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**22: 010: 690: 95: Special Topics in Audit Analytics Instructor: Dr. Ting Sun**

Spring 2016 1 Washington Park (Newark) & 907B

Rutgers Online learning center Email: tings@scarletmail.rutgers.edu

(<http://onlinelearning.rutgers.edu/ecollege>)

**COURSE DESCRIPTION**

- A certificate in “analytic auditing” is introduced by Rutgers Business School in conjunction with its Master of Accountancy in Financial Accounting (MAccy) Program. This certificate program can fulfill a dual purpose. MAccy students may specialize in the area taking these courses as electives, while non-matriculated students may take the four-course certificate independently.

- The course is consist of two parts: methodology and practice. The first part of the course is intended to develop students’ understanding of statistical inference. Students will learn how to apply some basic statistical models to the auditing problems, how to interpret the results, and troubleshoot some common problems. The second part of the course covers some specialized audit analytic techniques such as visualization, neural networks and continuity equations.

- The course is practice-oriented featuring presenter demonstrations and student hands-on learning.

This course is an online course, so there is not specific class hour for this course. Classes will be organized by weeks. Course materials as well as discussion topics will be posted online each week on **Wednesday**. You can study the course materials and participate in the discussion at any time during the week. You can access the course materials under your individual student accounts at Rutgers Online Learning center (http://onlinelearning.rutgers.edu/ecollege). A comprehensive instruction about how to use the system will be available after logging in.

 - There is a renewed focus on audit quality in the CPA profession. The PCAOB regulatory regime, the formation of the Center for Audit Quality (CAQ), initiatives at major firms, and other indicators attest to this. The profession is more focused on more effective audit methodologies than it has been for decades. The development of new methodologies needs to be preceded by basic and applied research that establishes a sound theoretical foundation and demonstrates that they will work. The need for such research represents an opportunity for universities to work with audit firms, software vendors and others. The objective of the course is to teach students audit analytic techniques and how to apply them in practice.

**COURSE MATERIALS**

- Textbook(s): I don’t assign any specific text book to this course. All the lectures will have a set of slides associated to it and some of them have corresponding videos. You will be able to see the slides and videos gradually at the beginning of each week on e-college.

- Teaching materials will be drawn from many sources including the Internet, professional articles, academic articles and books. The WWW is the Universal Library. Part of the learning process of this course is to understand how to mine this resource and combine it with more traditional sources. Make sure that you reference the materials you draw from the Internet, or from other sources.

- Check ecollege (http://onlinelearning.rutgers.edu/ecollege) regularly.

**LEARNING GOALS AND OBJECTIVES**

- This course is designed to help students develop skills and knowledge in the following area(s):

1. Audit analytic techniques
2. Applying audit analytic techniques in practice

- Students who complete this course will demonstrate the following:

1. Developing the understanding of what statistical inference is and how it is related to audit and audit data.
2. Mastering some specialized audit analytic techniques such as visualization, neural networks and continuity equations.

- Students develop these skills and knowledge through the following course activities and assignments:

Class Participation

Class participation will be evaluated according to students’ participation in each week’s discussion. Students can participate in the discussion by answering instructor’s questions, posting their own questions, and answering the other students’ questions in the discussion session of each class in e-college. Both the quality and quantity of the questions and answers will be assessed.

Assignments

There will be several individual assignments throughout the semester. The assignments will require you to do some analytic tasks using the tools and methods covered in class. They should be uploaded to e-college prior to the deadline. The assignments are important practice for interpreting statistical results of audit data.

**PREQUISITES**

There is no formal prerequisites. Students are assumed to have had basic knowledge of accounting (financial and managerial), auditing and some research methodology. If this is not the case a special supplementary reading list will be prepared with the instructor.

**ACADEMIC INTEGRITY**

*I do* NOT *tolerate cheating*. Students are responsible for understanding the RU Academic Integrity Policy (<http://academicintegrity.rutgers.edu/files/documents/AI_Policy_2013.pdf>). I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, “On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment.” [I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large database of past work.] Don’t let cheating destroy your hard-earned opportunity to learn. See [business.rutgers.edu/ai](http://www.business.rutgers.edu/ai) for more details.

**PREPARATION POLICY**

- Expect me to prepare properly for each class session. I expect the same of you. Complete all background reading and assignments. You cannot learn if you are not prepared. The minimum expectation is that for each class session, you have prepared by studying for at least twice as many hours.

**EXAM DATES AND POLICIES**

There are 1 course project and 1 final exam in this course:

Course project

Each student has to complete a course project. A course project is a practical application of any techniques(s) learned in this course. It is essential to prepare the project as soon as possible. Every student is recommended to prepare a two-page proposal for the project, and submit this proposal for instructor’s evaluation by **March 13, 2016.**

In this proposal, students need to clarify what is the research question that he/she would like to solve, why the question is interesting or important, what method will be used, and what dataset will be used in the project. Students are required to apply analytical techniques learned in the course to a real-world data set. The project should be well-documented and submitted for grading.

Finally, Students have to prepare presentations describing their course projects that do not exceed 15 minutes in length, and use the “Classlive” in e-college to make their presentations in a pre-scheduled time. The presentations will be evaluated based on the content, organization, presentation and originality.

Final exam

The final exam will be taken in **the final class**. It will be an open-book exam and last for **three hours**. Students should take the final exam though e-college system. Exams will include six essay questions; students need to choose **four** of them to answer. All the students are expected to take the final exam at the same time. If a student has a valid excuse not to take the final exam on the exam day which complies with the University regulations, the student must contact me and obtain permission to take the exam on another day. Failure to obtain the necessary permission will result in a zero grade.

