physics Workshop Skill	4	SKILL ENHANCEMENT
IV	UPHTC-401	Waves and Optics	4	CORE
	UPHPC-402	Practicals	2	CORE
	UPHSE-403	Renewable Energy and Energy Harvesting	4	SKILL ENHANCEMENT

V	UPYTE-501	Modern Physics	4	CORE
	UPYTE-502	Practicals	2	CORE
	UPYTS-503	Basic Instrumentation Skills	4	SKILL ENHANCEMENT
VI	UPYTE-601	Solid State Physics, Quantum Optics and Electronics.	4	CORE
	UPYTE-602	Practicals	2	CORE
	UPYTS-603	Weather Forecasting	4	SKILL ENHANCEMENT

PROGRAMME OUTCOMES: B. Sc. PHYSICS

Department of Physics		After successful completion of three-year degree program in physics a student should be able to
Programme Outcomes		<p>PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of Physics.</p> <p>PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion.</p> <p>PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyse the results of Physics experiments.</p> <p>PO-4. Create an awareness of the impact of Physics on the society, and development outside the scientific community.</p> <p>PO-5. discover the capability to use ICT, Electrical devices and other related resources for life-long learning</p> <p>PO-6. To inculcate the scientific temperament in the students and outside the scientific community.</p> <p>PO-7. To motivate the students to pursue PG courses in reputed institutions</p> <p>PO-8: Students will be capable of oral and written scientific communication and will prove that they can think critically and work independently.</p>
Programme Outcomes	Specific	<p>PSO-1 To understand the basic laws and explore the fundamental concepts of physics</p> <p>PSO-2 To understand the concepts and significance of the various physical phenomena.</p> <p>PSO-3 To carry out experiments to understand the laws and concepts of Physics.</p> <p>PSO-4 To apply the theories learnt and the skills acquired to solve real time problems.</p> <p>PSO-5 To acquire a wide range of problem-solving skills, both analytical and technical and to apply them.</p> <p>PSO-6 To enhance the student's academic abilities, personal qualities, and transferable skills this will give them an opportunity to develop as responsible citizens.</p> <p>PSO-7 To produce graduates who excel in the competencies and values required for leadership to serve a rapidly evolving global community.</p> <p>PSO-8 To motivate the students to pursue PG courses in reputed institutions.</p> <p>PSO-9 This course introduces students to the methods of experimental</p>

	<p>physics. Emphasis will be given on laboratory techniques specially the importance of accuracy of measurements.</p> <p>PSO-10 Providing a hands-on learning experience such as in measuring the basic concepts in properties of matter, heat, optics, electricity and electronics</p>
Course Outcomes B. Sc Physics	
Course	Outcomes After completion of these courses students should be able to
UPHTC-101: MECHANICS, OSCILLATION AND RELATIVITY (Credit:4)	<p>CO-1. Know the Cartesian, spherical polar and cylindrical co-ordinate systems.</p> <p>CO-2. Understand Newton's Laws of motion and their applications such as projectile and rocket motion</p> <p>CO-3: Gain the knowledge of motion in central force field</p> <p>CO-4. Classify elastic and inelastic scattering</p> <p>CO-5: Know the difference between Laboratory and centre of mass system</p> <p>CO-6: To understand the Special Theory of Relativity.</p> <p>CO-7: Discuss the Michelson- Morley Experiment.</p>
UPHPC-102: PHYSICS (Practicals) (Credit:2)	<p>CO-1: A working knowledge of fundamental physics and basic mechanics principles.</p> <p>CO-2: The ability to identify, formulates, and solve physics problems.</p> <p>CO-3: The ability to formulate, conduct, analyses and interprets experiments in physics.</p> <p>CO-4: The ability to use modern physics techniques and tools, including mathematical techniques, graphs and laboratory instrumentation.</p> <p>CO-5: Students would perform basic experiments related to mechanics and also get familiar with various measuring instruments would learn the importance of accuracy of measurements.</p>
UPHTC-201: VECTOR CALCULUS, ELECTROSTATICS AND ELECTROMAGNETIC WAVES (Credit:4)	<p>CO-1: Understand basics of vector calculus.</p> <p>CO-2: Understand divergence, gradient and curl and their physical interpretation.</p> <p>CO-3: Understand divergence theorem, Green's theorem, and Stoke's theorem and appreciate its applications.</p> <p>CO-4: Understand the basic concepts of electric and magnetic fields.</p> <p>CO-5: Understand the concept of conductors, dielectrics, inductance and capacitance.</p> <p>CO-6: Gain knowledge on the nature of magnetic materials.</p> <p>CO-7: Understand the concept of static and time varying fields.</p> <p>CO-8: Gain knowledge on electromagnetic induction and its applications</p> <p>CO-9: Gain knowledge on EM waves, propagation and their properties.</p> <p>CO-10: Ability to use Maxwell's equations in calculations featuring: both free and stationary electromagnetic waves.</p>
UPHPC-202: PHYSICS (Practical's) (Credit:2)	<p>CO-1: Understand physical characteristics of SHM and obtaining solution of the oscillator using experiment.</p> <p>CO-2: Students would gain practical knowledge about electricity and magnetism and measurements such as: Resistance, Voltage, current etc.</p>
UPHTC-301 : ELECTRONICS THERMODYNAMICS AND STATISTICAL MECHANICS (Credit:4)	<p>CO-1: Know the special purpose Diode.</p> <p>CO-2: To study the Transistor Amplifier.</p> <p>CO-3: To understand the FET, JFET and MOSFET. .</p> <p>CO-4: To study the Regulated Power supply.</p> <p>CO-5: To understand the Sequential Logic Circuits.</p> <p>CO-6: To study kinetic theory of Gases.</p> <p>CO-7: Faraday's Laws, Entropy and other thermal properties of matter.</p> <p>CO-8: Know the elementary concept of statistics.</p>




