MAT 201, Introduction to Statistics
Department of International Management and Math, Fall 2018

I. COURSE INFORMATION

Instructor: Sanja Dudukovic Ph.D. in Statistics
sdudukovic@fus.edu
Office Hours: Tuesday/Friday 11:30 a.m.-12:30 p.m. and 4 p.m.-5 p.m.
            Wednesday by appointment only
Class meeting location: LAC Classroom 5
Class meeting times: Tuesday/Friday 2:30 p.m.-3:45 p.m.

II. COURSE DESCRIPTION AND RATIONALE

Students are expected to learn how to promote the scientific method, ability to identify questions, collect evidence, discover and apply tools to interpret the data, and communicate results. While many of students may never conduct a complex scientific study on their own, it is still very possible that they may encounter data or statistical results over the course of a career. This computer based course presents basic concepts of statistics: random variables, random sampling, histograms, central tendency measures, variance and standard deviation, probability rules and correlation, bays and Chebyshev theorems , regression analysis, ANOVA analysis, contingency analysis. The most important probability distributions are introduced: Binomial, Poisson, Uniform, Normal distribution. Inferential statistics, sampling distributions and confidence intervals are covered in order to introduce statistical model building and single linear regression analysis and forecasting model evaluation. Ultimately students use real Internet data, from various areas to test the methods studied in the class by using EXCEL, EXCEL add INS and SPSS occasionally.

III. SPECIFIC LEARNING OUTCOMES

Students are expected to understand and know: a) how to describe random variables using graphical and numerical descriptors and Excel ; b)how to calculate marginal , conditional and joint probabilities for known and unknown probability distributions by applying Bays theorem and Chebyshev theorem ;c) how to apply probability distribution theory to a real word problem solving; d) how to model random variables and how to evaluate single regression models e) how to calculate covariances and correlations between several random variables using Excel ; f) how to use internet real world data from various areas to build and interpret linear dynamical models ;h) how to extract the information from available sample data , think critically about it, and make good decisions based on that information; f) to perform contingency analysis and test random factors for their dependence g) How to perform ANOVA test and test the differences between to population means .
As a byproduct, students will be able to conduct a month long simple individual empirical research projects and to establish the appropriate theoretical basis in the context of their preferred field of interest. They will ultimately investigate relationships between theoretically-linked real world random variables or test dependence between

them by using statistical methods they had learnt in the class. Class presentations and research paper are mandatory.

IV. REQUIRED TEXTS AND MATERIALS
Brase & Brase H.C.: Statistics, edition 10, Brooks/Cole, Cengage Learning, Boston, USA.

V. ASSESSMENT OVERVIEW
Assignments   10%
Quizzes   20%
Mid-term examination   25%
Final examination   30%
Class discussions   5%
Research paper   10%

VI. ASSESSMENT DETAILS
Quiz1 1 (Chapters 1, 2, 3.1 and 3.2, 3.3) – September 21
Mid -term examination (1 hour) –October 12
Quiz2 (Chapters 5, 6 and 11) - November 16
Cumulative Final examination Tuesday, December 11, 13:30-15:30, EC, LAC
(Chapters 1, 2, 3, 4, 5, 6, 7, 8, 10 and 11)
Presentation Date Due for all groups: November 30.
Dead line for Topic &Data Approval is November 20.
Research Paper due -last day of classes, December 7

Rating scale rubric for an oral presentation:

The presenters		Strongly agree	Agree	Disagree	Strongly disagree
Clearly stated and explained the purpose of the research	15				
Was knowledgeable about the concept and backed it by the scholar article/text	10				
Had main points that were appropriate to the central topic	25				
Had collected updated data from internet or ecowin	15				
Used appropriate statistical method	15				
Accomplished the stated objectives – clearly stated the conclusion and the findings	15				
Maintained eye contact with the audience and spoke clearly and loudly	5				

