

**University Institute of Engineering and Technology, Kurukshetra University,**  
**Kurukshetra Guidelines for Program Outcomes, Program Specific Outcomes,**  
**Course Outcomes and their Attainment**

1. **Introduction:** As per NAAC Revised Accreditation Framework (RAF), Program Outcomes (POs), Program Specific Outcomes (PSOs) and Course Outcomes (COs) for all the programs offered by the Institute are stated and displayed on the Institute website. These are communicated to teachers as well as to students. Along with this, the method of measuring attainment levels of POs, PSOs and COs are described. This is being emphasized by UGC/AICTE/NBA also. The Deans' committee in its meeting held on June 10, 2019 recommended to introduce the concept of POs, PSOs, COs and their respective attainment measures for all the UG/PG programs being offered by the University. This document presents the broad guidelines for the same. POs, PSOs, COs and method of attainment for all the UG/PG programs are prepared keeping in view the Kurukshetra University guidelines.
2. **Program Outcomes (POs):** Program Outcomes are what the students of an UG/PG program are expected to learn and be able to do after the successful completion of the UG/PG program. These are discipline non-specific. The POs for the institute are prepared by the committee of Director, Faculty Incharges and Nodal Officer, Academic of the institute. There are eight POs for the programs offered by the institute given at Annexure-I.
3. **Program Specific Outcomes (PSOs):** PSOs are what the students of a specific UG/PG program are expected to learn and be able to do after the successful completion of that specific program. PSOs are discipline specific and are prepared by the respective Faculty Incharge and the faculty members of the department offering the program(s). PSOs must be specific, measurable, achievable and realistic. PSOs can be 3 to 5 in number for each UG/PG program.
4. **Course Outcomes (COs):** Course outcomes are the statements that describe what the students are expected to know and be able to do after the successful completion of the course. These are relatively narrower statements and course specific and therefore are prepared by the teacher(s) concerned. These are written as shown below along with the course contents.

Course code (e.g. G101): Name of the course	
COs#	After the completion of this course the students will be able to do:
G101.1	Statement
G101.2	Statement
G101.3	Statement
G101.4	Statement

5. **Mapping:** Mapping is a process of representing the correlation between COs and POs, COs and PSOs in the scale of 1 to 3 as follows (Table 1 and Table 1.1):

**Table 1: Scale of mapping between COs and POs**

Scale	
1	If the contents of course have low correlation (i.e. in agreement with the particular PO to a small extent) with the particular Program outcome.
2	If the contents of course have medium correlation (i.e. in agreement with the particular PO to a reasonable extent) with the particular Program outcome.
3	If the contents of course have strong correlation (i.e. in agreement with the particular PO to a large extent) with the particular Program outcome.

**Table 1.1: Scale of mapping between COs and PSOs**

Scale	
1	If the contents of course have low correlation (i.e. in agreement with the particular PSO to a small extent) with the particular Program Specific Outcome.
2	If the contents of course have medium correlation (i.e. in agreement with the particular PSO to a reasonable extent) with the particular Program Specific Outcome.
3	If the contents of course have strong correlation (i.e. in agreement with the particular PSO to a large extent) with the particular Program Specific Outcome.

5.1 **CO-PO Mapping Matrix:** Table 2 shows the CO-PO mapping matrix for a course (e.g. G101) assuming that there are 8 POs and 5 COs.

**Table 2: CO-PO matrix for the course G101 (Name of the Course)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
G101.1	3	3	2	3	3	--	--	2
G101.2	3	2	3	3	3	2	2	--
G101.3	2	3	3	3	2	2	2	3
G101.4	3	2	2	2	3	3	3	3
G101.5	3	3	3	3	3	--	2	2
Average	2.8	2.6	2.6	2.8	2.8	2.33	2.25	2.5

*Note: It is not necessary that each CO has a correlation with all the POs.*

5.2 **CO-PSO Mapping Matrix:** Table 3 shows the CO-PSO mapping matrix for a course (e.g. G101) assuming that there are 4 PSOs and 5 COs.

