

Study & Evaluation Scheme

of

Bachelor of Science (Hons.) (Physics)

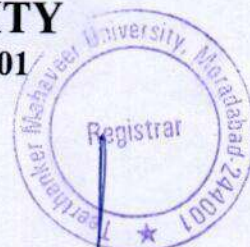
[Applicable for Academic Session 2019-20]



TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in



Program Structure-B.Sc.(H) Physics

A. Introduction:

The main goal of physics is to explain how things move in space and time and understand how the universe behaves. It studies matter, forces and their effects. Physics is a science of nature which deals the various phenomena from our daily life as well as interaction at atomic scales. It satisfies not only our curiosity to understand about galaxy and universe but also the backbone of engineering and technology. B.Sc.(Honours) in Physics is intended to provide a broad framework to create an academic base that responds to the need of the students to understand the basics of Physics and its ever evolving nature of applications in explaining the entire observed natural phenomenon as well as predicting the future applications to the new phenomenon.

The curriculum framework is designed and formulated in order to acquire and maintain standards of achievement in terms of knowledge, understanding and skills in Physics and their applications to the natural phenomenon as well as the development of scientific attitudes and values appropriate for rational reasoning, critical thinking and developing skills for problem solving and initiating research which are competitive globally.

The scope of physics is broadly divided into classical and modern physics. The key areas of classical physics comprise special relativity, classical mechanics, statistical mechanics, thermodynamics, electricity and magnetism, and optics. The modern physics deals quantum mechanics, atomic physics, nuclear particle physics, condense matter physics, laser physics. Development of new interdisciplinary subjects like nano-science, medical physics, and their applications from physics point of view added new dimension. Thus, the degree programme in physics also intended to cover overlapping areas of physics with chemistry, mathematics, environmental sciences. Further, a broad range of subjects such as Design and Installation of photo voltaic system , MATLAB, SPSS and Database management studies are introduced which can be helpful for students/faculty members to broaden the scope of their studies and hence applications from job prospective point of view. In addition, National Laboratory visits/industrial visits/ projects are encouraged and added to the curriculum in order to enhance better exposure to jobs/employment opportunities in National lab, scientific projects and allied sectors.

The aims and objectives of our three year degree UG programs in sciences in general and Physics in particular should be structured to create the facilities and environment in our institution to upgrade the knowledge of students and to motivate and inspire them to create deep interest in Physics. Our objective to develop broad and balanced knowledge of students for their understanding of physical concepts, principles and theories of Physics, designing and performing of experiments in the labs to demonstrate the concepts, principles theories learned in the classrooms. The curriculum include almost every area of physics such as Modern Physics, Quantum Physics, Material science, Nuclear and Particle Physics, Condensed matter Physics, Atomic and Molecular Physics, Mathematical Physics, Nano Science and Nano Technology, Electronics, Classical Physics, Mechanics, electricity and magnetism, optics and other related fields of study, including broader interdisciplinary subfields like Chemistry, Mathematics, Environmental sciences, Atmospheric Physics, Computer science, Polymer Science. The students during the course of study will be capable for asking relevant/appropriate questions and problems in the field of Physics, and planning, to executing the theoretical or experimental investigation such as Team player, Skilled project manager.



The aim of bachelor's degree programme in physics is intended to provide:

1. Read, understand and interpret physical information – verbal, mathematical and graphical.
2. Impart skills required to gather information from resources and use them.
3. To give need based education in physics of the highest quality at the undergraduate level thus enabling them to undertake further studies in Physics in related areas or multidisciplinary areas that can be helpful for self-employment/entrepreneurship
4. Offer courses to the choice of the students.
5. Perform experiments and interpret the results of observation, including making an assessment of experimental errors. Activities outside the classroom, such as independent research or study, allow students to further develop their knowledge and understanding.
6. Provide an intellectually stimulating environment to develop skills and enthusiasms of students to the best of their potential.
7. Attract outstanding students from all backgrounds.
8. To enable the graduate prepare for national as well as international competitive examinations, especially IIT-JAM and UPSC Civil Services Examination.

Course handouts for students will be provided in every course. A course handout is a thorough teaching plan of a faculty taking up a course. It is a blueprint which will guide the students about the pedagogical tools being used at different stages of the syllabus coverage and more specifically the topic-wise complete plan of discourse, that is, how the faculty members treat each and every topic from the syllabus and what they want the student to do, as an extra effort, for creating an effective learning. It may be a case study, a role-play, a classroom exercise, an assignment- home or field, or anything else which is relevant and which can enhance their learning about that particular concept or topic. Due to limited availability of time, most relevant topics will have this kind of method in course handout.

