**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:

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. Apply a prescribed process for solving complex problems *(Indicator: 2.3- Problem solving)* 2. Effectively communicate in written document following a prescribed format and using standard English. *(Indicator: 7.1 - Effective writing)* 3. Apply concepts including occupational health and safety principles, economics, law, and equity to engineering problems. *(Indicator 4.3)* 4. Apply critical and creative thinking principles to solve contextualized problems *(Indicator: 2.7)* 5. Apply numerical modeling tool to create model used for solving complex problems. 6. 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

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| --- | --- | --- | --- |
| **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

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| --- | --- | --- | --- |
| 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

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| --- | --- | --- | --- |
| 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 |  |  |

**Part 2 – Group A: Design process assessment**

Scenario: Your group is the graduate attribute planning committee. Currently your group is tasked with identifying an approach to assess how **design process skills** are developing over the duration of your program. You need to be able to recommend a process that will generate data that allows your committee to draw meaningful conclusions. Your group has been asked to ensure that your process describes:

* Which kinds of courses to involve
* How assessments will be compared from one year to another
* How you will evaluate the trust-worthiness of the data (are the assessments measuring what you think they are? Would the assessments yield the same results if retested?)

**Part 2 – Group B: Written communications skills assessment**

Scenario: Your group is the graduate attribute planning committee. Currently your group is tasked with identifying an approach to assess how **written communication skills** are developing over the duration of your program. You need to be able to recommend a process that will generate data that allows your committee to draw meaningful conclusions. Your group has been asked to ensure that your process describes:

* Which kinds of courses to involve
* How assessments will be compared from one year to another
* How you will evaluate the trust-worthiness of the data (are the assessments measuring what you think they are? Would the assessments yield the same results if retested?)

**Part 2 – Group C: Lifelong learning assessment**

Scenario: Your group is the graduate attribute planning committee. Currently your group is tasked with identifying an approach to assess how **students’ ability to be lifelong learners** are developing over the duration of your program. You need to be able to recommend a process that will generate data that allows your committee to draw meaningful conclusions. Your group has been asked to ensure that your process describes:

* Which kinds of courses to involve
* How assessments will be compared from one year to another
* How you will evaluate the trust-worthiness of the data (are the assessments measuring what you think they are? Would the assessments yield the same results if retested?)

**Part 2 – Group D: Teaming assessment**

Scenario: Your group is the graduate attribute planning committee. Currently your group is tasked with identifying an approach to assess how **students’ ability to work effectively in teams** are developing over the duration of your program. You need to be able to recommend a process that will generate data that allows your committee to draw meaningful conclusions. Your group has been asked to ensure that your process describes:

* Which kinds of courses to involve
* How assessments will be compared from one year to another
* How you will evaluate the trust-worthiness of the data (are the assessments measuring what you think they are? Would the assessments yield the same results if retested?)