UBC Faculty of Forestry & Environmental Stewardship

Using PrairieLearn for Adaptive Learning in Forestry Courses

PrairieLearn is an adaptive learning platform powered by machine learning algorithms. Compared to Canvas quizzes, PrairieLearn's primary advantage lies in its ability to present varied versions of a question to different students, allowing different practice opportunities (see the screenshot below). Additionally, the platform supports auto-grading for questions whose answers can be determined through equations, saving valuable time for teaching teams.

Note that PrairieLearn is not currently supported by UBC centrally, and may incur costs. If you have questions or would like a free trial in Forestry, please contact the Forestry Teaching & Learning Support Team at forestry.tls@ubc.ca. This tip-sheet is a preliminary guide to help teaching teams get acquainted with the platform.

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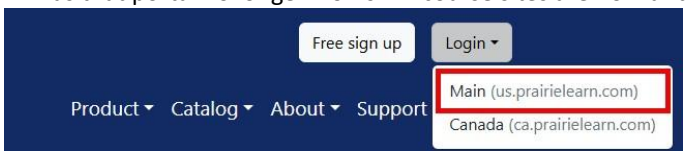
A. Getting Started

Requesting a Course/Sandbox Site

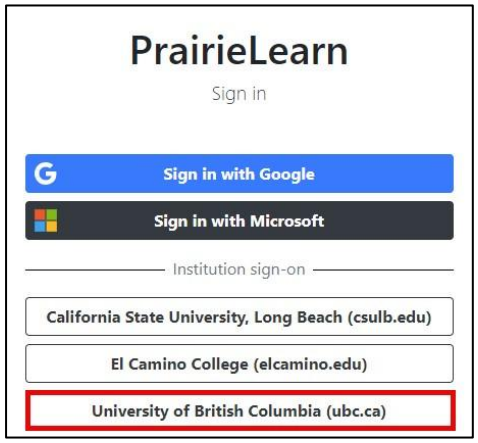
- Email forestry.tls@ubc.ca with the course code and title.
- We will coordinate with PrairieLearn to set it up for you. This process may take ~1 week.

Instructor & TA Access

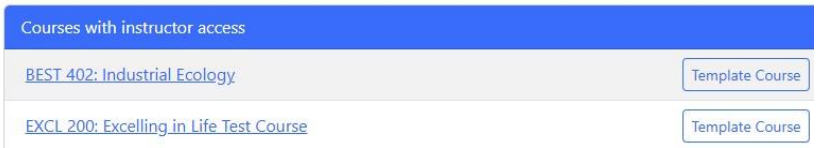
- Once the course site is created, we will add instructors and TAs using UBC CWL, and keep you posted.
- To log into PrairieLearn, visit https://www.prairielearn.com/, and choose **Main** under Login. Please do not click Canada as that portal no longer works. All course sites are now under the Main (i.e., U.S.) portal.



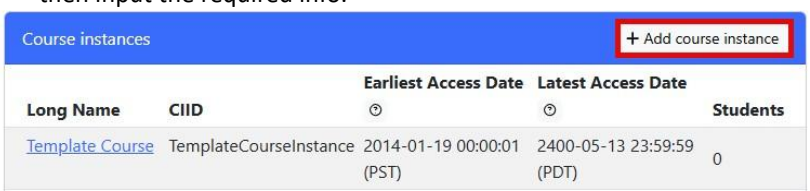
- Next, click **University of British Columbia (ubc.ca)** and you'll be directed to log in with your CWL.



- On the dashboard, you will be able to see the course(s) with instructor access. By clicking on the course title, you will go into the course site. By default, each course site has a Template Course instance for you to develop content.



- If you need to create a new instance for a specific term or section (e.g., 25 W1, Section 101), click + Add course instance, then input the required info.



- If you need to remove or duplicate an instance (e.g., from the template or previous term), contact the TLS Team.

Student Access

- Since PrairieLearn is not currently integrated with Canvas, it's recommended that the teaching team add the PrairieLearn assessment links to their corresponding assignments on Canvas. From there, students will be directed to access PrairieLearn. See the example in Section C for more details.
- When students log into the course site on PrairieLearn with their CWL, they should be automatically added as students.

Planning for Creating Questions & Assessments

- PrairieLearn uses python and HTML for question and assessment setup. The TLS Team is happy to help convert existing Canvas quiz questions into PrairieLearn, or assist in developing new ones.
- The process of brainstorming, developing, and testing may take some time (e.g., 2–4 weeks), depending on question complexity and quantity.
- So, we recommend the teaching team planning ahead to allow sufficient time for setup and refinement.
- For more info, see Sections B and C below.

Notice for Syllabus/Announcement

- If you decide to use PrairieLearn in your course, consider informing students with a notice like this.

Assignments and assessments in this course involve the use of PrairieLearn, which is an advanced online problem-driven learning platform. Students need to log in to PrairieLearn through UBC CWL Authentication.

Personal information is collected under the authority of section 26(c) of the Freedom of Information and Protection of Privacy Act (FIPPA), and is used for accessing, managing, and evaluating course assignments and assessments. All data are stored and accessed securely as noted in PrairieLearn's privacy policy (https://www.prairielearn.com/legal/privacy).

Please be aware that the data will be retained outside of Canada, and stored in the United States.

If you have questions or concerns, please reach out to the teaching team.

B. Creating & Managing Questions

Question Types

- PrairieLearn supports a variety of dynamic question types, including multiple choice, numeric, formula-based, fill-inthe-blank, short-answer, coding, matrix, and interactive graph questions.
- Visit this webpage for question templates and more info.

Question Components

- For each dynamic question in PrairieLearn, there are 2 main components: base and variants (see the example below).

Base:

A forester measures a tree with a diameter at breast height (DBH) of d cm. Using the species-specific equation for estimating tree volume: $V = k \times d^b$ where k and b are species-dependent coefficients.

Variants:

The tree species, DBH, and equation can be designed as variants. So, students will see questions like these:

- A Douglas-fir has a DBH of 42 cm. Given that k=0.25 and b=1.8, estimate the tree volume.
- A western red cedar has a DBH of 58 cm. Given that k=0.30 and b=1.6, estimate the tree volume. - etc.