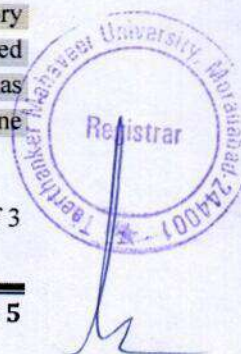
B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the B.Sc. (H) program:

- **Core competency:** Core courses of B.Sc. (Hons.) Physics are intended to provide deep understanding and interpreting skill of physical information – verbally, mathematically and graphically. The theoretical study along with laboratory courses also provides the connection between theoretical knowledge taught in textbooks/ homework problems and the experimental foundations of this knowledge. A wide range of core courses provides a deep understanding of classical as well as Modern Physics and train the students to analyses, interpret not only the physical phenomena but also develop their decision-making ability and contribute to the other area of life.
The core courses include 15 theory Papers and 8 laboratory courses which covers both Classical and Modern Physics, Electricity and Magnetism, Mechanics, Optics, Statistical Physics, Thermodynamics, Electromagnetic Theory, Quantum Physics, Atomic and Molecular Physics and Solid-State Physics etc.
- **Generic Elective Course (GEC):** Generic Elective is an interdisciplinary additional subject that is compulsory in the first, second, third and fourth semester of a program. The score of Generic Elective is counted in your overall aggregate marks under Choice Based Credit System (CBCS). Each Generic Elective paper will be of 4 Credits and students will have the choice of taking 4 GE's: One paper in Semester I, II, III & IV. Each student has to take Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Generic Electives.

- **Program/Discipline Specific Elective Course (DSEC):** A graduate student is expected to be capable of demonstrating comprehensive knowledge and understanding of both theoretical and experimental/applied physics knowledge in various fields of interest.
- **Skilled communicator:** The course curriculum incorporates basics and advanced training in order to make a graduate student capable of expressing the subject through technical writing as well as through oral presentation.
- **Critical thinker and problem solver:** The course curriculum also include components that can be helpful to graduate students to develop critical thinking ability by way of solving problems/numerical using basic & advance knowledge and concepts of Physics.
- **Sense of inquiry:** It is expected that the course curriculum will develop an inquisitive characteristic among the students through appropriate questions, planning and reporting experimental investigation.
- **Skilled project manager:** The course curriculum has been designed in such a manner as to enabling a graduate student to become a skilled project manager by acquiring knowledge about mathematical project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.
- **Ethical awareness/reasoning:** A graduate student requires understanding and developing ethical awareness/reasoning which the course curriculums adequately provide.
- **Lifelong learner:** The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.
- **Value Added Course (VAC):** A Value-Added Course is a non-credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be four courses of Aptitude in Semester I, II, III&IV semesters and two courses of Soft Skills in III&IV Semesters and will carry no credit, however, it will be compulsory for every student to pass these courses with minimum 45% marks to be eligible for the certificate. These marks will not be included in the calculation of CGPI. Students have to specifically be registered in the specific course of the respective semesters.
- **Skill Enhancement Course:** This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge. We offer three SECs-during the whole program, One SEC will carry 3 credits each.
- **Open Elective Course (OEC):** Open Elective is an interdisciplinary additional subject that is compulsory in a program. The score of Open Elective is counted in the overall aggregate marks under Choice Based Credit System (CBCS). Each Open Elective paper will be of 3 Credits in V semesters. Each student has to take Open/Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Open Electives.
- **Mandatory Course (MC):** This is a compulsory course that does not have any choice and will be of 3 credits. Each student of B.Sc. (Hons.) Program has to compulsorily pass the Environmental Studies.



B.Sc. (H) (Physics)-Semester V

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	BAS520	Electromagnetic Theory	4	-	-	4	40	60	100
2	CC	BAS523	Quantum Mechanics	4	-	-	4	40	60	100
3	CC	BAS537	Mathematical Physics-III	5	1	-	6	40	60	100
4	CC	BAS524	Solid State Physics	4	-	-	4	40	60	100
5	AECC	BHM515	Human values & Professional Ethics	3	-	-	3	40	60	100
6	DSE		Discipline Specific Elective Courses Discipline Specific Elective Course-I	4	-	-	4	40	60	100
7	OEC		Open Elective Course Open Elective-I	3	-	-	3	40/50	60/50	100
8	LC	BAS567	Solid State Physics (Lab)	-	-	4	2	50	50	100
9	PROJ	BAS 598	Industrial Training & Presentation	-	-	6	3	50	50	100
10	DGP	BGP511	Discipline & General Proficiency	-	-	-	-	100	-	100
Total				27	1	4	33	380/390	520/510	900

MOOC Course:

1	MOOC-2	MOOC13	MOOC Program -II (Optional)	-	-	-	2	-	100	100
---	--------	--------	-----------------------------	---	---	---	---	---	-----	-----




B.Sc. (H) (Physics)-Semester VI

S. No	Category	Course Code	Course	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC	BAS635	Statistical & Classical Mechanics	4	-	-	4	40	60	100
2	CC	BAS621	Nuclear & Particle Physics	4	-	-	4	40	60	100
3	DSE		Discipline Specific Elective Course-II	4	-	-	4	40	60	100
4	OEC		Open Elective-II	3	-	-	3	40/50	60/50	100
5	AECC	BHM615	Entrepreneurship	3	-	-	3	40	60	100
6	SEC	BAS636	Design and Installation of Solar Photovoltaic System (Lab)	-	2	2	3	50	50	100
7	PROJ	BAS698	Project	-	-	10	5	50	50	100
8	DGP	BGP611	Discipline & General Proficiency	-	-	-	-	100	-	100
Total				18	2	12	26	300/310	400/390	700