



Behind the curtain

The **people, processes and systems** that support a **CI Process**

Instructions: Mix 'em up! Each group should consist of people from different institutions who have not worked together.



Motivation



Engaging faculty and minimizing administrative workload

Characteristics of Effective CPI

- 1 Guided by effective practise
- 2 Program driven, faculty-owned, student-focused
- 3 Streamlines workflows, reduces workloads
- 4 Presents data effectively to spark discussion
- 5 Engage through exploration and visual analysis



6 Step Process



Engage



PEOPLE

using efficient and sustainable



PROCESS

that provide access to data
through linked



SYSTEMS



PEOPLE

- 2 page guides
- Packaged quality resources
- Easy access to data

Engage & Support



PROCESS

- Accessible repositories
- Flexible templates
- Easy-to-follow workflows

Streamline & Reduce



SYSTEMS

- Leverages other systems
- Integrates data silos
- Facilitate data discussions
- Timely quality reports

Integrate & Leverage



PEOPLE

Why are people disengaged?

TOP 3 BARRIERS

- ① FEAR OF EVALUATION
- ② LACK OF KNOWLEDGE
- ③ LACK OF RESOURCES

Traditionally
(Passive)

Ideally
(Active)

Faculty Engage:

“Forced” to do so

To improve student learning & engagement

Administrators Engage

Service & responsibility

Improvement from quality data

Support Staff Engage

“It’s my job”

Integral part of student achievement

Listen
Link
Leverage
Lead

Engage, don't disseminate

Practise to research

Existing data and experience

Clear obstacles, build capacity

Graduate Attribute Assessment

Quick Start Guide for Course Instructors



FACULTY OF
Engineering and
Applied Science



Indicate an included file (word, excel, pdf) found in the instructor package

This guide was developed for instructors incorporate graduate attribute assessment into their course, meet accreditation requirements and the standards set by the Faculty Office.

Purpose

The Canadian Engineering Accreditation Board requires programs to:

- 1 Demonstrate that graduates from programs possess 12 attributes

Knowledge Base
Problem Analysis
Investigation
Design
Engineering Tools
Teamwork
Communication
Professionalism
Impact of Engineering
Ethics and Equity
Economics
Life-long Learning

- 2 Demonstrate a process that assesses program outcomes and applies the results to develop and improve program quality

Outcomes-based Assessment



Assessing Graduate Attributes utilizes **outcomes-based assessment**: Clearly specify what students are expected to learn (**learning outcomes**), provide them meaningful tasks to demonstrate the outcomes, and assess them using clearly defined criteria.

Outcomes can be defined at both the course, program and professional levels, with each clearly linked to the other. Course outcomes are specific to a course experience, while program outcomes are representative of the more broader expectations of a program.

For accreditation, the professional outcomes are the **Graduate Attributes** which are broad and difficult to directly measure. Instead these are measured by program outcomes called **Indicators**. Instructors assess the indicators by linking to a **Course Learning Outcome**.

Example

Graduate Attribute —
Knowledge Base

Indicator —
Evaluate states of equilibrium for objects subjected to forces and moments

Course Learning Outcome —
Applies boundary conditions to determine reaction forces in simply supported beams

Workflow and Timeline

Step 1: Course Learning Outcomes & Mapping
Start of semester

Step 2: Assessment
During the semester

Step 3: Collecting & Reporting Data
End of semester

Step 4: Interpreting & Reflecting
After the semester

Step 1: Course Learning Outcomes & Mapping

- 1 Meet with your program representative for accreditation to **determine which indicators can and should be measured in your course** and the **learning level of instruction** (introduced, developed, applied). Be sure to copy the code associated with the indicators (e.g. APSC-1-CO-1).
- 2 For each indicator assessed in your course, create a course learning outcome or link the outcome to a suitable existing course learning outcome. Well constructed learning outcomes are **meaningful**, **measurable** and **clearly describe what the student is able to do**. Please consult [Writing learning outcomes](#) for more information.
- 3 For each course learning outcome, **identify appropriate deliverables in your course**.
- 4 Fill out the [FEAS sample syllabus](#) using all of the results from steps 1-3. The syllabus is **required** by Queen's Senate to be sent to the AMS for all of Queen's, and **must be completed for all courses**. Email the completed syllabus to your program representative.

<http://bit.ly/1M4TL2g>

Step 2: Assessment

Learning outcomes are assessed by a *set of 5 level performance criteria* that describes what must be demonstrated to achieve a specific level.



Each course is different. What fits one course may not fit another. To help find an approach for your course, see the diagram below:

What type of course do you teach?

Natural, Physical or Engineering Science Course

Primarily courses that focus on developing knowledge base in the sciences.

Deliverables are typically 'closed-ended': linear, or procedural style problems with a single answer.

- 1 For each deliverable, determine the question or section that best reflects the mapped outcome(s).
- 2 Use the **Outcomes rubric for close-ended problems** [\[W\]](#).
- 3 Modify the rubric to include a row for each outcome being assessed.
- 4 Assess student performance using the rubric, recording the results.

Laboratory Course

Blend knowledge base development with problem solving, investigation, experimentation and analysis.

Deliverables can be both 'closed-ended' or 'open-ended' lab and technical reports.

- 1 For each deliverable, determine the question or section that best reflects the mapped outcome(s).
- 2 For closed-ended problems: **Outcomes rubric for close-ended problems** [\[W\]](#).
For lab & technical reports: Develop a 5-level analytic rubric. **Writing effective rubrics** [\[A\]](#).
- 3 If necessary, modify rubrics to include a row for each outcome being assessed.
- 4 Assess student performance using the rubric, recording the results.

Design or Capstone Course

Embody professional engineering practise; complex, open-ended, ill-defined problems.

Deliverables are typically proposals, technical briefs, presentations and reports.

- 1 For each deliverable, determine the question or section that best reflects the mapped outcome(s).
- 2 Develop a 5-level analytic rubric. **Writing effective rubrics** [\[A\]](#).
- 3 Include a row for each outcome being assessed.
- 4 Assess student performance using the rubric, recording the results.

Step 3 Using brightspace^{by D2L} for Collecting & Reporting data

Contact **Eric Tremblay** (tremblae@queensu.ca) or **Leigha Tregunna** (leigha.tregunna@queensu.ca) for assistance setting up and using Brightspace for graduate attribute assessment in courses.

- 1 Email your program representative. Inform them that your course was using Brightspace, and include the information shown below for each outcome.

Course	Indicator	Assessment	Assessor	Context
AESC12	AESC1B3	Quiz#1(Question7)	TA	Individual

Please note: please include which question(s) or rubric rows were used to assess each outcome.

Step 3 Collecting & Reporting Data

Outcomes data is processed, analyzed and stored by the Faculty Office and used to create reports for programs and instructors.

- 1 Use the **Outcomes data collection template** [\[X\]](#). Rows are students, each column is an assessment of an outcome and its metadata. *Please note: multiple assessments of the same indicator should be in separate columns.*
- 2 Complete column headers. Paste student numbers and assessment data for each outcome. Once complete, send it to your program representative.

Step 4 Interpreting & Reflecting

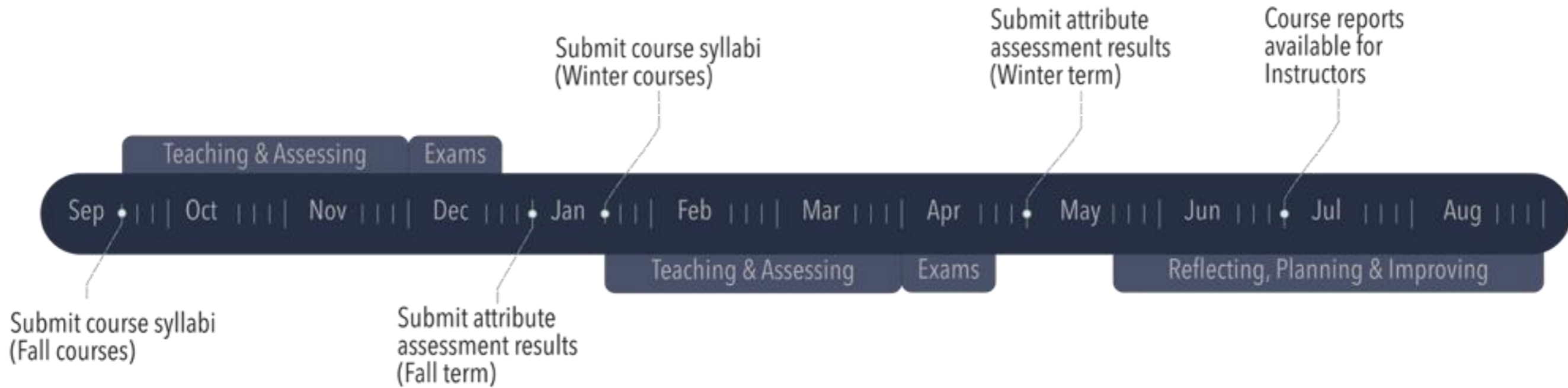
- 1 Review your course report. You are the best person to interpret and provide meaning to the data, regarding any trends, oddities or omissions.
- 2 Reflect upon the data, considering improvements you may make as a result. Send any insights and potential improvements to your program representative for accreditation.

