

# Integrative Assignment

For a Better Integration of  
Statistics in the Analytical  
Chemistry Program

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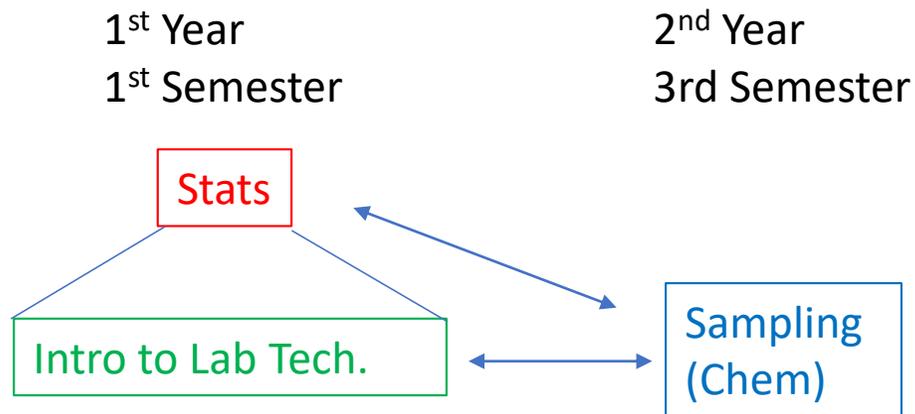
Steven Holden

# Summary of Project

Three main aspects:

- The **statistics** course will be:
  - Flipped so that the transfer of information is done prior to class
  - Class time will be used applying statistical tools in the context of chemistry.
  - Some of the exercises/assignments will use data directly taken from existing labs done in the Analytical Chemistry program.
- First semester **Intro to Lab Tech.** students will shadow third semester **sampling** students for one lab:
  - They will observe how the third semester students operate, and they will collect the lab data from the **sampling** students.
  - They will bring back the data and analyze them with **statistical tools**.
  - They will complete an assignment or quiz on **quality control** and **following Standard Operating procedures**.
- Third semester **sampling** students will:
  - Pair with first semester **Intro to Lab Tech.** students for one lab.
  - Create short videos explaining how some of the other labs are done. These videos will be used in the **stats** course to ground the statistics skills learned in concrete examples.

## The Classes Involved



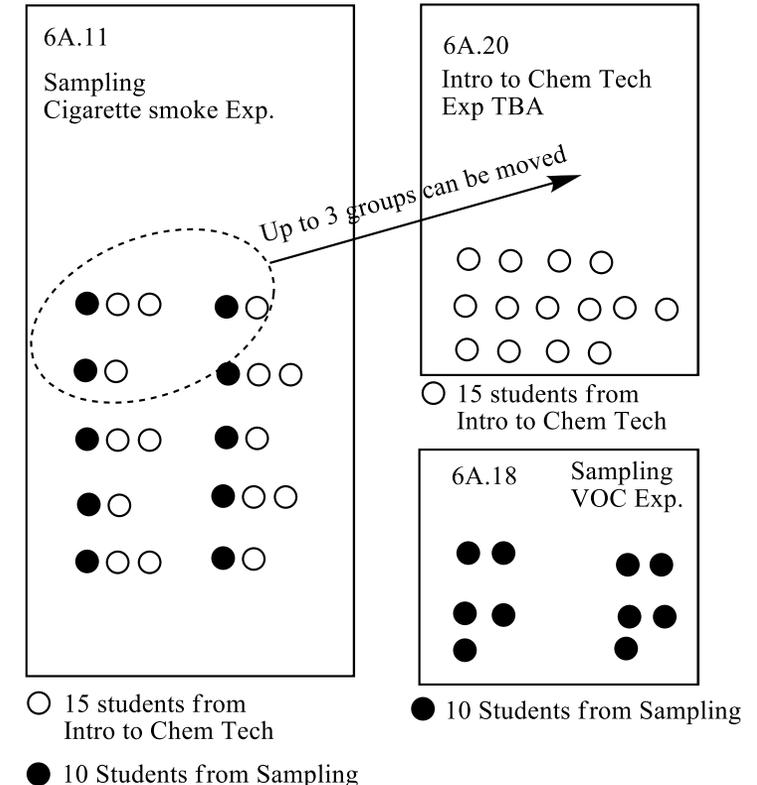
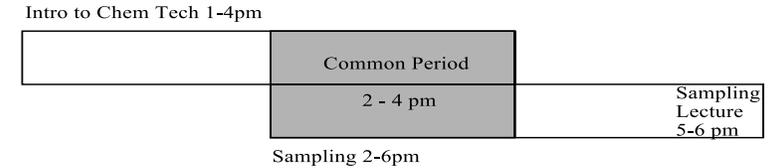
# Learning outcomes

By the end of the semester

- First semester students should be able to:
  - Apply statistical tools in the context of chemistry labs. (within the **Stats course**)
  - Write a Standard Operating Procedure after observing 3rd semester students perform a lab. (**Intro to Lab Tech. course**)
  - Demonstrate knowledge of quality control measures performed in the lab (**Intro to Lab Tech**).
- Third semester students from the **Sampling course** should be able to:
  - Describe an experimental procedure in simple terms, both in person and using short videos.
  - Apply statistical tools in the context of chemistry labs.

# Main Integrative Assessments

- First semester **Intro to Lab Tech** students will shadow third semester **Sampling** students for the “Sampling Cigarette Smoke” lab.
  - Class will be split into two groups – each group performing the lab on consecutive weeks for security reasons.
  - Lab will be done in weeks 12 and 13.
  - The data will be collected in a master copy on Excel by third semester **Sampling** students .
- After the first group have completed the lab, the first set of data will be analyzed in the **Stats** class with the help of the teacher.
- After both groups have completed the lab:
  - Students will be asked to do the analysis themselves on the combined sets of data. (and compare to first set of results (**Stats**)).
  - Students will be asked to complete an activity (quiz/assignment) on aspects of creating Standard Operating Procedures and applying quality control measures to ensure accurate experiment outcomes. (**Intro to Lab Tech**).



# Ancillary Integrative Assessments

Four other labs from the Sampling course require interesting statistical analysis. These labs will be used as real-life examples for the Stats course.

- For the four other labs that involve stats analysis:
  - A pre-class video explaining the lab and equipment will be created by the **Sampling students** - (this will be an assessment for them).
  - Aspects of the experiments will be incorporated into assessments provided in the **stats** class. The data used could be realistic data provided by the teacher or real data provided by the **sampling students**.



This will expose first-semester students to what the second year will look like.



This provides an opportunity for third-semester students to practice explaining a lab procedure in simple terms.



This will hopefully promote in the first year students a tangible connection between the data presented during stats class and the real world of chemistry.