Fall-2024 ANNUAL SAR REPORT

Department of Physics

Prepared by:

Dr. Abdul Hakim Shah
Mr. Junaid Khan
Mr. Muhammad Shoaib

Khushal Khan Khattak University Karak

Preface

Since its establishment in 2012, Khushal Khan Khattak University Karak has become one of the most prestigious institutions in the country and is well regarded internationally. The Department of Physics is one of the newer departments focused on contributing committed and knowledgeable scholars to the public and private sectors.

This document includes a report of self-assessment of the Bachelor of Science (BS) in Physics and Applied Physics (Nanotechnology) Programs. The report has been developed by the program team (PT) under the supervision of the Directorate of Quality Assurance (DQA) of this institution. Hopefully, this report will contribute to pointing out the department's strengths and weaknesses so that actions may be taken to improve the setup.

The Program Team (PTs) consists of the following members:

Dr. Abdul Hakim Shah (Focal Person)
Mr. Junaid Khan (Member)
Mr. Muhammad Shoaib (Member)

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Introduction

The Department of Physics was established in 2016. It offers two academic programs including BS-Physics and BS-Applied Physics (Nanotechnology) on undergraduate levels. The department has competent faculty and advanced research facilities. Studying Physics at Khushal Khan Khattak University Karak offers access to outstanding academic and research exposure. A broad-range curriculum is designed to train the next generation of physicists. The department is intended to educate its graduates and create research opportunities to meet the community's needs. It aims to produce physics graduates with strong basic and applied concepts. The goals are set to make the curriculum the modern-day needs, which exemplifies connections with daily life and the existing industry. It also rewards the students for initiative, commitment, and skills, compulsory to line up with the present state of knowledge in the subject on basic and applied levels.

Presently, the department has limited infrastructure and it can fulfill the present needs of the students. The department has two classrooms and one laboratory. All the classrooms are spacious and of standard size as per HEC guidelines and can accommodate around 50 students. The department's laboratory is equipped with more than 90 experiments. There is also a Nanotechnology Research lab, established under HEC sponsorship. Besides this, it has one computer laboratory. All these laboratories are designed to meet the needs of students at undergraduate and postgraduate levels. Department of Physics has a strong participation in sports at the national level.

The department offers admissions once in year. It accommodates 50 students at maximum in each undergraduate program. At the moment, there are more than 150 students, enrolled in both programmes whereas five batches (2016-20, 2017-21, 2018-22, 2019-23 and 2020-2024) have graduated successfully till now. At the postgraduate level, MPhil and PhD in Physics have also been launched this year.

The department has competent faculty, comprised of three Assistant Professor and five Lecturers. All these faculty members contribute sufficiently to academics and research. They have published their research articles in reputed international journals. The department has now focused on solving issues being faced by industries. Three research projects have been won by the department from HEC and other funding agencies. A major achievement is to establish the Nanotechnology laboratory funded by HEC.

Criterion 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

Standard 1-1: Mission Statement and Program Objectives

About the Program

BS - Physics is a four years' degree program having semester system of examination. The admission to BS - Physics is advertised after the declaration of F.Sc result every year.

Mission Statement

The mission of BS - Physics program is to produce high quality graduates for teaching, and local R&D organizations and hence lead the community in the subject of Physics and related fields. The program also set the basis and train graduates for further Higher Education programs like MPhil and PhD. The curricula are constantly updated via introducing new and novel courses to keep the syllabi as per the national and international standards.

Objectives

1. To prepare the basic level students for research in Physics
2. To become the most preferred choice of students, faculty and industry
3. To enhance the ranking of the department at national and global level
4. To train youth global leadership in human development, excellence in education, in accordance with the vision 2025.

Duration:	4 Years (8 Semesters)
Admission Criteria:	Science Intermediates with Physics as one subject, minimum second division (45 % marks) or Three-year diploma in Associate Engineering (DAE) equivalent to F. Sc
Total Credit hours:	**137**
Plus Non-Credit hours:	**06**

COURSE STRUCTURE

Sr.No	Categories	Credit Hours
Associate Degree Program (Semester I-IV)		
1	General Education Cluster Course (ADE):	34
2	Major Courses (ADS)	33
	Total Credit Hours (ADS):	**66**
BS (Semester V-VIII)		
3.	Allied courses	12
4.	Major Courses:	55
	Total Credit Hours (Semester V-VIII)	**67**
	Net Credit Hours (whole program)	**133**

Standard 1-2:

The program must have documented outcomes for graduating students. It must be demonstrated that the outcomes support the program objectives and that graduating students can perform these outcomes.

BS-Physics

Program Objectives	Outcomes
To prepare the students to understand the basic level of Physics	To recognize how observations, experiments, and theory work together to expand the frontiers of knowledge of the physical universe.
To Identify, analyze, and solve practical problems in Physics	To apply the basic mathematical tools commonly used in physics-related areas.
To demonstrate in-depth knowledge from traditional and emerging areas of Physics.	To use the basic laboratory data analysis techniques, including distinguishing statistical and systematic errors, propagating errors, and representing data graphically.
To develop the values and attitudes in them that lead to professionalism.	To exercise the use of physical insight, including the ability to guess approximate or conceptual answers to

	physical problems and recognize whether or not the result of calculations makes physical sense
To train the youth globally towards leadership in terms of human development, and excellence in science education(with emphasis on Physics), by the vision 2025.	To convert physical situations articulated in English to mathematical formulations, and then analyze them quantitatively based on Physics laws and theories.

Learning Outcomes BS-Applied Physics (Nanotechnology):

Upon completion of a BS degree in Applied Physics, graduates will be able to:

Program Objective	Outcome
To introduce fundamental theory and practice of Physics with specialization in nanotechnology through core and specialized courses.	To apply mathematical techniques to represent, model, and solve physical problems, including real-world problems related to nanotechnology.
To impart hands-on skills through well-designed Labs.	To carry out the process of scientific investigation, using appropriate lab techniques and safety procedures in the field of Nanotechnology
To encourage and foster a culture of creative problem-solving	Ability to comprehend and analyze a computational solution taking all involved constraints & tradeoffs into consideration to acquire optimal results as an output
To groom the students to enhance their subject grasp by conducting substantial interactive discussions and seminars.	i. Ability to display good technical writing skills. **ii.** Ability to market themselves and their knowledge out in the professional world.
To inculcate professional confidence and to improve their presentation.	i. Ability to effectively communicate and present their ideas of nanotechnology to all levels of technical and non-technical audiences ii. Ability to recognize the need and remain involved in professional development through continued knowledge of industries

Standard 1-3:

The results of the program's assessment and the extent to which they are used to improve the program must be documented.

The sample of program's assessment result for both the BS programs is given in table 1-2. The details are given in Annexure A and B.

Strengths

Curriculum	Approved BS 4 year courses for Physics and Applied Physics (Nanotechnology)
Faculty	Well qualified but insufficient Ph.D faculty
Undergrade Laboratories	Undergraduate lab has sufficient experimentl setup
Post Graduate Labs	High Tech Synthesis and Characterization Labs
Digital Library	A limited access is available

Weaknesses

Faculty	A limited number of full time faculty
Supporting staff	Lab assistants and attendants are not available
Laboratories	Power supply and electrical circuits need to be provided
Online literature	Limited access to the online literature
Computer Lab (Computaional Lab)	Infrastructural facilities are required
Library	A departmental seminar library needs to be established

Standard 1-4:

The department must assess its overall performance periodically using quantifiable measures

(1) Present student's enrolment in BS-Physics indicating percentages of the students, student-faculty ratio, average graduating grade point average per semester, average time for completing the undergraduate program, and attrition rate.

Department's data

Session	Year	Total No. of students enrolled	Total enrollment in department	Total no. of students dropped	No. of graduated students	No. of Faculty (regular and contract)	Student/Teacher ratio (considering regular/contract full time faculty)
2016-20	2016	44	44	-	-	1+2	14.67:1
2017-21	2017	39	83	-	-	1+2	27.67:1
2018-22	2018	40	118	05	-	1+1	59:1
2019-23	2019	33	147	04	-	1	147 : 1
2020-24	2020	31	136	03	39	1	136 : 1
2021-25	2021	29	124	06	35	1	124:1
2022-26	2022	17	100	04	37	3	33.33:1
2023-27	2023	23	94	04	25	3	31.33:1
2024-28	2024	19	91	04	22	3	30.33:1

Students' intake has been suffered due to insuffiecient space and faculty

Year	Average CGPA of students	Attrition rate (%)
2020	3.2	11.4
2020	3.15	10.25
2021	3.3	7.5
2022	3.4	18.18
2023	3.32	6.06
2024	3.15	4.08

(2) Present student's enrolment in BS-Applied Physics (Nanotechnology) indicating percentages of the students, student faculty ratio, average graduating grade point average per semester, average time for completing the undergraduate program and attrition rate.

Department's data

Based on the above data, we expect that the student's strength will increase in future.

Session	Year	Total No. of students enrolled	Total enrollment in department	Total no. of students dropped	No. of graduated students	No. of Faculty (regular and contract)	Student/Teacher ratio (considering regular/contract full-time faculty)
2016-20	2016	23	23	-	-	1+2	8:1
2017-21	2017	-	23	-	-	1+2	8:1
2018-22	2018	-	20	03	-	1+1	10:1
2019-23	2019	11	31	-	-	1	31 : 1
2020-24	2020	11	11	-	20	1	11 : 1
2021-25	2021	-	09	02	-	1	11:1
2022-26	2022	-	09	-	-	3	3.67:1
2023-27	2023	-	00	-	09	3	-
2024-28	2024	-		-			

Year	Average GPA of students	Attrition rate (%)
2020	3.34	13
2021	-	-
2022	-	-
2023	3.19	14.18
2024	-	-

Criterion 2: CURRICULUM DESIGN AND ORGANIZATION

Definition of Credit Hour

Courses are defined as credit hours. In theory, a credit hour is an academic unit that represents one hour of lecture per week for one term. However, for the laboratory work, one credit hour is equivalent to three contact hours of lab work in a week. Therefore courses represented as (2-1) consist of 2 hours of lectures in addition to three hours of lab work during a week.

