AKAL UNIVERSITY

TALWANDI SABO

(Established under Punjab State Act No. 25 of 2015)

Bachelor of Science Physics
Or
Bachelor of Science (Hons.) Physics (Major)
and Discipline-2 (Minor)
Or
Bachelor of Science (Hons.) Physics
with Research (Major) and Discipline-2 (Minor)

(Based on NEP – 2020)

Talwandi Sabo

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

Scheme & Syllabi

(Academic Year 2024-25)

6. CURRICULUM AND CREDIT FRAMEWORK FOR UNDERGRADUATE PROGRAMME

Sem.	Major Courses		Minor Courses (MI) (4 credit)	Multi-disciplinary courses (MDC) (4 credit)	Ability Enhancement Courses (AEC) (2 credit)	Skill Enhancement Courses (SEC) (3 credit)	Value-Added Courses VAC (2 credit)	Total Credit
	DSC	DSE						
I	DSC-1 [3] DSC-2 [3] DSC-L-1[2]	-	MI-1	MDC-1	AEC-1	SEC-1	VAC-1	23
II	DSC-3 [3] DSC-4 [3] DSC-L-2 [2]	-	MI-2	MDC-2	AEC-2	SEC-2	VAC-2	23
Students exiting the programme after securing 46 credits will be awarded UG Certificate in Physics provided they secure 4 credits in work based vocational courses offered during summer term or internship /Apprenticeship in addition to 6 credits from skill-based courses earned during first and second semester.								**46**
III	DSC-5 [3] DSC-L-3 [2]	DSE-1 [3] or DSE-2 [3] or DSE-3 [3]	MI-3	MDC-3	AEC-3	SEC-3	-	21
IV	DSC-6 [4] DSC-7 [3] DSC-L-4 [2]	DSE-4 [3] or DSE-5 [3] or DSE-6 [3]	MI-4	-	AEC-4		VAC-3	20
Students exiting the programme after securing 87 credits will be awarded UG Diploma in Physics provided they secure additional 4 credit in skill based vocational courses offered during first year or second year summer term.								**87**
V	DSC-8 [4] DSC-9 [4] DSC-10 [3] DSC-L-5 [2]	DSE-7 [3] or DSE-8 [3] or DSE-9 [3]	MI-5	-				20
VI	DSC-11 [4] DSC-12 [3] DSC-L-6 [2] Internship[4]	DSE-10 [3] or DSE-11[3] or DSE-12[3]	MI-6	-				20
Students who want to undertake 3-year UG programme will be awarded UG Degree in Physics upon securing 127 credits								**127**
VII	DSC-13 [4] DSC-14 [4] DSC-15 [3] DSC-L-7 [2]	DSE-13 [3] or DSE-14[3] or DSE-15[3]	MI-7	-				20
VIII	DSC-16 [4] DSC-17 [4] DSC-18 [3] DSC-L-8 [2]	DSE-16 [3] or DSE-17[3] or DSE-18[3]	MI-8	-				20
Students will be awarded Bachelor of Science (Hons.) Physics (Major) and Discipline-2 (Minor) provided they secure 167 credits								**167**
VII	DSC-13 [4] DSC-14 [4] DSC-D [4]	DSE-13 [4] or DSE-14[4] or DSE-15[4]	MI-7	-				20
VIII	DSC-16 [4] DSC-D [8]	DSE-16 [4] or DSE-17[4] or DSE-18[4]	MI-8	-				20
Students will be awarded Bachelor of Science (Hons.) Physics with Research (Major) and Discipline-2 (Minor) provided they successfully completed the dissertation work and secure 167 credits								**167**

7. SEMESTER-WISE DISTRIBUTION OF MAJOR COURSES

A student will have to study compulsory Discipline Specific Core Courses in each Semester. The semester wise distribution and credit details of DSC courses over eight semesters is listed below:

