

Mathematics Department
Probability & Statistics – Science
201 – BZS – 05

COURSE OBJECTIVES

For details, see “Dawson Science Program”.

COURSE COMPETENCIES

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

00UV: To apply the experimental method in a scientific field.

Elements of the Competency:

1. To represent various situations, drawing upon relevant concepts, laws and principles of science.
2. To solve problems using a method proper to science.
3. To apply techniques of experimentation or validation specific to science.

PRE-REQUISITE

Calculus II (201 – NYB – 05) or equivalent.

PONDERATION

3-2-3

EVALUATION SCHEME AND SCHEDULE

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.

Term Work

A minimum of 3.5 hours of in class testing is required.

Final Examination

The Final Examination will be a supervised, comprehensive examination held during the formal examination period.

Grading Policy

The final grade is the greatest between:

Option A

- | | |
|--|-----|
| 1. Term Mark (tests, quizzes, assignments, labs) | 50% |
| 2. Final Examination | 50% |

Option B

- | | |
|--|-----|
| 1. Term Mark (tests, quizzes, assignments, labs) | 25% |
| 2. Final Examination | 75% |

Comprehensive Examination

N.B. For a Science (200.xx) student who elects to do the Comprehensive Evaluation (CE) in this section, the teacher will evaluate the CE on a pass/fail basis.

A STUDENT CANNOT GRADUATE UNTIL ALL ASPECTS OF THE COMPREHENSIVE EXAMINATION INCLUDING THE INDEPENDENT PROJECT ARE SUCCESSFULLY COMPLETED.

To pass the course, the students must obtain at least 60%.

REQUIRED TEXT AND MATERIALS

Text: Main text: *OpenIntro Statistics* by David M. Diez, Christopher D. Barr, Mine Çetinkaya-Rundel

Additional text 1: *Introduction to Statistics* by David M. Lane

Additional text 2: *Statistics, Content Charts with Exercises* by George McArthur

References: (1) *STAT 2* by Johnson & Kuby

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

TEACHING METHODS

Lectures and problem sessions.

ISEP STATEMENT

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ATTENDANCE AND COURSE PARTICIPATION REQUIREMENTS

Students should refer to the Institutional Student Evaluation Policy (ISEP section III-C) regarding attendance. *Attendance is recommended for the successful completion of the course.*

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.

STUDENT 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) Electronic/communication devices (including cell phones, mp3 players, etc.) have the effect of disturbing the teacher and other students. All these devices must be turned off and put away. Students who do not observe these rules will be asked to leave the classroom.

(e) Students are reminded that they must conduct themselves according to the Professional Conduct Policy of their program. (ISEP Section IV-N.2)

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)

ACADEMIC INTEGRITY

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 IV-C.)

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.

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

Section & Topics	Pages	Homework
1. Introduction to data (5 classes)		
1.1 Case Study	11	p.57 #1.1-1.2
1.2 Data basics 1.2.1 to 1.2.3	13-18	p.57 #1.3 – 1.6
Additional section I: Levels of Measurement	367-372	p.373-374 #6,7
1.3 Overview of data collection principles 1.3.1 to 1.3.5	19-23	p.57 #1.7-1.10
1.4 Observational studies and sampling strategies 1.4.1 to 1.4.2	23-26	p.57 #1.11 - 1.18 1.19abe,1.20,abef
1.6 Examining numerical data 1.6.1 to 1.6.3	29-35	p.57 #1.23-1.26, 1.29-1.30
Classifying measurements	386-387	p.388 #1-3
1.6.4 to 1.6.6	35-40	1.30-1.42, 1.45-1.46
1.7 Considering categorical data 1.7.1, 1.7.2, 1.7.4, 1.7.5	45-48,50-52	p.57 #1.48-1.54
1.8 Case study	52	
2. Probability (8 classes)		
2.1 Defining probability 2.1.1 to 2.1.6	78-89	p.117 #2.1-2.14
2.2 Conditional probability 2.2.1 to 2.2.7	89-103	p.117 #2.15-2.26
Additional section II: Counting techniques	390-392	
Permutations and Combinations	376-380	p.393 #1-26