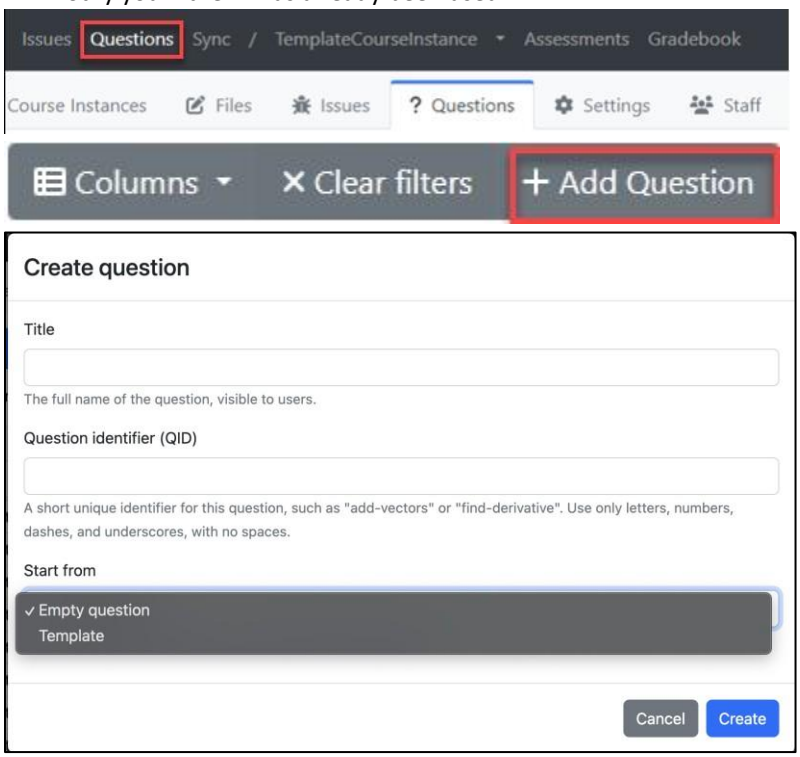
Migrating Questions from a Canvas Quiz to PrairieLearn

- Contact the TLS Team in advance for question migration.
- Note that the migrated questions will remain static (i.e., no variants) by default. The codes for these questions will be available for further editing in PrairieLearn.

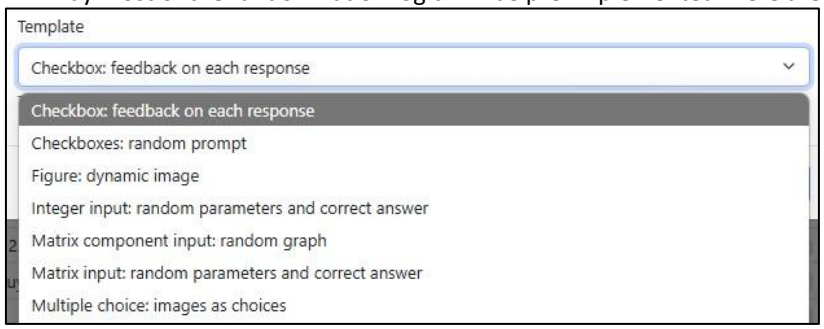
- It'd be a good idea for teaching teams to review questions and design variants ahead of time (see example above).

Developing New Questions

- The TLS team is happy to collaborate with the course's teaching team and create all questions and assessments beforehand. The teaching team can draft questions in a Word document, highlighting potential variants (e.g., numeric values, datasets, equations, maps, etc.).
- If needed, the TLS Team can help input the questions into PrairieLearn, incorporating coding for adaptability.
- The teaching team can review, test, and refine the questions as needed.
- We encourage the teaching team to practice setting up questions and get familiar with PrairieLearn to better support students. If the Instructors or TAs wish to make changes or add new questions, they can follow the steps given below.
- Click on the **Questions** tab, then **Add Question**. Provide a title, and a Unique ID (**QID**) for your question. PrairieLearn will notify you if the ID has already been used.

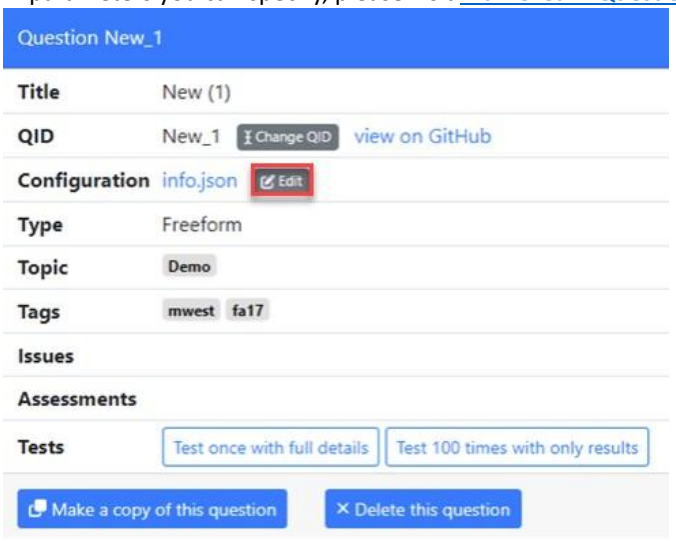


- Select whether you would like to start with an empty question or a **basic template**. The template provides a basic structure for the question.html and server.py files.
- Choose the from the list of templates that aligns closest to the format of the question you would like to implement. This way most of the randomization logic will be pre-implemented. Here are the different template options:

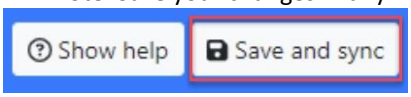


- To change the title of the question at any time, edit the **info.json** file. Then choose a new name for the question.