Additional Resources

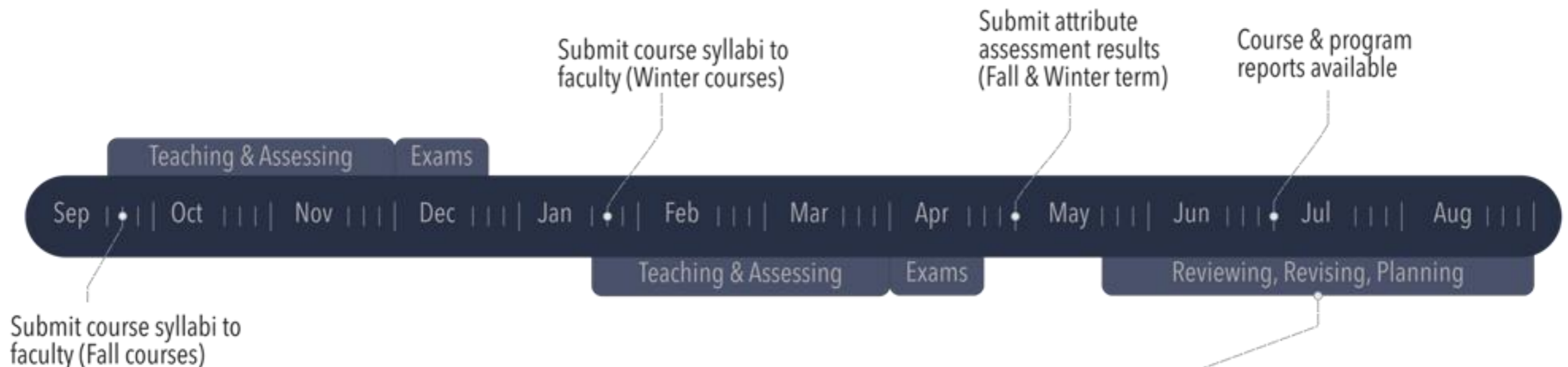
- Detailed Graduate Attribute Guide for Course Instructors [\[W\]](#)
- HEQCO Learning Outcomes Assessment: A Practitioners Handbook [\[\]](#)
- Developing Effective Learning Outcomes: A Practical Guide [\[\]](#)
- Queen's Centre for Teaching and Learning (queensu.ca/ctl)
- The EGAD Project (egad.engineering.queensu.ca)
- National Institute for Learning Outcomes Assessment (learningoutcomesassessment.org)

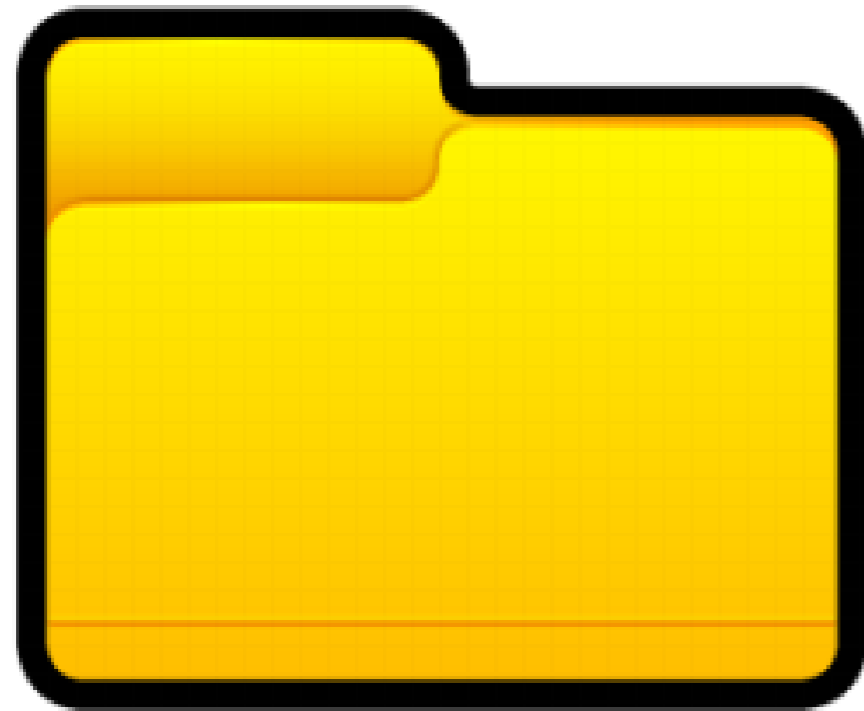
Example material

FEAS Graduate Attribute Timeline: Instructors



FEAS Graduate Attribute Timeline: Program Leaders





Centralized repository for Programs & Faculty

**Syllabus
Template**

**Data Collection
Template**

**Detailed & 2-page
guides**

**Outcomes &
Indicators**

**Curriculum
maps**

**Useful quality
resources**

Easy instructor web-based access to data

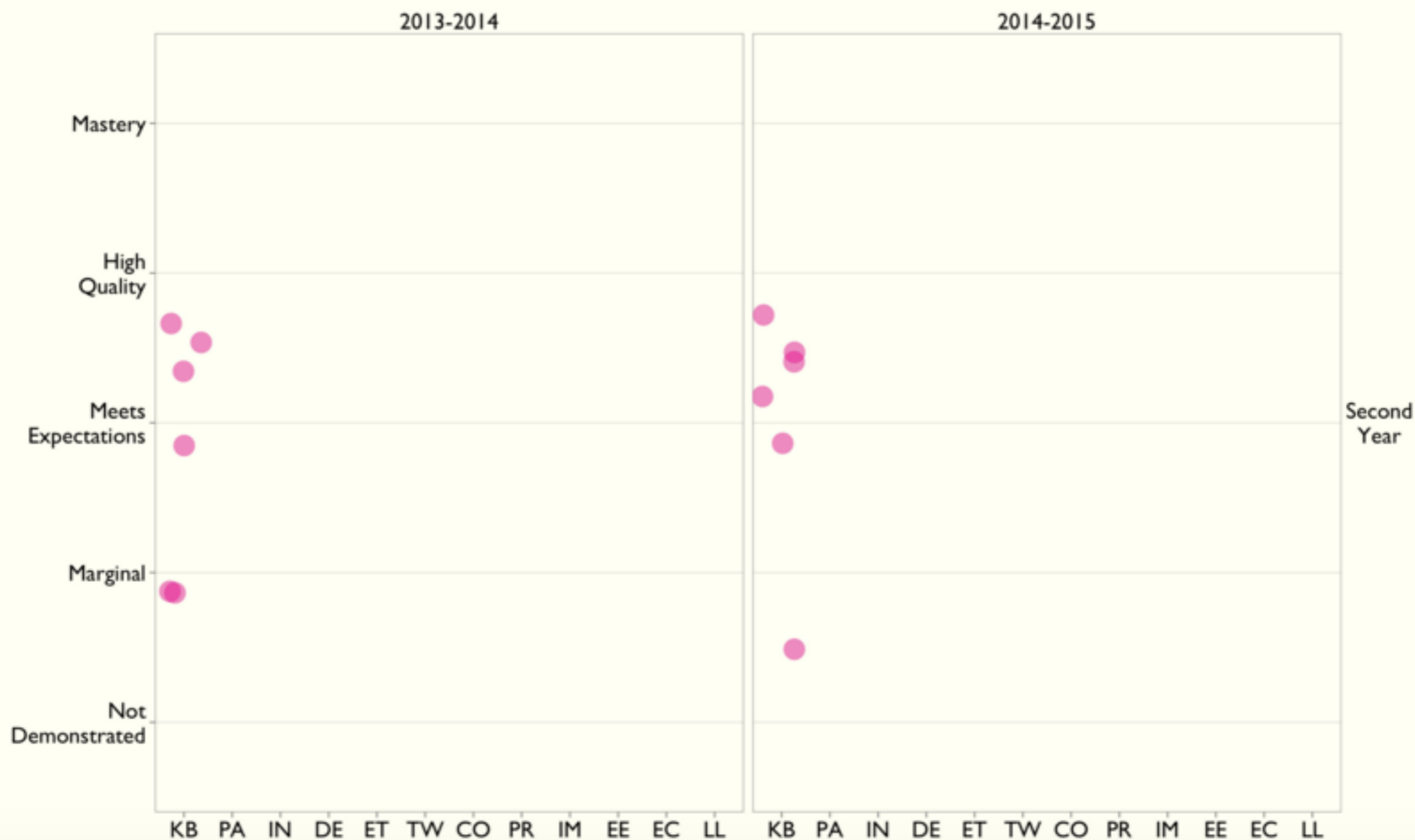
Graduate Attribute Course Report: MECH 230

Jake Kaupp

2015-07-21

1 Attribute Dashboard View

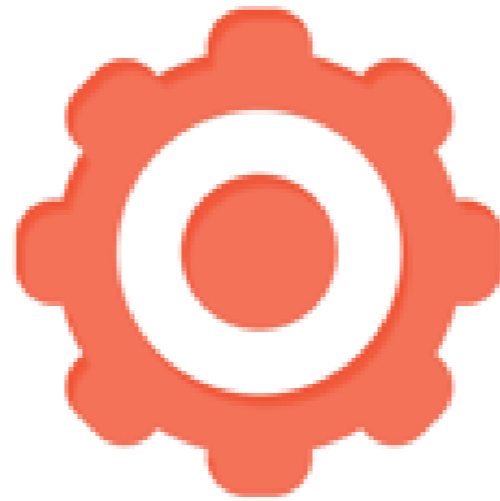
This visualization represents the aggregate student performance on each graduate attribute assessed in the course. Each data point represents the mean score achieved for each indicator for each respective attribute. The points are jittered to reduce overplotting.