7.1 Discipline Specific Core (DSC)

Semester	Course Code	Title of the Course	Schedule of Teaching (Credits-wise)			Total Credits
			Theory	Tutorial	Practical	
I	PHYS05C101	Mechanics	3	0	0	3
	PHYS05C102	Mathematical Physics-I	3	0	0	3
	PHYS05C103	Physics Lab-I	0	0	2	2
II	PHYS05C201	Electricity and Magnetism	3	0	0	3
	PHYS05C202	Mathematical Physics-II	3	0	0	3
	PHYS05C203	Physics Lab-II	0	0	2	2
III	PHYS05C301	Waves and Optics	3	0	0	3
	PHYS05C302	Physics Lab-III	0	0	2	2
IV	PHYS05C401	Elements of Modern Physics	3	1	0	4
	PHYS05C402	Analog System and Applications	3	0	0	3
	PHYS05C403	Physics Lab-IV	0	0	2	2
V	PHYS05C501	Quantum Mechanics	3	1	0	4
	PHYS05C502	Digital System and Applications	3	1	0	4
	PHYS05C503	Experimental Techniques	3	0	0	3
	PHYS05C504	Physics Lab-V	0	0	2	2
VI	PHYS05C601	Statistical Mechanics	3	1	0	4
	PHYS05C602	Condensed Matter Physics-I	3	0	0	3
	PHYS05C603	Physics Lab-VI	0	0	2	2
VII	PHYS05C701	Classical Mechanics	3	1	0	4
	PHYS05C702	Advanced Quantum Mechanics	3	1	0	4
	PHYS05C703	Condensed Matter Physics-II	3	0	0	3
	PHYS05C704	Physics Lab-VII	0	0	2	2
VIII	PHYS05C801	Advanced Mathematical Physics	3	0	1	4
	PHYS05C802	Advanced Statistical Mechanics	3	1	0	4
	PHYS05C803	Electrodynamics	3	0	0	3
	PHYS05C804	Physics Lab-VIII	0	0	2	2
B.Sc. (Hons.) Physics with Research						
VII	PHYS05C701	Classical Mechanics	3	1	0	4
	PHYS05C702	Advanced Quantum Mechanics	3	1	0	4
	-	Dissertation (Synopsis)	0	0	0	4
VIII	PHYS05C802	Advanced Statistical Mechanics	3	0	1	4
	-	Dissertation (Submission)	0	0	0	8

7.2 Discipline Specific Elective (DSE)

The Discipline Specific Electives (DSEs) are a pool of credit courses of Physics from which a student will choose to study based on his/ her interest. A student of Bachelor of Science (Hons.) Physics will have to study one DSE each III to VIII semester. The semester wise distribution of DSE courses over six semesters.

Semester	Course Code	Title of the Course	Schedule of Teaching (Credits-wise)			Total Credits
			Theory	Tutorial	Practical	
III	PHYS05E301	Thermal Physics	3	0	0	3
	PHYS05E302	Waves and Oscillations	3	0	0	3
	PHYS05E303	Atomic Physics	3	0	0	3
IV	PHYS05E401	Laser and Fiber Optics	3	0	0	3
	PHYS05E402	Physics of Devices	3	0	0	3
	PHYS05E403	Radiation Physics	3	0	0	3
V	PHYS05E501	Nanomaterials and Applications	3	0	0	3
	PHYS05E502	Accelerator Physics	3	0	0	3
	PHYS05E503	Atmospheric Physics	3	0	0	3
VI	PHYS05E601	Nuclear Physics	3	0	0	3
	PHYS05E602	Particle Physics	3	0	0	3
	PHYS05E603	Microprocessor	3	0	0	3
VII	PHYS05E701	Numerical Techniques	3	0	0	3
	PHYS05E702	Advanced Nuclear Physics	3	0	0	3
	PHYS05E703	Radiation Detectors	3	0	0	3
VIII	PHYS05E801	Electronics	3	0	0	3
	PHYS05E802	Plasma Physics	3	0	0	3
	PHYS05E803	Gravitation and Cosmology	3	0	0	3
B.Sc.(Hons.) Physics with Research						
VII	PHYS05E704	Numerical and Statistical Techniques	3	1	0	4
	PHYS05E705	Research Methodology	3	1	0	4
	PHYS05E706	General Theory of Relativity	3	1		
VIII	PHYS05E804	Advanced Electronics	3	1	0	4
	PHYS05E805	Material Science	3	1	0	4
	PHYS05E806	Characterization Techniques in Physics	3	1	0	4