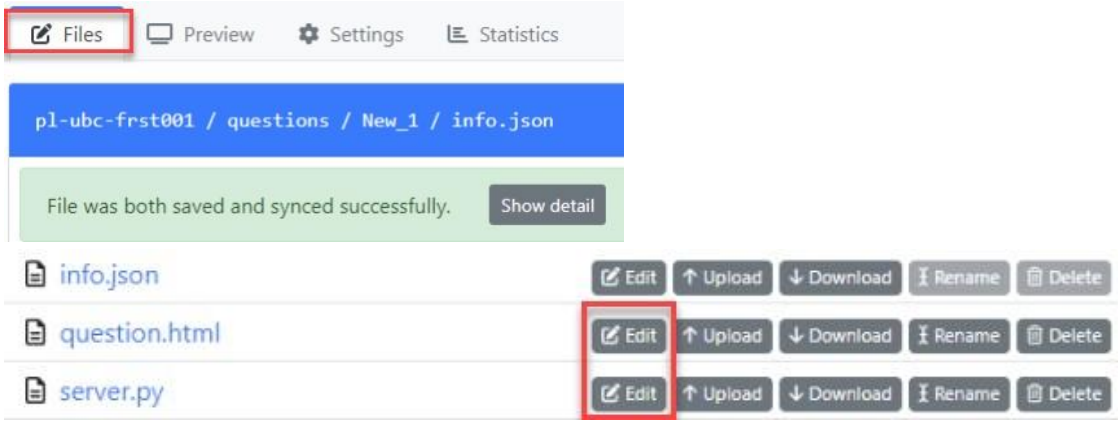
- You can also modify the number of attempts and variants in the info.json file. To learn more about the different parameters you can specify, please visit [PrairieLearn Question Configuration]



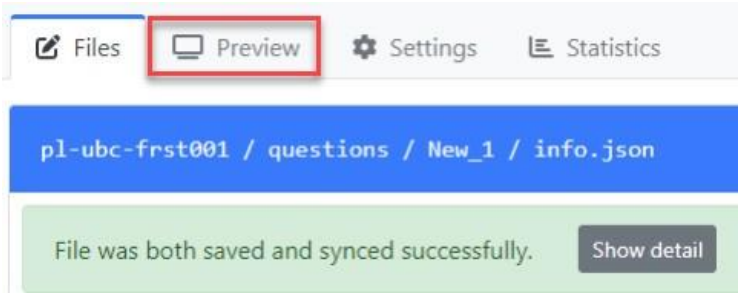
- Note: Save your changes in any file by clicking **Save and sync**.



- Click on **Files** and edit your question files to create your question



- The **question.html** file is a simple template where you create your question for students to see, using regular HTML with some special features like variables, input elements, Markdown for formatting, and LaTeX for equations.
- The **server.py** file, written in Python, generates different versions of the question by randomizing parameters and determining correct answers. It also handles the final preparation of the question, renders HTML output, parses student responses, and grades those responses based on specified criteria.
- The **server.py** file is also responsible for the question's Variants. Each time a question is loaded, it will populate it with sets of information pulled from the server.py file. This means that each attempt should produce a new **variant** that expands the utility of the question for practice or assessment.
- Server.py is the behind-the-scenes for a question. The [Elements for Writing Questions Guide] includes many examples of both templates and server files to use and edit.
- To view and test the question, click on **Preview**.



- Click on **Save & Grade** to evaluate the answer. Click on **New variant** to load a different variation of the question.
- For a full breakdown on creating PrairieLearn questions, check out the Question Configuration Guide. Explore the Elements for Writing Questions Guide for all the question types available as well as samples for each.

C. Creating & Managing Assessments

Once the required questions are created, the teaching team can set up and manage assessments.

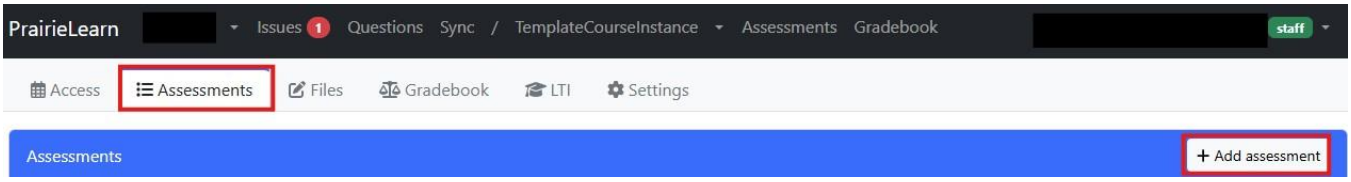
Assessment Types

- PrairieLearn offers 2 main types of assessments: Homework and Exam. Here is a table summarizing the main differences:

Homework	Exam
Multiple variants	Single variant
Unlimited attempts	Limited attempts, possibly with decreasing points
Rewards repeated correct answers	Incentivizes a correct answer as early as possible
Fixed order	Shuffled order within question groups by default
Automatic feedback is always enabled	Automatic feedback can be disabled

Setting Up Assessment

- In order to set up an Assessment on PraireLearn, you will have to first navigate to the assessments tab in you course and click on “Add Assessment”