Course	Duration of Class
Theory Course of 03 Credit Hours	03 classes, each of 01 hours each per week Or 02 classes of 1.5 hours each per week Or 01 class of 03 hours per week
Practical (Lab) Work of 01 Credit Hour	03 contact hours per week

A course counted in the calculation of GPA/CGPA is called a **'Credit Course'**, while a course mandatory to pass but not counted in calculating GPA/CGPA is called **'Non-Credit Course**

(1) BS - Physics
Scheme of Studies

1st Year			
Semester I			
Course Code	**Course Title**	**Credit Hours**	**Remarks**
ENG-100	Functional English	3(3+0)	General Education Cluster (Functional English)
PS-101	Ideology and Constitution of Pakistan	2(2+0)	General Education Cluster
MATH-104	Calculus and Linear Algebra	3(3+0)	Allied-I
PHY-100/…	Everyday Science	3(2+1)	General Education Cluster (Domain: Natural Science)
PHY-104	Introductory Mechanics	3(3+0)	(Major-I)
PHY-105	Introductory Electricity	3(3+0)	(Major-II)
PHY-191	Lab-I	1(0+1)	(Major-III)
	Total Credit Hours	18	
Semester II			
ENG-101	Expository Writing	3(3+0)	General Education Cluster (Pre-Requisite: Functional English))
CS-101	Applications of Information and Communication Technologies	3(2+1)	General Education Cluster (Domain: ICT)
IS-100/ ETH-100	Islamic Studies/Ethics	2(2+0)	General Education Cluster (Domain: Religious Studies)
PHY-112	Waves and Oscillations	3(3+0)	(Major-IV)
PHY-106	Introductory Magnetism	4(4+0)	(Major-V)
PHY-113	Fluid Dynamics	2(2+0)	(Major VI)
PHY-192	Lab-II	1(0+1)	(Major-VII)
….	Teaching of Holy Quran		Compulsory Non-Credit
	Total Credit Hours	18	

2nd Year			
Semester-III			
SOC-101/ GC-204	Introduction to Sociology/ A Course of Social Science	3 (3+0)	General Education Cluster (Domain: Social Science)
ENG-106/…	Introduction to Arts and Humanities / A course of Arts and Humanities	3(3+0)	General Education Cluster (Arts and Humanities)
QR-100	Quantitative Reasoning-I	3(3+0)	General Education Cluster
GC-101	Civics & Community Engagement	3(3+0)	General Education Cluster
PHY-241	Heat & Thermodynamics	3(3+0)	(Major VIII)
PHY-231	Special Theory of Relativity	2(2+0)	(Major-IX)
PHY-291	Lab-III	1(0+1)	(Major X)
	Total Credit Hours	18	
Semester IV			
MATH-222	Ordinary Differential Equations	3(3+0)	Allied-II
QR-101	Quantitative Reasoning-II	3(3+0)	General Education Cluster (Pre-Requisite: Quantitative Reasoning-I)
PHY-232	Modern Physics	3(3+0)	(Major-XI)
BBA-101	Entrepreneurship	3(3+0)	General Education Cluster
PHY-233	Optics	3(3+0)	(Major XII)
PS-102	Pakistan Studies	2(2+0)	
	Critical Study of Seerat al Nabi (SAWS)		Compulsory Non Credit
PHY-292	Lab-IV	1(0+1)	(Major XIII)
	Total Credit Hours	18	
3rd Year			
Semester V			
PHY-351	Mathematical Methods of Physics-I	3(3+0)	(Major XIV)
PHY-321	Electrodynamics-I	3(3+0)	(Major XV)
PHY-314	Classical Mechanics	3(3+0)	(Major XVI)
CHEM-101	General Chemistry (organic and Inorganic)	3(3+0)	Allied-III
PHY-361	Basic Electronics	3(3+0)	(Major XVIII)
PHY-391	Lab-V	1(0+1)	(Major XVIII)
	Total Credit Hours	16	
Semester VI			
PHY-352	Mathematical Methods of Physics-II	3(3+0)	(Major XIX)
PHY-322	Electrodynamics-II	3(3+0)	(Major XX)
PHY-315	Quantum Mechanics-I	3(3+0)	(Major XXI)
NANO-401	Introduction to Nanotechnology	3(3+0)	Allied-IV
PHY-434	Atomics and Molecular Physics	3(3+0)	(Major XXII)
PHY-392	Lab-VI	1(0+1)	(Major XXIII)
	Total Credit Hours	16	
4th Year			
Semester VII			
PHY-416	Quantum Mechanics-II	3(3+0)	(Major XXIV)
PHY-463	Solid State Physics-I	3(3+0)	(Major XXV)
PHY-462	Research Methodology	2(2+0)	(Major XXVI)
PHY-…	A course from the list of elective subjects	3(3+0)	Elective-I (Major XXVII)
PHY-492	Lab-VII	1(0+1)	(Major XXVIII)
PHY-493	Internship/ Field Experience	3(0+3)	Compulsory (Major XXIX)
	Total Credit Hours	15	
Semester VIII			
PHY-435	Nuclear Physics	3(3+0)	(Major XXX)
PHY-462	Solid State Physics-II	3(3+0)	(Major XXXI)
PHY-442	Statistical Mechanics	3(3+0)	(Major XXXII)

PHY-XXX	A course from the list of elective subjects	3(3+0)	Elective-II (Major XXXIII)
PHY-XXX	A course from the list of elective subjects	3(3+0)	Elective-II (Major XXXIV)
PHY-494	Capstone Project	3(0+3)	Compulsory (Major XXXV)
	Total Credit Hours	18	

Total Credit Hours: 137
Plus Non-Credit Hours: 06

Elective Courses

Sr.	Title of the Course	Course Code	Credit Hours
1.	Digital Electronics	PHY-424	3 (3+0)
2.	Introduction to Particle Physics	PHY-436	3 (3+0)
3.	Laser Physics	PHY-437	3 (3+0)
4.	Radiation Detection and Measurement	PHY-438	3 (3+0)
5.	Introduction to Semiconductor Physics	PHY-463	3 (3+0)
6.	Introduction to Materials Science	PHY-464	3 (3+0)
7.	Environmental Physics	PHY-465	3(3+0))
8.	Introduction to Condensed Matter Physics	PHY-466	3 (3+0)
9.	Solid State Electronic Devices	PHY-467	3(3+0)
10.	Computational Physics	PHY-468	3 (3+0)
11.	Renewable Energy Resources	PHY-469	3(3+0)
12.	Experimental methods in Physics	PHY-475	3 (3+0)
13.	Introduction to Plasma Physics	PHY-476	3 (3+0)
14.	Laser-Plasma Interaction	PHY-477	3 (3+0)
15.	Biophysics	PHY-496	3(3+0)

Scheme of Studies 2024-BS Applied Physics (Nanotechnology)

1st Year			
Semester I			
Course Code	**Course Title**	**Credit Hours**	**Remarks**
ENG-100	Functional English	3 (3+0)	General Education Cluster (Functional English)
PS-101	Ideology and Constitution of Pakistan	2(2+0)	General Education Cluster
MATH-104	Calculus and Linear Algebra	3(3+0)	General Education Cluster (Quantitative Reasoning-I)
PHY-100/…	Everyday Science or any other course from the General Education Cluster (domain of Natural Sciences)	3 (2+1)	General Education Cluster (Natural Science course)
PHY-104	Introductory Mechanics	3(3+0)	(Major-I)
PHY-105	Introduction to Electricity	3 (3+0)	(Major-II)
PHY-191	Lab-I	1 (0+1)	(Major-III)
	Total Credit Hours	18	
Semester II			
ENG-101	Expository Writing	3 (3+0)	General Education Cluster (Expository Writing)

CS-101	Introduction to computing	3 (2+1)	General Education Cluster (ICT)
IS-100/ ETH-100	Islamic Studies/Ethics	2 (2+0)	General Education Cluster (Religious Studies)
PHY-112	Waves and Oscillations	3 (3+0)	(Major-IV)
PHY-106	Introduction to Magnetism	3 (3+0)	(Major-V)
PHY-192	Lab-II	1 (0+1)	(Major-VI)
	Teaching of Holy Quran	3(3+0)	Compulsory Non-Credit
	Total Credit Hours	18	
2nd Year			
Semester-III			
GC-204/ECO-101/LIS-102/…	Any other course from the General Education Cluster (domain of Social Sciences)	3 (3+0)	General Education Cluster (Social Science)
ENG-106/…	Introduction to Arts and Humanities any other course from the General Education Cluster (domain of Arts and Humanities)	3(3+0)	General Education Cluster (Arts and Humanities)
STAT-101	Differential Equations and Introductory Statistics	3 (3+0)	General Education Cluster (Quantitative Reasoning - II)
PHY-213	Modern Physics	3(3+0)	(Major-VII)
PHY-231	Fluid Dynamics	2 (2+0)	(Major VIII)
PHY-232	Optics	3 (3+0)	(Major IX)
PHY-291	Lab-III	1 (0+1)	(Major X)
	Total Credit Hours	18	
Semester IV			
PHY-207	Introductory Electronics	3 (3+0)	(Major XI)
PHY-233	Special Theory of Relativity	2 (2+0)	(Major XII)
PHY-241	Heat & Thermodynamics	3 (3+0)	(Major XIII)
GC-101	Civics & Community Engagement	3 (3+0)	General Education Cluster
BBA-101	Entrepreneurship	3 (3+0)	General Education Cluster
	Critical Study of Seerat al-Nabi (SAWS)	3(3+0)	Compulsory Non-Credit
PHY-292	Lab-IV	1 (0+1)	(Major XIV)
	Total Credit Hours	18	
3rd Year			
Semester V			
RE-101	Introduction to Renewable Energy	3(3+0)	Allied-I
CHEM-102	General Chemistry (organic and Inorganic)	3(3+0)	Allied-II
PHY-351	Mathematical Methods of Physics-I	3(3+0)	(Major XV)
PHY-321	Electrodynamics-I	3(3+0)	(Major XVI)
PHY-314	Classical Mechanics	3(3+0)	(Major XVII)
PHY-391	Lab-V	1(0+1)	(Major XVIII)
	Total Credit Hours	16	
Semester VI			
CHEM-103	Introduction to Physical Chemistry	3(3+0)	Allied-III
PHY-352	Mathematical Methods of Physics-II	3(3+0)	(Major XIX)
PHY-322	Electrodynamics-II	3(3+0)	(Major XX)
PHY-315	Quantum Mechanics-I	3(3+0)	(Major XXI)
PHY-361	Solid State Physics-I	3(3+0)	(Major XXII)
PHY-392	Lab-VI	1(0+1)	(Major XXIII)
	Total Credit Hours	16	
4th Year			
Semester VII			
PHY-416	Quantum Mechanics-II	3(3+0)	(Major XXIV)
PHY-462	Solid State Physics-II	3(3+0)	(Major XXV)