	CO-9: Understand statistical distribution of system of particles. CO-10: To study Quantum statistics.
UPHPC-302: PHYSICS (Practicals) (Credit:2)	CO-1: Understand the applications of diode, npn transistor, and OP-AMP and logic gates. CO-2: Understand half adder and full adder. CO-3: Understand tunnel diode characteristics. CO-4: Students would gain practical knowledge about heat and radiation, thermodynamics, thermo emf etc. and perform various experiment
UPHSE-303: Physics Workshop Skill (Credit:4)	CO-1: To understand the basics of physics instruments CO-2: To study about elementary tools used in the physics lab.
UPHTC-401: WAVES AND OPTICS (Credit:4)	CO-1 : understand the phenomenon of interference and its applications CO-2 : describe the working of optical instruments like microscopes and telescopes CO-3 : solve problems related to polarization and interference of light CO-4 : explain the principles of various lasers CO-5 : recognize the applications of laser in day to day life CO-6: find wavelength of monochromatic light by forming Newton's rings. CO-7: The course is important for the students to make their career in various branches of science and engineering, especially in the field of photonic engineering.
UPHPC-402: PHYSICS (Practicals) (Credit:2)	The practical knowledge of wave motion doing experiments: Tuning fork, electric vibrations. They would also learn optical phenomena such as interference, diffraction and dispersion and do experiments related to optical devices: Prism, grating, spectrometers
UPHSE-403: Renewable Energy and Energy Harvesting (Credits: 4)	CO-1: To study about various renewable energy sources. CO-2: To study about the various process/methods of energy Harvesting. CO-3: To study about renewable energy sources. CO-4: To study about various methods of Energy Harvesting.
UPYTE-501: MODERN PHYSICS (Credit:4)	CO-1. Understand De-Broglie hypothesis and Uncertainty principle CO-2. Derive Schrodinger's time dependent and independent equations CO-3. Solve the problems using Schrödinger's steady state equation CO-4. Know the properties of nucleus likes binding energy, magnetic dipole moment and electric quadruple moment CO-5. To understand the concept of radioactivity and decays law CO-6. To study achievement of Nuclear Models of Physics and its limitations CO-7. To give an extended knowledge about nuclear reactions such as nuclear fission and fusion CO-8. To understand the basic concept of Particle Physics CO-9. Understand different operators in Quantum Mechanics
UPYTE-502: PHYSICS (Practicals) (Credit:2)	In this course students would be able to understand Basic experiments of modern physics such as: Determination of Plank's and Boltzmann's constants, Determination of ionization potential, Wavelength of H-spectrum, Single and double slit diffraction, Photo electric effect and determination of e/m
UPYTS-503: Basic Instrumentation Skills (Credit:4)	CO-1: To study about the use of basics equipments in the Physics Lab. CO-2: To Study about the elementary knowledge of electrical circuits. CO-3: To study about the elementary knowledge about welding process. CO-4: To study about the soldering and other elementary process.
UPYTE-601: SOLID STATE PHYSICS,	CO-1. Know the principles of structures determination by diffraction CO-2. To understand the principles and techniques of X-rays diffraction

QUANTUM OPTICS AND ELECTRONICS (Credit:4)	CO-3. Understanding the Point Defect, Line Defect with example. CO-4. Know the fundamental principles of semiconductors and be able to estimate the charge carrier mobility and density CO-5. To give an extended knowledge about magnetic properties like Department of Physics diamagnetic, paramagnetic, ferromagnetic, ferrites and superconductors CO-6. Know the history of LASERS and its basic concepts. CO-7. Understand the basic principle and working of different types of lasers. CO-8: Know the applications of lasers in various fields. CO-9: Understand the characteristics of LASERS. CO-10: Learn safety precaution sand measures while handling the lasers. CO-11. To study the Operational Amplifier and their types.
UPYPE-602: PHYSICS (Practicals) (Credit:2)	The students would gain the knowledge of Basic Electronics circuits, network theorems and measuring instruments: They would know about common solid state devices: Semiconductor diodes and transistors. The topics also include the Rectifiers, Filters and their applications, number systems and logic gates which are foundation blocks of digital electronics.
UPYTS-603: Weather Forecasting (Credits: 4)	CO-1: To study about different weather conditions. CO-2: To study about various methods of weather forecasting. CO-3: To study about the different methods for the prediction of weather. CO-4: To study about the latest technology for weather forecasting.

