Special Topics in Audit Analytics

Spring 2014

Developed by the generous support of Ernst & Young

Instructor: Pei Li
Email: pl307@rutgers.edu
Office Location: 1 Washington Park (Newark), Room 919J

Introduction

Rutgers Business School is introducing a certificate in “analytic auditing” in conjunction with its Master of Accountancy in Financial Accounting (MAccy) Program\(^1\). 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.

Background

For reasons that are well known, 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 following are examples, in no particular order, of the types of areas that are likely to prove fruitful in the field of analytical auditing: Analytical procedures, Other data Analytics, Continuous Auditing Integration, Audit Risk/Assurance Model, Elicitation, quantification and expression of professional judgment, Audit optimization, Fraud detection processes, Systems analysis and internal control evaluation and Smart navigation of GAAP

Course Description and Objectives

The objective of the course is to teach students audit analytic techniques and how to apply them in practice.

The first part of the course is intended to develop students’ understanding of what statistical inference is and how it is related to audit and audit data. Students will learn how to apply

---

\(^1\) [http://business.rutgers.edu/finmaccy/](http://business.rutgers.edu/finmaccy/)
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.

**Course Structure**

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.

**Textbook**

We 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.

**Course Grading:**

- Class participation 25%
- Assignments 25%
- Course Project 25%
- Final exam 25%

**Class Participation**

Class participation is highly encouraged. Online chat room is the primary way for the students to communicate with instructor and each other. 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 chat rooms 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.

Course project

Each student has to complete a course project. A course project should be a practical application of any method(s) learned in this course.

It is essential to start working on the project as soon as possible. Every student is recommended to prepare a two-page long proposal for the project, and submit this proposal for instructor’s evaluation by March 16, 2014. In this proposal, students need to clarify what is the problem he/she would like to solve, why the problem is interesting or important, what methods will be used to solve such problem, and what dataset will be used in the project.

Finally, students have to prepare presentations describing their course projects that do not exceed 15 minutes in length, and use the “Classvile” tool 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 an open-book exam and last for three hours. Students should take the final exam through 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 cut/paste from websites! Use your own words, and make sure that you cite the materials from the Internet, or from other sources.

Course Outline (Tentative)

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
<th>Material</th>
<th>Presenter/Discussant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 01/21-</td>
<td>Introduction</td>
<td>Reading: Formalization of</td>
<td>Miklos Vasarhelyi</td>
</tr>
<tr>
<td></td>
<td>• Analytics, Big Data, and Audit Automation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Course Title</td>
<td>Topics</td>
<td>Instructor(s)</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>01/26</td>
<td>Audit Ecosystem, Audit Data Standard</td>
<td>Standards, Automation, Robots, and IT governance</td>
<td>Pei Li</td>
</tr>
<tr>
<td>01/27-02/02</td>
<td>Audit Analytics with Statistics (I)</td>
<td>Probability, Statistics Introduction, Statistic Tests</td>
<td>Pei Li</td>
</tr>
<tr>
<td>02/03-02/09</td>
<td>Audit Analytics with Statistics (II)</td>
<td>Statistical Inference I</td>
<td>Pei Li</td>
</tr>
<tr>
<td>02/10-02/16</td>
<td>Audit Analytics with Statistics (III)</td>
<td>Simple Linear Regression</td>
<td>Pei Li</td>
</tr>
<tr>
<td>02/17-02/23</td>
<td>Audit Analytics with Statistics (III)</td>
<td>Generalized Linear Models, Ordered logistic regression, Control Risk Assessment</td>
<td>Pei Li, Hussein Issa</td>
</tr>
<tr>
<td>02/24-03/02</td>
<td>Advanced Audit Analytics in Audit Analytics</td>
<td>Visualization</td>
<td>Pei Li, Zhengjie Sun, Ke Xu</td>
</tr>
<tr>
<td>03/03-03/09</td>
<td>Advanced Audit Analytics Techniques (I)</td>
<td>Classification-Decision Tree, Supervised Method, How to use in audit, Diagnostics</td>
<td>Basma Moharram, Pei Li</td>
</tr>
<tr>
<td>03/10-03/16</td>
<td>Advanced Audit Analytics Techniques (II)</td>
<td>Association Analysis, Introduction, Example</td>
<td>Qi Liu</td>
</tr>
<tr>
<td>03/25-03/30</td>
<td>Exception Prioritization in Audit Analytics</td>
<td>Motivation, Related Approaches, Example</td>
<td>Pei Li</td>
</tr>
<tr>
<td>03/31-04/06</td>
<td>A Bayesian Audit Assurance Model</td>
<td>Component Materiality in Group Audits</td>
<td>Trevor Stewart</td>
</tr>
<tr>
<td>04/07-04/13</td>
<td>Process Mining</td>
<td>Business Processes, Workflows</td>
<td>Micke Jans</td>
</tr>
<tr>
<td>Week</td>
<td>Dates</td>
<td>Topic</td>
<td>Reading</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| 12.  | 04/14-04/20 | Continuous Auditing  
   - Introduction to Continuous Auditing | Reading: Internal auditors view in continuous auditing | Miklos Vasarhelyi |
| 13.  | 04/21-04/27 | Continuous Auditing: Advanced Analytics  
   - Analytics in Continuous Auditing  
   - Continuity Equations  
   - Final Exam Content Review | Kogan et al. – Analytical Procedures for Continuous Data Level Auditing: Continuity Equations | Alexander Kogan Pei Li |
| 14.  | 04/28-05/02 | Project Presentation and Final Exam | | |