

**Mathematics Department**  
**Statistics for Computer Science**  
**201-257-DW**

**COURSE OBJECTIVES**

*To provide the student in Computer Science Technology with a practical knowledge of elementary statistical methods.*

**COURSE COMPETENCIES**

This course will allow the student to partially achieve the competency:

*016P: Solve computer-related mathematical and statistical problems.*

**Elements of the Competency:**

1. Solve enumeration problems.
2. Solve probability and statistical problems.

**PRE-REQUISITE**

*High School Mathematics 406*

**PONDERATION**

3-2-3

**STANDARDS FOR SUCCESSFUL COMPLETION OF THE COURSE**

Term Work (assignments, computer labs, quizzes and tests): 75%

Final Test: 25%

To pass this course, two components must be met:

1. Students must attain a total grade of at least 60% for the course.
2. Students must receive a grade of at least 60% for the final test.

If the last condition is not met, the maximum grade the student will receive for the course is 50%.

## Term Work

The term work is based on a minimum of 4 ½ hours of tests/quizzes. A minimum of 3 class tests will be given.

## Final Examination

There is no final exam.

## REQUIRED TEXT AND MATERIALS

**Text:** The required text is *STAT*<sup>2</sup> by Johnson & Kubby (ISBN-10: 0-538-73841-3), publisher Brooks/Cole

**References:** (1) *Statistics for the Sciences* by Buntinas & Funk  
(2) *Understanding Basic Statistics (2nd Edition)* by Brase & Brase

**Calculators:** Students are only permitted to use the Sharp EL-531X, XG or XT calculator during tests and exam.

## TEACHING METHODS

Lectures and problem sessions.

## MATH TUTORIAL ROOM

Volunteer math teachers are available for help in room 7B.1 from 10:00 to 16:00 (Monday through Friday) and from 17:00-18:00 (Monday through Thursday).

## COURSE CONTENT & Tentative SCHEDULE

(number of classes listed is approximate)

### DESCRIPTIVE STATISTICS:(9 classes)

DESCRIPTIVE STATISTICS (*Chapters 1, 2*)

Descriptive Analysis and Presentation of Single Variable Data

#### SECTION & Topics

#### HOMEWORK

1.1 WHAT IS STATISTICS?

p.17 #1.7 – 1.17

*Measurements, Levels of Measurement*

1.20 – 1.25

1.2 MEASURABILITY and VARIABILITY

p.20 #1.27 – 1.31

1.3 DATA COLLECTION

p.20 #1.32 – 1.40

2.1 GRAPHS, PARETO DIAGRAMS AND STEM-AND-LEAF DISPLAYS

p.50 #2.1 – 2.6

*Dot plots, Stem-and-leaf displays*

2.2 FREQUENCY DISTRIBUTIONS AND HISTOGRAMS

p.50 #2.7 – 2.11

*Histograms, Ogives, Frequency distribution tables, Classes, Class width, Class boundaries, Class marks, Relative frequency, Cumulative frequency*

2.3 MEASURES OF CENTRAL TENDENCY p.51 #2.12 – 2.16  
*Mean, Median, Mode*

2.4 MEASURES OF DISPERSION p.51 #2.17 – 2.22  
*Range, Sample variance, Sample standard deviation*

2.5 MEASURES OF POSITION p.52 #2.23 – 2.27  
*Quartiles, Percentiles, Standard Scores, Five number summaries, Box-plots*

2.6 INTERPRETING AND UNDERSTANDING STANDARD DEVIATION p.52 #2.28 – 2.31  
*Empirical Rule, Chebyshev's Theorem*

### DESCRIPTIVE STATISTICS (*Chapter 3*)

#### Descriptive Analysis and Presentation of Bivariate Data

3.1 BIVARIATE DATA p.70 #3.3 – 3.9  
*Bivariate data, Scatter diagrams*

3.2 LINEAR CORRELATION p.71 #3.12 – 3.15,  
*Coefficient of linear correlation, coefficient of determination* 3.18 – 3.20