ACADEMIC IMPROVEMENT ACTIVITIES

- **Conferences/ UGC Refresher Course/Seminar/Workshops**
 - **Activities of Mr. Joginder Singh , Assistant Professor.**

PRACTICAL KNOWLEDGE

-  Basic Computer, MS Office, Word, Excel ,PPT etc
-  Basic Knowledge of C,C++ programming
-  Internet.

CONFERENCES /Seminars ATTENDED/ PARTICIPATED

1. Participated in the JK Science Congress at University of Jammu, October, 2011.
2. Participated in International Conference on Global Warming “The Biggest Challenge of 21 Century” at Govt. Degree College Udhampur on 24th of February to 26th of February, 2012.
3. Participated in Two day National Seminar on Higher Education at Govt. Degree College Kathua on 13th October to 15th October, 2012.
4. Participated Two day National Seminar at Eliezer Joldan Memorial College, Leh, Ladakh on the topic: “Sustainable Development in Ladakh (J&K): “Challenges and opportunities for Socio-Economic Development on 10th of June to 11th of June 2014.

5. Attended two day "National Conference on Emerging Challenges in Nuclear and Many Body Physics (ECNMP-2014) organised by "Department of Physics and Electronics University of Jammu, Jammu, J&K, India on 10th of November to 11th of November 2014.
6. Presented Paper on "Importance of Origin Software over Excel in Physics" in two day National Conference organised by Govt. Degree College Kathua (J&K), on the Topic " Role of Mathematics and Computer Science in advancement of Physics (RMCSAP2016) on 26th February to 27th February, 2016.
7. Presented paper on One day state level Science Conference on "Innovative Research in Science and Technology for Sustainable Development" on 20th of March, 2017 organised by Government Degree College Poonch.
8. Participated in the National E-Conference on "Smart materials and Nanotechnology" organised by Department of Physics,, Kamla Nehru Mahavidyalaya, Nagpur on 30th of May 2020.
9. Participated in one day webinar on "How the Covid-19 will effect Children's Mental Health". Organised by Department of Computer Science, Govt. S.P.M.R. College of Commerce, Jammu on 01/06/2020.
10. Participated in One day Global Webinar on the Topic " Global Research Perspectives to Pandemic Covid-19" organised by Alumni Association JNU on 13/06/2020.
11. Participated in "A Three Day National Level Symposium on " Culture Connect" organised by Govt. Degree College Poonch in collaboration with Arulmigu Palanindavar Arts College for Women w.e.f. 17/05/2021 to 19/05/2021.
12. Participated in one day webinar on the theme "Ozone Depletion: Disaster in Making" (International day for preservation of Ozone Layer) organised by Govt. Degree College Ukhral (J&K-UT) on 16-09-2021.
13. Organised online National webinar on Intellectual Property Rights (IPR) on 26-06-2021.
14. Organised online National webinar on New Education Policy (NEP) 2020 on 27-08-2021.

Orientation/Refreshers/WORKSHOPS ATTENDED/PARTICIPATED

- ✎ General Orientation Course for newly appointed Lecturers" UGC-Academic Staff College, University of Jammu, Jammu, March 2nd to 30th, 2012
- ✎ Refresher Course in Physics at UGC- Academic Staff College University of Jammu, Jammu w.e.f. 11/02/2013 to 01/03/2013.
- ✎ Three days' workshop on " Global Issues and Concerns" conducted by J&K Institute of management Public Administration & Rural Development " w.e.f. 19/08/2014 to 21/08/2014
- ✎ Refresher Course in Physics at UGC- Academic Staff College University of Jammu, Jammu w.e.f. 01/02/2016 to 22/02/2016.
- ✎ Refresher Course in Human Right at HRDC- University of Jammu, Jammu w.e.f. 06/12/2016 to 27/12/2016.
- ✎ Attended one day workshop on e-Granthalya (online digital Library software) conducted by the department of Higher Education, J&K in Collaboration with NIC Jammu at Government Gandhi Memorial Science College. Jammu on January 30th 2017.
- ✎ Three days FDP Webinar on "E-Learning: Tools for Teaching & Learning " w.e.f 01/06/2020 to 03/06/2020 organised by department of computer science, Govt. Maulana Azad Memorial PG College, Jammu.

- ✎ Two week Faculty Development Programme on "Information Communication Technology & Modern Education the Way forward (ICTME-2020)" w.e.f. 2nd March 2020 to 17th March 2020 organised by Higher Education Department Government of J&K (UT) at Govt. Sri Partap Memorial Rajput College of Commerce, Jammu.
- ✎ Participated in One Day Workshop on the topic "Explore the Magic Within You" organised by the Manodarpan Cell, Govt. Degree College, R.S Pura, Jammu (J&K) under Manodarpan, An Initiative of MHRD, Govt. of India, which is being executed by Department of Higher Education, J&K govt. on 30/01/2021.

FUTURE PLAN OF THE DEPARTMENT

1. Department planning to organize a Field Trip to Salal Hydro Electric Project with the improvement in the Covid-19 Situation.
2. Department has planned Extension Lectures at the end of each month.