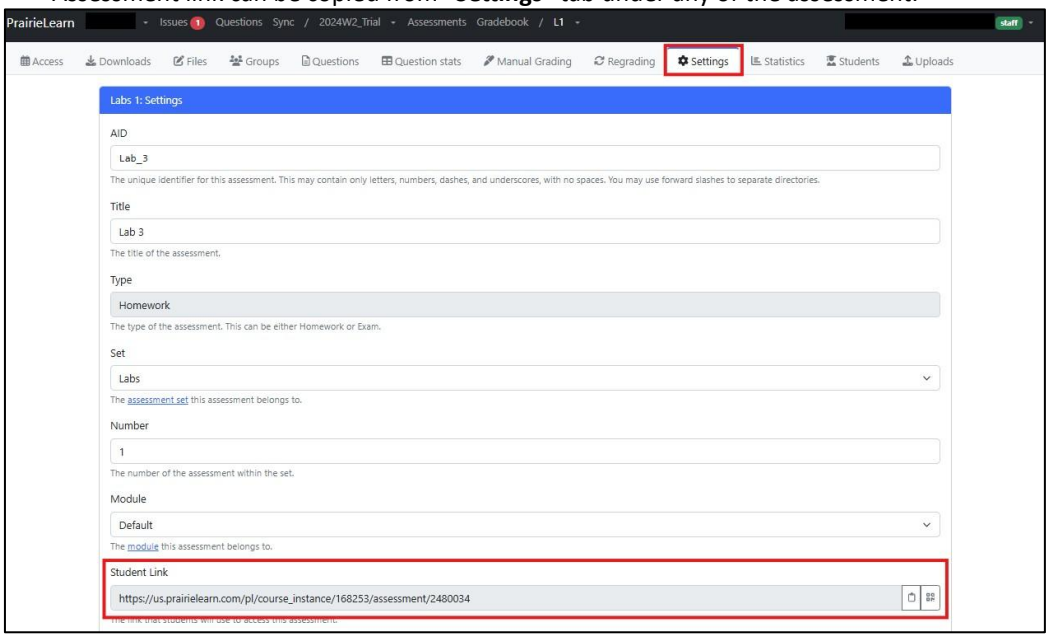


- Similar to question configuration, you will need to specify an assessment title, a unique Assessment ID (**AID**) and specify what type of assessment you would like to create this as. You can also specify which set you would like this assessment to belong to.
- Once the assessment is created, you can navigate to infoAssessment.json file and specify which questions you would like to include in this assessment. For more information on the different parameters you can specify in this file, please visit PrairieLearn Assessment Configuration. Below is an example of a fully configured assessment:

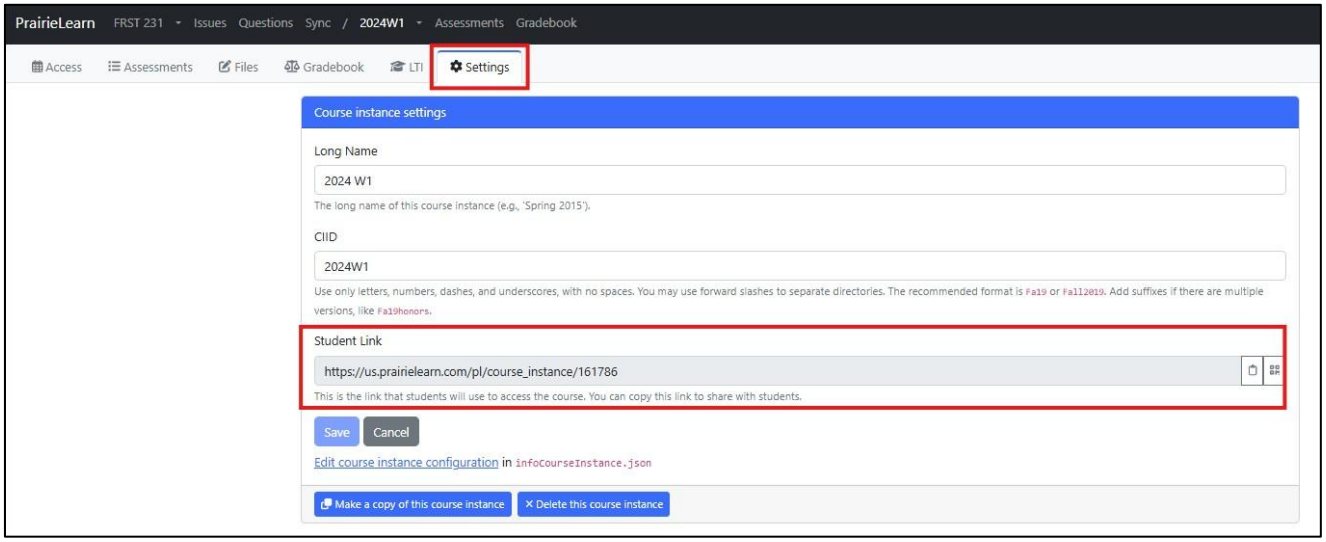
```
{
  "uuid": "0221d22b-974e-48aa-889e-086aefa9ccf1",
  "type": "Homework",
    "title": "Lab 3",
    "set": "Labs",
    "number": "1",
    "allowAccess": [
      {
            "startDate": "2025-01-29T08:00:00",
            "endDate": "2025-02-07T23:59:59",
      "showClosedAssessment": true
        },
       {
            "uids": [                ],
            "startDate": "2025-02-10T08:00:00",
            "endDate": "2025-02-10T23:59:59",
      "showClosedAssessment": true
        }
      ],
    "zones": [{
        "questions": [
            {"id": "Lab3Q1", "autoPoints": 30, "triesPerVariant": 100},
            {"id": "Lab3Q2", "autoPoints": 18, "triesPerVariant": 100},
            {"id": "Lab3Q3", "autoPoints": 32, "manualPoints": 20, "triesPerVariant": 100}]}]
}
```

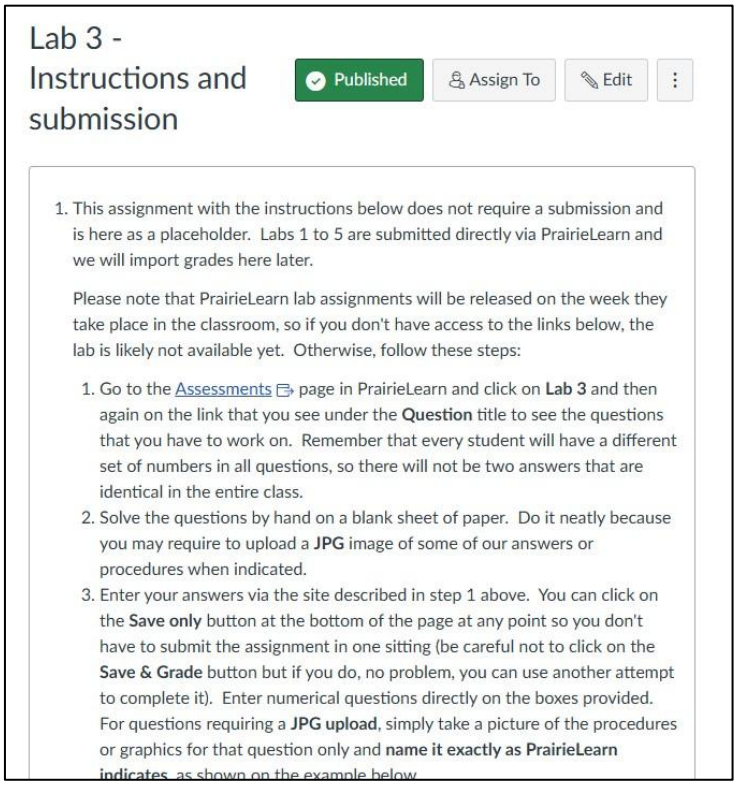

Adding Assessment Link to Canvas

- Assessment links can be copied from PrairieLearn to provide direct access from the Canvas page for students. This Assessment link can be copied from "**Settings**" tab under any of the assessment.



