PREDICT 402 Syllabus

Winter 2017

Contact Information

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Office Hours: As posted in syllabus and by appointment

Response Time: I will respond to emails within 24-48 hours.

Optional Synchronous Meetings: Mondays (Section 55) and Tuesdays (Section 59) 7:30-8:30 pm CDT

Biography

I'm a quantitative anthropologist with a PhD in Social Sciences from UC Irvine, known for its quantitative and data focus. My initial interest was demography, and I received a Fulbright fellowship to study fertility decline in Western Kenya, also teaching stats and research methods to grad students at the University of Nairobi. I held a Mellon Postdoc in anthropological demography at Penn, and was a tenured associate professor at a small private college in the Upper Midwest. I continue to be interested in population and ecology, as well as social networks, time allocation, gender, research methods, and history of science.

I have lived on three continents and five U.S. states, and now live on Seattle's Eastside, near one of my three accomplished Millennial children. I enjoy hiking, cycling, playing flute and banjo, and doing origami. In addition to the MSPA program, I usually teach a brick-and-mortar courses each term to some gifted retirees at a local college, an evolving series of classes at the intersection of anthropology, evolution, ethics, and skepticism. I also do editing, left over from an earlier career as a news editor and reporter, and consult as a SME for Accenture.

Course Description

This course introduces the field of predictive analytics, which combines business strategy, information technology, and modeling methods. The course reviews applications, benefits and opportunities in data science, explores implementation and development of analytics in organizations, and touches on social, ethical, regulatory, and compliance issues. Business problems and solutions in traditional and contemporary data management systems are discussed, as well as selecting appropriate tools for data collection, analysis, and presentation. Approaches to research, sampling, and survey design for business and nonprofit organizations are also covered.

Course Objectives

By the end of this course, you will be able to:

- Articulate the many applications of predictive analytics.
- List and evaluate a variety of methods used in data science.
- Understand the basic elements of the “Big Data” revolution.
- Articulate the value of predictive analytics in organizations.
- Know how to judge an organization’s analytic maturity level.
- Select the appropriate analytic approach for a given business situation.
- Understand the challenges of building an analytics team.
- Formulate solutions for resolving data quality issues
- Articulate various performance measures, and design powerful dashboards.
- Understand constraints to collecting, using, and storing data.
- Evaluate sample survey methods and create sample survey proposals for data collection.
- Determine sample size for commonly used probability sampling methods.
- Develop professional-level written communications skills, including using APA style and researching refereed sources.

Prerequisites

There are no prerequisites for this course. This is an introductory course.

Software

We will be using Tableau in this course for the dashboard assignment. Tableau for Students is available to any student worldwide as a one-year free download. You may download Tableau

for Students at the Tableau website. You may also request an access key from the instructor to use Tableau for the duration of the term only, however as long as you are a student you may continue to use Tableau for Students without cost. Learning tools for Tableau are available at the website, including advanced tutorials to help integrating Tableau with R (optional).

You do not need R and/or Python for this course.

Required and Optional Readings and Resources

Required Readings

Davenport, T. H., & Harris, J. G. (2007). *Competing on analytics: The new science of winning*. Boston, MA: Harvard Business School. [ISBN-13: 978-1422103326]

Miller, T. W. (2015) *Modeling techniques in predictive analytics with Python and R: A guide to data science*. NJ: Pearson FT Press. [ISBN-10: 0-13-389206-9 or ISBN-13: 978-0-13-389206-2]

Few, S. (2009). *Information dashboard design.* Oakland, Calif.: Analytics Press. [ISBN-13: 978-1938377006]

Groves, R.M., Fowler, F. Jr., Couper, M.P., Lepkowski, J.M., Singer E., & Tourangeau, R. (2009). *Survey methodology* (2nd ed.). Hoboken, NJ: Wiley. [ISBN-13: 978-0470465462] (Digital version is available on course reserve and accessible at the Northwestern library through the Canvas course link.)

Optional/Recommended

Siegel, E. (2016). *Predictive analytics: The power to predict who will click, buy, lie, or die.* Hoboken, NJ: Wiley. [ISBN-10: 1119145678] [ISBN-13: 978-1119145677] (The sections of this text relevant to the course will be on reserve at the library through the Canvas course link. You may also use the 2013 edition.)

Zinsser, W. (2006). *On writing well: The classic guide to writing nonfiction* (30th ed.). NY: Harper Collins.

