



**Boston University Study Abroad**  
London

**Boston University Study Abroad London**  
**Introduction to Elementary Statistics**  
**CAS MA 113 (*Elective A*)**  
**Spring 2018**

**Instructor Information**

A. Name	Caroline Gautier
B. Day and Time	Mondays and Tuesdays, 9.00am-1.00pm (plus Wednesday 17 <sup>th</sup> January 9.00am-1.00pm, Tuesday 23 <sup>rd</sup> January, 1.30pm-5.30pm and Friday 9 <sup>th</sup> February 1.30pm – 5.30pm, NO CLASS on Tuesday 13 <sup>th</sup> February)
C. BU Telephone	
D. Email	
E. Office hours	By appointment

**Course Objectives**

Topics include methods of summarizing data, probability, statistical inference and regression. After completion of this course, the student will be able to demonstrate statistical literacy and statistical thinking by being able to:

1. describe techniques used to collect data to represent a given population
2. classify data by type, organize data into tables, and summarize data graphically
3. identify the common shapes associated with data distributions
4. compute and apply descriptive measures to characterize data
5. quantify the variability that occurs naturally in data sets
6. explore relationships between two variables with scatter diagrams, the correlation coefficient, and, when justified, linear regression analysis
7. use simulation to create a sampling distribution and characterize the shape of the sampling distribution
8. determine probabilities of events associated with a normal distribution
9. construct confidence intervals to estimate means and proportions
10. conduct and interpret a test of hypothesis for means and proportions
11. use Excel confidently

**Course Overview**

Every day we are inundated with information. Information comes from newspaper, magazines, books, television newscasts and the Internet. Statistics may be the most important branch of mathematics for the citizens in today's society and it is important that all of us be confident consumers of statistics in both our professional and personal lives. Our goal in this course is to develop the ability to think critically about numerical information and to use it as a consumer to come to useful decisions and conclusions.

While good algebra skills are helpful, there is no prerequisite for this course.

## Course Methodology

The course incorporates collaborative learning, oral and written reports and technology. You will need a scientific calculator, please bring one to each class. Some basic skills on Excel would be useful. Lecture attendance and participation are vital, as is keeping up with the pace of the class.

## Course Assessment

There will be two midterms exams and one final exam for the course. The quizzes will be held during lecture. The final will be cumulative. By pair or individually, students will have to use the new statistical abilities on a project and will have to present their results to the class.

Grading Criteria	
Quiz 1	20%
Quiz 2	25%
Project and Presentation	20%
Final Exam	30%
Class contribution	5%

## Grading

Please refer to the Academic Handbook for detailed grading criteria and policies on plagiarism:

<http://www.bu.edu/london/current-semester>

*\* Final Grades are subject to deductions by the Academic Affairs Office due to unauthorised absences.*

## Attendance

### Classes

All Boston University London Programme students are expected to attend each and every class session, seminar, and field trip in order to fulfil the required course contact hours and receive course credit. Any student that has been absent from two class sessions (whether authorised or unauthorised) will need to meet with the Directors to discuss their continued participation on the programme.

### *Authorised Absence:*

Students who expect to be absent from any class should notify a member of Academic Affairs and complete an Authorized Absence Approval Form 10 working days in advance of the class date (except in the case of absence due to illness for more than one day. In this situation students should submit the Authorised Absence Approval Form with the required doctor's note as soon as possible). The Authorised Absence Approval Request Form is available from:

<http://www.bu.edu/london/current-semester/>

### **Please note: Submitting an Authorised Absence Approval Form does not guarantee an authorised absence**

Students may apply for an authorised absence only under the following circumstances:

- **Illness (first day of sickness):** If a student is too ill to attend class, the student must phone the BU London Student Affairs Office (who will in turn contact the student's lecturer).
- **Illness (multiple days):** If a student is missing more than one class day due to illness, the student must call into to the BU London Student Affairs Office each day the student is ill. Students must also provide the Student Affairs office with a completed Authorised Absence Approval Form and a sick note from a local doctor excusing their absence from

- class.
- Important placement event that clashes with a class (verified by internship supervisor)
  - Special circumstances which have been approved by the Directors (see note below).

