THE UNIVERSITY OF THE WEST INDIES, MONA CAMPUS
ECON3032: STATSITSICAL ESTIMATION & INFERENCE FOR BUSINESS & SOCIAL SCIENCES

Course Outline

Semester 2 2020/2021   3 credit hours

Lecturer: Dr Kelly-Ann Dixon Hamil
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Office: 1st Floor, Social Science Block, Rm 15
Office Hours: Tuesdays 2pm-3pm & Wednesdays 2pm–3pm (or by appointment)

Course Website: The course site on OurVLE (https://ourvle.mona.edu/)

ALL STUDENTS ARE REQUIRED TO READ THIS DOCUMENT IN FULL
(Ignorance of course structure and/or policy will not be excused)

Course Requisites

Prerequisites: It is assumed that students have mastered the requisite skills covered in at least one of the following:
- ECON3031 (Probability & Distribution Theory)
- MATH2404 (Introduction to Probability Theory)
- Students are also required to know and be able to apply the rules of **integration and differentiation** as these techniques will be heavily utilised during the course.

Corequisites: None

Anti-requisites: Students may not take this course and any of the following courses and get credit for both:
- STAT2001 (Inferential Statistics)

Course Description

Uncertainties in economic and business activities must be evaluated and quantified for effective decision-making and policy creation. Statistical theory and inference underpins the tools used to analyse the resulting statistical problems. This course builds on the knowledge of probability theory and allows students to apply the appropriate statistical tools to analyse real-world problems.

Mode of Delivery

ECON3032 is now being delivered as a flipped course. This means that students will be required to:
- Watch pre-recorded lecture videos prior to lecture sessions
- Attend lectures where questions related to the concepts taught in the videos are used to concretize statistical ideas
- Attend tutorials where students will share answers from given problems sets

All three hours per week will be used, whether as lecture or tutorial time. Lectures will be held until the topic is completed and then tutorial time will be used until the tutorial is completed. It therefore means that the one-hour time on a Wednesday can be used either as a lecture or a tutorial. Similarly, the two-hour time on a Tuesday can be used either as a tutorial or a lecture.

Required Texts & Materials

This course will make extensive use of OurVLE. All course materials (skeleton lecture notes, problem sets and announcements) will be posted on the course site on OurVLE. All communication about this course will be made through the OurVLE course site and/or your official email provided to you by the University. **Communication from non-UWI email addresses will be ignored**. Students must therefore be able to access the course site and their UWI email frequently.

Required Text: Miller, I., Miller, M., Freund, J. E., & Miller, I. (2014). *John E. Freund's mathematical statistics with applications.* Upper Saddle River, NJ: Prentice Hall.

Supplemental Texts:
Hogg, R. V., Tanis, E. & Zimmerman, D., (2014). *Probability and Statistical Inference*. Pearson. 9th Edition

Other Materials: Scientific Calculator

Students are highly encouraged to master differentiation and integration as this course heavily depends on both techniques.

Learning Outcomes

At the end of this course, students should be able to:
1. Derive the distributions for functions of random variables
2. Determine the statistical properties of estimators
3. Create estimators using selected methods of estimation
4. Create confidence intervals and hypothesis tests for estimators

The course will be assessed using the following methods:
- 1 Tutorial Presentation   -   10%
- 1 Mid Semester Exam Assignment   -   20%
- 1 Assignment   -   15%
- 1 Final Exam Assignment   -   50%

Tutorial Presentation

Students will be assigned a tutorial question to present in class. The presentation may be pre-recorded or done live in class. In addition to clarity of thought, correct use of notation and other things, students will also be assessed on how they respond to questions from their classmates. If there are no questions from the class in general, then the lecturer will pose questions and students will be assessed on their answers.

If a student is not able to log on due to connectivity issues or the connection is lost during the presentation, the presentation will be done at a mutually convenient time to the lecturer. This will also include the question and answer session.

Mid-Semester and Final Exams

There will be one mid-semester exam and one final exam. Their dates and times are to be determined, however below is critical information about each exam.

	Weight	Date	Duration	Topics	Format
Midterm Semester Assignment	20%	TBA		Beginning of the course to Properties of Estimators	Take Home
Final	50%	TBA		Methods of Estimation to the end of the course	Take Home

NO MAKE-UP EXAMS WILL BE GIVEN

If you miss a mid-semester exam for a University approved reason (documentation required), your final will be worth (20% + 50%). Otherwise, your final is worth 50%.

