**STA 543: Statistical Methods in Business and Finance**

**Summer Session 2**

**Instructor**: Scott Mcclintock

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**Office Hours:** MWF4pm to 6pm

**Credits:** 3

**Textbook (required):** None

**Prerequisites:** STA 505 or 504, 511 and 512

**Course Description:** This course will cover the application of statistics to modeling, estimation, inference and forecasting in the business and financial world through real world problems with an emphasis on critical evaluation. It will cover selected topics from econometrics, decision theory, and financial modeling, as well as business optimization and simulation.

**Programmatic Student Learning Objectives:** After finishing this program, students will have:

1.         Demonstrated an understanding of probability and statistical inference, including the fundamental laws of classical probability, discrete and continuous random variables, expectation theory, maximum likelihood methods, hypothesis testing, power, and bivariate and multivariate distribution theory.

2.         Demonstrated the ability to apply the elementary methods of statistical analysis, namely

those based on classical linear models, categorical methods, and non-parametric ideas to

perform data analysis for the purposes of statistical inference.

3.         Demonstrated proficiency in the effective use of computers for research data management and for analysis of data with standard statistical software packages, particularly SAS.

4.           Learned to develop and critically assess design of experimental studies and the collection

of data.

5.         Applied one or more methods of statistical inference to a particular area of interest,

particularly the program in the elective concentration.

6.         Gained practical experience in statistical consulting and communicating with non-

statisticians, culminating with interaction with research workers at a local company as part

of the internship practicum.

**Course Student Learning Outcomes:** Students will be able to:

Broadly,

1) Recognize how to successfully apply statistical reasoning and techniques to business and finance centric problems. [PSLO2, PSLO5]

More specifically,

2) Apply the fundamentals of STA 512 to answer business-oriented questions regarding costs, profits and pricing. [PSLO2, PSLO5]

3) Successfully perform non-linear hypothesis tests of model parameters using PROC MODEL in SAS. [PSLO3]

4) Recognize when a particular model exhibits either non-normal residuals or non-constant variation and, in either case, identify the appropriate technique to address this problem. [PSLO2]

5) Fit a set of simultaneous equations using PROC SYSLIN in SAS. [PSLO3, PSLO5]

6) Transform a business problem into a constrained optimization problem, solve it in SAS, and then recognize and perform the relevant sensitivity analysis given the business objectives. [PSLO1, PSLO5]

7) Use simulations to address business-oriented problems. [PSLO1, PSLO5]

8) Fit a distributional tail to a set of financial data. [PSLO1, PSLO5]

9) Successfully calculate the value at risk and expected shortfall for an asset or set of assets. [PSLO1, PSLO5]

**Evaluation:**

Homework: 45% [SCLO2-SCLO9]

Lab: 10% [SCLO2-SCLO9]

Final Presentation: 45% [SCLO1]

**Homework:** All homework assignments should be written up neatly, organized, and stapled. The homework assignments are an important component of the course. All problems assigned should be done as completely as possible. Solutions will be available for most homework assignments. Each homework assignment will count towards your final grade. Homework must be turned in at the due date. Late homework with a legitimate excuse must be turned in prior to the next class from the due date. Any late homework will receive at most 75% credit.

**Final Presentation:** You will work either as a group or, possibly, by yourself to create an informative introduction to a topic in Business/Financial Statistics. The length of your presentation is flexible but should be proportional to the number of people in your group (Roughly 10 minutes per person). It should be conducted through Powerpoint presentation although you are also free to use other mediums such as the white board. Your goal with the presentation should be:

a) Put together a presentation that you are proud to call your own

b) Create something of utility for your fellow students

**Evaluation & Grading:**

A letter grade will be assigned based on performance in the course, according to the following scale:

|  |  |  |  |
| --- | --- | --- | --- |
| **Grade** | **Quality Points** | **Percentage Equivalents** | **Interpretation** |
| A | 4.00 |  | Superior graduate attainment |
| A- | 3.67 |  |  |
| B+ | 3.33 |  | Satisfactory graduate attainment |
| B | 3.00 |  |  |
| B- | 2.67 |  |  |
| C+ | 2.33 |  | Attainment below graduate expectations |
| C | 2.00 |  |  |
| C- | 1.67 |  |  |
| F | 0 | < 70% | Failure |

D grades are not used. Refer to the Graduate Catalog for description of NG (No Grade), W, & other grades.

**Class Cancellation:** In the event that I am unable to meet a class I will a) notify you in person at a prior meeting or b) send an email notification.

**Attendance Policy:** Attendance is an expected part of class. In the event that you miss a class you should contact either myself or another student to determine what was missed.

**Academic and Personal Integrity:** It is the responsibility of each student to adhere to the university’s standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another’s work and/or using ideas of another and presenting them as one’s own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Graduate Handbook, the Graduate Catalog, the *Ram’s Eye View*, and the University website at www.wcupa.edu

**Students with Disabilities:** If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University’s Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. The OSSD hours of Operation are Monday – Friday, 8:30 a.m. – 4:30 p.m. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at www.wcupa.edu/ussss/ossd.

**Reporting Incidents of Sexual Violence:** West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator, Ms. Lynn Klingensmith. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University protection of minors policy.  Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at the webpage for the Office of Social Equity at <http://www.wcupa.edu/_admin/social.equity>/.

**Email policy statement:** It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.

**Emergency Preparedness**: All students are encouraged to sign up for the University’s free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

**Course Schedule: (Assumes a 5 week Summer Schedule)**

**Class 1:** Introductions and Topics in Econometrics -- Applied interpretation of parameters, tests of linear and nonlinear combinations of parameters, PROC MODEL [CSLOs 1,2,3]

**Class 2:** Topics in Econometrics -- Testing regression assumptions, Jarque-Bera normality test, robust standard errors, analysis of panel data and PROC AUTOREG [CSLOs 1,2,4]

**Class 3:** Topics in Econometrics – Omitted variable bias, random regressors and PROC SYSLIN [CSLOs 1,2,5]

**Class 4:** Topics in Econometrics – Simultaneous Equations [CSLOs 1,2,5]

**Class 5:** Topics in Business Optimization and Decision Analysis [CSLOs 1,2,6]

**Class 6:** Topics in Business Optimization and Decision Analysis Continued – Sensitivity Analysis. [CSLOs 1,2,6]

**Class 7:** Financial Engineering – Fitting Distributional Tails and Monte Carlo Simulation [CSLOs 1,2,7,8]

**Class 8:** Value at Risk, and Expected Shortfall [CSLOs 1,2,9]

**Class 9:** Stochastic Processes in Insurance, Credit and Finance [CSLOS 1,2]

**Class 10:** Wrap up and student presentations [CSLO 1]

**Possible Topics for Final Presentation:**

Survey of Local Business/Financial Statistics jobs and the expected skills

Solutions -> Analysis -> Investment Analysis in SAS

PROC LOAN in SAS

Modeling interest rate term structure

Credit risk modeling

Propensity Score Matching

Capital Asset Pricing Model (CAPM)

Segmentation/Cluster Analysis

Survey of the academic works of Nassim Taleb

Multivariate SPC (Statistical Process Control)

Conjoint Analysis

Topic or paper of personal choice!

**Important Dates:**

Last day to drop

Last day to add

Last day to withdraw

Final Presentations