**The Directors will only in the most extreme cases allow students to leave the programme early or for a significant break.**

*Unauthorised Absence:*

Any student to miss a class due to an unauthorised absence will receive a **4% grade penalty** to their final grade for the course whose class was missed.

This grade penalty will be applied by the Academic Affairs office to the final grade at the end of the course. As stated above, any student that has missed two classes will need to meet with the Directors to discuss their participation on the programme as excessive absences may result in a 'Fail' in the class and therefore expulsion from the programme.

### **Religious Holidays**

Boston University's Office of the University Registrar states:

'The University, in scheduling classes on religious holidays and observances, intends that students observing those traditions be given ample opportunity to make up work. Faculty members who wish to observe religious holidays will arrange for another faculty member to meet their classes or for cancelled classes to be rescheduled.'

### **Special Accommodations**

Each student will need to contact the Office of Disability Services to request accommodations for the semester they are abroad. Students are advised by BU-ODS not to expect the same accommodations as they receive on campus.

BU London can only uphold special accommodations if we have received the appropriate documentation from the BU-ODS. We cannot accept letters from other universities/centres.

All disabilities need to be known to the ODS in Boston if they are to be used as a reason for requiring a change in conditions, i.e. reduced internship hours or special accommodations for the internship schedule.

### **Lateness**

Students arriving more than 15 minutes after the posted class start time will be marked as late. Any student with irregular class attendance (more than two late arrivals to class) will be required to meet with the Associate Director for Academic Affairs and if the lateness continues, may have his/her final grade penalised.

### **Homework**

All "homework" problems are optional, but strongly suggested in order to solidify understanding and keep up with the material. None of the problems are due at any time, nor will they contribute to your grade in any way.

## Course Chronology

Readings from the M. Sullivan III textbook should be correlated to actual lecture content daily; supplementary problem sheets will also be posted on blackboard or given in class. Some topics and assignments of lesser importance may be cut if time does not permit their coverage.

***This course will move fast. It is imperative that you keep up with the material.***

### **Session 1 - Wednesday 17<sup>th</sup> Jan**

#### ***Module 1: Descriptive Statistics***

- Population parameters (mean, weighted mean, median, mode, standard deviation, variance)
- Graphical methods (histogram, pie chart, scatter points, bar chart, stem and leaf plot)
- Case study London demography

**Reading:** Read chapter 1.1-2, chapter 2.1,2,4, 3.1, 3.2

**Reading:** Read chapter 8, *How to tell the liars from the Statisticians*, by R. Hooke

**HW for next session:** 1.1 # 1-39 odds; 1.2 # 11,13; 2.1 #7-13 odds; 2.2 #9-15 odds and #44; 2.4 #6,7; 3.1 #13,15,17; 3.2# 5,7, 14, 24;

### **Session 2 – Monday 22<sup>nd</sup> Jan:**

#### ***Module 2: Location and Quartiles***

- Definition of quartile, percentile
- Outliers
- Box-whisker plot
- Case study, Activity on Excel

**Reading:** Read chapter 3.4,5

**Reading:** Read Introduction “the Roseto Mystery” from *Outliers, the story of success* by Malcolm Gladwell

**HW for next session:** 3.4#5-15 odds, 22, 25; 3.5#3,5,7,9

### **Session 3 – Tuesday 23<sup>rd</sup> Jan (am):**

#### ***Module 3: Probability, Binomial distribution***

- Basic probabilities, addition rule, independent events, conditional probabilities, mutually exclusive events
- Tree diagram, two-way table
- Probability distribution, mean, variance
- Binomial distribution