PHY-434	Atomics and Molecular Physics	3(3+0)	(Major XXVI)
PHY-491	Research Methodology	2(1+1)	Elective (Major XXVII)
NANO-401	Introduction to Nanotechnology	3(3+0)	Elective-I (Major XXVIII)
NANO-491	Internship/ Field Experience	3(0+3)	Compulsory (Major XXIX)
	Total Credit Hours	17	
Semester VIII			
PHY-464	Introduction of Material Science	3(3+0)	Allied-IV
PHY-435	Nuclear Physics	3(3+0)	(Major XXX)
PHY-442	Statistical Mechanics	3(3+0)	(Major XXXI)
NANO-481	Synthesis and Characterization of Nanomaterials	3(3+0)	Elective-II (Major XXXII)
NANO-482	Nanocomposite Materials	3(3+0)	Elective-III (Major XXXII)
NANO-492	Capstone Project	3(0+3)	Compulsory (Major XXXIII)
	Total Credit Hours	18	

Total Credit Hours: 133

Elective Courses

S.No	Course Code	Title of the Course	Credit Hours
1	NANO-479	Synthesis and Characterization of Nanomaterials	3 (3-0)
2	NANO-483	Nanocomposite Materials	3 (3-0)
3	NANO-484	Thin Film Technology	3 (3-0)
4.	NANO-485	Introduction to Nanotechnology	3 (3-0)
5.	NANO-486	Electronic Nano devices	3 (3-0)

Standard 2-1:

The curriculum must be consistent and support the program's documented objectives.

Each program at the Department of Physics is designed to support its objectives and is consistent. The department follows a standardized course syllabus to ensure the consistency in knowledge delivered to the students. The following matrices show the relevance of the individual courses to the program objectives.

Course versus program objectives – BS Physics

Semester and Courses	BS Program Objectives				
	To prepare the students to understand the basic level of Physics	To Identify, analyze, and solve practical problems in Physics	To demonstrate in-depth knowledge from traditional and emerging areas of Physics.	To develop the values and attitudes in them that lead to professionalism	To train the youth globally towards leadership in terms of human development, excellence in science education(with emphasis on Physics)

Sem 1	ENG-100				X	X
	PS-101		X			
	MATH-104			X	X	
	PHY-100/…	X			X	
	PHY-104	X	X		X	X
	PHY-105	X	X		X	X
	PHY-191	X	X		X	
Sem 2	ENG-101				X	X
	CS-101				X	X
	IS-100/ ETH-100	X	X		X	X
	PHY-112			X	X	
	PHY-106	X	X		X	X
	PHY-113	X			X	X
	PHY-192	X	X		X	X

Sem3	SOC-101/ GC-204	X	X	X		
	ENG-106/…	X	X	X		
	QR-100	X				
	GC-101				X	X
	PHY-241			X		
	PHY-231	X	X	X	X	X
	PHY-291					
Sem4	MATH-222	X	X	X	X	
	QR-101			X	X	X
	PHY-232	X	X	X	X	X
	BBA-101	X	X			
	PHY-233	X	X			X
	PS-102	X			X	
	PHY-292					
Sem5	PHY-351				X	X
	PHY-321	X	X	X	X	
	PHY-314	X			X	X
	CHEM-101	X	X	X		
	PHY-361	X	X	X		
	PHY-391					
Sem 6	PHY-352	X	X	X	X	X
	PHY-322	X			X	X
	PHY-315	X	X		X	X
	NANO-401	X			X	X
	PHY-434	X		X	X	
	PHY-392	X	X			X

Sem 7	PHY-416	X			X	X
	PHY-463	X			X	X
	PHY-462	X			X	X
	PHY-…	X			X	X
	PHY-492	X		X	X	X
	PHY-493	X				X
Sem 8	PHY-435	X			X	X
	PHY-462	X			X	X
	PHY-442	X		X	X	X
	PHY-XXX	X			X	X
	PHY-XXX	X			X	X
	PHY-494					

Standard 2.2: BS Physics Courses versus program outcomes

Theoretical background, problem analysis, and solution design must be stressed within the program's core material.

Problem solution

All courses are designed in a way to provide students with a solid background for further study or work in any area of experimental or theoretical Physics. It will enable them to solve all the problems related to the subject. It includes the mentioned subjects.

Quantum Mechanics, Classical Mechanics, Electrodynamics, Nuclear Physics, Solid State Physics, Plasma Physics, Semiconductor devices and Nano-Synthesis.

Theoretical background.

Subjects are designed based on a pure Physics background. It will develop the theoretical skills and expertise of students. The program emphasizes the theoretical side of Physics but minor experimental aspects are also included.

Statistical Physics
Mathematical Methods of Physics
Computational Physics
Calculus-I
Probability & Statistics
Linear Algebra

Solution Design.

Laboratories are designed to focus on a particular solution through experiments.

Labs
Research Projects

Nanotechnology?

Standard 2-3:

The Curriculum must satisfy the core requirements for the program as specified by the respective accreditation body.

The curriculum for BS Physics is divided into the following groups regarding credit hours.

Sr.No	Categories	Credit Hours
	Associate Degree Program (Semester I-IV)	
1.	General Education Cluster Course (ADE):	36
2.	Allied Courses	06
3.	Major Courses (ADS)	30
	Total Credit Hours (ADS):	**72**
	BS (Semester V-VIII)	
4.	Allied courses	06
5.	Major Courses:	53
	Total Credit Hours (Semester V-VIII)	**65**
	Net Credit Hours (whole program)	**137**

Table: Minimum Requirements for BS Physics

Standard 2-4:

The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.

This standard is closely similar to that of above standards 2-3. Both have the same requirements and credit hour distribution. For this purpose, we must be concerned about the above standard.

Standard 2-5:

The curriculum must satisfy the general education, arts, professional, and other discipline requirements for the program as specified by the respective accreditation body.

Table 2.1: Detail the curriculum satisfies the general education, arts, and professional and other discipline requirements for the program, as specified by HEC

S.No	Subjects	
1	Arts and humanities	Good
2	Basic sciences	Very Good
3	Tutorial	Good
4	Seminars	Good

Standard 2-6:

Information technology component of the curriculum must be integrated throughout the program

Information technology is very important for improving the standard of education nowadays. Latest technology made education updated and distance learning too. Technology is an emerging tool in education. That is why HEC stresses that universities make information technology an important part of the syllabus.

Department of Physics and BS-Applied Physics (Nanotechnology) has included the following computer/IT-oriented subjects in its curriculum for both programs.

S.No	IT Courses	Credit hours
1	ICT (CS-101)	03
3	Computational Physics (Elective, PHY-471)	03

Standard 2.7:

The oral and written communication skills of the student must be developed and applied in the program.

Oral and written communication is very important in Physics. To improve these, weekly seminars are arranged in the Department of Physics. However, the following English subjects have also been included in the scheme of studies for this purpose which is modified from time to time.

S.No	Subjects for oral written communication skills	Ccredit hour
1	English I (Functional English)	03
2	English II (Expository Writing)	03

Criteria 3. LABORATORIES AND COMPUTING FACILITIES

The standard and need-based facilities are vital for creating quality learning opportunities at the university. Such facilities create favorable learning conditions and facilitate the attainment of set objectives. These are important for strengthening effective teaching-learning that provides quality education. These facilities include not only classrooms, a library, and a laboratory but also financial aid in the form of different scholarships.

3.1. Classroom Facilities

Classrooms are well equipped with modern teaching aids. There are two classrooms in the Department of Physics, Khushal Khan Khattak University, Karak, which are equipped with a whiteboard, teacher's table and chair, computer, and multimedia projectors.

3.2. Laboratory Faculties

3.2.1. Undergraduate Laboratory

Laboratories are well-equipped, easily accessible, and useful according to the student's academic needs. The Department of Physics has following seven labs (two lab rooms) on undergraduate levels. All laboratories have laboratory manuals/ instructions required for

performing experiments. Following team has been appointed to take care of troubleshooting, repairing, and maintenance of the undergraduate departmental laboratory equipment.

S.No	Name	
1.	Dr. Atta Ur Rehman	Incharge
2.	Mr. Junaid Khan	Assistant Incharge

3.2.2. COMPUTING FACILITIES

There are 30x PCs for the computer lab which are to be installed after a suitable space is allocated.