American Psychological Association (2009) *Concise rules of APA style* (6th ed.). Washington, DC: APA

Course Reserves

Some readings will be available through the Course Reserves in the left navigation menu. Assignment and Discussion forum instructions will note which readings are to be accessed through Course Reserves. For assistance with Course Reserves, e-mail e-reserve@northwestern.edu. To ask a librarian for assistance, visit Northwestern's Ask A Librarian page.

Optional Readings and Resources

If available, posted in the weekly module.

Assignment Overview and Grading Breakdown

Discussion Forums	**Each week**, students will participate in group discussions, answering posted questions and identifying issues of personal and professional interest. Weekly discussion board participation is required, with at least one unique individual post per week along with discussion and response to other students' posts. See additional guidelines for discussion board in the syllabus. (10 points/week. 100 points total.)	17%
Individual Short Assignments	Two shorter assignments are due at the end of the first and second weeks of the term. **Week 1** - "Moneyball Review" (20 points) **Week 2** - Big Data Review (50 points) **Week 5** - Topic Interest Survey (20 points for timely submission)	14%
Individual Papers	Two longer individual assignments are due the fourth and sixth weeks of the term. **Week 4** - Applications in Predictive Analytics (100 points)	34%

	Week 6 - Dashboard and Executive Summary (100 points)	
Team Project	Teams will be assigned during the 6th week based on the Topic Interest Survey submitted in week 5. The final Survey Design and Implementation Project is due the final week, with three team checkpoints along the way in which drafts of the sampling design, survey, and final paper are submitted for review. **Week 7** - First team checkpoint (topic proposal) (20 points for timely submission) **Week 8** - Second team checkpoint (20 points for timely submission) **Week 9** - Third team checkpoint (20 points for timely submission) **Week 10** - Final Survey Design and Implementation Project Paper Due (150 points)	35%
	Total	100%

Grading Scale

A	94%-100%
A-	90%-93%
B+	87%-89%
B	84%-86%
B-	80%-83%
C+	77%-79%
C	74%-76%
C-	70%-73%
F	Below 70%

Late Work Policy

Unless otherwise noted, all work is due on the assigned day by 11:55 pm CST (central time). This includes papers and participation in the discussions. Late work is not accepted.

The worst thing to do is fall behind in this course. We cover a lot of material, and falling behind is a primary reason folks don't succeed. Plan ahead, and always reach out if you begin to fall behind or if you encounter an unanticipated event that may interfere with your coursework.

Online Communication Expectations

Discussion Forums

Discussion board participation is an essential and important part of this class, and is designed to allow free exchange of ideas in a respectful and open environment. How often you post is less important than the contents of your contribution, although a minimum level of engagement is expected. You are encouraged to post actively and frequently, but please try not to clutter the board with irrelevant or insignificant material, which could work against you. Stay on topic, keep your language professional (abbreviated texting language is not appropriate), and try always to offer something new when you post (a "me too" type post doesn't count). When relevant, please remember to cite all sources, and avoid plagiarism.

I want to see a minimum of three posts per week. Make at least one of those posts an original contribution to the discussion that includes references and citations, while being careful not to plagiarize or violate copyright. Also demonstrate engagement in the discussion forum by responding to others' posts. I prefer that you don't block quote the entire text of a previous post in your response, but select just those portions that are relevant. This will make it easier for your

colleagues to read and locate the salient information. Explain, clarify, politely ask for details, provide details, persuade, and enrich communications for a great discussion experience. Participation in discussion is worth up to 10 points per week (100 for the course).

Netiquette

For more information, read the 10 Rules of Netiquette. More coming soon...

Participation and Attendance

This course will not meet at a particular time each week. All course goals, session learning objectives, and assessments are supported through classroom elements that can be accessed at any time. To measure class participation (or attendance), your participation in threaded discussion boards is required, graded, and paramount to your success in this course. Please note that any scheduled synchronous meetings are optional. While your attendance is highly encouraged, it is not required and you will not be graded on your attendance or participation.

Sync Sessions

Sync sessions are an important and useful part of the course. However, attending sync session live is optional in the MSPA program due to its asynchronous nature. Sync sessions are always recorded for those who cannot attend live. You will be given information a day or two ahead about how to connect to the live sync session in Blue Jeans, which will take place within your scheduled “class” hour. Note that I usually schedule sync sessions at 7:30 pm CST (Central) rather than 7:00 pm to accommodate more students in various time zones. My sync sessions rarely last longer than an hour.