Students are expected to learn how to mine and organize the useful resource through Internet. Please do NOT copy/paste from websites! Use your own words and make sure that you cite the materials from the internet or from other sources appropriately.

About answering questions:

Please give me at least 48 hours to respond your emails and questions.

**GRADING POLICY**

Course grades are determined as follows:

• Class participation 30%

• Assignments 20%

• Course Project 25%

• Final exam 25%

**Note**: Both the quality and the timeliness of all your required tasks are considered when I grade. Your final grade is not subject to negotiation. If you feel I have made an error, submit your written argument to me within one week of receiving your final grade. Clarify the precise error I made and provide all due supporting documentation. If I have made an error, I will gladly correct it. But I will adjust grades only if I have made an error. I cannot and will not adjust grades based on consequences, such as hurt pride, lost scholarships, lost tuition reimbursement, lost job opportunities, or dismissals. Do not ask me to do so. It is dishonest to attempt to influence faculty in an effort to obtain a grade that you did not earn, and it will not work.

**COURSE SCHEDULE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Week | Date | Topic | Material | Presenter | Items due |
| 1 | 1/20- 1/25 | IntroductionAnalytics, Big Data, and Audit AutomationAudit EcosystemAudit Data Standard | Reading:Formalization of Standards,Automation,Robots, and IT governance Audit Data Standard | Miklos VasarhelyiTing Sun  |  |
| 2 | 1/26- 2/1 | Audit analytics with statistics (1-1):1. Introduction to Statistics
2. Statistical inference I:

Data distributionCentral Limit Theorem | Sample data | Ting Sun | Assignment 1 |
| 3 | 2/2- 2/8 | Audit analytics with statistics (1-2):1. Statistical inference II:

Hypothesis testing Demonstration with R | Sample data | Pei Li | Assignment 2 |
| 4 | 2/9- 2/15 | Audit analytics with statistics (2):Simple Linear Regression:1. Least squares method
2. R Square
3. Demonstration with R

Audit analytics with statistics (3):Generalized Linear Model:1. Logistic regression
2. Demonstration with R
 | Sample data | Pei Li | Assignment 3 |
| 5 | 2/16- 2/22 | Advanced audit analytics(1):The Application of Data Visualization in Auditing:1. Introduction and Background
2. Tableau Example

Classification-Decision Tree:1. Supervised Method
2. How to use it in audit
 | Sample data | Abdullah AlawadhiFeiqi Huang | Assignment 4 |
| 6 | 2/23- 3/1 | Advanced audit analytics (2):Neural Network:1. Analogy to the brain
2. Neural Network Structure
3. Implementation
4. Examples

Association Analysis:1. Frequent Itemsets
2. Association Rules
 | TBD | Desi Arisandi Qi Liu | Assignment 5 |
| 7 | 3/2- 3/8 | Process mining:1. Applying PM as an analytical procedure in auditing
2. PM of event logs

Process mining vs. data mining | TBD | Mieke JansTiffany Chiu | Assignment 6 |
| 8 | 3/9- 3/13 | Text analytics:1. Motivation
2. Definition
3. Application: ROE prediction with numbers and text
 | TBD | Kevin Moffitt | Assignment 7project proposal  |
| 9 | 3/23- 3/30 | An Introduction to Dempster-Shafer Theory of Belief Functions:1. Problems with Probability Framework2. Belief Functions versus Probability3. Basics of DS Theory (Probability Assignment Function (Basic Belief masses), Focal Elements, Bayesian Belief Functions, Nested Belief Functions)4. Dempster’s rule of Combination5. Evidence Evaluation and Aggregation and Audit Risk Model | TBD | Rajendra Srivastava | Assignment 8 |
| 10 | 3/31- 4/5 | Modern Continuous Auditing: AICPA Pink book chapter 1 | AICPA Pink book chapter 1 | Miklos Vasarhelyi | Assignment 9 |
| 11 | 4/6- 4/12 | Continuous auditing advanced analytics:1. Analytics in continuous auditing
2. Continuity equations
 | TBD | Alex Kogan |  |
| 12 | 4/13- 4/19 | Resourcing Expert System Shells for auditing | TBD | Deniz Applebaum |  |
| 13 | 4/20- 4/26 | Audit Apps:Audit Apps selection | TBD | Jun Dai |  |
| 14 | 4/27- 5/3 | Project Presentation & Final Exam |  | Ting Sun | Project report |

**SUPPORT SERVICES**

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. <https://ods.rutgers.edu>

If you are a military *veteran* or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. <http://veterans.rutgers.edu/>

If you are in need of *mental health* services, please use our readily available services.

 [Select for inclusion in syllabus based on course location]

[Rutgers University-Newark Counseling Center: <http://counseling.newark.rutgers.edu/>]

[Rutgers Counseling and Psychological Services – New Brunswick: <http://rhscaps.rutgers.edu/>]

If you are in need of *physical health* services, please use our readily available services.

[Select for inclusion in syllabus based on course location]

[Rutgers Health Services – Newark: <http://health.newark.rutgers.edu/>]

[Rutgers Health Services – New Brunswick: <http://health.rutgers.edu/>]

If you are in need of *legal* services, please use our readily available services: <http://rusls.rutgers.edu/>

If you are in need of additional *academic assistance*, please use our readily available services.

 [Select for inclusion in syllabus based on course location; undergraduate only]

[Rutgers University-Newark Learning Center: <http://www.ncas.rutgers.edu/rlc>

 Rutgers University-Newark Writing Center: <http://www.ncas.rutgers.edu/writingcenter>]

[Rutgers University-New Brunswick Learning Center: <https://rlc.rutgers.edu/>]