# Carnegie Mellon Faculty Survey:
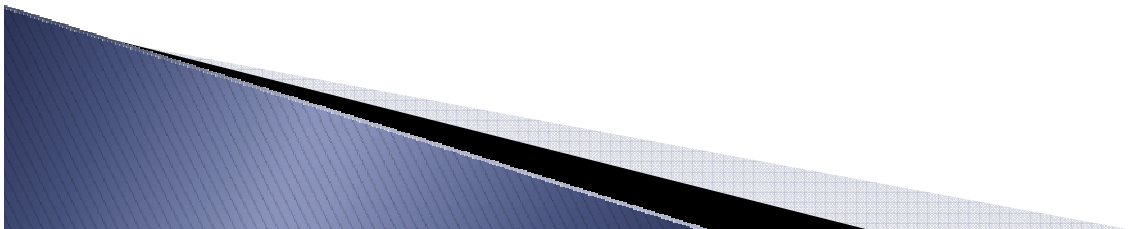## Student Attendance vs. Performance

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# Agenda

- Research Question & Motivation
- Population
- Questionnaire
- Survey Design
- Sample Selection
- Anticipated Problems
- Data Collection
- Post-Survey Processing
- Q&A

# Research Question

- Motivation
  - Better understand effect of class structure on student performance
  - Do classes with mandatory attendance have better final grade distributions?

- Who Benefits?
  - Students
    - Understand how much attendance can actually affect or not affect performance
  - University & Professors
    - Learn how to structure their classes
    - Should the university hire more faculty to decrease class sizes?
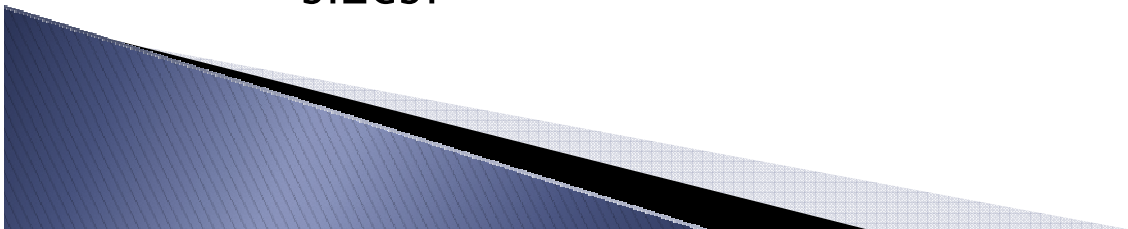
# Population of Interest

- We will survey faculty who taught undergraduate classes during the previous fall semester at Carnegie Mellon
- We will be making inferences about the undergraduate student population, but our observational unit are the courses for which we obtain a grade distribution, and our target population is Carnegie Mellon faculty
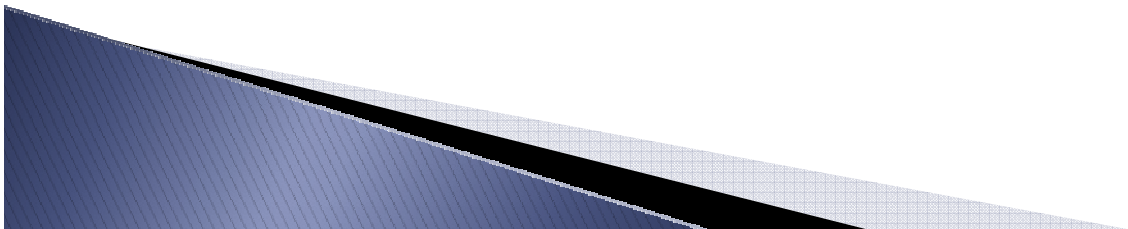
# Questionnaire

▸ **Basic Course Information**
  ◦ College, major/department, size

▸ **Attendance Requirement**
  ◦ Mandatory = direct measurable affect on grade

▸ **Course Structure**
  ◦ Lecture only? Recitations? Labs?

▸ **Note Availability**
  ◦ Lectures notes online?