PowerPoint files from the sync sessions are posted along with the recordings when available, usually within 24 hours after the sync sessions or as soon as they are ready. I often hold open office hours during sync session times when there are no formal sessions. You are free to utilize office hours individually or with your final project teams as you see fit.

Valuable information about assignments and course requirements is often communicated during sync sessions, so if you are unable to attend live you will benefit by listening to the recordings.

Student Support Services

AccessibleNU

This course is designed to be welcoming to, accessible to, and usable by everyone, including students are English-language learners, have a variety of learning styles, have disabilities, or are new to online learning. Be sure to let me know immediately if you encounter a required

element or resource in the course that is not accessible to you. Also, let me know of changes I can make to the course so that it is more welcoming to, accessible to, or usable by students who take this course in the future.

Northwestern University and AccessibleNU are committed to providing a supportive and challenging environment for all undergraduate, graduate, professional school, and professional studies students with disabilities who attend the University. Additionally, the University and AccessibleNU work to provide students with disabilities and other conditions requiring accommodation a learning and community environment that affords them full participation, equal access, and reasonable accommodation. The majority of accommodations, services, and auxiliary aids provided to eligible students are coordinated by AccessibleNU, which is part of the Dean of Students Office.

SPS Student Services

The Department of Student Services supports the academic and professional growth of SPS students. The Student Services team guides students through academic planning, policies, and administrative procedures, and promotes a supportive environment to foster student success. Students are encouraged to actively make use of the resources and staff available to assist them: Academic and Career Advisers, Counseling and Health Services, Student Affairs, Legal Services, Financial Aid and Student Accounts, among other services.

For a comprehensive overview of course and program processes and policies and helpful student resources, please refer to your SPS Student Handbook.

Academic Support Services

Northwestern University Library

As one of the leading private research libraries in the United States, Northwestern University Library serves the educational and information needs of its students and faculty as well as scholars around the world. Visit the Library About page for more information or contact Distance Learning Librarian Tracy Coyne at 312-503-6617 or tracy-coyne@northwestern.edu.

Program-Specific Library Guides

- Information Systems
- Public Policy
- Predictive Analytics
- Global Health
- Medical Informatics
- Sports Administration

Additional Library Resources

- Connectivity > Campus Wireless and Off-Campus Access to Electronic Resources
- Reserve a Library Study Room
- Sign up for an in-person or online Research Consultation Appointment
- Getting Available Items > Delivery to Long-Distance Patrons
- Social Science Data Resources
- Resources for Data Analysis

The Writing Place

The Writing Place is Northwestern's center for peer writing consultations. Consultations are free and available to anyone in the Northwestern community: undergraduates, graduate students, faculty, or staff. To book an appointment, go to The Writing Place website.

The Math Place

The Math Place is a free tutorial service provided to students currently enrolled in Northwestern University's School of Professional Studies courses or in other Northwestern University courses. Students of all levels can benefit from the individual tutoring provided from this service, whether they are taking undergraduate or graduate level courses. To book an appointment, go to The Math Place website.

Academic Integrity at Northwestern

Students are required to comply with University regulations regarding academic integrity. If you are in doubt about what constitutes academic dishonesty, speak with your instructor or graduate coordinator before the assignment is due and/or examine the University Web site. Academic dishonesty includes, but is not limited to, cheating on an exam, obtaining an unfair advantage, and plagiarism (e.g., using material from readings without citing or copying another student's paper). Failure to maintain academic integrity will result in a grade sanction, possibly as severe as failing and being required to retake the course, and could lead to a suspension or expulsion from the program. Further penalties may apply. For more information, visit The Office of the Provost's Academic Integrity page.

Some assignments in this course may be required to be submitted through Turnitin, a plagiarism detection and education tool. You can find an explanation of the tool here. In brief, Turnitin compares the submitted assignment to millions of documents in large databases. It then generates a report showing how much the text within a paper is similar to pre-existing sources. Turnitin returns a percentage score, indicating the percentage of the submitted paper that is similar or identical to pre-existing sources. High scores are not necessarily bad, nor do they necessarily indicate plagiarism, since the score does not take into account how or whether material is cited, information flagged by Turnitin. If a paper consists of one long quote that was cited appropriately, it would score 100%. This would not be plagiarism, due to the appropriate citation. However, submitting one long quote would probably be a poor paper. Low scores are

not necessarily good, nor do they necessarily indicate a lack of plagiarism. If a 50 page paper contained all original material, except for one short quote that was not cited, it might score around one percent. But not citing a quotation is still plagiarism.

ProctorU Requirement

There are no proctored exams or assignments for this course.