Assignment

There will be one assignment which will require students to use R, a statistical analysis programme. The assignment will be due by **Friday, March 22, 2021 at 1pm.** Assignments submitted after the due date and time will not be accepted. Additionally, students are encouraged to have at least one back-up of their assignment as technical issues such as lack of internet access, computer crashes etc. will not be accepted. Students may consider creating a Dropbox account or storing their assignment in the Cloud. Alternately, storing a copy of the assignment in your email is also an effective way of creating a backup.

The guidelines for the assignment will be posted on OurVLE at the appropriate time.

Students will have to download **R** (https://www.r-project.org/) and **RStudio** (https://rstudio.com/products/rstudio/download/) to be able to complete this assignment. Both programmes are absolutely free.

<u>NO MAKE UP ASSIGNMENTS WILL BE GIVEN</u>

Course Policies

Attendance
The course is delivered using both synchronous and asynchronous methods. *Students are expected to watch all pre-recorded lectures prior to class AND attend all lectures and tutorials.* However, all lectures and tutorials will be recorded and posted in the relevant section on OurVLE. If you miss a lecture or tutorial, it is the student's responsibility to get the relevant notes by watching the related recordings. The lecturer and tutors will not be giving completed notes, lecture slides or tutorial answers to any student.

Electronic Material
The recording of lectures and taking pictures of lectures is strictly prohibited (unless required for learning due to a disability approved by The Office of Special Student Services).

Additionally, lectures, notes and other material presented during the course of the lecture or as part of the course are protected by copyright laws. As such, students are not allowed to post, sell or otherwise barter, reproduce any of the above-mentioned en masse, either to other students or to any commercial concern. To obtain permission to sell or barter notes, the individual wishing to sell or barter the notes must be registered in the course or must be an approved visitor to the class. The lecturer may grant or not grant such permission at their own discretion and may require a review of the notes prior to their being sold or bartered. If they do grant such permission, they may revoke it at any time, if they so choose.

Tutorials
Each tutorial session will involve a discussion session about the tutorial questions with students presenting their assigned question.

Although students are assigned questions, **<u>ALL</u>** STUDENTS ARE REQUIRED TO **<u>ATTEMPT</u>** ALL TUTORIAL QUESTIONS PRIOR TO THE TUTORIAL.

If you are unable to attend your tutorial, for whatever reason, you are responsible for getting the information you missed from that tutorial.

Online Classes
During lectures and tutorials it is assumed that students will be engaged with material during the entire period. Students are encouraged to treat each class as if they were in a face-to-face session.

Missed Assessment

As noted above, there will be no make up exams or assignments for students who have missed assessments.

Communication

Communication between lecturer and students and vice versa will be done using official UWI email addresses. Emails sent from addresses at other domains will not be answered. All emails must include:

- a relevant subject;
- a proper salutation – includes a greeting and who you are addressing (e.g. Dear Dr Dixon Hamil);
- proper grammar (text language and short-hand type messages are not accepted)
- clear and complete sentences;
- a proper closing – includes a closing and who is sending the email (e.g. Regards, Keisha);

Emails without these key characteristics will be ignored.

Class announcements and/or email reminders **will not** be sent out about mid semester exams. It is the student's responsibility to follow the course schedule (see Page 6). Additionally, it is the student's responsibility to check the Exam's Notice Board for the exact dates of mid semester and final exams.

Emails sent to lecturers and tutors between Monday and Thursday (8am – 5pm) will be responded to within 24 hours. Emails sent between Friday and Sunday will be responded to on the next valid work day. This also applies emails sent during a holiday period.

Students with Disabilities

Students with disabilities MUST register with The Office of Special Student Services (OSSS) **and** your lecturer so that the necessary accommodations may be made for you. Also see Section II of the Assessment Regulations for First Degrees, Associate Degrees, Undergraduate Diplomas and Certificates 2017-2018 document.
(https://www.mona.uwi.edu/registry/sites/default/files/registry/uploads/Assessment Regulations 2017-2018 Final.pdf)

Academic Dishonesty

Acts of dishonesty, including cheating, plagiarism, and directly or indirectly aiding and/or abetting persons in committing a dishonest act, will not be tolerated. Students found to be committing an act of dishonesty, will be given a zero for the related assessment and will be reported to the Head of Department who can in turn report it to the Campus Registrar for further action. Please refer to Section IX of the Assessment Regulations for First Degrees, Associate Degrees, Undergraduate Diplomas and Certificates 2017-2018 document (https://www.mona.uwi.edu/registry/sites/default/files/registry/uploads/Assessment Regulations 2017-2018 Final.pdf). In this section, plagiarism refers to the "presentation of work by a student for evaluation, whether or not for credit, but do[es] not apply to invigilated written examinations".