3.3 LINEAR REGRESSION p.72 #3.23 – 3.25,  
*Line of best fit, Making predictions* 3.27 – 3.29

### **PROBABILITY:(16 classes)**

#### PROBABILITY (*Chapter 4*)

#### **ADDITIONAL SECTION I: COUNTING TOOLS**

*Fundamental Counting Principle, Permutations, Combinations, Combining the rules of probability, Venn diagrams*

Exercises distributed  
in class

4.1 PROBABILITY OF EVENTS p.95 #4.1 – 4.7,  
*Theoretical (expected) probability, Empirical probability, Sample space* 4.11

4.2 CONDITIONAL PROBABILITY OF EVENTS p.96 #4.12 – 4.15  
*Conditional probability*

4.3 RULES OF PROBABILITY p.97 #4.16 – 4.23,  
*Complementary events, Addition rules, General Multiplication rule, Conditional probability* #25 – 27

4.4 MUTUALLY EXCLUSIVE EVENTS p.97 #4.28 – 4.35  
*Mutually exclusive events, Special Addition Rule*

4.5 INDEPENDENT EVENTS p.98 #4.36 – 4.44

*Independent events, Dependent events, Special Multiplication Rule*

4.6 ARE MUTUAL-EXCLUSIVENESS AND INDEPENDENCE RELATED? p.99 #4.45 – 4.50

*Using conditional probability to determine independence*

**ADDITIONAL SECTION II: BAYES' THEOREM** Exercises distributed  
*Bayes' Theorem, Tree diagrams* in class

PROBABILITY DISTRIBUTIONS (*Chapter 5*)

Probability distributions and Discrete Variables

5.1 RANDOM VARIABLES p.113 #5.3 – 5.6  
*Random variables*

5.2 PROBABILITY DISTRIBUTIONS OF A DISCRETE RANDOM VARIABLE p.113 #5.7 – 5.23,  
5.26 a – c  
*Probability distribution, Probability function*  
*Mean (expected value), variance, standard deviation*

5.3 THE BINOMIAL PROBABILITY DISTRIBUTION p.115 #5.27 – 5.32,  
5.34 – 5.54 a - g  
*Binomial probability experiments, Binomial probability function*  
*Mean, standard deviation of binomial distribution*

**ADDITIONAL SECTION III: POISSON DISTRIBUTION** Exercises distributed  
*Poisson distribution, Mean of Poisson Distribution,* in class  
*Applications of Poisson Distributions*

**ADDITIONAL SECTION IV: THE HYPERGEOMETRIC DISTRIBUTION** Exercises distributed  
*Hypergeometric distribution (sampling without replacement),* in class  
*Comparison of binomial and hypergeometric distributions*

CONTINUOUS PROBABILITY DISTRIBUTIONS (*Chapter 6*)

Continuous probability distributions, Normal probability distributions

6.1 NORMAL PROBABILITY DISTRIBUTION p. 132 # 6.1, 6.2  
*Normal probability distribution function*

6.2 STANDARD NORMAL DISTRIBUTION p.132 #6.3 – 6.19  
*Properties of standard normal distribution, Finding area under standard normal curve*

6.3 APPLICATIONS OF NORMAL DISTRIBUTION p.133 #6.20 – 6.26  
*Probabilities, Percentiles*

6.4 NOTATION p.134 #6.29 – 6.35  
*z-scores, critical values  $z_{\alpha}$*

6.5 NORMAL APPROXIMATION OF THE BINOMIAL p.134 #6.36 – 6.47  
*Normal approximation to the binomial, continuity correction factor*

SAMPLE VARIABILITY (*Chapter 7*)

7.1 SAMPLING DISTRIBUTIONS p.148 #7.1, 7.2,  
*Sampling distribution of a sample statistic, Creating a sampling 7.6, 7.8*  
*distribution of sample means*

7.2 THE SAMPLING DISTRIBUTION OF SAMPLE MEANS p.149 #7.9 – 7.14  
*Mean and variance of sampling distribution of*  
*sample mean, Central Limit Theorem*

