

## Statistics Learning Compact

Statistics continues to gain importance as a field, first as a crucial interdisciplinary component of the liberal arts, and second as the main method of turning data into information and knowledge across the globe. Moreover, statistics is at the heart of the emerging and fast growing field of data science. With the digital revolution, the world is becoming increasingly more quantitative, and the field of statistics has become essential in advancing our understanding in the natural, political and social sciences as well as in medicine, public health, digital humanities and business.

As a major in Statistics at New College, you will develop statistical thinking and reasoning skills and apply them when analyzing and modeling data from many different sources. You will learn about both classical and modern statistical techniques, as well as the theoretical foundations underlying these methodologies. At the same time, you are going to learn about the necessary computational skills to work with data and implement these procedures.

Additionally, you will develop the ability to effectively communicate and report statistical results, while working on both individual and team projects consistently throughout your classes.

### Expected Learning Outcomes

Expected outcomes of an area of concentration in statistics are the following:

1. **Statistical Methods: Students will know how to employ and assess commonly used statistical methods and concepts.**
  - a. Demonstrate the ability to recognize and apply principles of study design and sampling
  - b. Utilize appropriate descriptive measures and visualization to explore data and analyze specific research questions
  - c. Use common statistical models and inferential methods to analyze data
  - d. Recognize the conditions and limitations of specific statistical models

2. **Statistical Theory and Probability: Students will be able to explain the theoretical foundations of common statistical methods and results.**
  - a. Use the abstract language of random variables to model random phenomena
  - b. Apply results from calculus and linear algebra to statistical problems and models
  - c. Work with common probability distributions
3. **Computational Skills: Students will demonstrate competence in using the statistical programming language R.**
  - a. Utilize R for basic computer programming and simulation tasks
  - b. Implement statistical methods and models with R
  - c. Handle common data management tasks with R
4. **Statistical practice: Students will develop the ability to collaborate with others and communicate results clearly.**
  - a. Demonstrate strong written and oral communication skills when presenting statistical analyses and conclusions
  - b. Successfully work independently or as part of a team
  - c. Utilize practices encouraging reproducible research
  - d. Recognize and adhere to ethical standards for statistical practice

### **Measures to track student progress**

The Statistics faculty track student progress toward satisfactorily completing an area of concentration in statistics using the following methods:

1. Satisfactory evaluations in required courses
2. A review of academic performance during the 5th semester with the Provisional Area of Concentration form
3. A review of academic performance during the 6th semester with the Thesis Prospectus form

### **Measures to demonstrate each graduate's competencies**

1. Oral baccalaureate exam and the written thesis project as measures of evidence to demonstrate student competencies
2. Narrative evaluations from required coursework

## 5. Assessing Learning Outcomes

Evaluation of student's ability to meet the learning outcomes in the Statistics Area of Concentration will be implemented via the following assessment plan:

- Instructors will evaluate and grade the performance of each student in the required courses of the AOC and provide constructive feedback through narrative evaluations.
- Each student's thesis will be assessed by faculty for depth and breadth of knowledge and statistical rigor with respect to the four learning outcomes.
- During the Baccalaureate oral exam, each student will be asked to describe and reflect on important concepts from courses taken as part of the Statistics AOC.
- Student will reflect on program experiences and provide feedback via course evaluations and exit interviews.

### Mapping of Learning Objectives to Specific Courses in the Statistics AOC

| Course                       | Learning Outcomes   |                                  |                 |                      |
|------------------------------|---------------------|----------------------------------|-----------------|----------------------|
|                              | Statistical Methods | Statistical Theory & Probability | Computer Skills | Statistical Practice |
| Calculus 1                   |                     | X                                |                 |                      |
| Linear Algebra               |                     | X                                |                 |                      |
| Probability 1 & 2            |                     | X                                |                 |                      |
| Dealing with Data 1          | X                   |                                  | X               |                      |
| Dealing with Data 2          | X                   |                                  | X               | X                    |
| Linear Models                | X                   | X                                | X               | X                    |
| Statistical Computing with R | X                   |                                  | X               | X                    |
| Categorical Data Analysis    | X                   | X                                | X               |                      |
| Time Series Analysis         | X                   | X                                | X               | X                    |
| Bayesian Statistics          | X                   | X                                | X               | X                    |
| Statistical Consulting       | X                   |                                  | X               | X                    |
| Statistical Inference        | X                   | X                                |                 |                      |