

# PHY8514: DATA ACQUISITION AND PROCESSING SKILLS FOR PHYSICISTS I

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Data Acquisition and Processing Skills for Physicists I

### Subject Code

PHY - Physics

### Course Number

8514

### Academic Unit

Physics (PHY)

### College/School

College of Science (SI)

### Course Duration

One Semester

### Credit Units

3

### Level

R8 - Research Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Exclusive Courses

PHY5504 Data Acquisition and Processing Skills for Physicists I

## Part II Course Details

### Abstract

The primary aim of this course is to equip physics students with fundamental skills in data acquisition and processing, thereby enhancing their ability to confidently handle diverse data sources. These skills are essential for modern physicists who must be adept not only in theoretical calculations but also in the practical aspects of data handling. Students will learn to utilize various computer programming languages, with a focus on Python, which is renowned for its efficiency and ease of use in scientific computing. Additionally, the course will cover the use of various hardware tools for data collection, including but not limited to microcontrollers like Arduino, sensors, and real-time data processing units. The students are expected to finish several mini-projects on data acquisition and processing.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)		
1	Be able to acquire data from different sources	50	x	x
2	Be able to process big data sets	50	x	x

**A1: Attitude**

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

**A2: Ability**

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

**A3: Accomplishments**

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

**Learning and Teaching Activities (LTAs)**

LTAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lectures	Presentation of course material	1, 2	3
2	Projects	The students will complete several mini-projects related to data acquisition and processing.	1, 2	
3	Presentations/exhibition	The students will showcase projects.	1, 2	

**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?	
1	Presentations/exhibition	1, 2	100	-	Yes

**Continuous Assessment (%)**

100

**Assessment Rubrics (AR)****Assessment Task**

Presentations/exhibition (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Demonstrating the capability in data acquisition and processing.

**Excellent**

(A+, A, A-) High

(excellent accomplishment with creativity and correct understanding)

**Good**

(B+, B, B-) Significant  
(good accomplishment with mostly correct understanding)

**Fair**

(C+, C, C-) Moderate  
(fair accomplishment with some correct understanding)

**Marginal**

(D) Basic  
(essential accomplishment with basic understanding)

**Failure**

(F) Not reaching marginal level

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**Assessment Task**

Presentations/exhibition (for students admitted in Semester A 2022/23 to Summer Term 2024)

**Criterion**

Demonstrating the capability in data acquisition and processing.

**Excellent**

(A+, A, A-) High  
(excellent accomplishment with creativity and correct understanding)

**Good**

(B+, B) Significant  
(good accomplishment with mostly correct understanding)

**Marginal**

(B-, C+, C) Moderate  
(fair accomplishment with some correct understanding)

**Failure**

(F) Not reaching marginal level

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## Part III Other Information

**Keyword Syllabus**

- Introduction to Data
- Data Acquisition
- Data format, Database, Data acquisition hardwires, e.g., Arduino.
- Data Processing
- Data processing program languages, e.g., MATLAB, Python, Data Visualization, e.g., Matplotlib.

**Reading List**

**Compulsory Readings**

Title	
1	None

**Additional Readings**

	<b>Title</b>
1	None