3.3.Objectives

To provide experimental facilities to the students so that they can observe the implementation of theoretical concepts of physics

3.3.1. Courses Taught

The following courses are taught to meet the experimental requirements at the BS level

S.No	Laboratories	Course Conducted
i.	Lab (I)	Mechanics
ii.	Lab (II)	Electricity and Magnetism
iii.	Lab (III)	Wave and Oscillations
iv.	Lab (IV)	Optics
v.	Lab (V)	Modern Physics
vi.	Lab (VI)	Electronics
vii.	Lab (VII)	Solid State Physics

Semester-I

Lab-I (Mechanics)

Code: PHY-116L

S.No	Name of Experiments	Components
01.	Work Energy Theorem	Model: EX-5513A Brand: PASCO Scientific USA
02.	Measurement of Physical Quantities	Vernier calipers Micrometer Screw gauge Digital stopwatches Compound pendulums Sextants Bar pendulums
03.	Experiments with Pendulum on Dimensional Motion	Model: ME-8091 Brand: PASCO Scientific USA

04.	Hook's Law	Model:8979 Brand: PASCO Scientific USA Stand with a heavy base Transparent scale with mm resolution Horizontal support for spring Brightly colored stretch indicator Three springs with identical diameter and length, but different spring constants Three of each spring included, for a total of nine springs: spring constants are 5 N/m, 8N/m, 70 N/m
05.	Experiments Demonstrating the Bernoulli Principle	Model: ME-9481 Brand: PASCO Scientific USA Supplied Components only Components: Venturi tube (ME-2220) General Flow Sensor (ME-2222), Pitot tube (ME-2221)
06.	Atwood's Machine Experiment & Newton's Law	Model: SN-7970A Brand: PASCO Scientific USA

Semester-II

Lab-II (Electricity & Magnetism)
Code: PHY-127L

07.	Rresistivity Experiments	Model: EX-5534 Brand: PASCO Scientific USA Resistivity Apparatus (EM-8812) Voltage Sensor (unshrouded) (UI-5100) Banana Plug Cord-Red (5 Pack) (SE-9750)
08.	Thermoelectric Effect	Model: ET-8782 Brand: PASCO Scientific USA Energy Transfer – Thermoelectric Circuit Board Heat Sink Foam Insulation (2) Thermistor Temperature Cables (2) Short Patch Cords (8)
09.	Lenz's Law Experiment	Model :MG-8600 Brand : PASCO Scientific USA 1.5 m Tube

		Non-magnetic mass Magnetic mass Spring scale
11.	Coulombs Law Experiment	Model: EX-9930B Brand: PASCO Scientific USA Coulomb's Law Apparatus (ES-9070) Basic Electrometer (ES-9078A) Faraday Ice Pail (ES-9042A) Charge Producers and Proof Plane (ES-9057C) Kilovolt Power Supply (SF-9586B)
12.	Basic Electricity Lab	Model: EM-8622 Brand: PASCO Scientific USA Battery holders (2) Resistor: (1) 3.3 Ω, 2 W Light sockets with bulbs (#14) (3) Potentiometer 25 Ω, 2 W Spring connectors (32) Transistor socket Storage tube for holding Components (components stay with the kit longer
13.	RLC Resonance & Voltage/Current Phase Relationships	Model: CI-6512 Brand: PASCO Scientific USA Resistors Capacitors Lamp LED Inductor

Semester-III

Lab-III (Wave & Oscillation)
Code: PHY-237L

14.	Standing Waves on a Rope and Helical Spring	Model: EX-9952 Brand: PASCO Scientific USA String Vibrator (WA-9857A) Sine Wave Generator (WA-9867) Open Speaker (WA-9900) Economy Resonance Tube (WA-9495) Elastic Wave Cord (SE-9409)

		Braided Physics String (SE-8050) Yellow Braided Cord (699-067) Mass and Hanger Set (ME-8979) Universal Table Clamp (ME-9376B) (2) Adjustable Angle Clamp (ME-8744) Super Pulley (ME-9450A) Pulley Mounting Rod (SA-9242) 45 cm Stainless Steel Rod (ME-8736) (2) Banana Plug Cord-Red (5 Pack) (SE-9750)
15.	Experiments with Pendulums one dimensional motion/ME-8091	Model: ME-8091 Brand: PASCO Scientific USA Super Pulley with clamp (Not Available) Mass and Hanger Set((Not Available) Large rod base (Not Available 90 cm stainless steel rod(Not Available)

Semester-IV

Lab-IV (Modern Physics)

Code: PHY-246L

16	Magnetic Fields of Coils Experiment	Model: EX-5540 Brand: PASCO Scientific USA Helmholtz Coil Base (EM-6715) 500 Turn Field Coil (EM-6723) (2) Dynamics Track Mount (CI-6692) Small Round Base (2 pack) (ME-8974A) Stainless Steel Rod, 25 cm Threaded (ME-8988) (2) Optics Benches (60 cm) (OS-8541) Optics Bench Rod Clamp (set of 2) (OS-8479) PASPORT Rotary Motion Sensor (PS-2120A) PASPORT 2-Axis Magnetic Field Sensor (PS-2162) Banana Plug Cord-Red (5 Pack) (SE-9750) Banana Plug Cord-Black (5 Pack) (SE-9751)
17.	Photo Electric Effect/SE-6609	Model: SE-6609 Brand: PASCO Scientific USA Mercury Light Source (SE-6608) Mercury Light Source (SE-6608) DC Current Amplifier (SE-6621)

		DC Power Supply I (SE-6615) Mercury Light Source (BEM-5005) Mercury Lamp (BEM-5007) DC Current Amplifier (BEM-5004) DC Power Supply I (BEM-5001)
18.	Zeeman Effect/SE-9654	Electromagnet (SE-9655) Tunable DC Power Supply 6A (SE-9656) Collimating Lens Camera Lens CMOS Camera Electromagnet (BEM-5010) Tunable DC Power Supply 6A (BEM-5012) Camera Lens CMOS Camera
20**.**	Student Spectrometer/SP-9268A	Spectral Tube Power and Mount Spectral Tube (Hydrogen) (SE-9461 Spectral Tube (Helium) SE-9462 Spectral Tube (Argon) SE-9463 Spectral Tube (Corbon dioxide) SE-9464 Spectral Tube (Krypton) SE-9465 Spectral Tube (Mercury) SE-9466 Spectral Tube (Neon) SE-9467 Spectral Tube (Water Vapour) SE-9468

Semester-V

Lab-V (Optics)

Code: PHY-356L

21.	Law of Lenses & Optical Instruments	Model: EX-9988 Brand: PASCO Scientific USA Basic Optics Light Source (OS-8470) Adjustable Lens Holder (OS-8474) Basic Optics Geometric Lens Set (OS-8456) Basic Optics Viewing Screen (OS-8460) 1.2 m Optics Track -- Basic Optics (Model No not mentioned)

Semester-VI

Lab-VI (Basic Electronic)

Code: PHY-366L

22.	AC/DC Electronics Laboratory	Model : EM-8656 Brand : PASCO Scientific USA Student Power Supply (Not Available) Electronic Components (EM-8668) PASPORT Voltage Current Sensor (PS-2115)
23.	Electronic Components-AC/DC Lab/	Model: EM-8668 Brand: PASCO Scientific USA Repeated and double-paid

Semester-VI

Lab-VII (Solid State Physics)

Code: PHY-477L

24.	Thermoelectric Effect	Model: ET-8782 Brand: PASCO Scientific USA Energy Transfer – Thermoelectric Circuit Board Heat Sink Foam Insulation (2) Thermistor Temperature Cables (2) Short Patch Cords (8)

3.4. Research Laboratories

3.4.1. Location and Area

The location of all of the Physics Graduate labs is the Department of Physics, Science Block, New Campus, Khushal Khan Khattak University, Karak.

3.4.2. Objectives

i. To provide a facility to the Final semester students of BS to work on their projects under the supervision of their supervisors.

ii. To meet the above-mentioned objective, the preparation of the laboratory according to the needs of the students undertaking the project

3.4.3. Adequacy for Instruction

Research Laboratory is the basic need of every good educational institution or department where both the students and teachers (researchers) can feel and practice the science in its real sense. The role of research laboratories can't be ignored in higher learning departments/institutions. The standard of any department of higher studies is determined by the quality of research being conducted there along with the quality of graduates produced.

The Department of Physics has one modern research laboratory "Advanced Functional Nanomaterials Laboratory", sponsored by HEC under NRPU and other research projects awarded to Dr Abdul Hakim Shah (Assistant Professor/ Head of the Department), and is equipped with the following facilities.

i. Horizental programmable tube furnace
ii. Programmable Muffle furnace
iii. Conventional oven
iv. Magnetic stirrer
v. Ultrasonic bath
vi. Centrifuge machine
vii. Double beam UV-Vis Spectrophotometer
viii. BET Surface area and pore size analyzer (supply order issued)
ix. TG/DTA (Supply order issued)

3.4.4. Synthesis and Characterization Laboratory

Synthesis and Characterization Laboratory team

S.No	Name	
1.	Dr. Abdul Hakim Shah	Incharge
2.	Mr. Muzammil	Lab Attendant

3.4.5. Computational Laboratory

Computational Laboratory team

S.No	Name	
1.	Dr. Fida Rehman	Incharge
2.	Mr. Tahir Usman	Lab Attendant

3.5. Computer Laboratory

The Department of Physics has been issued 30x computers for the establishment of the Computer lab. However, due to limited space, the same has not yet been finalized. The proposed location of the Physics Computer Laboratory is the Department of Physics, Science Block, New Campus, Khushal Khan Khattak University, Karak. The computer lab course has the following objectives.

3.5.1. Objectives

i. To provide access to the digital online library.
ii. To provide printing facilities
iii. To provide facility to undergraduate students to work on their assignments & research students to work on their projects and thesis.

iv. To meet the above-mentioned objective each system is prepared according to the needs of the students undertaking the project
v. To install the custom software and to upgrade the hardware on the instructions of the project supervisor (Keeping in mind the complexity of the project)

3.5.2. Computers specifications

i. 25 Branded Dell Computers
ii. Dell (P-IV Systems with RAM 3GB, 256GB, Hard Disk, and basic Operating System (Windows XP and/or Red Hat Linux))
iii. DSL Connection
iv. Digital Library access

3.5.3. Adequacy for Instruction

This lab will be used for teaching purposes.

