Course Outline

ST. CLAIR COLLEGE

DAB 502 Advanced Statistics for Data Analytics

Course ID: 028542 **Academic Year:** 2018/19

Course Description:

In this course, students will learn how to apply the methods of statistical inference for numerical and categorical data. Students will learn how to set up and perform hypothesis tests, interpret the results of the analysis in a way that is interpretable for business managers. Using sample data sets, students will learn to report estimates of quantities in a way that expresses the uncertainty of the quantity of interest.

Pre-Requisites:	None	**Category:**	Vocational
Co-Requisites:	None	**Course Credits:**	5.00
Special Conditions:	None	**Academic Level:**	Credit (Post Basic)

Instructional Hours:	Classroom Instruction	45
	Laboratory/Workshops	30
	Other	0
	Total Hours	**75**

Chair: James Marsh

Academic Department:

Windsor: Zekelman School of Business & Information Technolo
Chatham:

Revised By: Mark Cassar

Last Revision: 2018/11/27

Required Tools, Equipment, and Learning Resources:

Textbook: OpenIntro Statistics, David Diez, Christopher Barr, and Mine Çetinkaya-Rundel (openintro.org 2017)

Software: R and RStudio

Essential Employability Skills (EES):

	Description	Teach	Assess	Reinforce
1)	Communication: Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.	✔	✔	
2)	Communication: Respond to written, spoken, or visual messages in a manner that ensures effective communication			
3)	Numeracy: Execute mathematical operations accurately	✔	✔	
4)	Critical Thinking: Apply a systematic approach to solve problems	✔	✔	
5)	Critical Thinking: Use a variety of thinking skills to anticipate and solve problems	✔	✔	
6)	Information Management: Locate, select, organize, and document information using appropriate technology and information systems			
7)	Information Management: Analyze, evaluate and apply relevant information from a variety of sources	✔	✔	
8)	Interpersonal: Show respect for the diverse opinions, values, belief systems, and contributions of others			
9)	Interpersonal: Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals			
10)	Personal: Manage the use of time and other resources to complete projects			
11)	Personal: Take responsibility for one's own actions, decision and consequences			

Course Learning Outcomes (CLO):

Upon successful completion of this course, the student will be able to:
(EKS = Embedded Knowledge and Skills)

- Describe data types, relationships, and distributions in the context of specific data sets (CLO #1)
  EKS:
  - Identify variables as numerical or categorical.
  - Define associated variables

- Identify the independent and dependent variables from a set of variables
- Question confounding variables and sources of bias in a given study
- Distinguish between simple random, stratified, cluster, and multistage sampling
- Identify the shape of a distribution as symmetric, right skewed, or left skewed, and unimodal, bimodal, multimodal, or uniform
- Recognize when transformations can make the distribution of data more symmetric, and hence easier to model

- Use probability concepts and simulation to describe data samples. (CLO #2)
  EKS:
  - Calculate and interpret probabilities to provide basic interpretations of a data set
  - Use probability distributions to describe the behavior of discrete and continuous random variables

- Estimate population parameters using confidence intervals when appropriate (CLO #3)
  EKS:
  - Verify that the necessary conditions have been met for establishing population parameters
  - Define point estimates that can be used for decision making
  - Construct one- and two-sample confidence intervals for point estimates
  - Interpret confidence intervals in context of the given data

- Conduct tests of significance when appropriate to aid in decision making (CLO #4)
  EKS:
  - Carry out one- and two- sample hypothesis tests
  - Articulate appropriate hypotheses within the context of a given data
  - Explain type I and type II errors, in general, and in the context of the given data
  - Interpret the meanings of rejection of the null hypothesis and of failure to reject the null hypothesis
  - Use a p-value to reach an appropriate conclusion
  - Explain the difference between practical significance and statistical significance for the given context and data

Teaching/Learning Activities:

Lecture / Discussion, Guided Analysis, Individual / Group Class Exercises, Lab exercises

Assessment:

Standard/Traditional Delivery

- Exam 1 — 15.00%

Frequency: 1
Description: This exam will consist of questions that may include application, programming, short answer, multiple choice, and project-style questions.
Outcomes Assessed: 1, 2, 3
EES Assessed: 3, 4, 5, 7

- Exam 2 — 20.00%

Frequency: 1
Description: This exam will consist of questions that may include application, programming, short answer, multiple choice, and project-style questions.
Outcomes Assessed: 2, 3, 4
EES Assessed: 3, 4, 5, 7

- Exam 3 — 35.00%

Frequency: 1
Description: This cumulative exam will consist of questions that may include application, programming, short answer, multiple choice, and project-style questions.
Outcomes Assessed: 1, 2, 3, 4
EES Assessed: 3, 4, 5, 7

- Lab Exercises — 30.00%

Frequency: 8-10
Description: The lab exercises require students to carry out statistical inference.
Outcomes Assessed: 1, 2, 3
EES Assessed: 1, 3, 4, 5, 7

100%

Note: The assessment listed in this outline represents the planned assessment method for this course. Unanticipated conditions during the delivery of the course may necessitate changes to the planned assessment. Students will receive reasonable advance notice should any changes be necessary.

Grading:

A = 80 - 100%
B = 70 - 79%
C = 60 - 69%
D = 50 59%
F = Less than 50%

Course Content:

See Embedded Knowledge and Skills

"Academic misconduct, including cheating of any form, will not be tolerated. Consequences may include, but are not limited to, a warning, a grade of "0" on the assignment/test/examination, or a failing grade in the course."

(Code of Students Rights and Responsibilities: Section 7.1.6)

All students and employees of this College have a right to study and work in an environment that is free from harassment and discrimination.

Accommodation Statement

The College will provide supports and services to all students with disabilities, both temporary and permanent, with valid supporting documentation. Interim accommodation requests will be received in good faith and can be provided pending receipt of medical documentation. Retroactive accommodations will be considered based on the unique circumstances of the individual matter. The College will give all Human Rights Code-related requests for accommodation meaningful consideration.

Procedure: The student is responsible to meet with a counsellor in Accessibility Services to discuss their functional limitations and accommodation needs and provide Accessibility Services with supporting documentation. Students are not required under the Ontario Human Rights Code to disclose their disability diagnosis (with the exception of Learning Disabilities) to receive accessibility supports and services and/or academic accommodations. Students are encouraged to meet with a counsellor prior to the start of a semester to provide information and arrange accommodations.