- Alternatively, you can provide the general student link from the **course instance** level settings tab and instruct the students to navigate to the correct assessment.





Managing Assessment Availability

- In the infoAssessment.json file, the start and end dates and time in the box in the image below **must be edited by the teaching team** prior to the assessment start date to ensure the students have access to the assessment. If you have any questions or require clarification, please feel free to contact us.

```
{
  "uuid": "76322f64-0638-4572-b657-f4e1bbb54255",
  "type": "Homework",
  "title": "Lab 5",
  "set": "Labs",
  "number": "5",
  "allowAccess": [{
            "startDate": "2025-02-24T08:00:00",
            "endDate": "2025-03-28T23:59:59"
        }],
  "zones": [{
        "questions": [
            {"id": "Lab5Q1", "autoPoints": 13, "triesPerVariant": 100},
            {"id": "Lab5Q2", "autoPoints": 5, "triesPerVariant": 100},
            {"id": "Lab5Q3", "autoPoints": 3, "triesPerVariant": 100},
            {"id": "Lab5Q4", "autoPoints": 3, "triesPerVariant": 100},
            {"id": "Lab5Q5", "autoPoints": 1, "triesPerVariant": 100},
            {"id": "Lab5Q6", "autoPoints": 5, "triesPerVariant": 100}]}]
}

```

Granting Extensions

- To accommodate certain students with an extended deadline for their assessment, please update the infoAssessment.json file as follows:
- **Add the extended deadline:** Include the new deadline in addition to the existing one.
- **Specify CWLs:** List the Campus-Wide Logins (CWLs) of the students who are granted the extension under the uids field.
- With these modifications, the specified students will have until the extended deadline to submit their assessments, while all other students must adhere to the original end date.

```
{
    "uuid": "63e27a30-29eb-44c3-994d-239dadbdf7b7",
    "type": "Homework",
    "title": "Lab 4",
    "set": "Labs",
    "number": "1",
    "allowAccess": [
      {
            "uids": ["CWL@ubc.ca"],
            "startDate": "2024-10-08T08:00:00",
            "endDate": "2024-10-25T23:59:59"
      },
      {
            "startDate": "2024-10-07T08:00:00",
            "endDate": "2024-10-18T23:59:59"
        }],
    "zones": [{
        "questions": [
            {"id": "Lab4Q1", "autoPoints": 8, "triesPerVariant": 100},
            {"id": "Lab4Q2", "autoPoints": 30, "triesPerVariant": 100},
            {"id": "Lab4Q3", "autoPoints": 10, "triesPerVariant": 100},
            {"id": "Lab4Q4", "autoPoints": 18, "triesPerVariant": 100},
            {"id": "Lab4Q5", "autoPoints": 8, "triesPerVariant": 100},
            {"id": "Lab4Q6", "autoPoints": 8, "triesPerVariant": 100},
            {"id": "Lab4Q7", "autoPoints": 18, "triesPerVariant": 100}]}]
}
```

- In this example, any students specified under “uids” will have a deadline until 25th October, and everyone else will have a deadline till 18th October.

Submission with Late Penalty

- In order to allow students to submit an assessment after the deadline, but with a penalty, you can include a "credit" attribute to the Access control in infoAssessment.json. Here is an example implementing this feature

D. Grading Feedback & Analytics

Grading Options

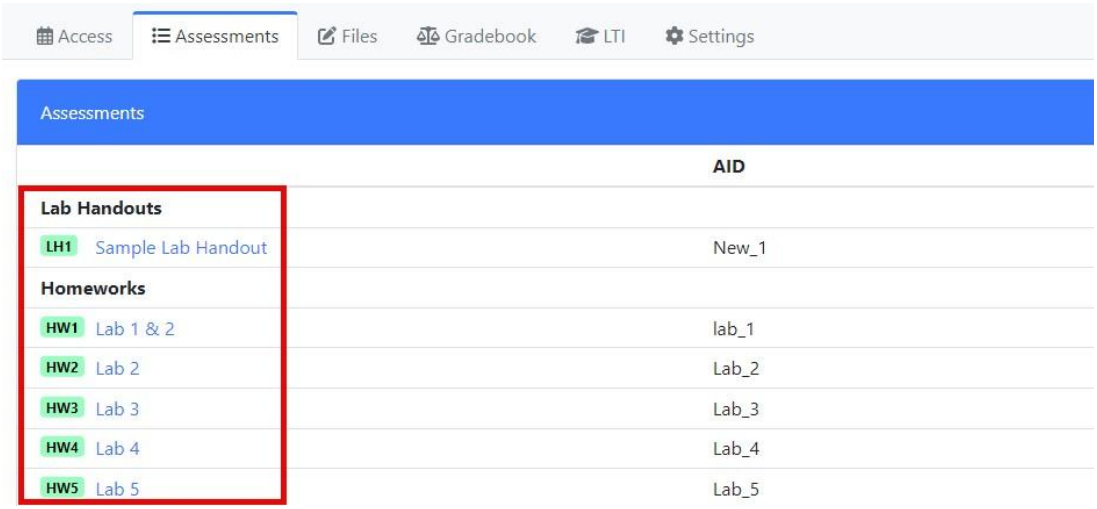
- Prairielearn offers the option to automatically grade as well as manually grade responses submitted by the students. It is only possible to grade multiple choice and numerical responses submitted. **Any handwritten, descriptive or pictorial responses must be graded manually.**

Automatic Grading

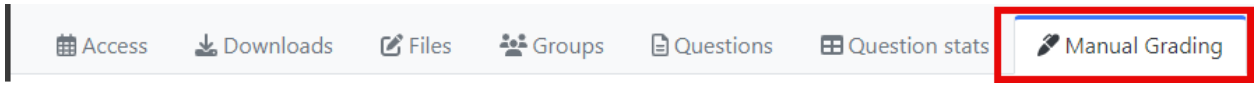
- Questions must be specified as auto or manual graded while configuring the assessment under infoAssessment,json. Here is also where you specify how many points are awarded for a correct auto graded answer. For more information, please visit Question specification under infoAssessment.json.