Task 1

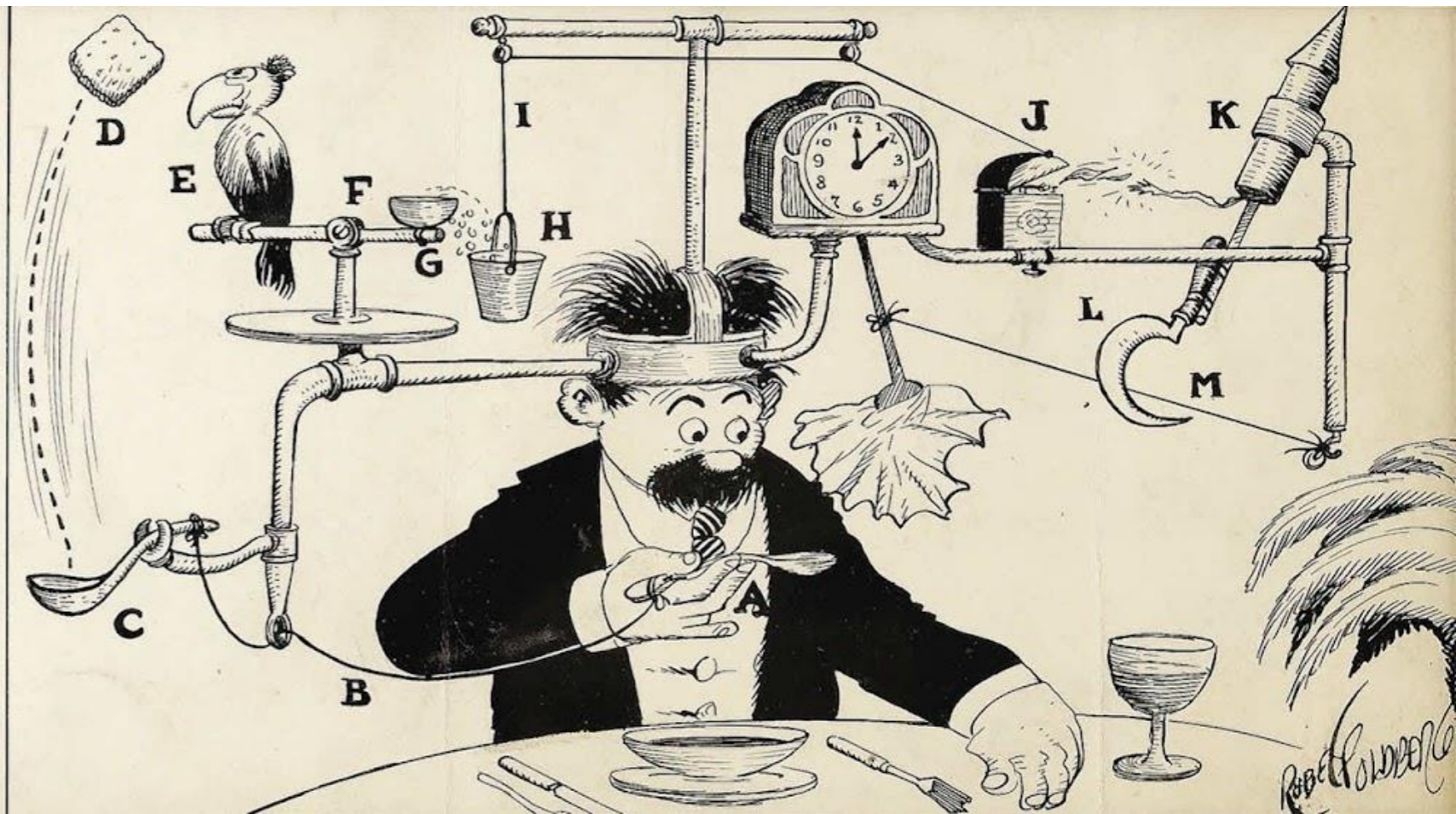
In a small group, identify the key barriers to faculty engagement and share approaches that are working at your institution.

Designate a spokesperson to provide a 30-second highlight to the group.



PROCESS

PROFESSOR BUTTS WALKS IN HIS SLEEP, STROLLS THROUGH A CACTUS FIELD IN HIS BARE FEET, AND SCREAMS OUT AN IDEA FOR A SELF-OPERATING NAPKIN. AS YOU RAISE SPOON OF SOUP (A) TO YOUR MOUTH IT PULLS STRING (B), THEREBY JERKING LADLE (C) WHICH THROWS CRACKER (D) PAST PARROT (E). PARROT JUMPS AFTER CRACKER AND PERCH (F) TILTS, UPSETTING SEEDS (G) INTO PAIL (H). EXTRA WEIGHT IN PAIL PULLS CORD (I) WHICH OPENS AND LIGHTS AUTOMATIC CIGAR LIGHTER (J), SETTING OFF SKY-ROCKET (K) WHICH CAUSES SICKLE (L) TO CUT STRING (M) AND ALLOW PENDULUM WITH ATTACHED NAPKIN TO SWING BACK AND FORTH THEREBY WIPING OFF YOUR CHIN. AFTER THE MEAL, SUBSTITUTE A HARMONICA FOR THE NAPKIN AND YOU'LL BE ABLE TO ENTERTAIN THE GUESTS WITH A LITTLE MUSIC.





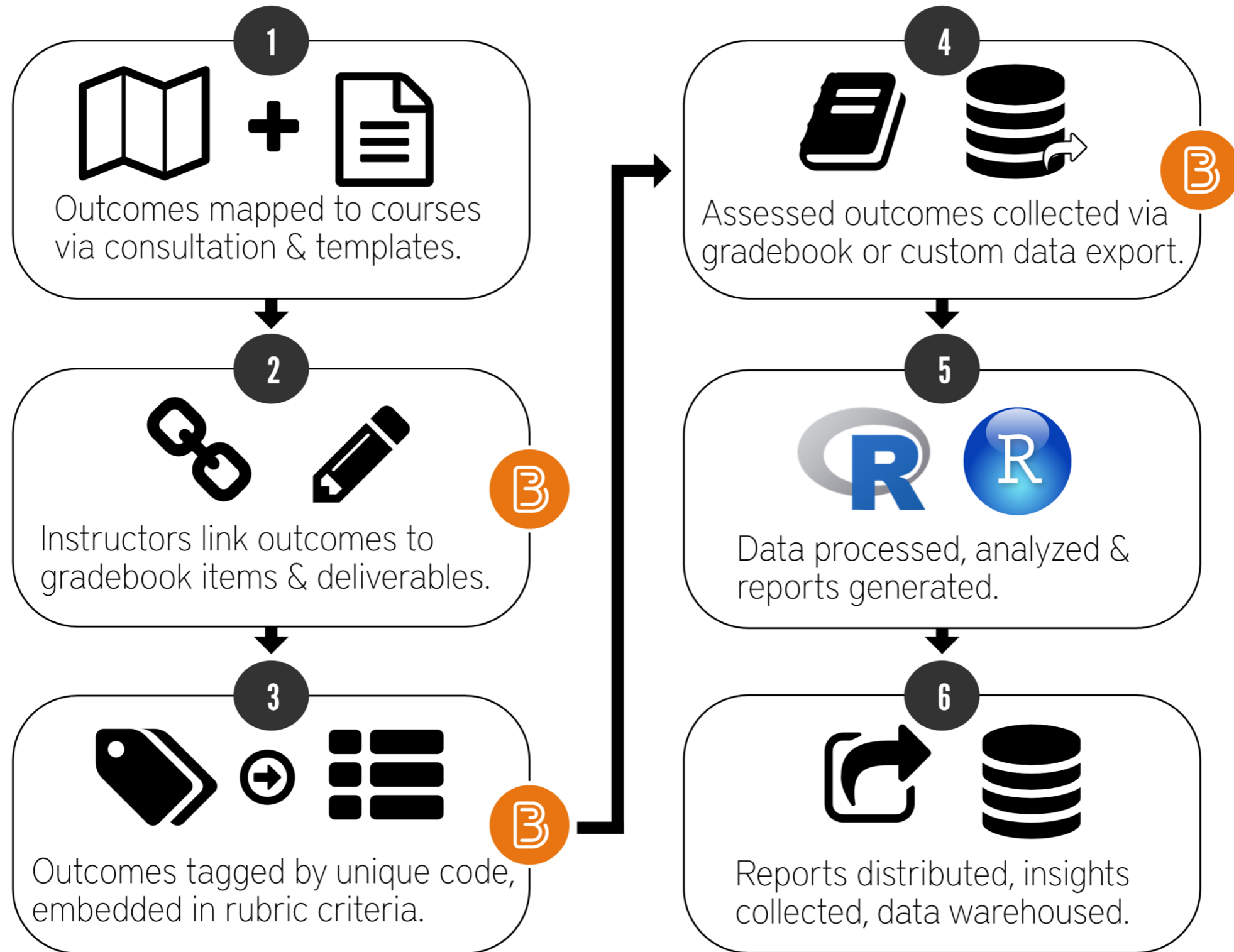
EFFICIENCY

Focusing on adaptable workflows

Sustainability

Literate & Implementation

Savvy



Workflow adaptable to departmental processes

Example material

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Standard and unified data submission: Templates

Student Number	<i>Indicator Code</i>	APSC-1-CO-3	APSC-1-DE-4
	<i>Assessment</i>	MEA 2	MEA2
	<i>Assessed By</i>	TA	TA
	<i>Week Assessed</i>	6	6
	<i>Context</i>	Group	Group
10089314		5	3
...		3	3
...		2	4
...		2	5
...		4	3

Everything needed from an instructor in **one table**

Data collection: bit.ly/1NlaJcb



Timetable

Why do I have to fill out this syllabus?