2.3 Sampling from a small population	103	p.117 #2.27-2.32
2.4 Random variables		
2.4.1 to 2.4.2	105-109	p.117 #2.33-2.43
2.5 Continuous distributions		
2.5.1, 2.5.2	114-116	p.117 #2.45-2.46
Additional section III:		
Continuous prob. distrib. cont.	398-399	p.400 #1-10
3. Distributions of random variables (6 classes)		
3.1 Normal distribution		
3.1.1 to 3.1.5	128-137	p.159 #3.1-3.18
3.2 Evaluating the normal approximation	137-142	p.159 #3.19-3.20
3.4 Binomial distribution		
3.4.1 to 3.4.3	147-153	p.159 #3.27-3.40
3.5 More discrete distributions (Poisson)		
3.5.2	157-158	p.159 #3.45-3.48
Additional section V:		
Hypergeometric distribution	381-382	p.383 #9
4. Foundations for inference (6 classes)		
4.1 Variability in estimates		
4.1.1 to 4.1.4	170-174	p.207 #4.1-4.6
4.2 Confidence intervals		
4.2.1 to 4.2.6	175-182	p.207 #4.7-4.14
4.3 Hypothesis testing		
4.3.1 to 4.3.6	182-195	p.207 #4.15-4.32
4.4 Examining the Central Limit Theorem	195-198	p.207 #4.33-4.42
4.5 Inference for other estimators		
4.5.1 to 4.5.4	198-203	p.207 #4.43-4.46
4.6 Sample size and power		
4.6.1	203-206	p.207 #4.47,4.48abc 4.49,4.50,4.51ab
5. Inference for numerical data (5 classes)		
5.1 Paired data		
5.1.1 to 5.1.2	222-225	p.257 #5.1-5.6

5.2 Difference of two mean		
5.2.1 to 5.2.5	225-231	p.257 #5.7-5.14
5.3 One-sample means with the t-distribution		
5.3.1 to 5.3.5	231-238	p.257 #5.15-5.22
5.4 The t distribution for the difference of two means		
5.4.1 to 5.4.4	240-245	p.257 #5.23-5.36
6. Inference for categorical data (6 classes)		
6.1 Inference for a single proportion		
6.1.1 to 6.1.4	273-278	p.308 #6.1-6.22
6.2 Difference of two proportions		
6.2.1 to 6.2.3	278-283	p.308 #6.23-6.36
6.3 Testing for goodness of fit using chi-square		
6.3.1 to 6.3.5	283-293	p.308 #6.37-6.40
6.4 Testing for independence in two-way tables		
6.4.1 to 6.4.2	293-298	p.308 #6.41-6.46
7. Introduction to linear regression (6 classes)		
7.1 Line fitting, residuals and correlation		
7.1.1 to 7.1.4	325-334	p.349 #7.1-7.16
7.2 Fitting a line by least squares regression		
7.2.1 to 7.2.6	334-340	p.349 #7.17-7.23
7.3 Types of outliers in linear regression	342-344	p.349 #7.24-7.27
7.4 Inference for linear regression		
7.4.1 to 7.4.3	344-348	p.349 #7.28-7.34

USING MODERN TECHNOLOGY:

ADDITIONAL SECTION VIII: USING EXCEL

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

Lab Report Requirements:

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

RELIGIOUS OBSERVANCE/ INTENSIVE COURSES FORM: ISEP Section IV-D

Students who intend to observe religious holidays must inform their teachers, in writing, within the **first two weeks of the semester** as prescribed in the ISEP Policy on Religious Observances. (ISEP, Section IV D). This includes any religious holidays that occur during the final exam period. Please refer to the academic calendar for the exact dates.

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

Name: _____

Student Number: _____

Course: _____

Teacher: _____

Date: Description:

_____	_____
_____	_____
_____	_____
_____	_____