**Reading:** Read chapter 5, 6.1 – 2

**HW for next session:** 6.1#19, 6.2#35,49. Finish Worksheets 1 to 4

### **Session 4 – Tuesday 23<sup>rd</sup> Jan (pm):**

#### **Quiz 1: Module 1 and 2**

**Field trip – Museum of Transportation of London**

### **Session 5 – Monday 29<sup>th</sup> Jan:**

#### ***Module 4: Normal distribution and central limit theorem***

- Standard Normal distribution
- Normal probabilities
- Normal/binomial distribution
- Z-score
- Central limit theorem

**Reading:** Read chapter 7.1-2, 7.4, 8.1-2

**HW for next session: 7.1#31-35 odds; 7.2#5-17 odds; 33,47 odds; 8.1#15,19,21; 8.2# 11-17 odds**

**Session 6 – Tuesday 30<sup>th</sup> Jan:**

***Module 5: Correlation and Regression***

- Correlation analysis, correlation coefficient and coefficient of determination
- Simple linear regression – least square method
- How to use Excel and SPSS for linear regression
- Case study: smoking and cancers

**Reading: Read chapter 4.1-4**

**Chapter 55, *How to tell liars from Statistician* by R. Hooke**

**Chapter 12, *Naked Statistics*. W. W. Norton and Co. pp.212-224.**

**HW for next session: 4.1#14,15,23,37 (Excel file on blackboard); 4.2#13; 4.3#5,9,15**

**Session 7 – Monday 5<sup>th</sup> Feb:**

**Quiz 2: Module 3, 4 and 5**

***Module 6: Confidence intervals***

- Confidence interval for the mean
- Confidence interval for the proportion
- Simulation on Excel

**Reading: Chapter 9.1-2**

**HW for next session: 9.1#25,29; 9.2#21-33 odds**

**\*Contingency Class Date: Friday 9<sup>th</sup> February** Students are obligated to keep this date free to attend class should any class dates need to be rescheduled.

**Session 8 – Tuesday 6<sup>th</sup> Feb:**

***Module 7: Hypothesis tests***

- What is a hypothesis test?
- Hypothesis test for the mean
- Hypothesis test for the proportion
- Introduction to SPSS (as time permits)

**Reading: Chapter 10.1-3**

**HW for next session: 10.1#9-14, 15-21 odds; 10.3#1-5, 11-19 odds; 10.2 #7-19 odds**

**Session 9 – Friday 9<sup>th</sup> Feb:**

***Module 7: Hypothesis tests (cont.)***

- Review (Past Paper practice)

**HW: Past Exams**

**Session 10 – Monday 12<sup>th</sup> Feb:**

- Student presentations of their project
- Review

**FINAL EXAM: Tuesday 20<sup>th</sup> Feb.** Exam times and locations will be posted on the BU London Programmes Blackboard course page and will be emailed to students, a week before the final exam.

Please Note: Schedules and topics are subject to change, in which case announcements will be made in class as appropriate.

## **Readings**

**Required reading** is noted above in the Course Chronology. It is essential that all students read and reflect upon the relevant reading *before* each class. Students will be able to borrow the required textbook at the start of term on a semester-long loan. All books listed below are available through the BU Study Abroad London Library. Chapters mentioned in the syllabus are available on the course blackboard page.

*Statistics: Informed Decisions Using Data* by Michael Sullivan III (4th ed; Pearson)

### **Supplementary and Secondary Reading:**

*How to tell liars from statisticians* by Robert Hook

*Outliers, the story of success* by Malcolm Gladwell

*Introductory Statistics* by Jay Devore and Roxy Peck

*A basic course in statistics* by G.M. Clarke and D. Cooke

*Presenting data: how to communicate your message effectively* by Ed Swires-Hennessy

*Naked Statistics: Stripping the Dread from the Data* by C. Wheelan and J. Davis

Additional readings and resources are posted on Blackboard: <http://learn.bu.edu>

Current news articles will be given out in class.

**Terms & Conditions:** I expect students to be active and engaged participants. Students have to take all exams, and complete all coursework on time.