The Queen's University Senate approved a motion by AMS in 2009 that all courses send in a syllabus to the AMS to be part of a central syllabus bank. This motion was brought forth before the Senate again in 2014, and programs are expected to comply with this request.

The Faculty of Engineering has also realized the need of providing engineering departments with support in curriculum development, accreditation and cyclical program review. There is a great deal of information required for these reports, most of which is contained within the syllabi and faculty course lists.

In order to meet all of the above needs, as well as being sensitive to the workload of instructors; we have created an **FEAS sample syllabus** based on pedagogical best practices and student needs. This provides both a template for a syllabus as well as a completed sample to work from.

What is this syllabus is used for:

First and foremost, this syllabus provides students with critical course information and timeline details that are essential for student success.

In addition, this template collects information about courses to:

- Generate Course Information Sheets for Accreditation
- Generate Curriculum Information for Cyclical Program Review
- Generate Curriculum Mapping for program use
- Generate Course and Program Reports for program and instructor use
- Provide programs with information to improve program quality
- Provide programs a means to illustrate student development through the program.

Instructions

1. Fill out the template as completely as possible. Replace all elements with those specific to your course.
 - Pages 1,2,5,6 and the Timetable **MUST** be completed
 - All other elements are optional but strongly recommended.
2. Once complete remove these instructions.
3. Email the completed file to your program representative.

APSC XXX Insert Course Title (Example)

Course Outline – Fall 2015

This is your course syllabus. Keep it for future reference.

Indicators and Outcomes

Graduate attribute indicators

APSC XXX develops the Canadian Engineering Accreditation Board Graduate Attributes through four indicators:

- APSC-2-EC-1: Gathers appropriate information, categorize it, and determines the economic attractiveness of an engineering project [introductory]
- APSC-2-EC-2: Measures and manages the risks associated with the engineering project and considers the risk and return relationship as a component of determining economic attractiveness [intermediate]
- APSC-2-EC-4: Describes a project's sustainability and broader contribution and impact on the enterprise, environment and society [advanced]
- APSC-2-EC-5: Demonstrates use of change management principles [introductory]

Course Learning Outcomes (CLO)

By the end of this course, learners should be able to:

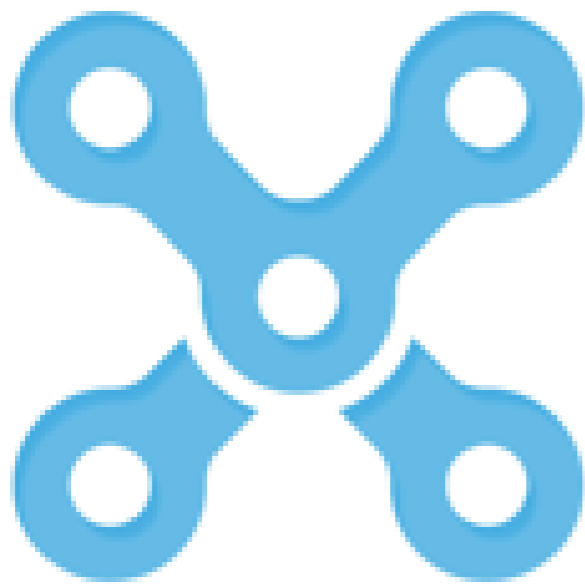
- CLO 1: Solve problems involving cash flows and economic return (time value of money and project comparison methods)
- CLO 2: Determine the economic attractiveness of an engineering project (replacement analysis, inflation, taxes, sensitivity, assessing risk, estimating costs)
[APSC-2-EC-1], [APSC-2-EC-2]
- CLO 3: Conduct opportunity analysis to determine economic feasibility of an innovation

Sample syllabus: bit.ly/1NXkAg7

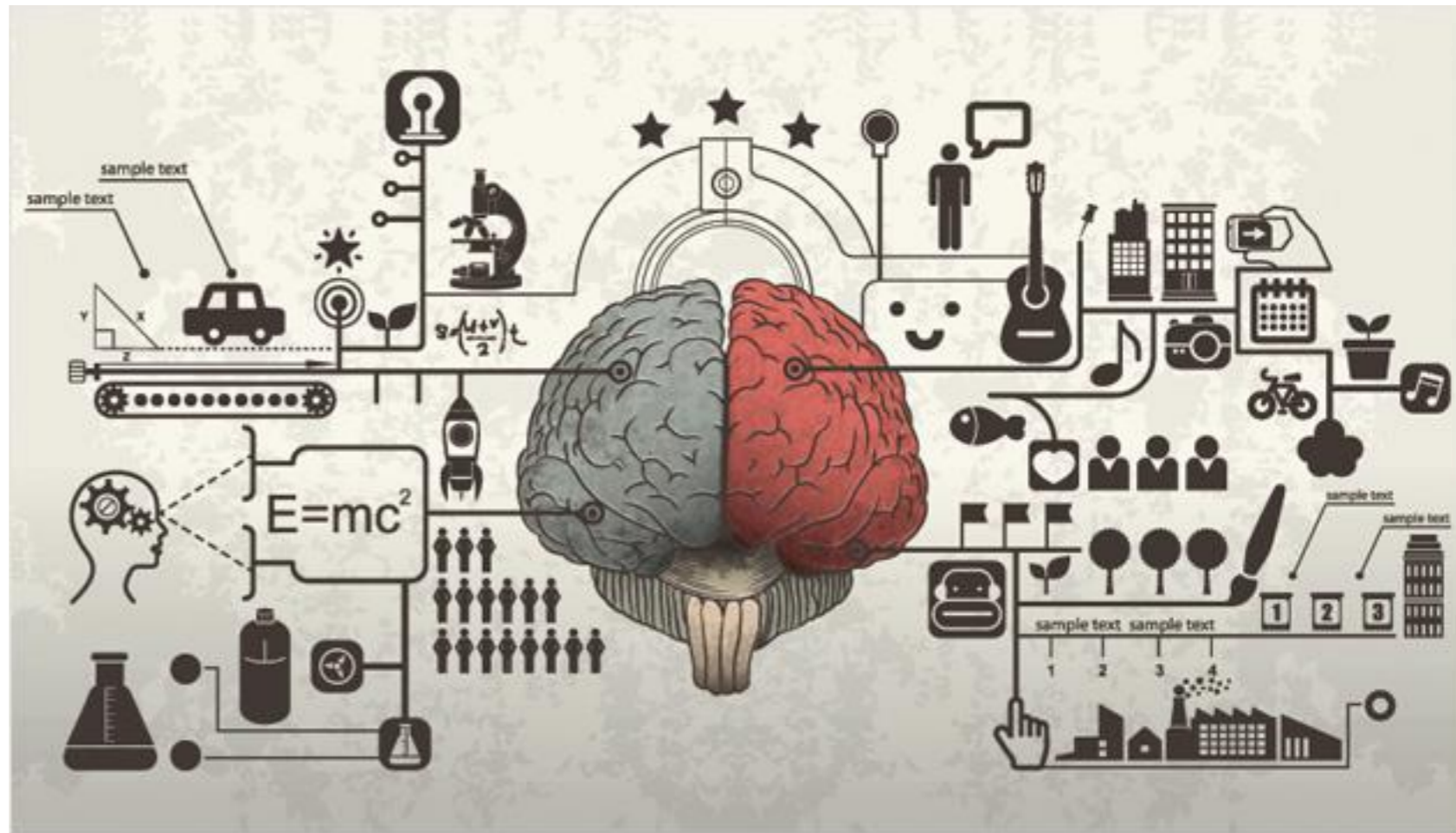
Task 2

In a small group share success stories and nightmares.