**Table 3: CO-PSO matrix for the course G101 (Name of the Course)**

	PSO1	PSO2	PSO3	PSO4
G101.1	3	3	2	2
G101.2	3	3	1	3
G101.3	3	2	2	2
G101.4	2	3	3	3
G101.5	3	3	3	2
Average	2.8	2.8	2.2	2.4

**5.3 CO-PO-PSO Mapping Matrix:** The COs-POs and COs-PSOs mapping matrices are to be prepared, as shown in Tables 2 and 3 above, for all the courses of a program. These are then combine to prepare a CO-PO-PSO mapping matrix as shown in the Table 4 below:

**Table 4: CO-PO-PSO mapping matrix for all the courses of: \_\_\_\_\_ (Name of the program)**

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
G101	2.8	2.6	2.6	2.8	2.8	2.0	2.4	2.6	2.8	2.8	2.2	2.4
G102	--	--	--	2.6	2.5	3.0	2.8	2.7	2.6	2.8	2.4	2.6
G103												
G104												
G105												
G106												
G201												
G201												
G203												
G204												
G205												
G206												
G301												
G302												
G303	--	2.8	2.6	2.6	2.8	2.8	2.0	2.4	2.6	--	--	--
G304												
G305												
G306												
G401												
G402												
G403												
G404												
G405												
G406												

**6. Attainment of COs:**

The attainment of COs is to be measured on the basis of the results of internal assessment and semester examination. The attainment is measured on scale of 3 after setting the target for COs attainment. The set target may be revised on yearly basis as per the

performance and requirements of the course/program/institute. Table 5 shows the CO attainment levels against the set target of 60% marks:

**Table 5: CO Attainment Levels for internal assessment**

Attainment Level	
1 (low level of attainment)	$\leq 45\%$ of students score more than 60% of marks in class tests of a course.
2 (Medium level of attainment)	$46\% \leq 55\%$ of students score more than 60% of marks in class tests of a course.
3 (High level of attainment)	$\geq 56\%$ of students score more than 60% of marks in class tests of a course.

A proper mapping of course outcomes with assessment methods are defined for measuring the attainment level. The assessment method may include sessional tests, seminar, report writing, experimental work, class quiz, assignments, viva-voce etc. as per the requirements of the course. However, before measuring the attainment level of the COs, the assessment method should be well defined by the concerned teacher and proper record should be maintained. An example of measuring the attainment level based on sessional tests is described below:

The questions in sessional tests for internal assessment are to be based on COs. Here it is assumed that sessional test – I is based on first CO (i.e. G101.1) of a course. Similarly sessional test – II is based on next two COs (i.e. G101.2 and G101.3) of a course with equal weightage given to these two COs. Sessional test –III/Assignment is based on the next CO (i.e. G101.4). For each internal assessment sessional test, the percentage of students attaining the target level of CO is estimated and average percentage will decide the attainment level of COs. Following steps are to be followed for determining the attainment level in internal assessment of a course.

- (i) Estimate the %age of students scoring set target (say 60%) or more in the question(s) of Sessional test -I based on first CO i.e. G101.1
- (ii) Estimate the %age of students scoring set target (60%) or more in the question(s) of Sessional test -II based on second CO i.e. G101.2
- (iii) Estimate the %age of students scoring set target (60%) or more in the question(s) of Sessional test -II based on third CO i.e. G101.3
- (iv) Estimate the %age of students scoring set target (60%) or more in the question(s) of Sessional test –III/Assignment based on the fourth CO i.e. G101.4
- (v) Take average of the percentages obtained above.

(vi) Determine the attainment level i.e. 3, 2 or 1 as per scale defined in table 5.

For determining the attainment levels for end semester examination, it is assumed that questions in the end term examination are based on all COs of the course. Attainment levels for end semester examination of a course are to be determined after the declaration of the results.

The CO attainment levels for end semester examination are given in Table 6.

**Table 6: CO Attainment Levels for End Semester Examination (ESE)**

Attainment Level	
1 (Low level of attainment)	$\leq 45\%$ of students obtained letter grade of A or above/ score more than 60% of marks in ESE of a course.
2 (Medium level of attainment)	$46\% \leq 55\%$ of students obtained letter grade of A or above / score more than 60% of marks in ESE of a course.
3 (High level of attainment)	$\geq 56\%$ of students obtained letter grade of A or above/ score more than 60% of marks in ESE of a course.