3.5.4. Relevant Courses Taught

The following courses are offered to meet the computational requirements at the BS and MS/MPhil levels

i. Programming Fundamentals
ii. Computer Programming
iii. Computational Physics

3. Library Facility

Library facilities with quality textbooks, reference books, research journals, and access to digital library facilities and e-learning materials are mandatory for academic and research purposes and the department has already provided such facilities for its students. At the central library on the campus, Physics has its section; which has a stock of about 2,500 books and research journals related to various fields of Physics. Faculty members and students of the department use resources available at the central library.

Standard 3.1:

Laboratory manuals/ documentation/ instructions for experiments are available and readily accessible to faculty and students.

The Khushal Khan Khattak University, Karak Student has access to the KKKUK portal which provides the interaction between various stakeholders such as faculty, students, administrative departments (examination, accounts, etc.), and parents.

In addition to this, a special web space is available where faculty can upload their lectures, slides, and other resource material they want to provide to the students. Handouts are also provided (if

deemed necessary) by the instructor. In addition, all instructors can create a course website through Yahoo groups to share all the relevant materials.

In-house photocopy machines are available which students can utilize to obtain photocopies of lecture slides and other lab work details.

Standard 3.2:

There are adequate support personnel for instruction and maintaining the laboratories.

As the department is newly established, therefore the department has been looking for smart and young support personnel for its undergraduate laboratory. However, for computer labs, a proper cell known as a support section exists. The IT support section has the necessary skilled/technical workforce and tools available to carry out routine as well as any urgent maintenance/repair. There is a system administrator supported by assistant system administrators. However, as far as the lectures and tutorials are concerned that is the sole responsibility of the concerned instructor and its associated teaching assistants.

Standard 3.3:

The University's computing infrastructure and facilities are adequate to support program objectives.

Khushal Khan Khattak University, Karak has provided sufficient funds for the maintenance/upgrading of the existing facilities as well as for building the latest state-of-the-art computational facilities.

Criteria 4. STUDENT SUPPORT AND GUIDANCE

Standard 4-1:

Courses offered with sufficient frequency and number for students to complete the program promptly

Courses are offered in a semester of 15-16 weeks duration. As far as course offerings in the department are concerned, courses are given to those teachers who have tremendous experience in their respective fields.

Standard 4-2:

Courses in the major must be structured to ensure effective interaction between students, faculty and teaching assistants

The courses taught by different faculty members have to follow standardized course outlines which are designed at the departmental level after mutual consultation of faculty members and are approved by the board of studies. During the semester, teachers consult each other to improve the quality of the subject. Different teachers are detailed to teach distinct semesters and to have an effective interaction with students.

Standard 4-3:

Guidance on how to complete the program is available to all students and access to qualified advising must be available to make course decisions and career choices

Students are informed about their course objectives and requirements through course outlines provided to them. For all academic programs faculty members are assigned as student counselors to take care of their problems regarding academics and administrative affairs. The Department remains in touch with various professionals who frequently share job opportunities with the students.

Criterion 5: PROCESS CONTROL

Standard 5-1:

The process by which students are admitted to the program must be based on quantities criteria and documented. This process must be periodically evaluated to ensure that meets its objectives.

The admission advertisements are announced in Daily leading newspapers and uploaded on the university's official website by web admin as well. The admission process is carried out under the supervision of the departmental admission committee, formed by the Head of Department to ensure merit and to follow university rules and regulations.

5.1.1 Criteria for admission:

BS-Physics
BS-Applied Physics (Nanotechnology)

Students who have passed the Intermediate examination in Pre Engineering, Pre Medical, Computer Science, or Diploma of Associate Engineering (equivalent to F.Sc) with Physics as one subject minimum second division (45% marks) are eligible for admission into BS Physics and BS Applied Physics program.

5.1.2 Seat distribution:

The seat distribution is approved by the university academic council.

Open Merit	40
Fata	2
Baluchistan	01
Others	01 Seat for each Province
Disable	01
Hafiz e Qur'an	01
Sports	02
Gilgit Balitistan Student	02
Total	50

5.1.3 Migration Policy;

A student from another educational institution, who intends to migrate to the University, shall meet the following requirements:

A genuine and plausible reason for migration.

i. Production of a certificate of good character from his/her parent institution.
ii. Production of detailed marks certificate and syllabi of courses he/she studied for equivalence purposes.
iii. Migration certificate from the institution/University last attended.

Students desiring to transfer their credits, earned at other institutions, will be accepted under the following conditions:

The applicants can apply after completion of the first year of study. They should apply for transfer
of credit before the start date of a semester.

i. Applicants desiring to transfer their credits, earned at other institutions, will be accepted under the following conditions:
ii. Credits have been earned from institutions recognized/accredited by HEC.
iii. Enrollment of applicants in their parent Universities/Degree Awarding Institutes (DAIs) at the time of applying for transfer of credit hours.
iv. Production of character certificate, from the last attended institution, stating that the the student has not been penalized for misconduct, indiscipline, or undesirable activities.
v. Possession of SSC & HSSC/equivalent certificates of relevant groups with a minimum 70% marks. All FSc stream candidates have to provide equivalence certificates duly obtained from the Inter Boards Committee of Chairmen (IBCC), Pakistan.
vi. Original transcripts duly verified by the concerned University/DAI are produced along with photocopies.

vii. Course outlines, duly signed by the institutes, are produced for evaluation.
viii. No credit hour of a course will be transferred if the grade is less than C.
ix. Credits from other institutions will be evaluated by the equivalence/evaluation committee on a course-to-course basis with the courses offered by the University.
x. Courses must correspond to courses offered by KKKUK or equivalent in depth and intensity.
xi. Candidate must complete at least 60% credit hours of his degree program at KKKUK.
xii. The transferred courses will appear on the full transcript of the University. However, they will not be counted towards CGPA of courses of the University.
xiii. Students should not assume that their academic qualifications will allow them to transfer credits till written confirmation has been given.
xiv. In case of acceptance and willingness of the student for admission, he will have to produce a migration certificate from the last attended institution within one month time, failing which the acceptance shall stand withdrawn.

Standard 5-2:

The process by which students are registered in the program and the monitoring of student's progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that meets its objectives.

Students are required to register for the courses they take each semester before the commencement of a semester. For new students in the first semester, the Department of Physics conducts 'Orientation' before the start of the semester. for each program where the students are formally welcomed and registered to their relevant programs, details of which are then updated on the IIUI portal. Students in the rest of the semesters register for the courses online at the Admission office. For each course being taken by a student during a semester in BS. It is required that the student undertakes one 'Midterm' examination, at least 3 assignments / 3 quizzes, and a final examination. The assessment criterion for each course is as follows:

i. Midterm Examination (30%)
ii. Assignments, quizzes, projects (20%)
iii. Final Examination (50%)

A Student must achieve 60% marks to be successful in a subject. The final marks for each course are then graded according to the following scheme (BS).

Marks	Grade	GPA
90-100	A+	4.00
80-89	A	3.76
75-79	B+	3.50
70-74	B	3.0
65-69	C+	2.50
60-64	C	2.00

55-59	D+	1.50
50-54-	D	1.00
Below 50	F	0.00

The program of study is verified through the Cumulative Grade Point Average (CGPA) system and students are awarded scholastic status based on the GPA and CGPA in that particular semester. Each student's performance is measured at the end of each semester. A student must first clear the pre-requisite courses before they can register for any specialization course. If the CGPA of a student goes below 2.00 during a semester, a warning is issued and the student is put on probation. and, if there is still no progress the students are dropped from the program.
(New semester regulations 2022 must be included)

Standard 5-3:

The process of recruiting and retaining highly qualified faculty members must be in place and documented. Also, processes and procedures for faculty evaluation, and promotion must be consistent with an institution's mission statement. These processes must be periodically evaluated to ensure that meet their objectives.

The University follows the following procedure in the recruitment of faculty members.

i. First of all, posts are advertised in three leading daily newspapers of the region and also uploaded on the university website. After the closing date of the advertisement, the establishment section of the university scrutinizes the application form and if there is any deficiency in the application form, the applicant is properly informed to overcome the deficiency in the given time.
ii. After the proper scrutiny by the scrutiny committee, the university has the proper selection board.
iii. After the selection board the case is forwarded to the syndicate for approval.
iv. The candidates selected are informed by office orders, and they have to join at a specific time.

Standard 5-4:

The process and procedures used to ensure that teaching and delivery of course material to the students emphasize active learning and meet the course learning outcomes. The process must be periodically evaluated to ensure that meets its objectives.

- Recently, the Department of Physics conducted its 6th Board of Studies meeting on 30 March 2022 in the meeting it approved its curriculum in which the courses for BS-Physics and BS-Applied Physics (Nanotechnology) programs have been finalized as per HEC criteria.
- Besides the available reference books and course materials, some reference books and course materials have been suggested which will be purchased/arranged for the department library.

Standard 5-5:

The process that ensures that graduates have completed the requirements of the program must be based on standards and effective and documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.

The requirements are ensured by checking each student's CGPA and whether they have submitted the final project or not. The degree is awarded on completion of a minimum of 136 credits with a CGPA of at least 2.0/4.0; the defense of the final year project is completed along with a report and presentation. The process is evaluated when the course is designed and implemented and is used for improvement.

The examination section has divided the examination and evaluation into the following categories.

- Quizzes
- Assignments
- Mid and Final examinations
- Oral presentations
- Practical viva/voce

The exam scheduled by the controller of examination and marks of the subject are distributed in the following pattern.