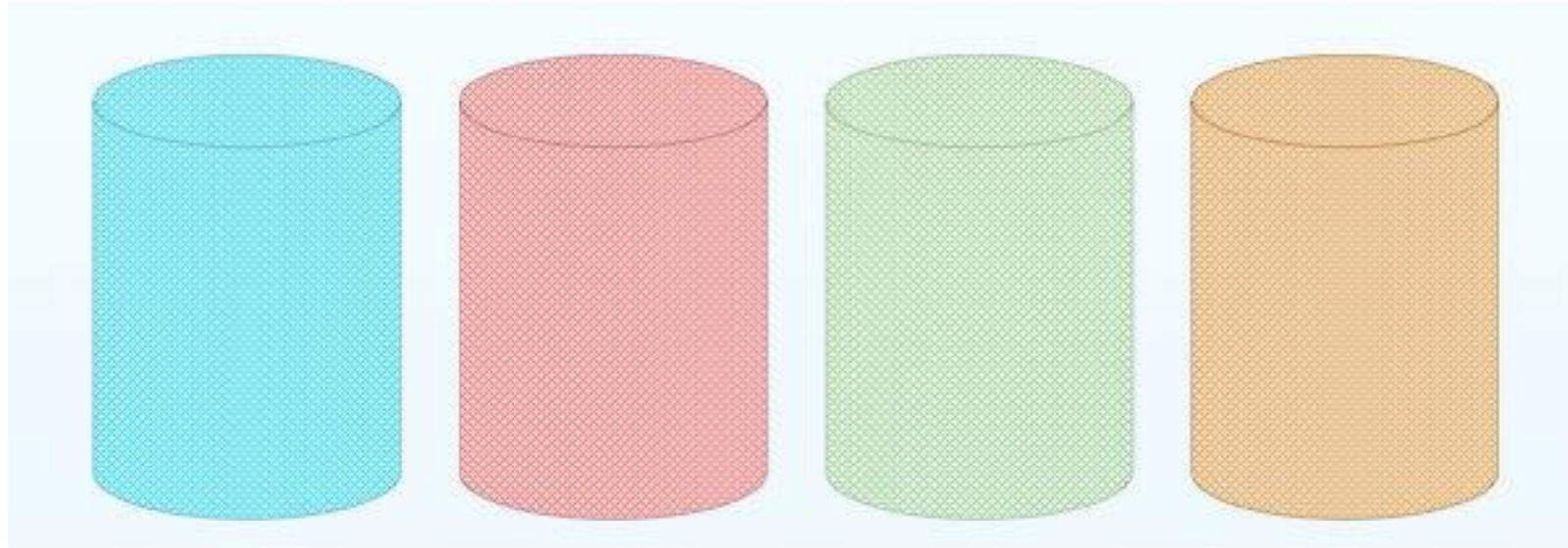
Designate a spokesperson to provide a 30-second highlight to the group.



SYSTEMS



Assessment Data is confined in many silos



That don't talk to each other

And there is a LOT of it

5 Indicators 15-20 Courses 4 Years

10 Programs

approximately 5000 measurements



+Repeated measures

+Triangulation

Systems should be a **lightweight** &
SCALABLE framework used to bridge silos



And make data readily available on demand or
just-in-time fashion

**Leverages & communicates with
other systems**

Promotes

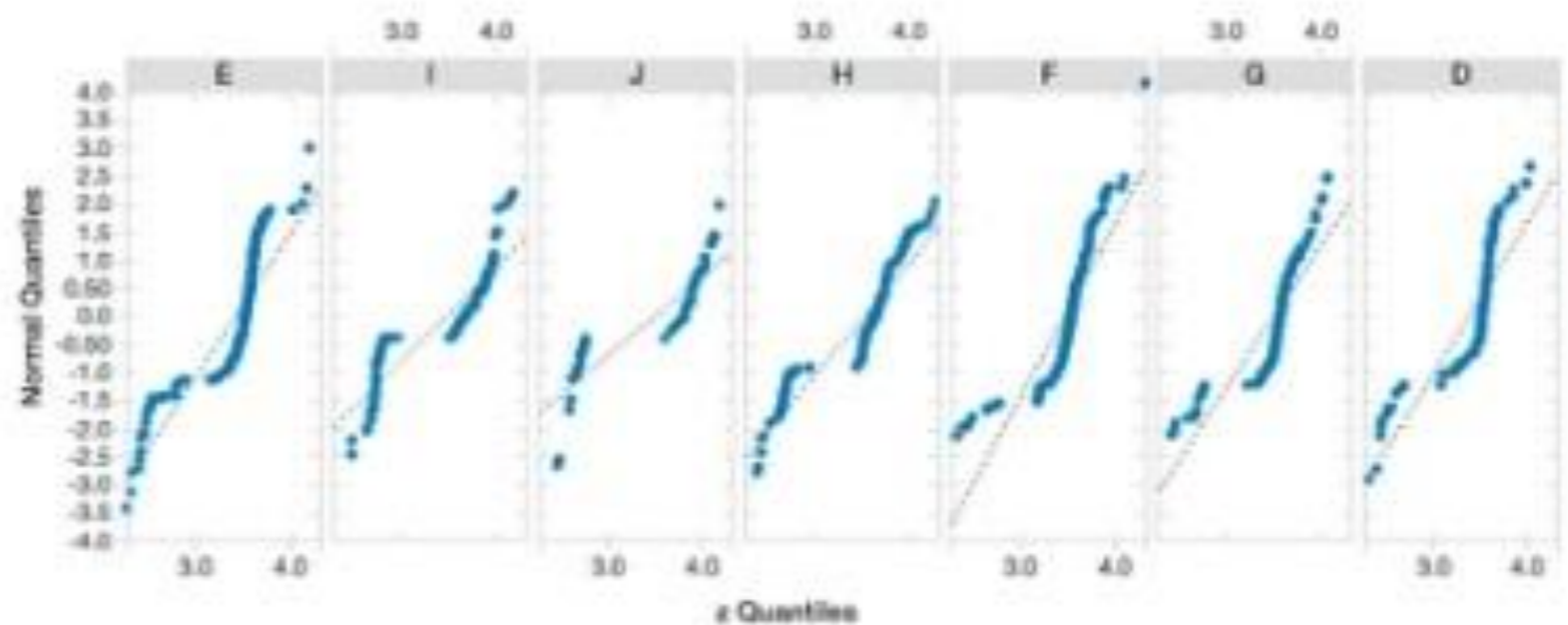
Exploratory Visualization

“Critical part of data analysis”

—William S. Cleveland

Put visualization back in the normal workflow of data analysis regardless of data size.

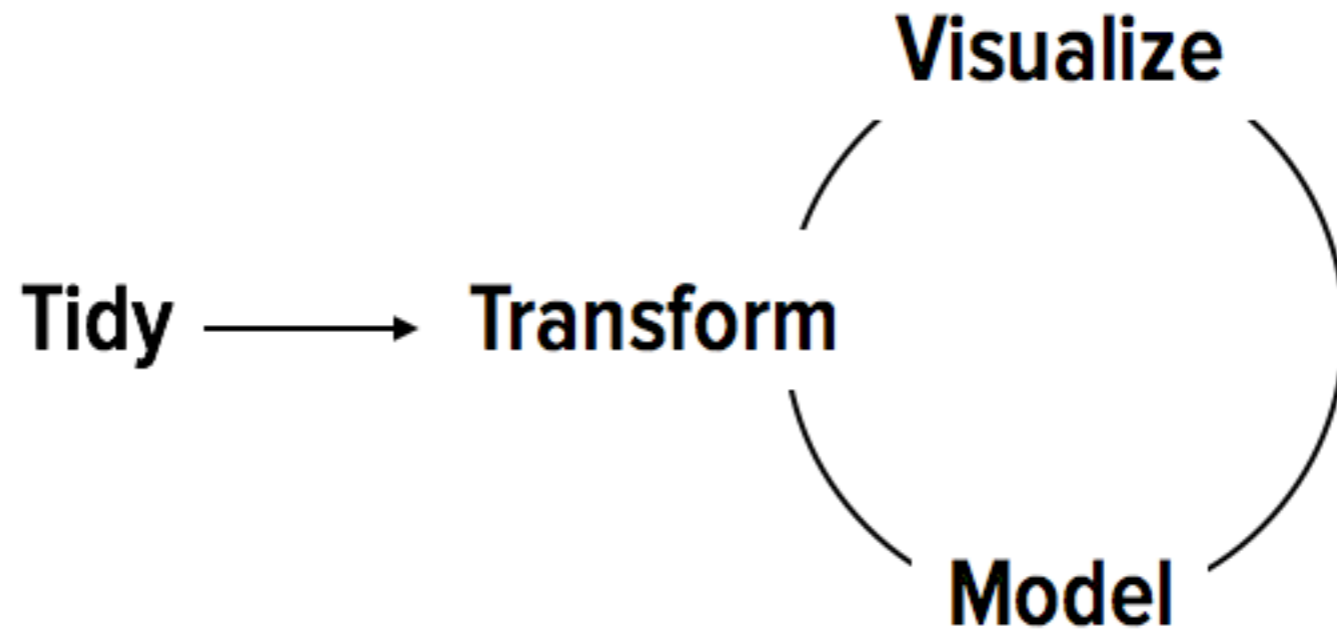
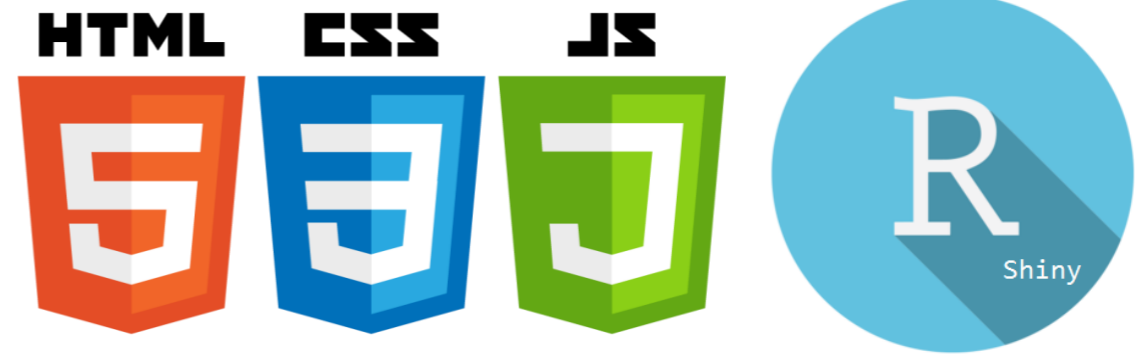
- Interactive
- Collaborative
- Reproducible