Manual Grading

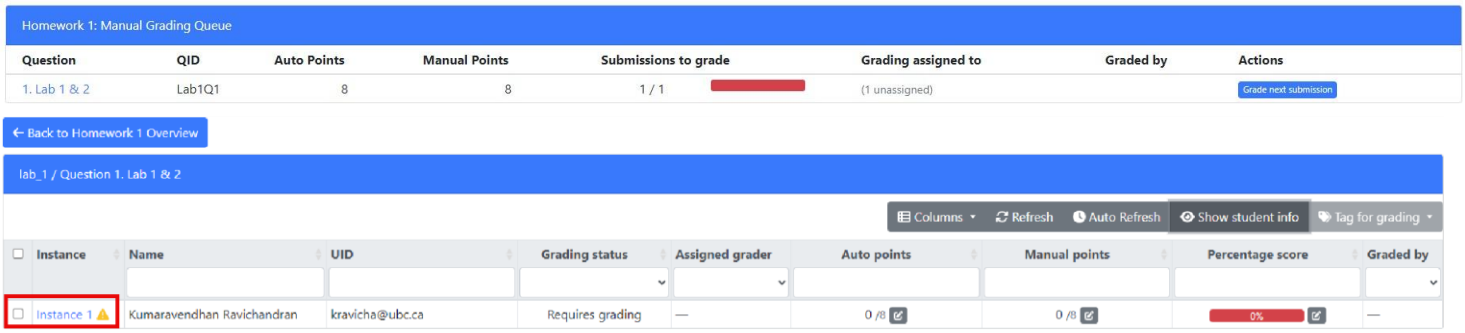
- From your course's Assessment Page, click on the assessment that you would like to manually grade:



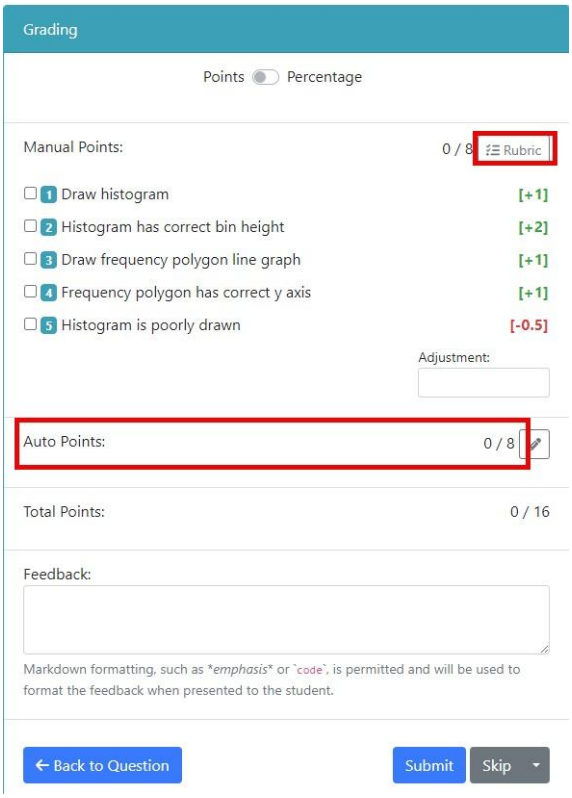
- Select "**Manual Grading**" from the top Menu bar



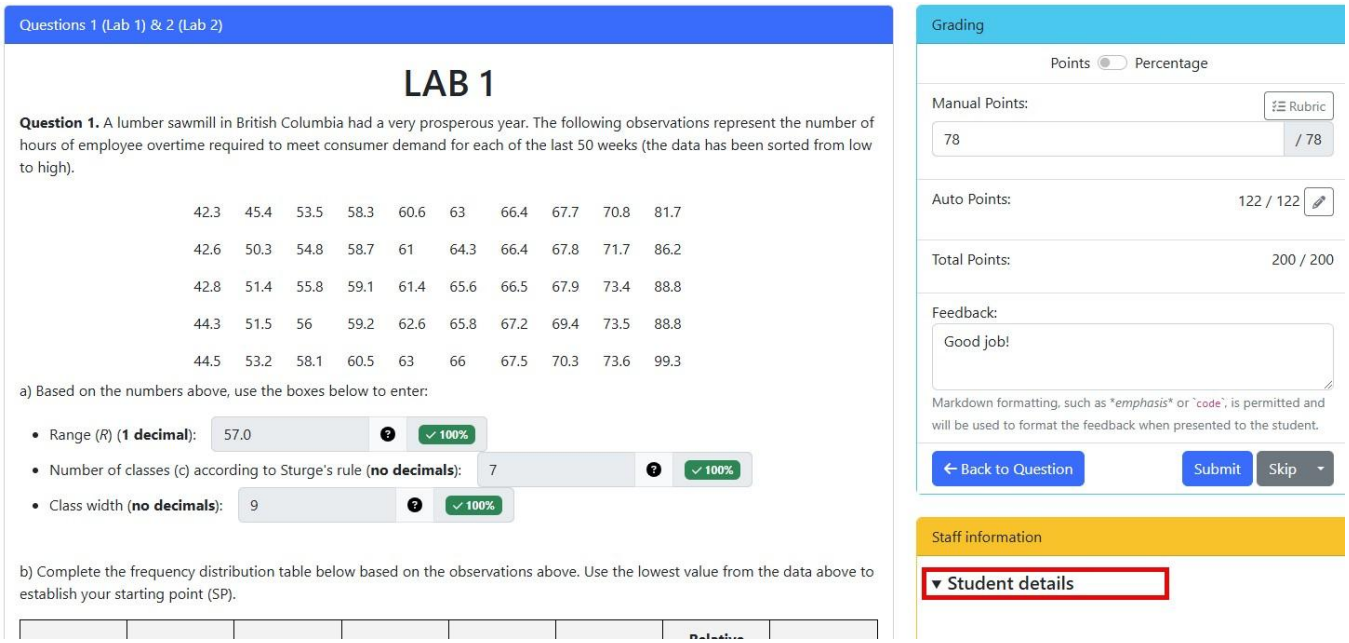
- Select the question that you would like to grade