▸ **Final Grade Calculation**
  ◦ Percentage allocated to attendance

▸ **Grade Distribution**
  ◦ Number of students receiving A, B, C, D, F
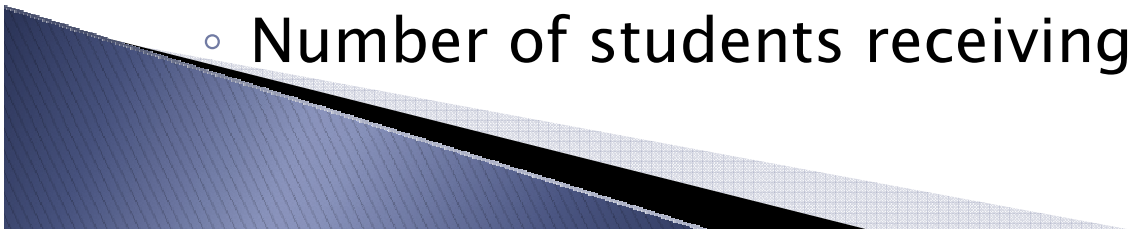
# Sample Design

▸ **Stratified Sample**
- ◦ Schools are stratum
- ◦ Within each stratum, clustered sample of departments
- ◦ Randomly generated sample of departments using random number generator
- ◦ Will be emailing all faculty who taught courses last semester in sampled departments
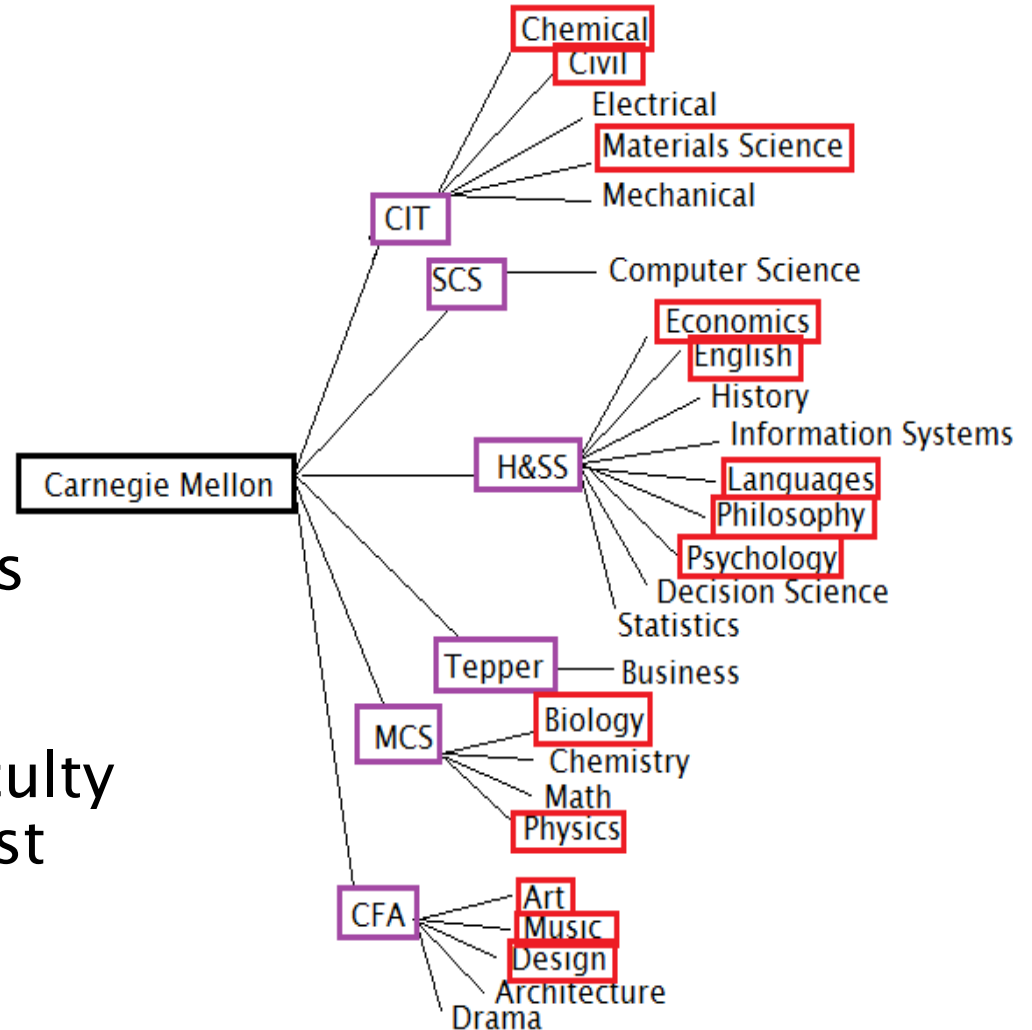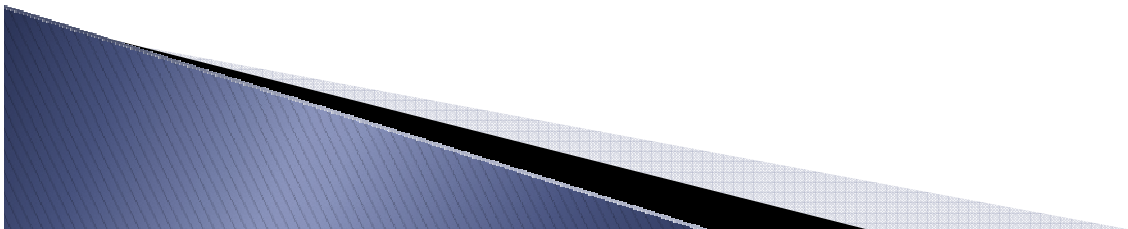
# Sample Selection/Size

