Course name

Information about the course: Instructor, semester/term and year:

Attributes primarily targeted in this course (list them):

(1) **Workload:** Results in a feasible workload for students and graders
(2) **Generalizability:** Results are representative of entire program/class
(3) **Content:** The assessment tool is clearly aligned with the outcome
(4) **Reliability:** Results will be consistent between graders, or if tested again
(5) **Actionable:** Provides useful information related to educational experience that can be used for course and/or program improvement

Course: Introduction to Design and professionalism

Course learning outcomes (CLOs): Students will be able to:

1. *(Indicator:)*
2. *(Indicator:)*
3. *(Indicator:)*
4. *(Indicator:)*

Week	Key goals and CLO developed	Student activity	Assessment and CLOs	Assessment weight (%)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Case 1: Assessment in a first year design course

Scenario: The following is a design course, ENGR-101, in the fall semester of a first year engineering program. Your group is the instruction team responsible assessing the course learning outcomes and providing meaningful data to the program. A previous course instructor has worked with the departmental curriculum committee on the course learning outcomes and their connection to program-wide indicators (shown below in italics). Note that the indicators to which the learning outcomes connect are not described. You do not need to worry about the indicators for this activity.

You have been asked to propose specific assessments (under the "Assessment" column) to ensure that data is gathered to inform both course and program improvement. You are free to assess multiple learning outcomes per assessment. You should consider the following:

(6) **Workload:** Results in a feasible workload for students and graders
(7) **Generalizability:** Results are representative of entire program/class
(8) **Content:** The assessment tool is clearly aligned with the outcome
(9) **Reliability:** Results will be consistent between graders, or if tested again
(10) **Actionable:** Provides useful information related to educational experience that can be used for course and/or program improvement

Course: Introduction to Design and professionalism

Course learning outcomes (CLOs): Students will be able to:

5. Apply a prescribed process for solving complex problems *(Indicator: 2.3- Problem solving)*
6. Effectively communicate in written document following a prescribed format and using standard English. *(Indicator: 7.1 - Effective writing)*
7. Apply concepts including occupational health and safety principles, economics, law, and equity to engineering problems. *(Indicator 4.3)*
8. Apply critical and creative thinking principles to solve contextualized problems *(Indicator: 2.7)*
9. Apply numerical modeling tool to create model used for solving complex problems.
10. Critically evaluate information on prescribed criteria *(Indicator: 12.1)*.

Week	Key concepts	Student activity	Assessment
1	Motivation, course overview, models.		
2	Complex problem solving process		
3	Stakeholders and constraints		
4	Argumentation		
5	Teaming		
6	Idea generation		
7	Decision making		
8	Safety and hazard analysis		
9	Evaluating Information		
10	Professionalism and ethics		
11	Engineering Law		
12	Economics		
13	Design process		

Case 2: Assessment in a Chemical Engineering course

Scenario: The following is a third year Chemical Engineering course, Chemical Reaction Engineering. Your group is the instruction team responsible for ensuring that the course activities align with program-wide indicators, and can provide useful data. A previous course instructor has worked with the departmental curriculum committee on the course learning outcomes and their connection to program-wide indicators (shown below in italics). Note that the indicators to which the learning outcomes connect are not described. You do not need to worry about the indicators for this activity.

You have been asked to propose specific assessments (under the "Assessment" column) to ensure that data is gathered to inform both course and program improvement. You are free to assess multiple learning outcomes per assessment. You should consider the following:

(1) **Workload:** Results in a feasible workload for students and graders
(2) **Generalizability:** Results are representative of entire program/class
(3) **Content:** The assessment tool is clearly aligned with the outcome
(4) **Reliability:** Results will be consistent between graders, or if tested again
(5) **Actionable:** Provides useful information related to educational experience that can be used for course and/or program improvement

Course: Chemical Reaction Engineering

Course learning outcomes (CLOs): Students will be able to:

1. Calculate operating parameters (size, flowrates, conversion, etc.) for isothermal and non-isothermal operation of ideal well- mixed batch and continuous reactors, and for ideal plug-flow reactors *(Indicator 1.10, 1.12)*
2. Formulate a set of consistent material and energy balance equations to describe operation of batch, semi-continuous and continuous reactor systems with single or multiple reactions
3. Formulate an overall rate expression from a series of elementary mechanistic steps
4. Investigate the choice of reactor type and operating conditions on output such as reactant conversion, selectivity and yield. *(Indicator 1.11)*
5. Demonstrate ability to take leader role on a team project *(Indicator 6.3)*