Overall CO Attainment level of a Course:

The overall CO attainment level of a course can be obtained as:

Overall CO attainment level = 50% of CO attainment level in Internal assessment + 50% of CO Attainment level in End semester examination.

The overall COs attainment level can be obtained for all the courses of the program in a similar manner.

### **6.1 Attainment of POs:**

The overall attainment level of POs is based on the values obtained using direct and indirect methods in the ratio of 80:20. The direct attainment of POs is obtained through the attainment of COs. The overall CO attainment value as estimated above and CO-PO mapping value as shown in Table 4 are used to compute the attainment of POs. PO attainment values obtained using direct method are written as shown in the Table 7.

**Table 7: PO Attainment Values using Direct Method**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
G101								
G102								
G103								
G104								
-								
-								
G406								
Direct PO attainment	Average of above values	Average of above values	Average of above values	--	--	--	--	Average of above values

The PO attainment values to be filled in above table can be obtained as follows:

For G101-PO1 Cell:

PO1 attainment value = (Mapping factor of G101-PO1 from Table 4 × Overall CO attainment value for the course G101)/3

For G104-PO1 Cell:

PO1 attainment value = (Mapping factor of G104-PO1 from Table 4 × Overall CO attainment value for the course G104)/3

Similarly values for each cell of Table 7 can be obtained. The direct attainment of POs is average of individual PO attainment values.

In order to obtain the PO attainment using indirect method, a student exit survey based on the questionnaire of POs are to be conducted at end of last semester of the program. The format for the same is given in Table 8. Average of the responses from the outgoing students for each PO is estimated.

The overall PO attainment values are obtained by adding attainment values estimated using direct and indirect methods in the proportion of 80:20 as follows:

$$\begin{aligned} \text{Overall attainment value for PO1} = & \\ & 0.8 \times \text{average attainment value for PO1 using direct method (from table 7)} \\ & + \\ & 0.2 \times \text{average response of outgoing students for PO1} \end{aligned}$$

**Table 8 : Questionnaire for indirect measurement of PO attainment  
(For outgoing students)**

At the end of my degree program I am able to do:

	Please tick any one		
Statement of PO1	3	2	1
Statement of PO2	3	2	1
Statement of PO3	3	2	1
Statement of PO4	3	2	1
--	3	2	1
---	3	2	1
---	3	2	1
Statement of PO8	3	2	1
3: Strongly Agree; 2: Agree; 1: Average			

Similarly overall attainment value is to be obtained for each PO. Overall PO attainment values are written as shown in Table 9:

**Table 9: Overall PO attainment Values**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Direct PO attainment								
Indirect PO attainment								
Overall PO attainment								
Target	2	2	2	2	2	1.5	2	2

The overall PO attainment values obtained above are compared with set target. If overall PO attainment value is less than the set target value then an action plan may be prepared for improvement in the subsequent academic session.

The overall PSO attainment level based on CO-PSO mapping values and overall CO attainment values is to be obtained in a similar manner.

## Annexure-I

### PROGRAM OUTCOMES

By the end of the program, students will acquire the following Program Outcomes:

1. Graduates will be able to exhibit knowledge in Science, Mathematics, Engineering and Technology by expressing imaginative thoughts in a successful way with a consciousness of social and moral obligations.
2. Graduates will be able to describe, persive & apply the knowledge in Engineering and Technology to understand the given Engineering problems
3. Graduates will be able to apply the knowledge in Engineering and Technology to formulate and develop solution to the Engineering problems.
4. Graduates will be able to analyze and interpret data by using Engineering skills to differentiate among the proposed solutions and will be able to provide significant conclusions.
5. Graduates will be able to evaluate the solution of dynamic problems by conducting research and experimenting with modern tools of modelling and simulation.
6. Graduates will be able to design a hardware and software system, component or process to meet desired needs with given specifications.
7. Graduates will be able to demonstrate leadership qualities with best professional, economic and ethical responsibilities to understand and assess global and national issues.
8. Graduates will be able to communicate adequately in both verbal and written contexts among society and the peers with knowledge of sustainable development of the society and the safe environment,