VII. GRADING POLICIES AND EXPECTATIONS

Teaching methods: In addition to teaching-learning methods based on textbooks and cases, within the course new methods are used when appropriate: problem based learning (PBL) and interactive engagement (IE) learning methods. When PBL method is applied, students are given a problem before gaining some knowledge. The problem is posed in such a way that the students discover that they need to gain some new knowledge before they can solve the problem. If IE method is applied, during and after the lecture students do activities in which their lecture-learning is strengthened (by reinforcement) and extended (by application in different contexts). Thus some elements of a student's previous knowledge are becoming stronger and more profound due to its application, while their overall knowledge is becoming broader due to the new ideas-and-computer based skills they are learning from the exploratory extension (where exploration involves extending old knowledge beyond simple application).Two software products are used: Excel and SPSS. All hands on exercises will be available on the drive: K/classes/MAT201FAll 2018/.

Active Learning & Class assessment: There will be several short tests at the end of the classes. These tests will not be announced in advance. They serve to measure students learning during the classes and will not be graded.
Project or Research topic will be determined with professor on individual/group basis.

VIII. HOW TO DO WELL IN THIS COURSE (POLICIES / REQUIREMENTS)

Course Requirements: On a weekly basis students are asked to submit assignments. Assignments are assigned each class but are collected each Friday. Feedback is given within a week. No late assignments are accepted. Supplementary cases and some short research papers are assigned for reading and presentation.

Attendance policy: Regular class attendance is necessary for good performance and is required. In the case of illness official medical excuse should be provided. Noncompliance will incur reduction of the final grade by at least 10%. Students who accumulate more than 4 absences regardless the reason are advised to withdraw from the course or they risk receiving an F grade for the course. Students are expected to arrive promptly for class. There will be no makeup examinations. Exam dates are binding Student who misses the quiz loses 10% of the total final grade.

IX. ACADEMIC INTEGRITY: STATEMENT ON CHEATING AND PLAGIARISM

A student whose actions are deemed by the University to be out of sympathy with the ideals, objectives or the spirit of good conduct as fostered by the University and Swiss community, may be placed on Disciplinary Probation or become subject to dismissal from the University. Cheating is a dishonest action out of sympathy with the ideals, objectives and spirit of the University. Furthermore, cheating reflects negatively on one's personal integrity and is unjust to those students who have studied.

See the Academic Catalog for full statement (page 199):
https://www.fus.edu/images/pdf/FUS_ACADEMIC_CATALOG_2018_2020_web.pdf

X. RESOURCES AVAILABLE

WLC, Learning Disabilities, Information Technology, Library, USI, etc.

XI. COURSE SCHEDULE

The course schedule should be complete, including exam dates and assignment due dates.
There are several ways visualize course schedule. See the sample syllabi.

Week 1:   System and random variables
              Random sampling
Week2:   Descriptive statistics
              Histograms and frequency polygons
              Numerical descriptive measures
              Variance and Standard deviation
Week3:   Real world data bases: GDP, FX, CPI –volatility calculation with EXCEL
              Chebyshev theorem –real world examples
Wee 4:   Variance and standard deviation of grouped data in EXCEL
              Quiz1 1 (Chapters 1, 2, 3.1 and 3.2, 3.3) – September 21
              Correlation coefficient; EXCEL case CO2 emission versus Corporate Profits
              based on direct Internet download
              Portfolio Variance /Yahoo finance data download
Week 5:   Introduction to Probability theory
              Relative frequency - probability relationship
              Probability rules
              Independent events, mutually exclusive events
Week 6:   Bays theorem
              Discrete and continuous variables –Expected values in Excel
              Contingency Analysis
Week 7:   Review, exercises
              Mid -term examination (1 hour) –October 12
              (Chapters 1, 2, 3, and 4, 9.1 and 11)
Week 8:   Introduction to probability distributions
              Discrete distributions Binomial distribution
              Poisson distribution
Week 9:   Continuous distributions Uniform distribution
              Normal distribution
              Normality tests based on the Internet data (Skewness and Kurtosis)
              Standard Normal distribution
Week10:   **Quiz2** (Chapters 5, 6 and 11) - November 16
Week11:   Introduction to linear regression
              Internet data and Excel based regression
              Coefficient of determination
Week12:   Point and interval forecasting
              Regression with SPSS
              Central Limit Theorem Introduction to estimation
              Confidence interval –population mean
              Research paper presentations/1
Week 13:   Research paper presentations/2
              Cumulative review