Example material



FluidSurveys



Templated Reporting

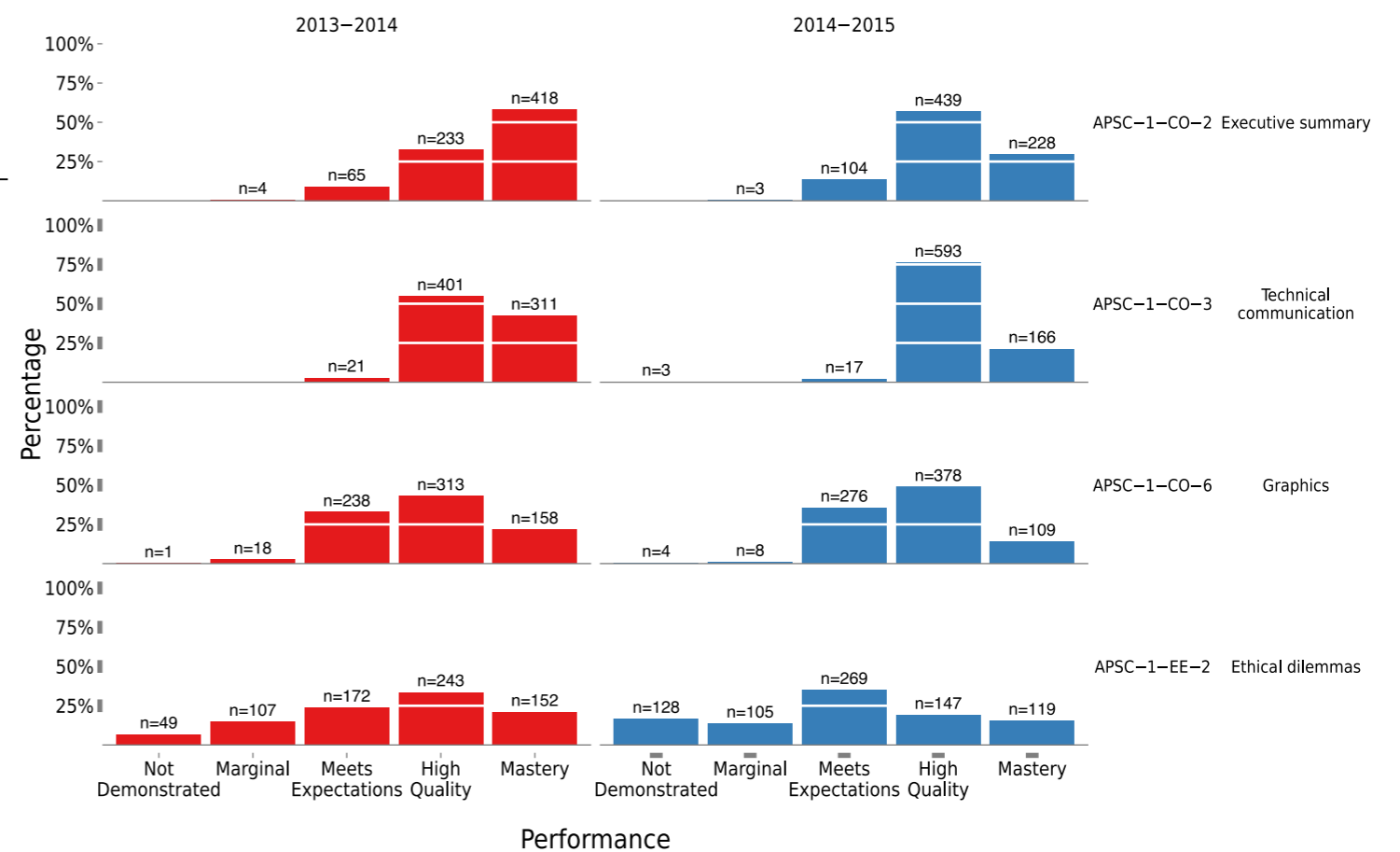
Graduate Attribute Course Report: MECH 216

Jake Kaupp

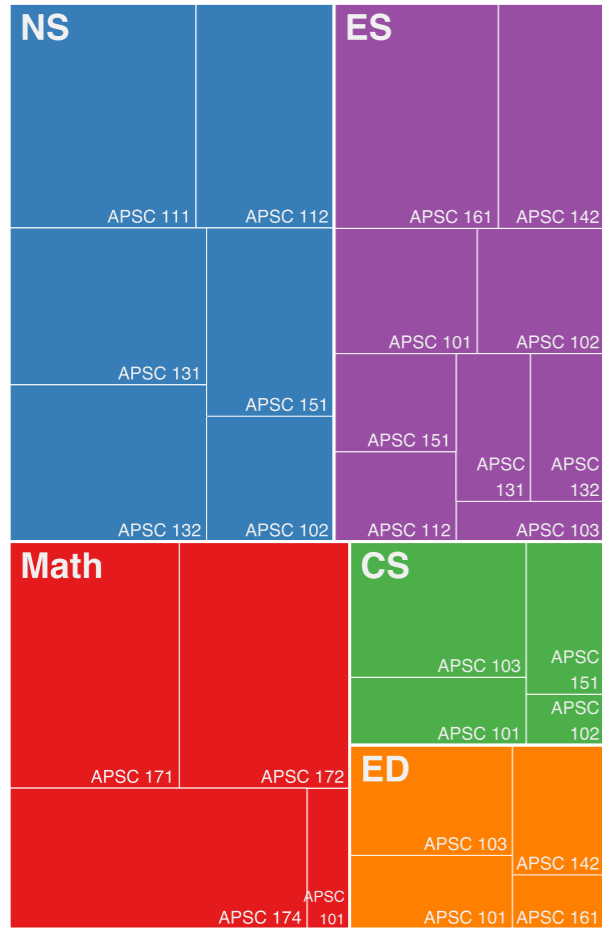
May 22nd, 2015

Course Mapping Tables

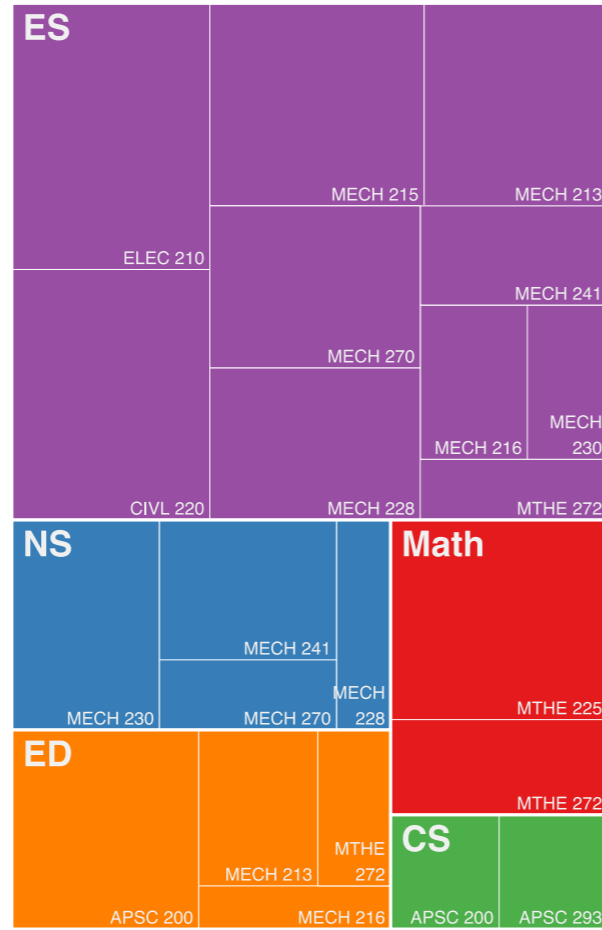
Course	Indicator	Short Description	Assessment	Assessor	Date Assessed	Instructor Comments	Number of Students Assessed
MECH 216	APSC-2-IN-2	Data Acquisition	lab reports	TA	NA	NA	163
MECH 216	APSC-2-IN-5	Uncertainty	lab reports	TA	NA	NA	163
MECH 216	APSC-2-IN-6	Draw Conclusions	lab reports	TA	NA	NA	163
MECH 216	APSC-2-CO-3	Write Clearly	lab reports	TA	NA	NA	163
MECH 216	APSC-2-CO-6	Technical Graphics	lab reports	TA	NA	NA	163