S.N0	Component	Marks
1	attendance	05
2.	Test, Quiz, Time Constraint Assignments, Group Assignments, Class Participation	15
3.	Mid Term Examination	30
4.	Final Term Examination	50
Total		100

Grading standard:

A. Equivalence between letter grading and numerical marks shall be as follows;

Grade	Grade Points	Percentage
A	3.67 - 4.00	85 and above
A-	3.34 - 3.66	80 – 84
B+	3.01 - 3.33	75 – 79
B	2.67 - 3.00	71 – 74
B-	2.34 - 2.66	68 – 70

C+	2.01 - 2.33	64 – 67
C	1.67 - 2.00	61 – 63
C-	1.31 - 1.66	58 – 60
D+	1.01 - 1.30	54 – 57
D	0.10 - 1.00	50 – 53
F	0.00	Below 50

B. The range of marks defined above for a particular grade is split below further to reflectincremental grade points.

N.B: In case numerical grades are not feasible (e.g. Field Work, Thesis/Dissertation) ornot required (e.g. related course(s)), letter grade 'P' (Pass) or 'F' (Fail) shall instead be used, and not counted towards the CGPA.

Grade	Marks(%)	Grade Points	Grade	Marks(%)	Grade Points	Grade	Marks(%)	Grade Points
A	100	4	B+	79	3.33	D+	57	1.30
	99	3.98		78	3.26		56	1.21
	98	3.96		77	3.18		55	1.11
	97	3.93		76	3.1		54	1.01
	96	3.91		75	3.01	D	53	1.00
	95	3.89	B	74	3		52	0.77
	94	3.87		73	2.9		51	0.44
	93	3.85		72	2.79		50	0.10
	92	3.83		71	2.67	F	<50	0.00
	91	3.81	B-	70	2.66	P	-----	Pass
	90	3.78		69	2.51	I	-----	Incomplete
	89	3.76		68	2.34			
	88	3.74	C+	67	2.33			
	87	3.72		66	2.24			
	86	3.7		65	2.13			
	85	3.67		64	2.01			
A-	84	3.66	C	63	2			
	83	3.59		62	1.84			
	82	3.51		61	1.67			
	81	3.43	C-	60	1.66			
	80	3.34		59	1.51			
				58	1.31			

Criterion 6: FACULTY

Standard 6-1:

There must be enough full-time faculty members who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses and plan, modify, and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline.

There are three full-time and five visiting faculty members who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability. The interests and qualifications of all faculty members are sufficient to teach all courses and plan, modify, and update courses and curricula. All faculty members have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty has a PhD in the discipline

Program Area of Specialization	Courses in the area	Number of faculty members in each area	Number of faculty with PhD degree
Theoretical/ Computational Physics	Theoretical particle Physics, Neutronics, and Thermal Hydraulic Analysis of PWR Core and Simulation	**01**	
Laser & Optics	Optoelectronic devices	**01**	
Material Sciences & Semiconductor Devices	(i) Material Science I & II (ii)Solid state electronic devices(undergrad) (iii) Material Science(iv) Solid state electronic devices(grad)	**02**	**02**
Nanoscience & Technology	(i) Nanobased Materials and Applications (ii) Experimental methods of nanophysics (iii) Electronic properties of nanomaterials (iv) Nanoscale surfaces and interfaces (v)Nanostructural characterization	**01**	**01**

	techniques (vi) Nanosafety(vii)Nano magnetism (viii) Experimental Techniques in nanotechnology (ix) Nanomaterials and applications (x) Growth of nanostructured materials (xi) Magnetic and spintronic materials and devices		
Total		**06**	

S.No.	Name	Designation	Qualification
1	Dr. Abdul Hakim Shah	Assistant Professor/ HoD	PhD
2	Dr. Atta Ur Rahman	Assistant Professor	PhD
3	Dr. Fida Rahman	Assistant Professor	PhD
4	Dr. Muhammad Tufail	Visiting Lecturer	PhD
5	Mr. Junaid Khan	Visiting Lecturer	M.Phil.
6	Mr. Insar Ullah	Visiting Lecturer	M.Phil.
7	Mr. Muhammad Shoaib	Visiting Lecturer	M.Phil.
8	Ms. Sadaf Noreen	Visiting Lecturer	M.Phil.

The faculty Resumes are available in Annexure A.

Standard 6-2:

All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place.

In the Physics department, we have different research groups for different subfields of Physics like Nanoscience and Technology, Computational Physics, Laser & Optics, Material Sciences, and Semiconductor Devices, All these research groups are headed by highly qualified and senior faculty members. As a result of this, faculty can participate in research activities and publications are being made periodically to verify this effort of the faculty members. Faculty members have been given resources that they utilize optimally for this purpose and remain current in their respective fields.

Faculty are also encouraged to get funding for their projects. In this regard, the following projects have been awarded by HEC, Pakistan.

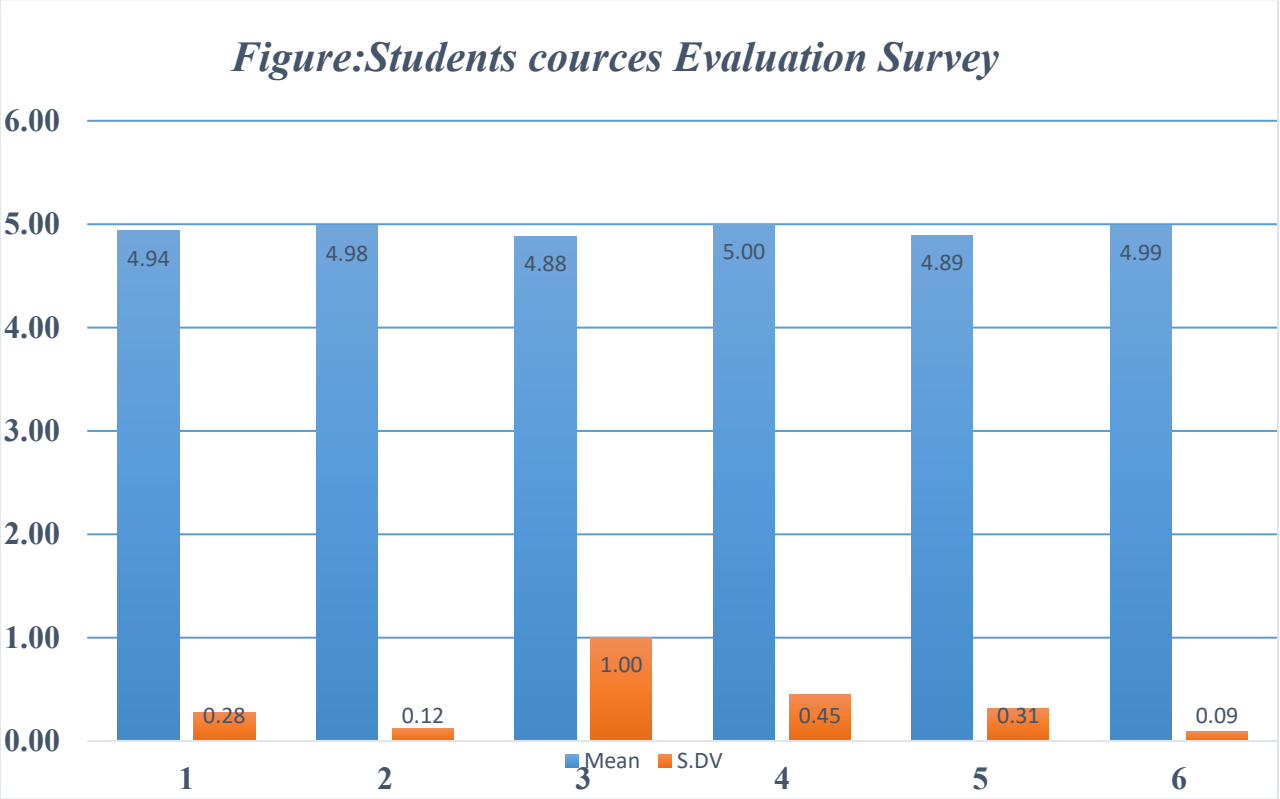
S.No	Title of the project	Funding Agency	Project amount (M)	PI/Co-PI	Project ID/No.	Project status
1.	Start-Up Research Grant "Synthesis of metal oxides nanostructures for gas sensors and photocatalytic applications"	HEC	0.4	Dr Abdul Hakim Shah (PI)	731	Completed
2.	Strengthening of Synthesis Lab of the Advanced Functional Nanomaterials Laboratory	HEC	2.3	Dr Abdul Hakim Shah (PI)	HEC/ACAD/ISULL/2017/208	Completed
3.	NRPU "Development of highly selective gas sensors based on vanadium pentoxide nanohybrid materials for sensing of VOCs pollutants at oil and gas industries"	HEC	4.1	Dr Abdul Hakim Shah (PI)	17387	In process
4.	Start-Up Research Grant "Covalent organic framework (COFs) coupled with 2D (MoS2, WS2, and MoSe2) material for visible-light-driven hydrogen evolution and pollutant degradation"	HEC	1.0	Dr Abdul Hakim Shah (Co-PI)	36/IPFP-II(Batch-I)/NAHE/HEC/2020/373 (PI: Dr. Sher Ali)	In progress
5.	Start-Up Research Grant "Electrochemical sensing/ detection of selected heavy metal ions from food and water samples of Khyber Pakhtunkhwa and Sindh by nanocomposites"	HEC	1.0	Dr Abdul Hakim Shah (Co-PI)	484/IPFP-II(Batch-I)/NAHE/HEC/2020/372 (PI: Dr. Afrasiab)	Competed
6.	Start-Up Research Grant "Pre & post seasonal (spatial/temporal) variation gauging of water quality in natural & man-made water reservoirs using multivariate statistical analysis in the context of international & local regulatory frameworks: a case study for health risk assessment from Karak"	HEC	1.0	Dr Abdul Hakim Shah (CoPI)	11080/IPFP-II(Batch-I)/NAHE/HEC/2020/374 (PI: Dr. Atta ur Rehman)	Completed

Various faculty development programs include workshops and seminars which are being run under the banner of Khushal Khan Khattak University, Karak. The main aim of these faculty development programs is to develop better teaching and counseling techniques for the faculty members so that they can adopt more effective teaching methodologies in classrooms.