Cumulative Final examination Tuesday, December 11, 13:30-15:30, EC, LAC
(Chapters 1, 2, 3, 4, 5, 6, 7, 8, 10 and 11)

XII. RESEARCH PROJECT INSTRUCTIONS

As part of the course, you are required to do a group research and to write an individual research paper which demonstrate your ability to use statistical techniques in a practical context. Project will count for 10% of the course grade. The instruction sheet for Empirical Project provides assignment submission instructions, grading criteria as well as complete details of how you should organize and format your project. The objective of the project is to apply statistical analysis that we have covered in the course using a real data taken from Internet or other data sources.

Some analytical tools to be explored might be:
- Correlation analysis in medicine , in economics ,in business or in environmental sciences
- Contingency analysis using categorical data
- Linear models in political science, economics, business or environment.
- New drags evaluation -Statistical tests
- Psychology and Statistics
- Sales forecasting
- Survey data analysis
- Statistics and Social Science
- Green Gas predictions and determinants

What you should do is the following:
a) Find at least two scholar article dealing with the topic you have chosen (Use JSTOR, EBSCO, Google.com Yahoo.com or FUS library data bases). Using advanced searching option you can easily find articles dealing with statistical analysis and psychology, medicine environment …Define the concept you want to test. Send to me the project proposal sheet available on K/MAT201/FALL 2018/
b) Collect real data or the time series files from the Internet sites or any other data base data base.

Once the group of two students choose the topic of application bring the material to me for my approval.
c) Make the group research presentation and the individual paper:
"Statistical analysis as applied in .."

Instructions and Deadlines
- Presentation Date Due for all groups: November 30.
- Dead line for Topic &Data Approval is November 20.
- Research Paper due -last day of classes, December 7.
- The research accounts for 10% of your total course mark.
- Word size = 2000 (excluding tables and diagrams).
- Treat this assignment as the first draft of a journal article.
- All tables and graphics should be integrated with the text - choose Representative and important information.

The paper should have the following sections:
- Introduction;
- Problem and Method description;
- Data description and sources (web and other references)
- Computer output, explanations about what you did and your results ;
- A chart of your raw data and all your models;
- Conclusion;
- References (books, articles)

<u>Students are expected to send to me</u>:
Via E-mail: Proposal worksheet available on K drive, containing topic, article web page or equivalent, definition of variables and data sources (web addresses or pdf files); Presentation files by November 30, before the class.

A folder with a student's name, which contain the presentation files, word files, and excel files with row and processed data must be given to me by December 7.

One hard copy of the final individual paper has to be given to me directly in the class, December 7.

<u>Useful addresses for historical data</u>:
https://fred.stlouisfed.org/
http://cdiac.esd.ornl.gov/
http://www.mixmarket.org/
http://www.economagic.com
http://pwt.econ.upenn.edu/
http://www.bea.gov/index.htm
http://data.bls.gov/cgi-bin/srgate
http://data.giss.nasa.gov/gistemp/tabledata_v3/GLB.Ts.txt
http://rfe.wustl.edu/
http://www.ecb.int/stats/exchange/eurofxref/html/gbp.xml
http://www.federalreserve.gov/releases/h10/Hist/
http://rfe.wustl.edu/Data/USMacro/index.html
http://pages.stern.nyu.edu/~adamodar/New_Home_Page/data.html