# ANL553 Applied Statistical Methods and Causal Analysis

**Level:** 5
**Credit Units:** 5 Credit Units
**Language:** ENGLISH
**Presentation Pattern:** EVERY JULY

**Synopsis:**

ANL553 Applied Statistical Methods and Causal Analysis introduces the concept of statistical inference, empirical methods and causal analyses that are hands-on and practitioner focused. The course will provide an understanding of the fundamental principles of various empirical methods for statistical inference and causal analysis. The course will begin by covering basic concepts in statistics and programming. It will focus on common confounding challenges of causal analysis, and how classical empirical approaches such as linear regression and panel data regression may address them. It will also cover modern approaches for causal analysis such as instrumental variable estimation and difference-in-differences estimation. The course will focus on equipping students with the sound intuition and practical research skills in conducting statistical and causal analysis to address relevant business problems.

**Topics:**

- Fundamental statistical concepts
- Programming for statistics
- Hypothesis testing and statistical inference
- Common issues in empirical design
- Randomized controlled trials and quasi-natural experiments
- Linear regression concepts
- Linear regression model design
- Panel data regression concepts
- Panel data regression results and interpretation
- Regressions with dummy variables
- Difference-in-differences estimation
- Instrumental variable regression

**Textbooks:**

: Cunningham, Scott. Causal Inference: The Mixtape, New Haven (eText) 2021 Yale University Press ISBN-13: 9780300255881

**Learning Outcome:**

- Construct testable hypotheses from available data
- Test various hypotheses with appropriate statistical tests
- Evaluate the suitability of various empirical approaches for different business problems
- Assess the advantages and pitfalls of the various empirical approaches
- Design experiments, research to understand the relationship between variables of interest
- Construct a programming workflow to execute an empirical method
- Design an empirical method, interpret and deploy the results of the empirical analysis
- Demonstrate understanding of statistical inference and causal analysis between two or more variables

**Assessment Strategies (Evening Class):**

| Components | Description | Weightage Allocation (%) |
|---|---|---|
| Overall Continuous Assessment | PRE-COURSE QUIZ 1 | 10 |
| | PARTICIPATION 1 | 10 |
| | GROUP BASED ASSIGNMENT 1 | 30 |
| Overall Examinable Components | ECA | 50 |
| **Total** | | **100** |