Please note that collaborating with any other student, faculty, staff member or anyone that does not fall in the previously listed categories while doing an exam/assignment is a breach of exam regulations and constitutes cheating. Collaboration includes, but is not limited, to any of the following:

- using any other material than the ones stipulated in the guidelines (you may not use any website or any other unapproved material (hard or soft copy), etc.)
- doing the exam/assignment for someone else
- having someone do the exam/assignment for you
- asking someone to give you the answer to the question
- asking someone to suggest ways you should do the question
- assisting someone by giving answers to a question
- assisting someone by giving ideas on how to answer a question
- screenshotting questions and sharing the file with others (whether at the time of the exam/assignment or any time after the exam/assignment is due)
- sharing answers

How to Succeed in this Course

Success in this course requires you to:
- Print off the lecture notes and fill them in during class
- Attend classes (lectures and tutorials)
- Engage in classes (lectures and tutorials) – ask questions; answer questions
- Read the required sections in your text prior to attending class
- Complete tutorials prior to your tutorial time
- Attend office hours (or make an appointment to meet with your lecturer) if you need assistance
- Email your lecturer or tutor if you need any assistance with understanding certain concepts or examples
- Keep track of questions you have that may develop in class, tutorials or your personal study and contact your lecturer

Course Website & Other Details

The OurVLE course website is currently divided into 8 main sections.

I. **General Information (Section1)**: Information on course logistics such as the syllabus and important notices can be found here. The link to join lectures and tutorials is at the top of the section. You will click this link and then select the relevant session that you need to join. The News Forum is also located in this area – check this regularly as notices are sent to students using this medium.

II. **Unit Notes & Related Problem Sets (Sections 2-7)**: There are 6 such divisions – one for each unit. Each will contain the following:

- Pre-recorded lectures

- Video related fill-in-the blank lecture notes
- Related problem sets

You are required to watch the pre-recorded videos prior to our lecture time (see syllabus for schedule) along with the accompanying fill-in-the blank lecture notes which follow the videos.

III. **Live Lecture Sessions (Section 8)**: This section contains links to the recordings for each lecture session. They are arranged according to the weeks of the lecture. Live lectures are posted 24 hours after the lecture has been completed.

IV. **Tutorial Sessions (Section 9)**: This section contains links to the recordings for each tutorial session. They are arranged chronologically. These are posted 24 hours after the session has been completed.

V. **Assignment (Section 10):** The following information is contained in this section:
- Instructions for completing the assignment
- Instructions for using R and RStudio
- Additional paperwork to be submitted with the assignment

Students are strongly encouraged to adhere to the instructions and ensure that the requisite documentation is submitted along with the assignment. Failure to do so will result in deduction of points and potentially a 0 for the assignment.

Note: As the semester progresses, there may be the need to include additional sections and/or information.

Course Schedule

*** Disclaimer: this schedule may be adjusted if needed. Students will be informed of any changes via email and/or an announcement on OurVLE*

Week	Week Beginning	Lecture Topic	Readings	Tutorial Topic	Videos to Watch
Week 1	January 18	• Course Information & Introduction • Distribution of Functions of Random Variables	Freund Chapter 7		Unit 1
Week 2	January 26	• Sampling Distributions	Freund Chapter 8	Distribution of Combinations of Random Variables (Problem Set 1)	Unit 2
Week 3	February 1	• Properties of Estimators	Freund Sections 10.1 – 10.6	Sampling Distributions (Problem Set 2)	Unit 3
Week 4	February 8			Properties of Estimators (Problem Set 3)	
Week 5	February 15 (Ash Wednesday)	• Catch Up Time (if not needed, continue to following week)			
Week 6	February 22	• Methods of Estimation	Freund Sections 10.7 – 10.9		Unit 4

Week	Week Beginning	Lecture Topic	Readings	Tutorial Topic	Videos to Watch
Week 7	March 1	• Interval Estimation	Freund Chapter 11	Methods of Estimation (Problem Set 4)	Unit 5
Week 8	March 8	• Interval Estimation		Interval Estimation (Problem Set 5)	
Week 9	March 15	• Hypothesis Testing	Freund Chapter 12		Unit 6
Week 10	March 22	• Hypothesis Testing		Hypothesis Testing (Problem Set 6)	**ASSIGNMENT DUE (Friday, March 26)**
Week 11	March 29 (Good Friday)	Contingency Time			
Week 12	April 5 (Easter Monday)	Review (students come with questions)		Review session (students come with questions)	