Week	Key concepts	Student activity	Assessment
1-2	Reaction rates, stoichiometry		
3-5	Isothermal reactors, reversible reactions		
6-8	Nonisothermal reactor design		
9-11	Multiple reactions, selectivity and yield		
12	Reaction networks and pathways		
13	Reactor design challenge		

Case 3: Assessment in an Electrical Engineering course

Scenario: The following is a second year Electrical Engineering course. Your group is the instruction team responsible for ensuring that the course activities align with program-wide indicators, and can provide useful data. A previous course instructor has worked with the departmental curriculum committee on the course learning outcomes and their connection to program-wide indicators (shown below in italics). Note that the indicators to which the learning outcomes connect are not described. You do not need to worry about the indicators for this activity.

You have been asked to propose specific assessments (under the "Assessment" column) to ensure that data is gathered to inform both course and program improvement. You are free to assess multiple learning outcomes per assessment. You should consider the following:

(1) **Workload:** Results in a feasible workload for students and graders
(2) **Generalizability:** Results are representative of entire program/class
(3) **Content:** The assessment tool is clearly aligned with the outcome
(4) **Reliability:** Results will be consistent between graders, or if tested again
(5) **Actionable:** Provides useful information related to educational experience that can be used for course and/or program improvement

Course: Electronics I

Course learning outcomes (CLO): Students will be able to:

1. Select and use a small signal model to predict behaviour of common nonlinear active devices *(Indicator 1.8-KB-devices)*
2. Calculate current and voltage at nodes of non-linear devices when connected using common bias networks.
3. Calculate component values to implement common amplifier configurations *(Indicator 1.9-KB-amplifiers)*
4. Select and design an electronic circuit (in this course, an amplifier) for a specific real-world application *(Indicator 4.3-electrical design)*

Week	Key concepts	Student activity	Assessment
1	Motivation, connection to passive electric circuits		
2	Two terminal and three terminal active devices (diodes and transistors). Non-linear vs linear.		
3	Applications for two terminal devices		
4	Applications and characteristics of amplifiers.		
6-7	Operation and behaviour of operational amplifiers. Applications.		
8-9	MOSFET amplifiers (CS, CG, CD)		
10-11	Bipolar amplifiers (CE, CC, CB)		
12	Nonlinear behaviour of transistors		
13	Design considerations, practical limitations of common devices.		

Case 4: Assessment in a Mechanical Engineering course

Scenario: The following is a second year Mechanical Engineering course. Your group is the instruction team responsible for ensuring that the course activities align with program-wide indicators, and can provide useful data. A previous course instructor has worked with the departmental curriculum committee on the course learning outcomes and their connection to program-wide indicators (shown below in italics). Note that the indicators to which the learning outcomes connect are not described. You do not need to worry about the indicators for this activity.

You have been asked to propose specific assessments (under the "Assessment" column) to ensure that data is gathered to inform both course and program improvement. You are free to assess multiple learning outcomes per assessment. You should consider the following:

(1) **Workload:** Results in a feasible workload for students and graders
(2) **Generalizability:** Results are representative of entire program/class
(3) **Content:** The assessment tool is clearly aligned with the outcome
(4) **Reliability:** Results will be consistent between graders, or if tested again
(5) **Actionable:** Provides useful information related to educational experience that can be used for course and/or program improvement

Course: Solid Mechanics I

Course learning outcomes (CLO): Students will be able to:

(1) Evaluate states of static equilibrium for objects subjected to forces in 2 & 3 dimensions, including free body diagrams. *(M-KB-10)*
(2) Assess internal forces in simple trusses, beams and frames including axial force, bending moment and shearing force diagrams (*M-KB-11)*
(3) Determine elastic normal and shearing stresses in loaded objects (*M-KB-12)*
(4) Evaluate properties of cross-sections (including centroids and moment of inertia) and stiffness and strength properties of engineering materials *(M-KB-13)*
(5) Evaluate deflection of simple beams, beam buckling and failure, and internal/external forces in simple two dimensional applications (*M-KB-14)*

Week	Key concepts	Student activity	Assessment
1	Equilibrium conditions and determination of forces on structures		
2	Determination of internal force systems in structures		
3	Principles of stress and strain		
4	Mechanical properties of materials, stress-strain curves & applications		
6-7	2 & 3D applications of stress, transformations, principal stresses, maximum shear stress, Mohr's circle		
8-10	Structures under axial, bending, torsional loading and combined loading		
11-12	Beam deflection, buckling and simple failure modes		