Standard 6-3:

Results of the faculty survey:

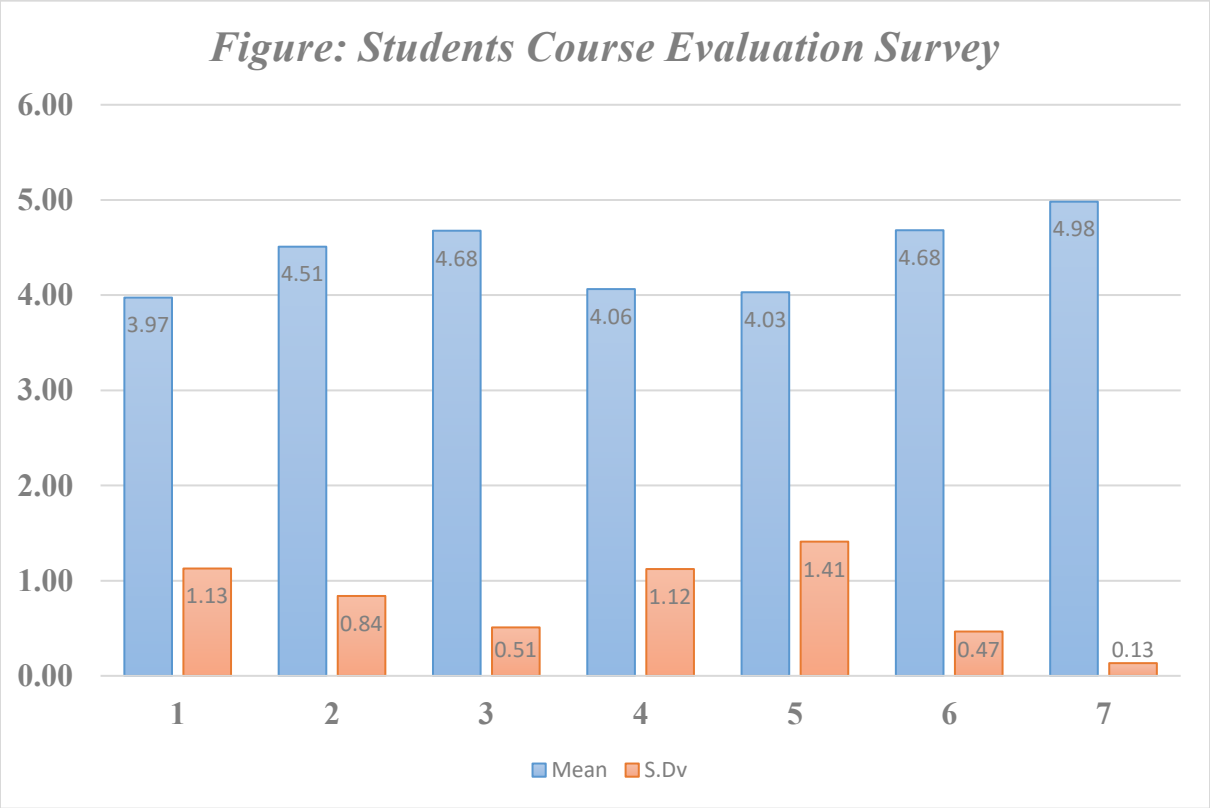
1St Semester



3rd Semester

Subject	Course Code	Teacher	Mean	S.Dv	Min	Max	Responses
	PHY-231	Dr. Atta Ur Rahman	3.97	1.13	1	5	7
	PHY-232	Mr. Muhammad Ilyas Khan	4.51	0.84	1	5	10

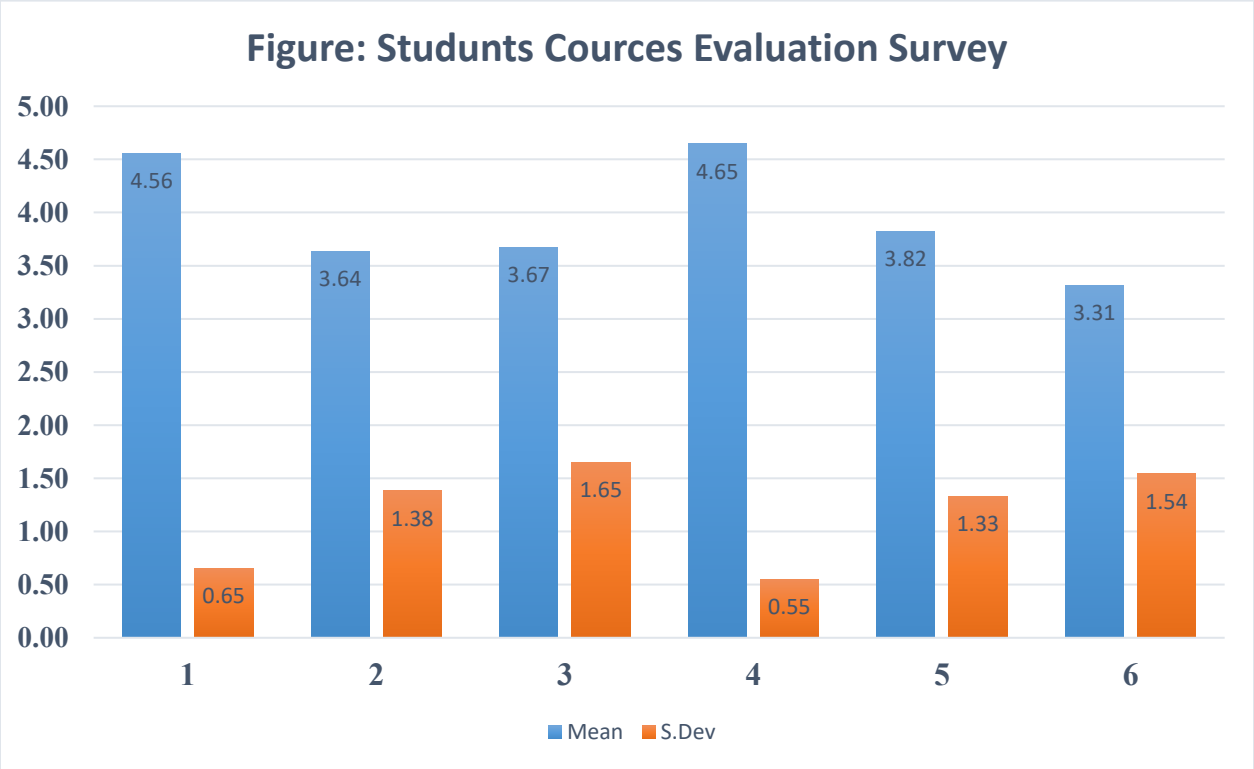
	CS-101	Mr. Shad Muhammad	4.68	0.51	3	5	9
	ENG-201	Ms. Sana Altaf	4.06	1.12	1	5	10
	MATH-202	Mr. Zaheer Anjum	4.03	1.41	1	5	9
	CHEM-202	Mr. Latif Ur Rehman	4.68	0.47	4	5	10
Lab-III	PHY-237L	Mr. Junaid Khan	4.98	0.13	4	5	10



5th Semester

Subject	Course Code	Teacher	Mean	S.Dev	Min	Max	Responses
1.	PHY-351	Dr. Abdul Hakim Shah	4.56	0.65	3	5	9

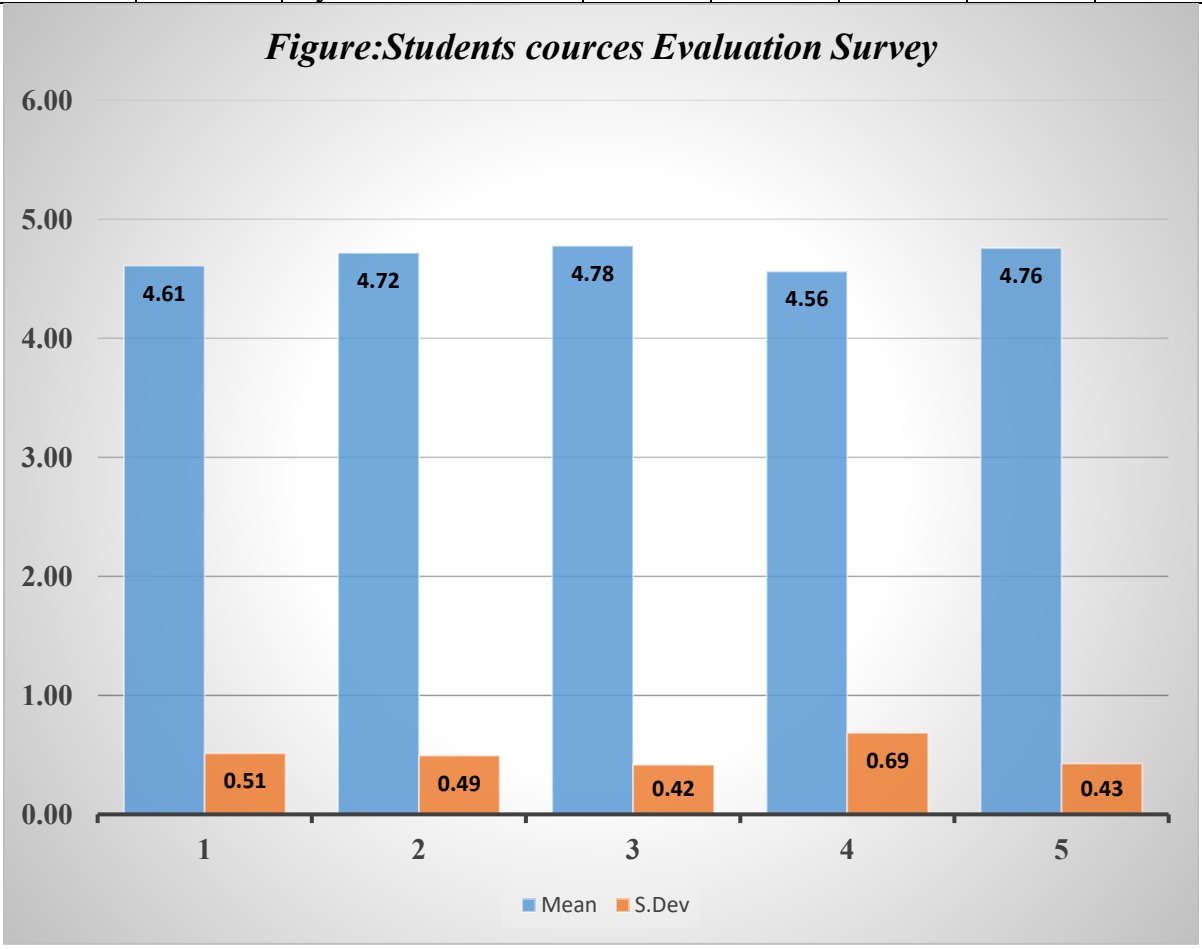
2.	PHY-352	Mr. Insar Ullah	3.64	1.38	1	5	9
3.	PHY-353	Mr. Junaid Khan	3.67	1.65	1	5	10
4.	BBA-113	Dr. Jamshid ur Rehman	4.65	0.55	4	5	10
5.	PHY-355	Mr. Muhammad Ilyas	3.82	1.33	1	5	10
6.	PHY-356L	Mr. Insar Ullah	3.31	1.54	1	5	10