Course Technology

This course will involve a number of different types of interactions. These interactions will take place primarily through the Canvas system. Please take the time to navigate through the course and become familiar with the course syllabus, structure, and content and review the list of resources below.

Canvas

The Canvas Student Center includes information on communicating in Canvas, navigating a Canvas course, grades, additional help, and more. The Canvas at Northwestern website provides information of getting to know Canvas at Northwestern and getting Canvas support. The Canvas Student Guide provides tutorials on all the features of Canvas. For additional Canvas help and support, you can always click the Help icon in the lower left corner to begin a live chat with Canvas support or contact the Canvas Support Hotline.

The Canvas Accessibility Statement and Canvas Privacy Policy is also available.

BlueJeans

We will use BlueJeans for optional synchronous meetings. The Northwestern IT YouTube channel on Blue Jeans Video conferencing and the BlueJeans for Canvas User Guide provide additional guidance for using Blue Jeans. The Blue Jeans Privacy Policy and the Accessibility Features on BlueJeans is also available. Please note that any scheduled synchronous meetings are optional. While your attendance is highly encouraged, it is not required and you will not be graded on your attendance or participation. These synchronous sessions will be recorded, so you will be able to review the session afterwards. Minimum

Minimum Required Technical Skills

Students in an online program should be able to do the following:

- Communicate via email and Canvas discussion forums
- Use web browsers and navigate the World Wide Web
- Use the learning management system Canvas
- Use integrated Canvas tools (e.g., BlueJeans, YellowDig, ARC, Course Reserves)

- Use applications to create documents and presentations (e.g., Microsoft Word, PowerPoint,)
- Use applications to share files (e.g., Box, Google Drive)
- Use software for statistical analysis (e.g., SPSS)
- Use software for predictive analytics (e.g., R, Tableau)

Systems Requirements for Distance Learning

Students and faculty enrolled in SPS online master's degree programs should have access to a computer with the Minimum System Requirements.

Technical Help and Support

The SPS Help Desk is available for Faculty, Students and Staff to support their daily IT needs. For additional technical support, contact the Northwestern IT Support Center.

Course Schedule

Module 1	After this session, you will be able to: ● Define analytics. ● State the importance of analytics in business competition. ● Assess common attributes of analytically competitive businesses. ● Rank the stages of analytic competition. ● Define the roles of data, theory and prediction in three different models for research ● Clarify the importance of dashboards	Readings/Resources ***Readings*** *Competing on Analytics*, Chapters 1–3 (pgs. 3-56) *Modeling Techniques in Predictive Analytics,* Chapter 1 (9 pgs.) *Information Dashboard Design,* Chapter 1 (pgs. 1-33) ***Video*** *Moneyball* (stream from library & post comment online) ***Multimedia*** *What is analytics and why is it important* *Strategic Data Assets, Tools & Big Data*	Activities/Assessments ● *Moneyball* Review ● Discussion Board participation

Module 2	After this session, you will be able to: ● Identify analytic techniques used to analyze internal business processes. ● Select appropriate analytic applications for a given internal business process. ● Identify analytic techniques used to analyze external business processes. ● Select appropriate analytic applications for a given external business process. ● Describe the roles of data visualization in business analytics. ● Identify common mistakes in dashboard design	Readings/Resources ***Readings*** *Competing on Analytics*, Chapters 4 and 5 (pgs 57-103) *Modeling Techniques in Predictive Analytics,* Chapters 2-4, 9 (21 pgs) *Information Dashboard Design,* Chapters 2-4 (pgs. 59-75) **Multimedia** *BI Part1 - Analytics among High vs. Low Performing Cos. and Why Analytics is Unique?* *BI Part 2 - Business Intelligence, Competition, and Maturity Levels* *Top Videos on Learning BIG Data Science*	Activities/Assessments ● "Big Data Review" due ● Discussion Board participation
Module 3	After this session, you will be able to: ● Assess the analytic capabilities of an organization. ● Distinguish the stages of organizational analytic competition.	Readings/Resources ***Readings*** *Competing on Analytics*, Chapters 6–7 (107-152) *Modeling Techniques in Predictive Analytics* Chapters 5-8 (23 pgs. text plus tables & graphics)	Activities/Assessments ● Discussion Board participation

