



## **CAS MA 113 (*Elective A*)**

### **Course Overview**

How can a polling firm take a sample of a few hundred people and use the results to predict the outcome of an election with hundreds of millions of voters? How do pollsters compute the margin of error and what does it mean? How do we verify a claim based on a small sample? For example, if you flip a coin 100 times and it lands on heads 60 times, does this “prove” the coin is unfair or is this observation a likely outcome for a fair coin?

Statistics is the process of interpreting the evidence from a sample so that we may draw valid inferences about the population as a whole. This course serves as an introduction to basic concepts and tools in probability and statistics. We begin with techniques for describing data.

Then we study the elements of probability theory, including probability densities, means, variances, correlation, independence, the binomial distribution, and the central limit theorem.

Finally, we combine data description and probability theory into an approach to statistical inference. Students should emerge from this course with the ability to incorporate a variety of skills in analysing and reasoning from data.

In addition to lecture and discussion sessions all students will use Excel to describe and create simulation. The Excel session will utilise three educational strategies: active learning, experiential learning, and project-based learning activity.

### **Course Methodology**

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

### **Hub-aligned Course Objectives**

1. Students will use statistical methods to set up and frame problems arising from real world situations, including deciding on their own real-world topic of interest (during their project) and developing relevant statistical questions. Real-world problems may involve (a) analysing a survey given to the class to make inferences about BU students, (b) studying the probability that the escalator at an Underground Station overloads, (c) quantifying the relationship between rate of smoking and rate of cancers and (d) analysing election polls to compute and compare margins of error.

2. Students will decide on appropriate statistical methods to apply to sets of data in order to make inferences about populations of interest. Data will be drawn from fields related to students' interests.
3. Students will use statistical methods on data sets to analyse claims about populations of interest. These tools will include descriptive statistics, parameter estimation, confidence intervals, hypothesis tests, and linear regression.
4. Students will take data and give graphical and numerical summaries (eg. box plots, histograms, tables, residual plots, p-values, z-scores). Students will work in team and choose a field of interest related with their studies or the study abroad programme. After gathering data in the chosen field, they will be expected to present these summaries to their peers in a class presentation.
5. Students will give a margin of error and a degree of uncertainty with any inferential statistical analysis. A key component of statistics is being able to quantify the likelihood of drawing the wrong conclusions from observations. Students will examine the limitations of statistical procedures and be able to distinguish ideas like correlation and causation.

### **Additional Course Objectives**

Upon successful completion of this course students will be able to:

- think critically about numerical information,
- apply numerical information as a consumer to come to useful decisions and conclusions, and
- use Excel with confidence.

### **Grading**

The following Boston University table explains the grading system that is used by most faculty members on Boston University's Study Abroad London Programmes.

<u>Grade</u>	<u>Honour Points</u>	<u>Usual %</u>
A	4.0	93-100
A-	3.7	89-92
B+	3.3	85-88
B	3.0	81-84
B-	2.7	77-80
C+	2.3	73-76
C	2.0	69-72
C-	1.7	65-68
D	1.0	60-64
F	0.0	Unmarked

### **Grading Criteria**

**'Incomplete'** or **I** grades are not permitted because of the obvious difficulty in making up missed work once the student has left the country. All work must be completed on time. We also do not allow **'Audits'** (AU), **'Withdrawals'** (W), or **'Pass/Fail'** (P) grades.

The grades reflect the quality of the work. Lecturers and students should use the following criteria for an understanding of what each grade means.

**A** This exceptional grade is assigned only to work that has persistently outstanding quality in both substance and presentation. The student must demonstrate a sustained capacity for independent thought and extensive study, producing rigorous and convincing analyses in well-ordered prose.

**A-** Awarded to work that is clearly focused and analytical, and based on wide reading. The student must cover all the principal points of a question and systematically develop a persuasive overall thesis, allowing for one or two venial omissions or inapt expressions.

**B+, B, B-** This range of grades indicates that the student has shown some evidence of original thought and intellectual initiative. The student has cited sources beyond the class materials, and shown a degree of originality in perception and/or approach to the subject. The work will show thoughtful management of material, and a good grasp of the issues. The differences between a B+, a straight B and a B- may reflect poor presentation of the material, or mistakes in punctuation, spelling and grammar.

**C+, C, C-** Work in this grade range is satisfactory, but uninspiring. If the work is simply a recitation of the class materials or discussions, and shows no sign of genuine intellectual engagement with the issues, it cannot deserve a higher grade. Should an essay fail to provide a clear answer to the question as set, or argue a position coherently, the grade will fall within this range.

Quality of presentation can lift such work into the upper levels of this grade range. Work of this quality which is poorly presented, and riddled with errors in grammar, spelling and punctuation, will fall into the lower end of the range. To earn a C grade, the work must demonstrate that the student is familiar with the primary course material, be written well enough to be readily understood, be relevant to the assignment, and, of course, be the student's own work except where properly cited.

**D** A marginal pass can be given where some but not all the elements of the course have been completed satisfactorily.

**F** The failing grade indicates the work is seriously flawed in one or more ways:

- Obvious lack of familiarity with the material
- So poorly written as to defy understanding
- So brief and insubstantial that it fails to properly address the subject
- Material presented is not relevant to the assignment
- Demonstrates evidence of plagiarism (see following section in Academic Conduct Code)

Please refer to the Academic Handbook for detailed grading criteria and policies on plagiarism. This can be accessed via Blackboard Learn: <http://learn.bu.edu>

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

## **Attendance Policies**

### **Classes**

All Boston University London Programme students are expected to attend every class session, seminar, and field trip 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:*

The Authorised Absence Approval Request Form is available through the Academic Affairs section of the BU London Personal Page: <https://fm.bu-london.co.uk/fmi/webd/>

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

Students who expect in advance to be absent from any class should notify a member of Academic Affairs and complete an Authorised Absence Approval Request Form ten working days in advance of the class date.

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 notify Academic Affairs as soon as possible by submitting an Authorised Absence Approval Request Form in advance of the class. If it is the student's first absence of the semester (from any class) a doctor's note is not required.
- **Illness (multiple days):** If a student is missing more than one class day due to illness, the student must complete an Authorised Absence Approval Request Form and a sick note from a local doctor excusing their absence from class. Once well enough, the student will need to meet with Academic Affairs.
- 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 Academic Affairs 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 Disability & Access Services to request accommodations for the semester they are abroad. Students are advised by BU-DAS 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-DAS. We cannot accept letters from other universities/centres.

All disabilities need to be known to the DAS 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 Academic Affairs and if the lateness continues, may have their final grade penalised.