7th Semester

Subject	Course Code	Teacher	Mean	S.Dev	Min	Max	Response
1.	PHY-471	Mr. Junaid Khan	4.61	0.51	3	5	7
2.	PHY-472	Dr. Fida Rehman	4.72	0.49	3	5	9
3.	PHY-473	Dr. Abdul Hakim Shah	4.78	0.42	4	5	9

4.	PHY-477	Mr. Insar Ullah	4.56	0.69	2	5	9
5.	PHY-477L	Mr. Muhammad Ilyas	4.76	0.43	4	5	10



Criterion 7: INSTITUTIONAL FACILITIES

Regarding this Criterion, the University should have an updated system for students' learning like newspapers, libraries like digital libraries, departmental and central libraries, online books, and publications. Photocopy, scanner, printer, and plotter will be available very soon.

Standard 7-1:

The institution must have the infrastructure to support new trends in learning such as E-learning, Supportive Infrastructure, and Facilities in learning.

Khushal Khan Khattak University, Karak, is a newly established university but in a very short time, the University achieved most targets regarding education standards.

a. Khushal Khan Khattak University has updated laboratories for the students. Two labs are well developed and well updated, computer lab and media lab. Pakistan Education Research Network

facilities are also now available for students and faculty for research purposes. It will make the research work very accessible for students.

b. Five labs for the Department of Physics and Applied Physics have been approved and tendered.

Standard- 7-2:

The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.

Khushal Khan Khattak University, Karak, has the central library of the latest books and journals. The university has arranged the book fair events in 2015 and 2016. A qualified librarian with a well-trained supporting staff is responsible for managing the library efficiently. Approximately 14200 books, and subscriptions to an adequate number of international journals, periodicals, and magazines have been stocked in the library.

As per the requirement of the Physics and Applied Physics department, the university shall purchase more books for the department shortly.

Standard- 7-3:

Classrooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.

Khushal Khan Khattak University, Karak, has proper classrooms for each department. Practical classes' labs are available for students. For presentations projectors are available. There are combined offices for lecturers in each department. These offices have basic facilities. Faculty members need the latest laptops for

- Research work.
- Presentations

Criterion 8: INSTITUTIONAL SUPPORT

Khushal Khan Khattak University, Karak, has a supporting Administration team. This team facilitates the faculty differently. They also help and support the students in different activities and provide many services.

The administration team is a very important partner in achieving Khushal Khan Khattak University's vision, mission, and goals by providing standard financial and administrative support services to faculty. This team is also important for students to facilitate them in scholarships etc.

The university budget office is a supporter of the effective and capable use of Khushal Khan Khattak University resources through planning, analysis, liability, and arrangement of resources to significance.

The Registrar is responsible for supporting the academic as well as administrative purposes of the University. At Khushal Khan Khattak University, the registrar provides services in the recruitment, placement, and development of the University's teaching and administrative staff as well as the admission of students.

Khushal Khan Khattak University has permanent security guards. They are very experienced retired persons in the defense force of Pakistan. This team of the university facilitates the students and employees from a security point of view.

Khushal Khan Khattak University's Transportation Services provides management in developing and implementing complete, reasonable, flexible, well-organized, and supportable programs to facilitate the faculty and students in pick and drop.

This section of the university provides all necessary things to the employees and students. This section of our university is very cooperative and active and provides all accessories to the departments without delay.

Technical staff members of the Khushal Khan Khattak University are very supportive of the employees and students too. They properly deliver technical services to the departments and other administrative offices.

Standard 8-1:

There must be sufficient support and financial resources to attract and retain high-quality faculty and provide the means for them to maintain competence as teachers and scholars.

Khushal Khan Khattak University provides the best financial resources to facilitate its employees. The university is situated in a remote area and due to this reason; the University has attractive salary packages as compared to other universities. The financial resources are managed by the finance section of the university.

The university gets funds for research projects from HEC and other organizations to the faculty members through the ORIC department.

The university provides transport facilities to the students and employees.

Standard 8-2:

There must be an adequate number of high-quality graduate students, research assistants and Ph.D. students.

Khushal Khan Khattak University is newly established and is striving to promote the research capabilities of the students, scholars, and faculty. BS students are engaged in different projects and scientific events under the supervision of faculty members. M.Phil. and Ph.D. scholars are being provided with better resources to meet their research needs.

Standard- 8-3:

Financial resources must be provided to acquire and maintain Library Holdings, laboratories, and computing facilities.

Khushal Khan Khattak University, Karak IT department has substantial resources available to develop and maintain the library. Faculty is directed to contact the library for new books, cases, videos, etc of all kinds. There is no restriction on the quantity and price of material.

Khushal Khan Khattak University, Karak – The IT department has substantial resources available to develop and maintain computer facilities. Every faculty member as well as supporting staff has a personal

computer and access to a printer on the network. Systems are frequently updated as per the requirement of faculty and new technology available in the market

Each year there are several co-curricular and extra-curricular activities at the university. Such initiatives help them to utilize their out-of-class time provocatively and make it more useful. Broadly known as co-curricular activities are opportunities to involve students in creative and healthy activities, and all such things are an integral part of university life. It offers students additional avenues in which to explore their talents, passions, and interests. Participating in co-curricular activities, the students continue to apply what they learn in the classroom to enhance their knowledge and performance.

SUMMARY AND CONCLUSIONS

The Department of Physics, Khushal Khan Khattak University, Karak, is a department of higher learning and research.

It was established in May 2016 to explore specific approaches to solving problems and to apply knowledge from different areas of Physics to independent research projects. The department is going to launch a strong experimental research program in several areas of physics shortly. The main focus of the Department is to establish well-equipped labs. The department is in the initial stages and offering only a BS Physics program in two disciplines i.e. Physics and Nanotechnology. The Department offers admissions in the fall semester.

It should be a matter of satisfaction to all concerned that the Department has been successful in the pursuit of the aims and objectives for which it was established. The curriculum is designed by the faculty members of the department and has been approved by the Board of Studies, comprising renowned Physics and Nanotechnologists across the country.

The Department of Physics is in the phase of development and currently has plans to establish BS-level labs and MPhil/ Ph.D. level labs of research which are in the pipeline. However, Students are currently not involved in the research projects due to the initial stage of the department. Although, the faculty members are getting some research projects from HEC. Head of Department Dr. Abdul Hakim Shah has recently completed his SRGP project at HEC and has established a preliminary synthesis lab for Nanotechnology research.

Curriculum design updating is based on approved criteria. The university Examinations and academics are scheduled semester-wise. Tutorial classes are also weekly arranged.

Institutional facilities are measured through labs, libraries, administration, infrastructure, classrooms, and faculty offices. There are some minor shortcomings and limitations.

The Physics department of the university can be advanced if the following suggestions are fulfilled the classroom department needs effective techniques of learning use of multimedia.

Classrooms are the platform for open discussion and presentations.

- The Department of Physics needs a laboratory and computer laboratory for students.
- Students in the department need a high-speed internet facility.
- Sufficient space is needed for the research activates

DEPARTMENT OF PHYSICS
KHUSHAL KHAN KHATTAK UNIVERSITY, KARAK
Phone: 0927-291053

Executive Summary

Department: Physics **Program: BS Physics and BS Applied Physics (Nanotechnology)**

The Department of Physics was established in February 2016. It is the part of Energy Centre approved by HEC. Currently, the department has almost 91 students and 03 full time faculty members (03 Assistant Professors) and five visiting faculty members (5x Lecturers). The QEC cell has carried out the assessment of the department against the standards and criterion provided by HEC Quality Enhancement Cell. This assessment is carried out for fall semester 2024.

Major Findings

1. Five batches of BS-Physics i.e. (F2016-S2020), (F2017-S2021), (F2018-S2022), (F2019-S2023), (F2020-S2024) and two batch of BS-Applied Physics (Nanotechnology); (F2016-S2020) and (F2019-S2023) have been successfully graduated.
2. A total of 91 students are currently enrolled in BS-Physics.
3. Frequency of holding the BOS meetings is good which shows improvements in the schemes of program from time to time.
4. The curriculum highlights the scheme of studies as per HEC QEC assessment manual.
5. M.Phil and PhD program have been successfully launched Spring 2023 semester. A total of 46 M.Phil and 08 PhD scholars have been enrolled in these programs, respectively.
6. The department follows the rules and regulations for admission, enrolment, migration provided by the University.
7. The majority of faculty members are not satisfied with the facilities provided by the University.
8. The institution facilities e.g. library, classrooms, offices, e-learning are not sufficient at this stage.
9. The department needs fast internet facility for faculty and students which is weak at the moment.

Head
Department of Physics

Countersigned

Director QEC, Khushal Khan Khattak University, Karak