

# **GUIDELINES ON MAPPING COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES**

## **1. PROGRAM LEARNING OUTCOMES AND COURSE LEARNING OUTCOMES**

*Program learning outcomes* (PLO) are the knowledge/skills/competences which students gain from a successful completion of a program. *Course learning outcomes* (CLO) are the knowledge/skills/competences which students gain from a successful completion of a course.

## **2. WRITING LEARNING OUTCOMES**

PLOs or CLOs writing statement is prefaced by a verb, followed by a noun and any conditions or timescales as follows: Action Verb + Noun (+condition + timescale). Following this format ensures that the statements can be assessed.

To be effective, program and course learning outcomes are:

- Clear and measurable. They are written to be assessed (i.e., we can identify if a student has achieved that outcome).
- Flexible to diverse teaching methods. They are written to accommodate a variety of teaching and learning approaches (i.e., there are multiple ways to teach to the outcome).
- Tailored to the specific discipline.
- Aligned with the appropriate stage of learning, to ensure progressive development from foundational knowledge to higher-order thinking skills.

Bloom's Revised Learning Taxonomy is a recognized learning taxonomy and the recommended taxonomy for academic programs. By organizing outcomes into six progressive cognitive levels—remember, understand, apply, analyse, evaluate, and create—it ensures a comprehensive approach to learning that facilitates both foundational knowledge acquisition and the development of higher-order thinking skills. This categorisation aids faculty in designing curricula that enhance students' abilities from basic recall of information to creative problem-solving.

## **3. STUDY PROGRAM COHERENCE AND CURRICULUM MAPPING**

Alignment between PLOs and CLOs reflects a program's ability to clearly demonstrate how its structure and content are intentionally designed to achieve program goals through specific course-level objectives. A program is considered aligned if the program's outcomes are met across courses (via course learning outcomes, learning activities, and assessments). An aligned program is one in which any course learning objective, activity, or assessment explicitly connects to at least one program outcome.

The Curriculum Map ensures that CLOs align with PLOs, to maintain logical sequencing, and support continuous program quality improvement. The map aligns course learning outcomes to program outcomes. This depth of mapping offers a detailed and precise alignment, ensuring each aspect of the curriculum contributes to the intended outcomes.

For this purpose, IUS faculty is encouraged to use the matrices presented below as follows;

The matrices provided below serve as illustrative examples.

## ANNEX x.I\_Cycle: The Impact of the Courses/modules on learning outcomes at the qualification level.

Affiliation marked with an "x"

**CYCLE OF STUDY and STUDY PROGRAM TITLE : I STUDY CYCLE: GENETICS AND BIOENGINEERING**

### MODULES

		Mathematics and Statistics	English Language	Biological Sciences	Chemistry	Other natural sciences	Foreign languages	Genetics and Engineering	Computer Science and Bioinformatics	Protein Engineering	Ethics in Engineering	Project management	Internship/ Work placement	University and Free Electives	Program Electives
	<b>Total ECTS per module</b>	24	12	30	24	21	6	18	12	6	6	6	6	21	48
	<b>ECTS Total</b>	<b>240</b>													

### PROGRAM LEARNING OUTCOMES

LO1	Identify, formulate and solve biological problems by using appropriate theoretical and experimental skills (including bioinformatics and laboratory work);	x		x	x			x	x	x			x	x		x
LO2	Identify, classify and describe the performance of biological systems and components through the use of analytical methods and modelling techniques;	x	x	x	x	x		x	x	x				x		x
LO3	Identify constraints of engineering solutions including environmental, social and sustainability limitations, health and safety and risk assessment issues;	x									x		x	x	x	x
LO4	Apply gained management experience in designing and running experiments and analyze obtained results;	x		x				x					x	x		x
LO5	Apply knowledge and understanding to acquire practical skills for problem solving, for research tasks and the design of protocols and procedures;		x	x	x								x	x		x
LO6	Develop an awareness of and commitment to the role of engineers in society including their professional and ethical responsibilities;					x					x		x		x	x
LO7	Develop technical and professional skills for individual and team work including coordinating the team if necessary;		x								x		x			
LO8	Develop an area for creativity excellence through interactivity and participate in scientific events;		x				x							x	x	x
LO9	Recognize a need to engage in a life-long learning and usage of contemporary technological advances.								x						x	

source: Prirucnik za primjenu kvalifikacijskog okvira u visokom obrazovanju BHFQHE, TEMPUS Projekat, 2016

## ANNEX x.II\_Cycle: The Impact of the Courses/modules on learning outcomes at the qualification level.

Affiliation marked with an "x"

CYCLE OF STUDY and STUDY PROGRAM TITLE : II STUDY CYCLE: GENETICS AND BIOENGINEERING			
MODULES			
		Program Electives	Master thesis
	Total ECTS per module	36	24
	ECTS Total	60	

### PROGRAM LEARNING OUTCOMES

LO1	Possess in-depth knowledge and skills in specific discipline with global perspective;		x
LO2	Analyze, evaluate and apply existing knowledge to develop critical solutions in new situations;	x	x
LO3	Disseminate ideas to the wider community in a confident, effective and coherent manner;		x
LO4	Describe and critically evaluate current aspects of biosciences in order to solve related problems;	x	
LO5	Create and sustain networking efficiently;	x	x
LO6	Perform given tasks ethically and with dedication;	x	x
LO7	Possess strong enthusiasm and commitment to continuously acquire and disseminate new knowledge and skills.	x	x

source: Prirucnik za primjenu kvalifikacijskog okvira u visokom obrazovanju BHQFHE, TEMPUS Projekat, 2016

## ANNEX x.III\_Cycle: The Impact of the Courses/modules on learning outcomes at the qualification level.

Affiliation marked with an "x"

**CYCLE OF STUDY and STUDY PROGRAM TITLE : III STUDY CYCLE: GENETICS AND BIOENGINEERING**

		MODULES		
		<i>Program Electives</i>	<i>Scientific Activity</i>	<i>PhD Thesis</i>
<b>Total ECTS per module</b>		<b>36</b>	<b>24</b>	<b>120</b>
<b>ECTS Total</b>		<b>180</b>		

### PROGRAM LEARNING OUTCOMES

LO1	Apply advanced omics-based methods and models for solving problems in engineering;	x		x
LO2	Assess the performance and limitations of computational and biological models for particular cases;	x		x
LO3	Apply appropriate methodologies to study and understand the pathways which occur in the cell;	x		x
LO4	Choose the appropriate molecular biology technique to achieve particular engineering objectives;	x		x
LO5	Perform independent research activity and report on it;	x	x	x
LO6	Transfer the obtained knowledge in oral and written form;	x	x	x
LO7	Critically evaluate various research approaches, methods and techniques;	x	x	x
LO8	Work effectively in a team.	x	x	x

source: Prirucnik za primjenu kvalifikacijskog okvira u visokom obrazovanju BHQFHE, TEMPUS Projekat, 2016