7.3 APPLICATION OF THE SAMPLING DISTRIBUTION OF p.150 #7.18 – 7.29  
SAMPLE MEANS  
*Calculating probabilities for the mean*

**INFERENCEAL STATISTICS: (17 classes)**

INTRODUCTION TO STATISTICAL INFERENCES (*Chapter 8*)

8.1 THE NATURE OF ESTIMATION p.178 #8.1 – 8.9  
*Point estimate, Interval estimate, Level of confidence,*  
*Confidence interval*

8.2 ESTIMATION OF MEAN  $\mu$  ( $\sigma$  KNOWN) p.178 #8.10 – 8.20  
*Point estimate, Confidence interval, Sample size*

8.3 THE NATURE OF HYPOTHESIS TESTING p.179 #8.21 – 8.32  
*Statistical hypothesis test, Null Hypothesis, Alternative Hypothesis,*  
*Type I and II errors*

8.4 HYPOTHESIS TEST OF MEAN  $\mu$  ( $\sigma$  KNOWN): A PROBABILITY p.180 #8.33 – 8.39  
VALUE APPROACH  
*Probability value hypothesis test (p-value approach),*  
*One-tailed and Two-tailed tests*

INFERENCES INVOLVING ONE POPULATION (*Chapter 9*)

9.1 INFERENCES ABOUT THE MEAN  $\mu$  ( $\sigma$  UNKNOWN) p.203 #9.1 – 9.18  
*Properties of the t-Distribution, Confidence Intervals, Hypothesis*  
*Testing (p-value and classical approach)*

9.2 INFERENCES ABOUT THE BINOMIAL PROBABILITY OF SUCCESS  
*Confidence Interval for a Proportion, p.205 #9.19 – 9.33 Hypothesis Test for a*  
*Proportion (p-value and classical approach)*

INFERENCES INVOLVING TWO POPULATIONS (*Chapter 10*)

10.1 DEPENDENT AND INDEPENDENT SAMPLES	p.230 #10.1 – 10.5
10.2 INFERENCES CONCERNING THE MEAN DIFFERENCE <i>Dependent samples, Confidence intervals and hypothesis testing of paired differences</i>	p.230 #10.6 – 10.17
10.3 INFERENCES CONCERNING THE DIFFERENCE BETWEEN MEANS <i>Independent samples, Confidence intervals and hypothesis testing</i>	p.232 #10.18 – 10.24
APPLICATION OF CHI-SQUARE ( <i>Chapter 11</i> )	
11.1 CHI-SQUARE STATISTIC <i>Observed and Expected Values, Test Statistic for Chi-Square</i>	p.250 #11.2, 11.3
11.2 INFERENCES CONCERNING MULTINOMIAL EXPERIMENTS <i>Multinomial experiments, Degrees of freedom for multinomial experiments</i>	p.252 #11.4 – 11.16
11.3 INFERENCES CONCERNING CONTINGENCY TABLES <i>Test of Independence, Contingency Tables</i>	p.252 #11.17 – 11.26

**USING MODERN TECHNOLOGY:**

**ADDITIONAL SECTION VI: USING EXCEL**

*Statistical and graphing software will be demonstrated in class and will be required in completing assignments.*

Exercises distributed  
in class

**Lab Report Requirements:**

*All text and formulas must be word-processed.  
All graphs must be computer-generated.*

## **ISEP STATEMENT**

The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore a crucial policy to read and understand. The policy describes the rights and obligations of students, faculty, departments, programs, and the College administration with regard to evaluation in all your courses, including grade reviews and resolution of academic grievance. ISEP is available on the Dawson website.

<https://www.dawsoncollege.qc.ca/governance/institutional-student-evaluation-policy/>

## **LITERACY STANDARDS**

Problem solving is an essential component of this course. Students will be expected to analyze problems stated in words, to present their solutions logically and coherently, and to display their answers in a form corresponding to the statement of the problem, including appropriate units of measurement. Marks will be deducted for work which is inadequate in these respects, even though the answers may be numerically correct.

