ST. XAVIER'S COLLEGE (AUTONOMOUS), AHMEDABAD-9
FACULTY OF SCIENCE

DEPARTMENT OF PHYSICS & ELECTRONICS

SEMESTER – IV

SYLLABUS
OF
BSc PHYSICS (HONOURS)

BASED ON UNDERGRADUATE CURRICULUM FRAMEWORK
(NEP – 2020)

(Effective from Academic Year 2023)

Curriculum Framework for Semester – IV

Course	Title	Content		Credit
DSC-8 (Theory)	PHMC441C Modern Physics and Nuclear Physics	U1	Modern Physics	4
		U2	Special Relativity	
		U3	Nuclear Physics	
		U4	Nuclear Physics: Instrumentation	
DSC-9 (Theory)	PHMC442C Electromagnetism and Thermal Physics	U1	Magnetic Field in Matter	4
		U2	Electric Field in Matter	
		U3	Kinetic Theory and Thermoelectricity	
		U4	Thermodynamics	
DSC-10 (Laboratory)	PHMC443L Physics and Experiential Lab-IV	14 Physics Experiments		4
		Experiential Lab		
Minor-1 (Theory + Lab)	PHMN441C Basic Physics-III	U1	Electric Field in Matter	2
		U2	Kinetic Theory and Thermoelectricity	
		U3 U4	14 Physics Experiments	2
Minor-1 (Theory + Lab)	ELMN441C Basic Electronics-III	U1	Voltage Regulators	2
		U2	Impedance Transformer and Coupled Circuits	
		U3 U4	14 Experiments	2
SEC	PHSE441C Arduino (Swayam)	U1	Arduino	2
		U2	Laboratory Component	
AEC	Ability Enhancement Course	(To be offered by the concerned subject Department)		2
VAC	Value Added Course	(To be chosen from a basket of courses)		2
Total Credits				**22**

* DSC: Discipline Specific Core

St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester–V to be implemented from the Academic Year **2025-26.**

DEPARTMENT OF PHYSICS & ELECTRONICS

Skill Enhancement Course: Arduino (Swayam)

Course Code & Title	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Cr	Lecture + Tutorials hrs	Laboratory Hrs per week	Activity/Case study analysis	
PHSE441C: Arduino (Swayam)	2	12 + 3	2		10 + 2 from a recognized board	Science Stream Math-Group

Learning Objectives:

LO1	Understand the interfacing of various input/output devices (like push buttons, LEDs, LCDs, seven-segment displays) with Arduino, and implement functions like PWM and ADC.
LO2	Develop embedded programs using Arduino IDE and AVR-GCC for digital logic design and wireless communication, combining C and assembly programming techniques.

Course Outcomes:

CO1	Demonstrate the ability to design and implement embedded systems using Arduino for real-time applications such as counters, displays, and wireless modules.
CO2	Integrate assembly and C programming with Arduino and AVR-GCC to develop advanced digital logic and display systems including LCDs and seven-segment displays.

Unit 1: Arduino

Credit of Course: 1 Cr   **Lecture 12 Hrs**   **Tutorial 3Hrs**

Overview of Arduino, Electronic components and connections, Introduction to Arduino, Arduino components and IDE, First Arduino Program, Arduino with Tricolor LED and Push button, Arduino with LCD, Display counter using Arduino, Seven segment display, Pulse Width Modulation, Analog to Digital Conversion, Wireless Connectivity to Arduino, Assembly programming through Arduino, Digital logic design with Arduino, AVR-GCC programming through Arduino, Interfacing LCD through AVR-GCC programming, Mixing Assembly and C programming

Text Book
- Swayam

Unit 2: Laboratory Component

S. No.	Experiment
1	Display Counter using Arduino
2	Pulse width modulation
3	Analogue to digital conversion
4	Wireless connectivity to Arduino
5	Digital Logic design with Arduino
6	Mixing Assembly and C programming
7	Interfacing LCD to AVR GCC programming
8	Seven Segment Display
9	Arduino with tri color with LED and Push button