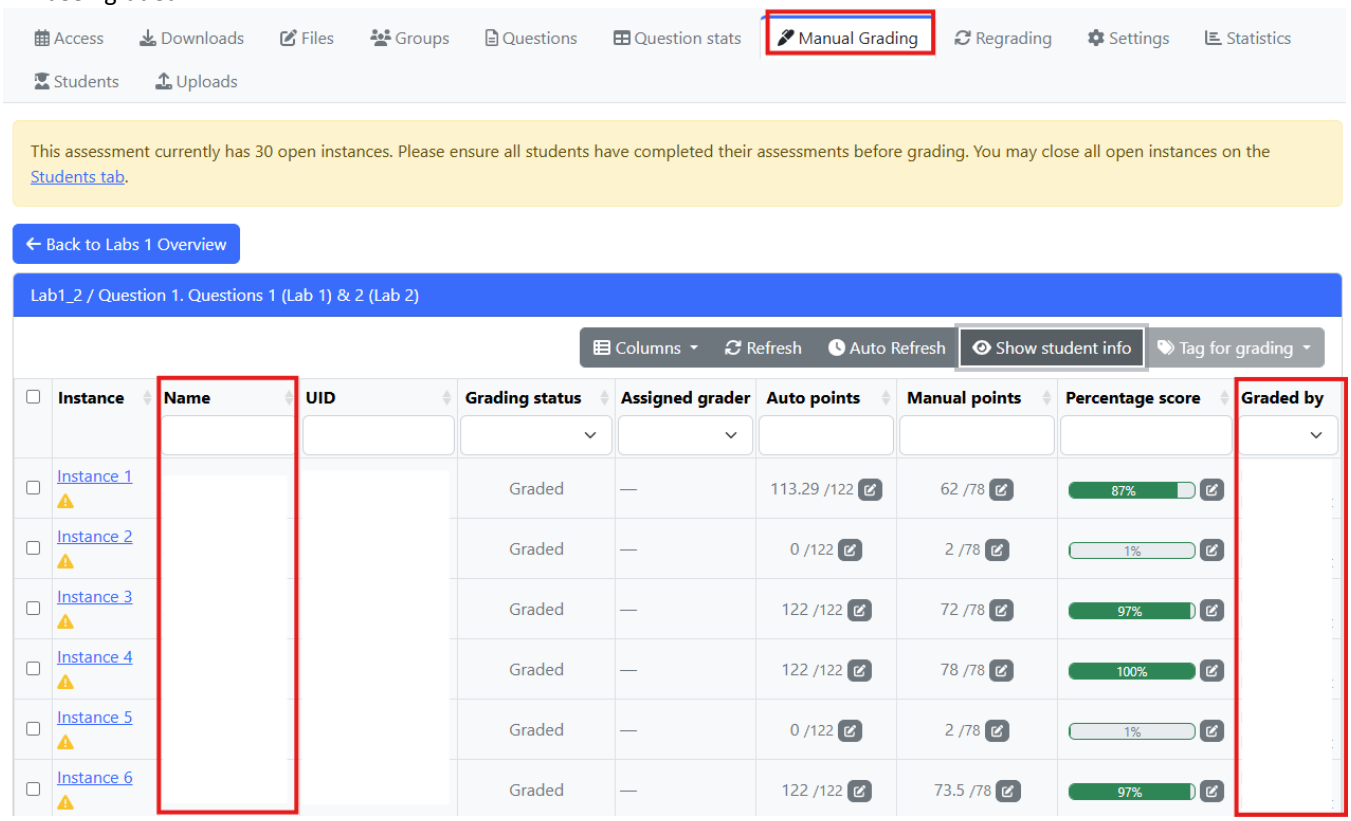
- Select the **instance** of the student's attempt that you would like to grade
- On the right-hand side of the page, you will find a **Rubric pane**, click on the Rubric button to adjust the rubric for manually graded questions. Auto-points awarded by the auto grader can also be edited here at the grader's discretion.



- Once you have started manual grading for an assessment, you can find the student's name under "**Student details**".



- When you need to compare your feedbacks after manual grading, you can go to Assessment - > Manual Grading and click on “Show student info”. Here, you can see the students’ name, whether or not the assessment has been graded and who graded the assessment. This should make it easier for you to navigate through assessments that have already been graded.



- Questions can be manually graded with **Grader’s Notes** that will only be visible to the grader at the time of grading. This can be added while creating the questions. Refer to Question Configuration Guide and Elements for Writing Questions Guide for more information.

l) Does the mode from raw data mean much in a dataset like this? Why or why not? Answer in a very short sentence.

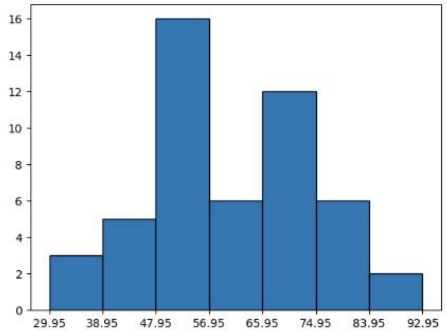
Grader Notes: No, mode from raw data is useless

m) Based on the analysis of this data and assuming that demand remains constant in the upcoming years, what would you do as a manager of the mill?

Grader Notes: No correct answer ... One possibility is that more staff (an additional shift) is required to keep up with demand. The solution should include sorne of the statistics computed in the lab. For example, an average of 54.69 hours is equivalent to more than one person-day.

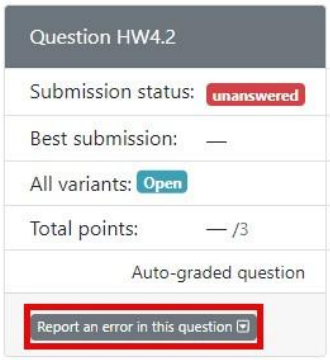
- Wherever necessary, hand-drawn graphs by the students can be compared to a computer-generated graph specific to the student's attempt for grading. Clicking on "**Show Preview**" will display a preview of the student's graph.

c) [JPG submission] Draw a histogram that illustrates the frequency distribution above. Don't forget to include axis labels and units.