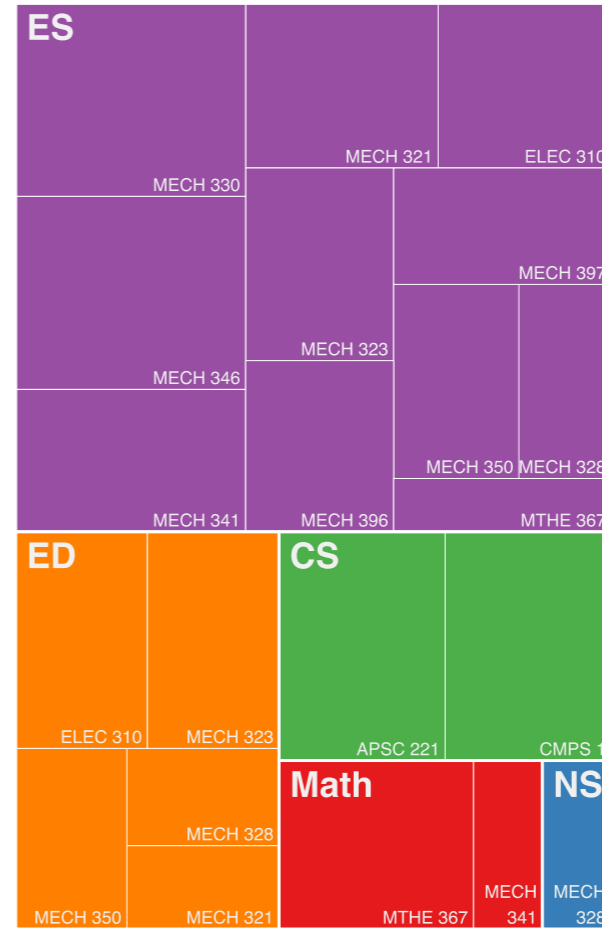
MECH Program Structure:First Year



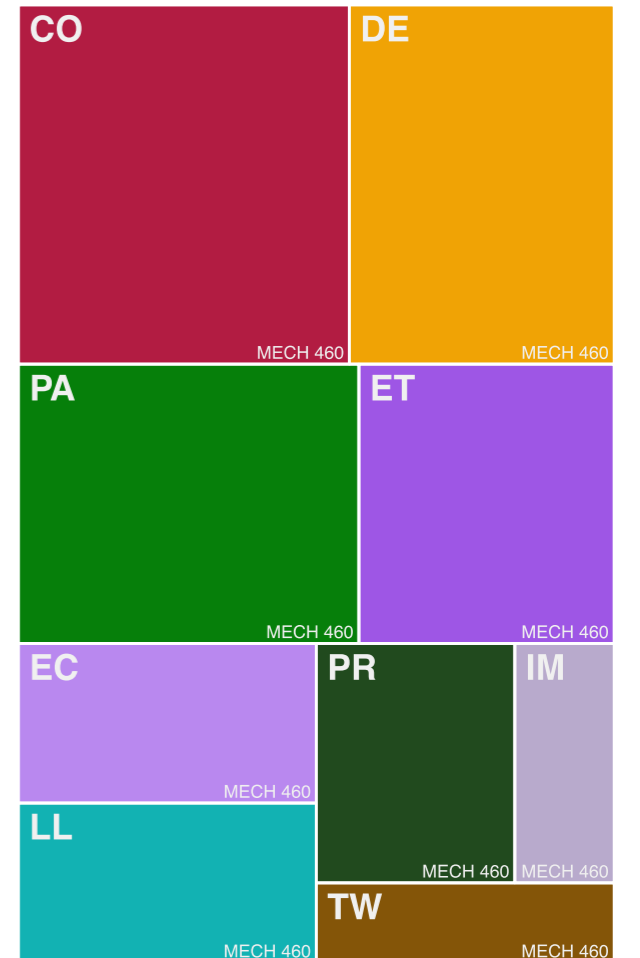
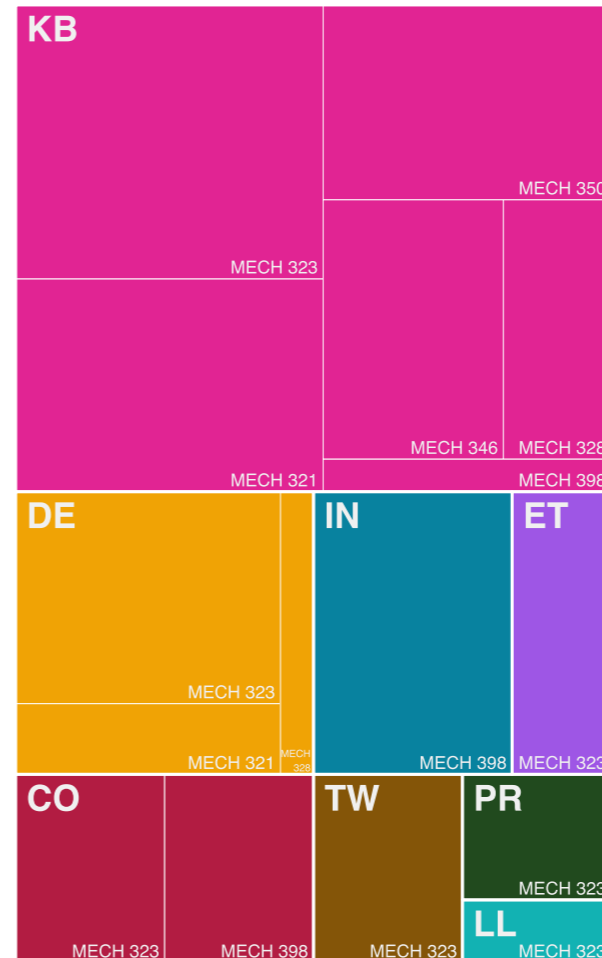
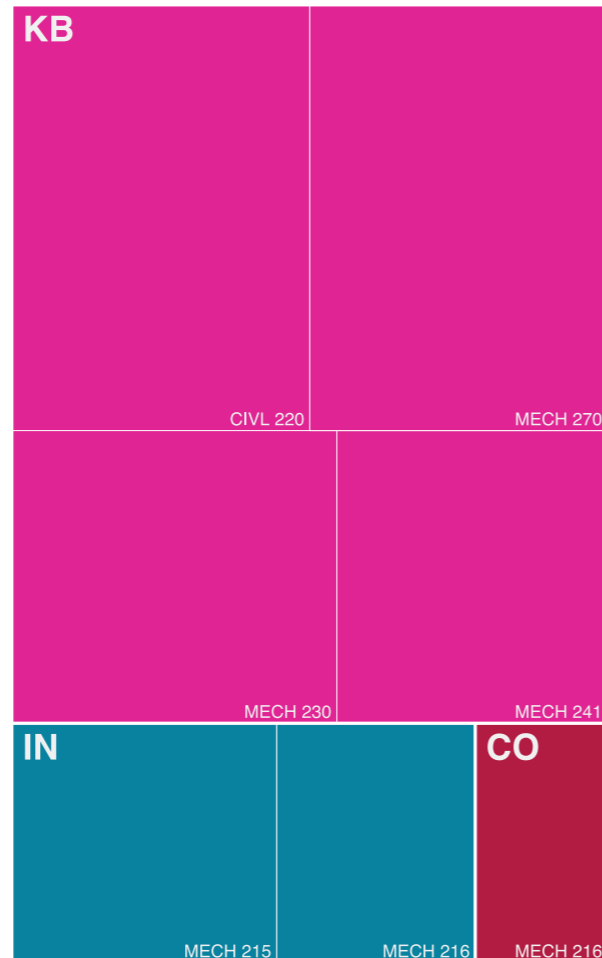
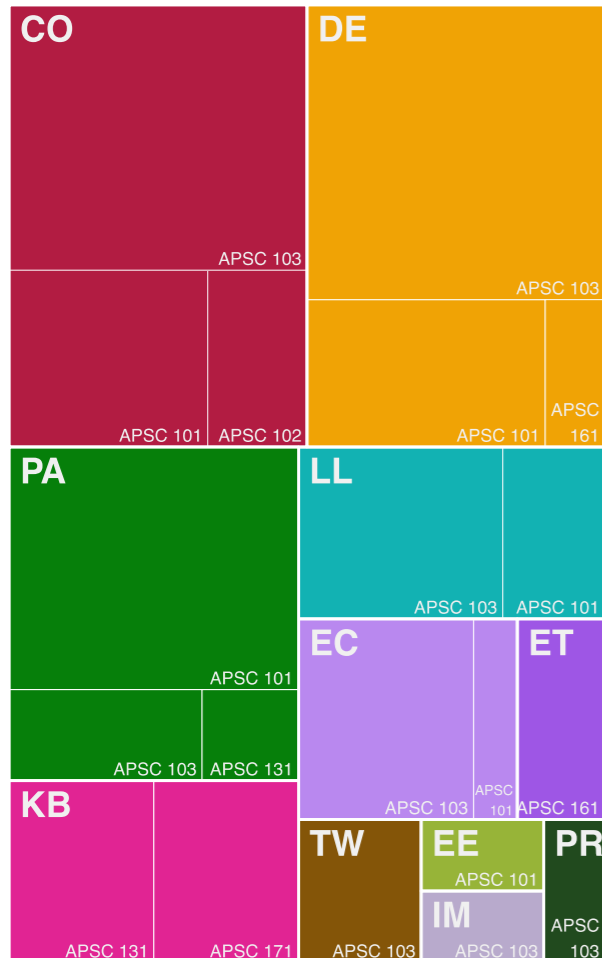
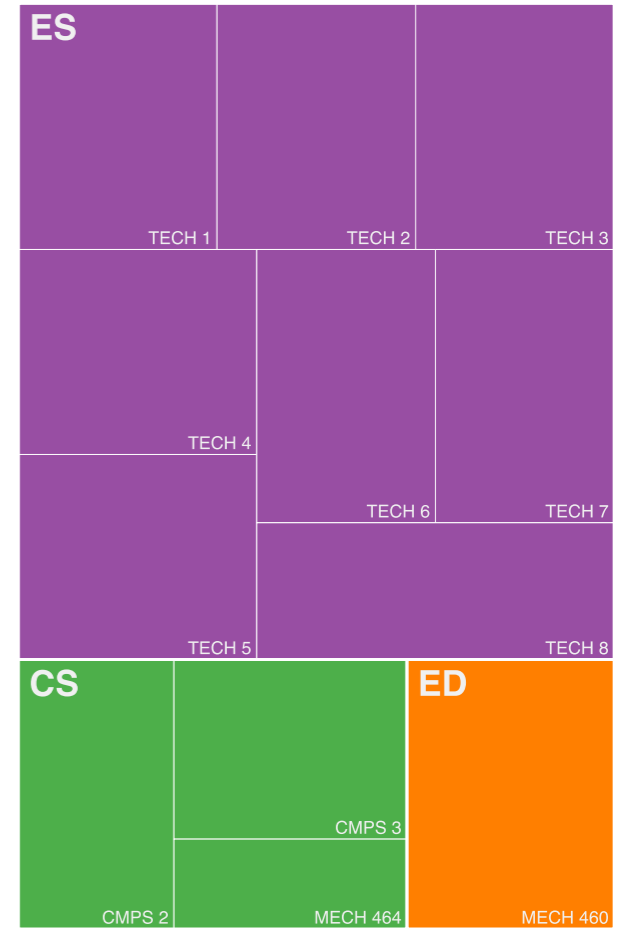
MECH Program Structure:Second Year