	● Evaluate the way organizations navigate the stages of becoming an analytic competitor. ● Compare the roles played by analytic executives, analytic professionals, and analytic amateurs. ● Assess simplicity of design, advantages of graphics, and an ideal library of graphs	*Information Dashboard Design,* Chapters 5-6 (pgs. 77-111 extremely graphics heavy) ***On Reserve at Library*** From Siegel, *Predictive Analytics* (in preparation for the Applications in Predictive Analytics assignment): Introduction; Chapter 1; Insert: 147 Examples of Predictive Analytics; Appendix B. ***Multimedia*** *Analytical Methods for Internal and External Processes*	
Module 4	After this session, you will be able to: ● Organize the components of the business analytics model. ● Assess the role of data in the business analytics model. ● Classify the different types of links between business analytics and strategy ● Compare and contrast lag and lead information. ● Distinguish how lead versus lag	Readings/Resources ***Readings*** *Competing on Analytics,* Chapters 8-9 (pgs 153-186) *Modeling Techniques in Predictive Analytics*, Ch 12; (Ch 10-11 optional for advanced students) *Information Dashboard Design,* Chapters 7-8, 12-13 ***Multimedia*** *Strategic Metrics, KPIs, KLIs, Dashboards*	Activities/Assessments ● Applications in Predictive Analytics assignment due ● Discussion Board participation

	information can be used in the development and management of a new business process. ● Distinguish how lead versus lag information can be used to optimize existing processes. ● Assess each of the business processes listed on the three disciplines. ● Classify key performance indicators into their suggested business functions.		
Module 5	After this session, you will be able to: ● Understand how to formulate a research question ● Understand the difference between a research question and a hypothesis ● Understand what it means to operationalize a construct ● Describe three different approaches to research and their applications	Readings/Resources ***Textbook Reading*** Reread Chapter 1 of *Modeling Techniques in Predictive Analytics*; read Appendixes A & B *Survey Methodology*, Chapters 1–2 (pg. 1–64) ***On Reserve at Library*** Berinato, S. (2014). With big data comes big responsibility: An interview with MIT Media Lab's Alex "Sandy"	Activities/Assessments ● Individual Topic Interest Surveys due ● Discussion Board participation

	● Be able to talk about the value of data, data ownership, rights in data, and data privacy	Pentland. *Harvard Business Review*. 92(1): 100. ***Multimedia*** *Development and Deployment of an Information Strategy*	
Module 6	After this session, you will be able to: ● Evaluate sample survey methods and create sample survey proposals for data collection. ● Determine sample size for commonly used probability sampling methods. ● Distinguish between probability and nonprobability sampling ● Discuss and analyze problems that arise in nonprobability sampling	Readings/Resources **Textbook Reading** Survey Methodology, Chapters 3 & 4 (pg. 69–95) ***Reserve Reading*** Meyer, I. H. & Wilson, P. A. (2009). Sampling Lesbian, Gay, and Bisexual Populations. *Journal of Counseling Psychology*, 56(1), 23-31. ***Optional Additional Sources*** Cochran, W. G. (1977). *Sampling Techniques* (3rd ed.). Hoboken, NJ: John Wiley & Sons. ***Multimedia*** *Sample size, Neyman Allocation, and Minimum Allocation*	Activities/Assessments ● Dashboard & Executive Summary assignment due ● Discussion Board participation
Module 7	After this session, you will be able to: ● Propose potential sources of poor	Readings/Resources ***Readings***	Activities/Assessments

	quality data. ● Evaluate the effects of poor quality data. ● Identify potential sources of data in an organization. ● Assess the relationship between the usability and the availability of data.	*Survey Methodology,* Chapters 4, 5 (pg. 97–182) ***Multimedia*** *Survey Methodology – Part 1 and Part II*	● First Team Checkpoint (topic proposals) ● Discussion Board participation
Module 8	After this session, you will be able to: ● Evaluate the benefits and limitations of data collection methodologies. ● Evaluate the benefits and limitations of data collection modalities. ● Apply the fundamentals of survey design to develop an effective survey.	Readings/Resources ***Textbook Reading*** *Survey Methodology, Chapters 6–8 (pg. 183–288)*	Activities/Assessments ● Second Team Checkpoint ● Discussion Board Participation
Module 9	After this session, you will be able to: ● Understand the processes and problems involved in survey creation ● Discuss ethical standards for social research	Readings/Resources ***Readings*** *Survey Methodology*, Chapters 9–11 (pg. 291–400)	Activities/Assessments ● Third Team Checkpoint ● Discussion Board participation

Module 10	No new learning objectives will be introduced.	Readings/Resources None	Activities/Assessments ● Final Team Survey Design & Implementation Project Due ● Discussion Board participation