▸ In calculating the sample size, we used the following equation to find mean GPA across all the schools, using estimated average GPA for each school and department (asked students we knew in those majors)

$$\bar{y}_{st} = \frac{1}{n}\sum_{i=1}^{n} y_i = \sum_{h=1}^{H} \frac{N_h}{N}\bar{y}_h = \sum_{h=1}^{H} W_h\bar{y}_h = 3.42$$

▸ We determined $n_h$, the sample size in each stratum, based on a sample of 50% of the departments in each college – Modifications were made given size of college

▸ Final sample sizes below:
▸ H&SS – 5 depts             SCS – 1 dept
▸ MCS – 2 depts             Tepper – 1 dept
▸ CIT – 3 depts             CFA – 3 depts

# Sample Selection/Size

▸ After determining the weights for each stratum, ($W_h = n_h/N_h$), we can calculate the sample variance in each stratum and the overall sample variance

$$s_h^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (y_{hi} - \bar{y}_h)^2$$

$$Var(\bar{y}_{st}) = Var\left(\sum_{h=1}^{H} W_h \bar{y}_h\right)$$

$$= \sum_{h=1}^{H} Var(W_h \bar{y}_h) = \sum_{h=1}^{H} W_h^2 Var(\bar{y}_h)$$

$$= \sum_{h=1}^{H} W_h^2 (1 - f_h) \frac{s_h^2}{n_h}$$

▸ We determine our overall variance $\bar{y}_{st} = 0.005$
▸ This gives a standard deviation of 0.07 and a margin of error of $(1.96 \times 0.07) = 0.1372$.
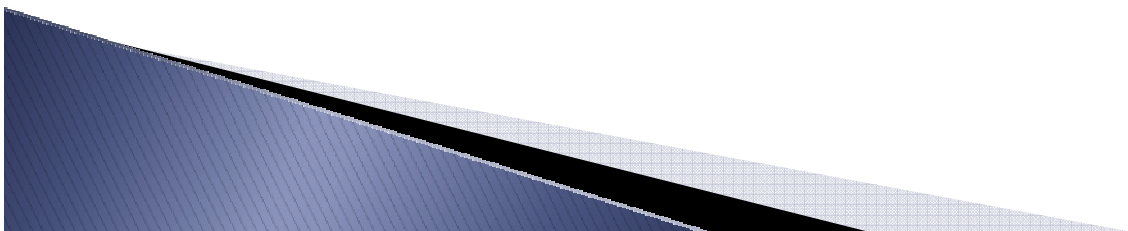
# Anticipated Problems