## **ACADEMIC INTEGRITY POLICY**

### **Cheating in Examinations, Tests, and Quizzes**

Cheating includes any dishonest or deceptive practice relative to formal final examinations, in-class tests, or quizzes. Such cheating is discoverable during or after the exercise in the evaluation process by the instructor. Such cheating includes, but is not limited to

- a. copying or attempting to copy another's work.
- b. obtaining or attempting to obtain unauthorized assistance of any kind.
- c. providing or attempting to provide unauthorized assistance of any kind.
- d. using or possessing any unauthorized material or instruments which can be used as information storage and retrieval devices.
- e. taking an examination, test, or quiz for someone else.
- f. having someone take an examination, test, or quiz in one's place.

### **Unauthorized Communication**

Unauthorized communication of any kind during an examination, test, or quiz is forbidden and subject to the same penalties as cheating.

### **Plagiarism on Assignments and the Comprehensive Examination**

Plagiarism is the presentation or submission by a student of another person's assignments or Comprehensive Assessment as his or her own. Students who permit their work to be copied are considered to be as guilty as the plagiarizer.

### **Penalties**

Cheating and plagiarism are considered extremely serious academic offences. Action in response to an incident of cheating and plagiarism is within the authority of the teacher. Penalties may range from zero on a test, to failure in the course, to suspension or expulsion from the college.

According to ISEP, the teacher is required to report to the Sector Dean all cases of cheating and plagiarism affecting a student's grade. (See ISEP section V-C.)

## STUDENT CONDUCT AND OBLIGATIONS

- (a) Students have an obligation to arrive on time and remain in the classroom for the duration of scheduled classes and activities.
- (b) Students have an obligation to write tests and final examinations at the times scheduled by the teacher or the College. Students have an obligation to inform themselves of, and respect, College examination procedures.
- (c) Students have an obligation to show respectful behavior and appropriate classroom deportment. Should a student be disruptive and/or disrespectful, the teacher has the right to exclude the disruptive student from learning activities (classes) and may refer the case to the Director of Student Services under the Student Code of Conduct.
- (d) Cellular phones, pagers and musical listening devices have the effect of disturbing the teacher and other students. All these devices should be turned off. Students who do not observe these rules will be asked to leave the classroom.

Everyone has the right to a safe and non-violent environment. Students are obliged to conduct themselves as stated in the Student Code of Conduct and in the ISEP section on the roles and responsibilities of students. (ISEP section II-D)

## ATTENDANCE AND COURSE PARTICIPATION REQUIREMENTS

Students should refer to the Institutional Student Evaluation Policy (ISEP section IV-C) regarding attendance.

Attendance is recommended for the successful completion of the course.

## INTENSIVE COURSE CONFLICTS & POLICY ON RELIGIOUS OBSERVANCE

If a student is attending an intensive course, the student must inform the teacher, within the first two weeks of class, of the specific dates of any anticipated absences.

Students observing religious holidays must **inform** each of their teachers, in writing, of the specific dates as soon as possible, but **no later than the end of the second week of the impacted semester or term**. Alternative arrangements convenient to both the student and the teacher must be made at the earliest opportunity. In the event that the date of a religious observance has yet to be determined, students must submit the name of the observance to their teachers and provide them with the specific date(s) as soon as it becomes available. This applies both to the semester or term, as well as to any final examination period. Students who make such arrangements will not be required to attend classes or take examinations on the designated days, nor be penalized for their absence.

It must be emphasized, however, that this College policy should not be interpreted to mean that a student can receive credit for work not performed. It is the student's responsibility to fulfill the requirements of the alternative arrangement. (ISEP Section IV-D)

A form for this purpose is available at the end of this document.



## RELIGIOUS OBSERVANCE/ INTENSIVE COURSES FORM

Students who intend to observe religious holidays or who take intensive courses must inform their teachers in writing as prescribed in the ISEP Policy on Religious Observance. (ISEP Section IV-D)

The following form must be submitted within the first two weeks of classes.

Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

Course: \_\_\_\_\_

Teacher: \_\_\_\_\_

**Date of Holiday**

**Description of Holiday:**

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