MECH Program Structure:Third Year

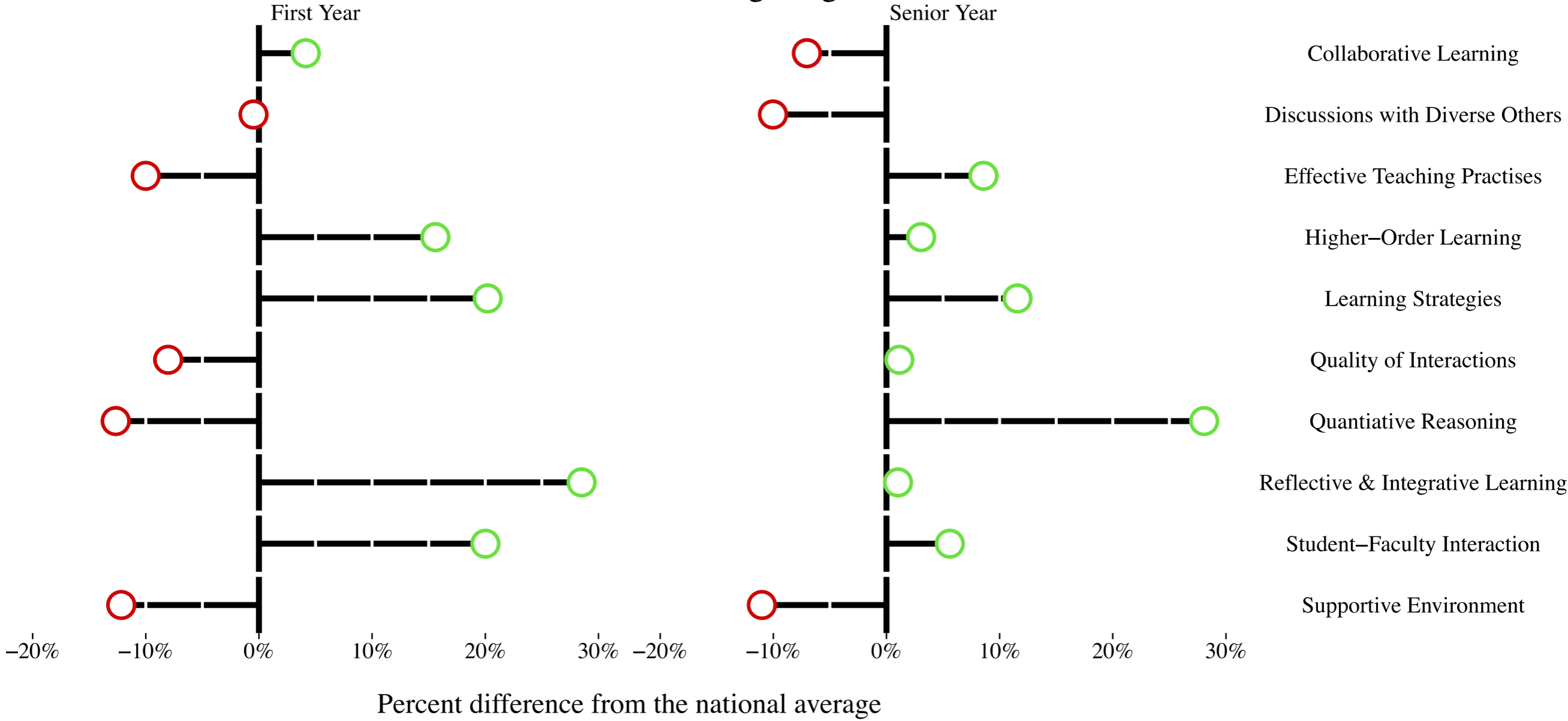


MECH Program Structure:Fourth Year



Utilizing additional data

The National Survey of Student Engagement NSSE: Engagement Indicator Comparison
Underwater Basket Weaving Program





Select Department

National

Select Comparison Institutions

- Alberta
- Calgary
- Dalhousie
- Laval
- Guelph
- Manitoba
- McGill
- McMaster
- Ottawa
- Saskatchewan
- UBC
- Waterloo
- Western

Refresh Chart

NSSE Engagement Indicators: First Year
Ratio to National Average



NSSE Engagement Indicators: Senior Year
Ratio to National Average



Instructor Reflective memo beneath visualized data

5 Instructor Feedback/Interpretation

Part of CEAB's requirements is to demonstrate the use of outcomes assessment data to make improvements to the course, program and process. The Faculty is supporting all departments in their accreditation efforts. In order to have some consistent information about data-informed improvement and to help prepare future accreditation reports, **the Faculty would like you to answer the following questions.** Please pass your comments and any feedback to your departmental lead for graduate attributes, or directly to the Assessment and Quality Assurance Coordinator for the Faculty, Jake Kaupp (jake.kaupp@queensu.ca).

5.1 Intended Learning Outcomes

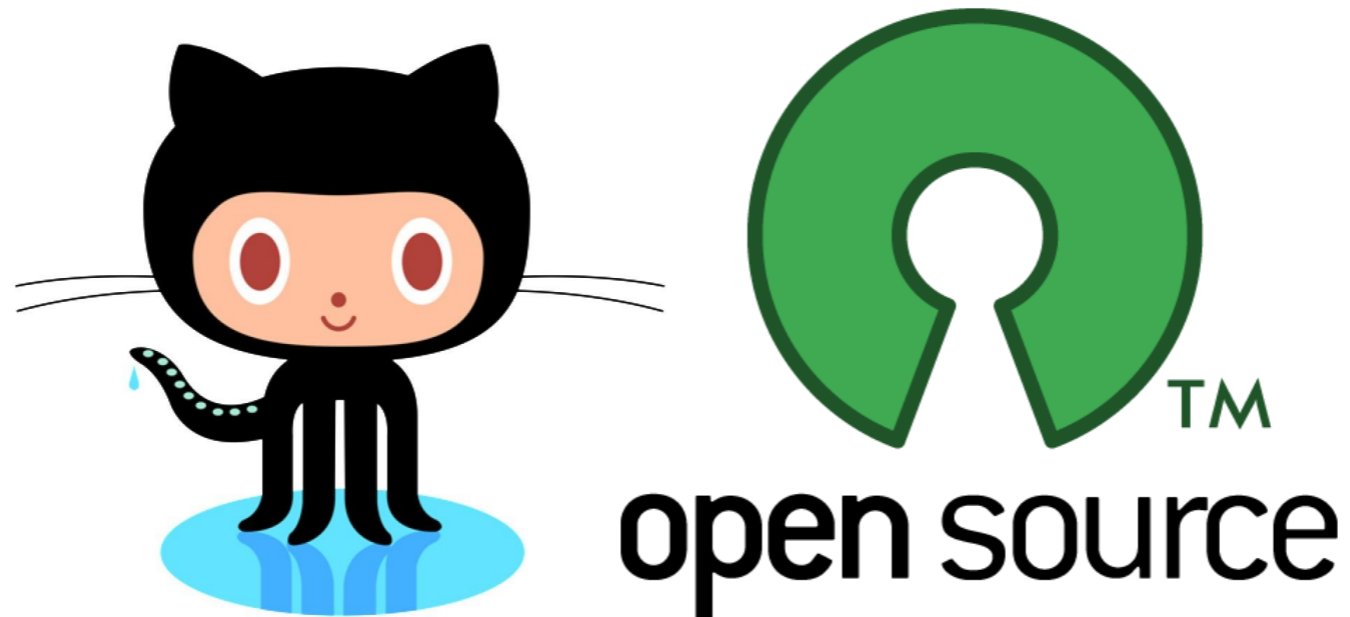
Do the listed learning outcomes match the course? Are there additional outcomes beyond those already documented?

To what extent were you able to integrate the learning outcomes specified for this course in the overall integrated curriculum plan for this program?

5.2 Teaching and Assessment Methods

What teaching and assessment methods did you use and what evidence indicates these methods were successful or not?

Entire System



[Github.com/jkaupp/QUIVER](https://github.com/jkaupp/QUIVER)

Task 3

In a small group, discuss the challenges and strengths of your current systems.

Share approaches that are working and highlight any common features



PEOPLE

- 2 page guides
- Packaged quality resources
- Easy access to data

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