7.3 List of Courses offered as Minors

All UG students are required to undergo eight minor courses of 04 credits each from the minor discipline which helps them to gain a broader understanding beyond the major discipline. These courses will be offered as generic electives for Multi-disciplinary programmes.

Semester	Code	Course Title	Schedule of Teaching (Credit-wise)			Credits
			Theory	Tutorial	Practical	
Semester-I	PHYS05MI101	Mechanics	3	0	1	4
Semester-II	PHYS05MI201	Electricity and Magnetism	3	0	1	4
Semester-III	PHYS05MI301	Elements of Modern Physics	4	0	0	4
Semester-IV	PHYS05MI401	Analog and Digital Electronics	3	0	1	4
Semester-V	PHYS05MI501	Statistical and Thermodynamics	3	1	0	4
Semester-VI	PHYS05MI601	Quantum Physics	3	1	0	4
Semester-VII	PHYS05MI701	Solid State Physics	3	0	1	4
Semester-VIII	PHYS05MI801	Nuclear and Particle Physics	3	1	0	4

7.4 List of Courses offered as Multi-disciplinary Course

All UG students are required to undergo 3 introductory-level multi-disciplinary courses relating to any of the broad disciplines other than chosen major.

Semester	Code	Course Title	Schedule of Teaching (Credit-wise)			Credits
			Theory	Tutorial	Practical	
I	PHYS05M101	Physics in Daily Life	3	1	0	4
	PHYS05M102	Kinematics	3	1		
II	PHYS05M201	Renewable Energy Harvesting	3	1	0	4
	PHYS05M202	Basic Electrical Devices	3	1	0	4
III	PHYS05M301	Modern Physics	3	1	0	4
	PHYS05M302	Thermal Physics	3	1	0	4
IV	PHYS05M401	Quantum Mechanics	3	1	0	4
	PHYS05M402	Nanotechnology	3	1	0	4

7.5 List of Courses offered as Skill Enhancement Courses

To improve the skills essential for advanced studies, research, and employability, students will be offered a variety of Skill Enhancement as listed in Table below:

Semester	Code	Course Title	Schedule of Teaching (Credit-wise)			Credits
			Theory	Tutorial	Practical	
I	PHYS05S101	Basic Instrumentation Skills	2	0	1	3
	PHYS05S102	Sensors and Detection Technologies	2	0	1	3
II	PHYS05S201	Computational Physics	2	0	1	3
	PHYS05S202	Introduction to Laser and Fiber Optics	2	0	1	3
III	PHYS05S301	Basic Electrical Circuits and Devices	2	0	1	3
	PHYS05S302	Semiconductor Devices	2	0	1	3
IV	PHYS05S401	Radiation Safety	3	0	0	3
	PHYS05S402	Physics Workshop Skills	3	0	0	3

Note: Additionally, students can select Skill Enhancement Courses, Ability Enhancement Courses (AECs) and Value-Added Courses (VACs) from the pool of courses provided by the university.

8. CREDIT DISTRIBUTION OF DIFFERENT TYPE OF COURSES

Subjects	B.Sc. in Physics	B.Sc. (Hons.) Physics (Major) and Discipline-2 (Minor)	B.Sc. (Hons.) Physics with Research (Major) and Discipline-2 (Minor)
Major [DSC + DSE]	64	96	84
Minor	24	32	32
Multi-disciplinary Course	12	12	12
Ability Enhancement Course	8	8	8
Skill Enhancement Course	9	9	9
Internship	4	4	4
Value Added Course	6	6	6
Dissertation in Major	-	-	12
Total Credits	127	167	167