- Non-Response
  - Professors may be sensitive about releasing grade distributions
  - Professor may also not have time or may ignore our emails
  - Send follow up emails to professors who do not respond
- Coverage
  - Professors or courses may not be listed in directory or departmental websites
- Comparison Difficulty
  - Departments and courses are very different and therefore, making comparisons between them may be difficult
  - Representativeness – Will we have a large enough sample of attendance mandatory(or optional) courses that we can accurately compare
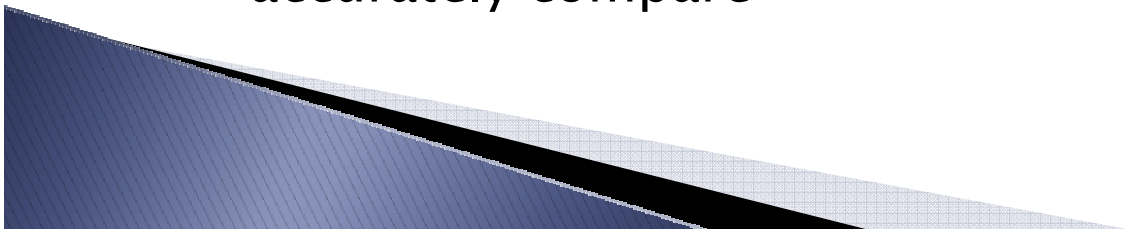
# Data Collection

- Preliminary emails to professors who will be asked to participate – what we are doing now
- Email online survey questionnaire, using an email account created for the project as opposed to our personal emails
- If professors prefer not to give information regarding grades over the internet, we will accommodate for face-to-face interviews
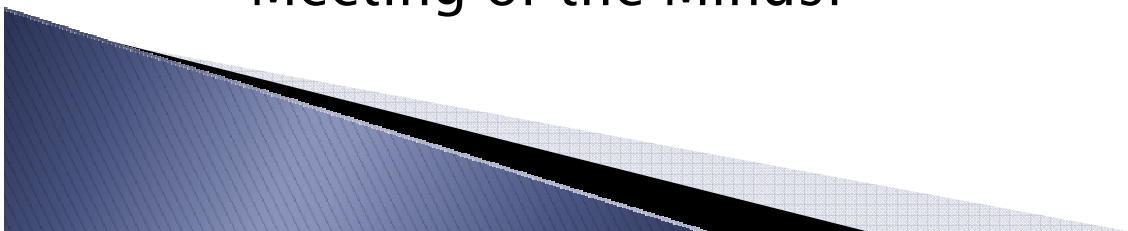- End data collection on April 8
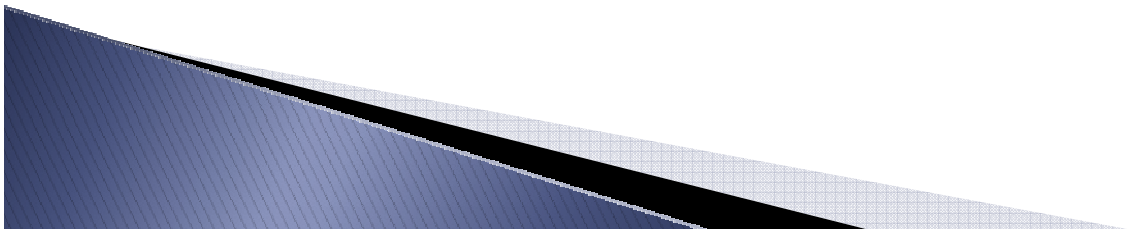
# Post-Survey Processing

- Analysis and Conclusions
  - How attendance requirement affects student performance
  - Is there a difference in student grades for attendance mandatory courses versus attendance optional courses?
  - How lecture note availability may affect grades and attendance
  - The importance of attendance as a percentage of final grade, with regard to performance

- Post-Survey Presentations
  - Meeting of the Minds!

# Q&A

- Any questions?