CO-PO Mapping and Attainment Comprehensive Faculty Training Module

What is CO–PO Mapping?

CO (Course Outcomes):
Statements describing what a student should **know or be able to do** after completing a course.

PO (Program Outcomes):
Broad abilities students should achieve by the end of a **degree program** (e.g., critical thinking, communication, problem-solving).

CO–PO Mapping is the process of linking each course outcome (CO) to relevant program outcomes (POs) to show how a course contributes to the overall program.

What to Do in CO–PO Mapping?

You need to:

1. Define **clear COs** for each subject
2. List all **POs** of the program
3. Create a **mapping matrix**
4. Assign **correlation levels** between COs and POs

Typical Mapping Scale:

3 → High correlation

2 → Medium correlation

1 → Low correlation

0 → No correlation

Bloom’s Taxonomy

Levels: Remember → Understand → Apply → Analyze → Evaluate → Create

Use measurable verbs:

Explain, Analyze, Calculate, Design, Evaluate

Writing COs (Optics Example)

CO1: Analyze aberrations in lenses and apply correction methods.

CO2: Apply interference principles to determine wavelength.

CO3: Evaluate diffraction patterns and resolving power.

CO4: Explain polarization and optical activity.

CO5: Analyze laser systems and applications.

Program Outcomes (POs)

PO1 Knowledge of Physics concepts
PO2 Problem analysis (analytical thinking)

PO3 Application of concepts to solve problems
PO4 Experimental skills & data analysis
PO5 Use of modern tools (lasers, optics instruments, etc.)

Program Specific Outcomes (PSOs)

PSO1 Understanding core physics domains
PSO2 Mathematical modeling in physics
PSO3 Experimental design
PSO4 Application in technology/industry
PSO5 Research orientation
PSO6 Advanced conceptual understanding
PSO7 Interdisciplinary applications

Proper CO–PO Mapping (With Logic)

CO1: Aberrations

- Conceptual understanding
- Optical system analysis
- Application in lens design

Mapping:

PO/PSO	Level	Reason
PO1	3	Core optics knowledge
PO2	2	Analytical understanding of defects
PO3	3	Applying correction methods
PO4	2	Some experimental relevance
PO5	2	Limited tool usage
PSO1	3	Core physics
PSO2	2	Mathematical relations
PSO3	2	Some experimental relevance
PSO4	2	Optical instruments
PSO5	1	Minimal research
PSO6	3	Strong conceptual depth
PSO7	2	Used in imaging systems

CO2: Interference

- Wave optics theory
- Mathematical derivations
- Experimental setups

Mapping:

PO/PSO	Level	Reason
PO1	3	Fundamental concept
PO2	3	Strong analytical reasoning

PO/PSO	Level	Reason
PO3	3	Solving wavelength problems
PO4	3	Strong experimental basis
PO5	2	Instruments like interferometer
PSO1	3	Core physics
PSO2	3	Heavy math involvement
PSO3	3	Experiment design
PSO4	2	Applied in coatings
PSO5	2	Research relevance
PSO6	3	Deep wave optics
PSO7	2	Applied in engineering optics

CO3: Diffraction

- Pattern analysis
- Grating calculations
- Resolution concepts

Mapping:

PO/PSO	Level
PO1	3
PO2	3
PO3	3
PO4	3
PO5	3
PSO1	3
PSO2	3
PSO3	3
PSO4	2
PSO5	2

PO/PSO	Level
PSO6	3
PSO7	2

Diffraction is **highly analytical + experimental + application-heavy**

CO4: Polarization

Conceptual + experimental

Optical devices

Mapping:

PO/PSO	Level
PO1	3
PO2	2
PO3	2
PO4	3
PO5	3
PSO1	3
PSO2	2
PSO3	3
PSO4	3
PSO5	2
PSO6	3
PSO7	2

- Strong in **devices (Nicol prism, polarimeter)**
- Strong experimental relevance

CO5: Lasers & Holography

- Modern physics
- Applications
- Technology integration

Mapping:

PO/PSO	Level
PO1	3
PO2	2
PO3	3
PO4	2
PO5	3
PSO1	3
PSO2	2
PSO3	2
PSO4	3
PSO5	3
PSO6	3
PSO7	3

Final Clean CO–PO Table

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	3	2	2							
CO2	3	3	3	3	3							
CO3	3	3	3	3	3							
CO4	3	2	2	3	3							
CO5	3	2	3	2	3							

CO-PO Attainment Table

1. What This Table Means

CO1 Direct: 70% Indirect: 80% Final: 72%

This shows:

- **Direct Attainment = 70%**
- **Indirect Attainment = 80%**
- **Final CO Attainment = 72%**

2. What is Direct Attainment? (Very Important)

Direct attainment comes from:

- Internal exams
- Assignments
- Lab performance

Step-by-Step Calculation

Example Data:

- Total students = 40
- Threshold mark = 40% (or 16/40, etc.)

Marks distribution:

| Students scoring ≥ threshold | 28 |
| Total students | 40 |

Formula:
Direct Attainment=Students above thresholdTotal students×100

☞ That's how **70%** is obtained.

3. What is Indirect Attainment?

This comes from:

- Student feedback
- Course exit survey

Example Survey

Question:

"Did this course help you understand aberrations?"

Students rate (1–5 scale):

Rating	Meaning
5	Excellent
4	Good
3	Average

Suppose:

- Average score = **4 out of 5**

Convert to percentage:

☞ That's your **Indirect Attainment = 80%**

4. Why We Combine Direct & Indirect?

Because:

- Direct → actual performance
- Indirect → student perception

☞ Both together give a **complete picture**

5. Final CO Attainment Formula

Most institutions use:

Final CO Attainment=(Direct×0.8)+(Indirect×0.2

☞ Weightage:

- 80% → Direct

- 20% → Indirect

6. Step-by-Step Final Calculation

Given:

- Direct = 70%
- Indirect = 80%

Step 1: Multiply weights
70×0.8=56+ 80×0.2=16

Step 2: Add
56+16=7256 + 16 = 7256+16=72

 Final Answer:
Attainment=72%

7. Interpretation (Very Important for IQAC)

Range	Meaning
≥ 70%	Target achieved
60–70%	Moderate ⚠
< 60%	Needs improvement

☞ Here:
72% → CO achieved successfully