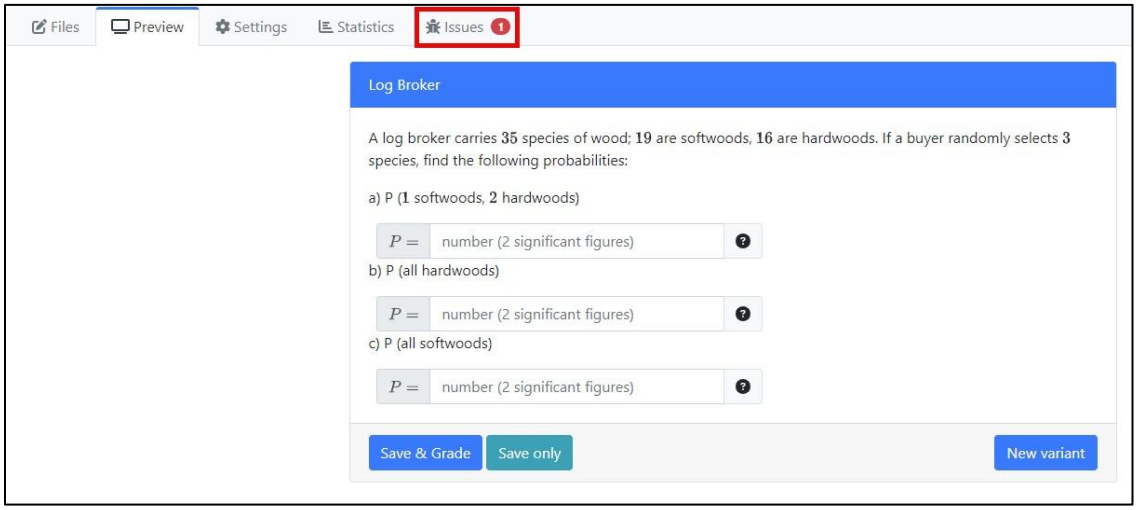


Resolving Errors reported by Students

- Students can report errors in assignment and quiz questions when they attempt it.



- These errors will appear on the instructors' end as an “Issue” .



- The teaching team can then review the error reported and resolve it at their discretion. For additional help on troubleshooting the errors, please contact the TLS team.

Releasing Grades

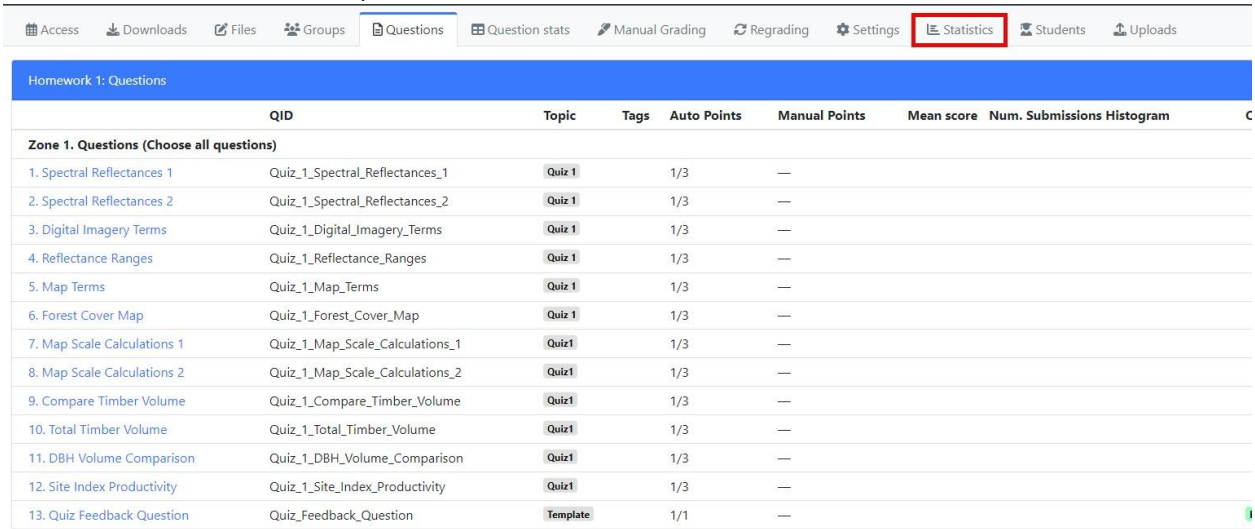
- To allow students to see their attempt and feedback after the assessment is closed, you will need to specify another json parameter **“showClosedAssessment”** : true.
- If you would like to release the grades only after all assessments are graded, you can add another json parameter **“showClosedAssessmentScore”** : false.

Transferring Grades to Canvas

- Since PrairieLearn does not automatically sync grades with Canvas, it's recommended that the teaching team manually transfer grades to the Canvas Gradebook after grading is complete.
- For large courses, if you need help, please contact the TLS Team in advance.

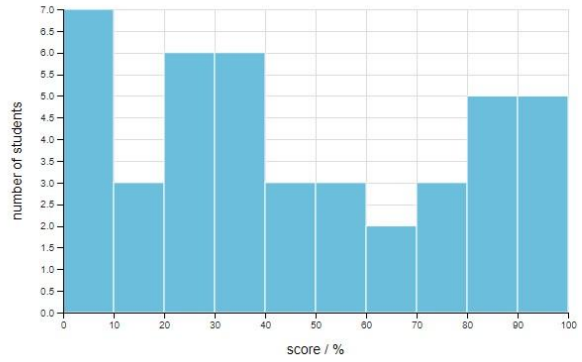
Assessment Statistics

- Click on "**Statistics**" on the top Menu bar for an assessment



- This page displays the summary statistics for a particular assessment, including the students' overall average, median, etc. A **CSV file** of this data can be obtained by clicking on the link displayed at the bottom of the page

Homework 1: Score statistics



Number of students	43
Mean score	46%
Standard deviation	32%
Median score	39%
Minimum score	0%
Maximum score	100%
Number of 0%	3 (7% of class)
Number of 100%	2 (5% of class)

Download FRST_239_TemplateCourseInstance_HW1_score_stats.csv Data outside of the plotted range is included in the last bin.