Introduction to Sports Analytics

ITP 499 (2 Units)

USC Viterbi School of Engineering

Spring 2014

Objective

Upon successful completion of this course, students will:

1. Improve their overall problem solving and critical thinking ability
2. Gain an understanding of basic statistical concepts and their applications in the sports world
3. Obtain a broad survey of the methods used in sports data acquisition, processing, analysis, visualization and implementation
4. Develop the ability to recognize, formulate, and analyze decision-making in sports

Concepts

The class will discuss the theory, development, and application of analytics in sports. Students will learn about the application of analytics in sports for purposes of in-game strategy, player performance, team management, sports operations, and fantasy competitions, among many other topics. The class will consist of lectures, guest speakers from the sports industry and academia, and culminate with a group project.

Prerequisites

There are NO prerequisites for this course. Some familiarity with basic statistics is preferred.

Instructor	Dr. Jeremy Abramson
Contacting the Instructor	Abramson@isi.edu Telephone or office location is optional
Office Hours	Listed on Blackboard under Contacts
Lab Assistants	Listed on Blackboard under Contacts
Lecture	Lecture schedule, time and location, or estimated hours per week
Lab	Lab schedule, time and location, or estimated hours per week

Required Textbooks

"Mathletics: How Gamblers, Managers, and Sports Enthusiasts Use Mathematics in Baseball, Basketball, and Football", Wayne Winston
Other articles throughout the semester

Optional Textbooks

Potential introductory statistics book

Website

All course material will be on Blackboard (http://blackboard.usc.edu).

Grading

Course participation includes reading and commenting on the class Web Forum. Guest speaker questions, book review quizzes and the article report are to be done individually. The final project is to be done in groups of 2-4 (depending on overall class size).

The following percentage breakdown will be used in determining the grade for the course.

Course participation (10 points)	10%
Guest speaker questions (10 points)	15%
Book Review Quizzes (15 points)	20%
Article Report (30 points)	20%
Final Project (40 points)	35%
Total (100 points)	100%

Grading Scale

The following shows the grading scale to be used to determine the letter grade. Percentage of total points:

90% - and above	A
87% - 89%	B+
80% - 86%	B
77% - 79%	C+
70% - 76%	C
67% - 69%	D+
64% - 66%	D
63% and below	F

Policies

Since this course convenes only once a week, attendance at all class meetings is mandatory. Please do not plan to be absent. You are expected to arrive on time and to be prepared to discuss the session's readings (if applicable). This is not a solely a lecture course, but an active learning opportunity built around guest speakers and readings. As such, **no late submissions**

of assignments will be allowed, unless prior arrangements have been made with the instructor. If cannot attend a class for any reason, it is up to the student to notify the instructor, and to make sure all assignments are turned in on time. In lieu of a late homework policy, a number of "extra credit" opportunities will be offered throughout the term.

Guest-speaker Questions
In order to facilitate an interesting discussion and student engagement with the guest speakers, students will be asked to submit a number of questions, relevant to each speaker. These are typically due the week before the speaker is scheduled to appear. **NOTE: The guest speaker list is provided as an example only. Due to scheduling issues, etc. the final list may vary.**

Article Report
Each student will complete a short (under 10 minute) presentation and discussion on a current, state-of-the-art topic in sports analytics. This can be a blog posting they found interesting, or other current topic in sports analysis.

Project
The final project will include the in-depth investigation and presentation of a sports analytics related topic. The focus can be on the use of analytics in a particular sport (e.g. baseball, football, etc.) or a particular technology (e.g. data mining, visualization, etc.). A progress report presentation will be due in class on partway through the term. The final deliverable will include a presentation to class.

Incomplete and Missing Grades

Excerpts for this section have been taken from the University Grading Handbook, located at http://www.usc.edu/dept/ARR/grades/gradinghandbook/index.html. Please see the link for more details on this and any other grading concerns.

A grade of Missing Grade (MG) "should only be assigned in unique or unusual situations… for those cases in which a student does not complete work for the course before the semester ends. All missing grades must be resolved by the instructor through the Correction of Grade Process. One calendar year is allowed to resolve a MG. If an MG is not resolved [within] one year the grade is changed to [Unofficial Withdrawal] UW and will be calculated into the grade point average a zero grade points.

A grade of Incomplete (IN) "is assigned when work is no completed because of documented illness or other 'emergency' **occurring after the twelfth week** of the semester (or 12th week equivalency for any course scheduled for less than 15 weeks)."

Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *Scampus,* the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to your course instructor (or TA) as early in the semester as possible. DSP is located in STU 301 and is open from 8:30am to 5:00pm, Monday through Friday. Website and contact information for DSP http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu

Emergency Preparedness/Course Continuity in a Crisis

In case of emergency, when travel to campus is difficult, if not impossible, USC executive leadership will announce a digital way for instructors to teach students in their residence halls or homes using a combination of the Blackboard LMS (Learning Management System), teleconferencing, and other technologies. Instructors should be prepared to assign students a "Plan B" project that can be completed 'at a distance.' For additional information about maintaining your classes in an emergency, please access: http://cst.usc.edu/services/emergencyprep.html

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Course Outline

Note: Schedule subject to change

Week 1 (Week of Jan 13) – Introduction and course overview

- Administrative logistics
- Outline of course

Reading

Chapters 1-3

Assignment/Lab

N/A

Week 2 (Week of Jan 20) – Baseball Decision Making

- Pythagorean theorem
- Runs created
- Linear weights

Reading

Chapters 4-6

Assignment/Lab

Questions for guest speaker

Week 3 (Week of Jan 27) – Sample article report / Guest speaker [baseball] (?)

- Format for article report
- Baseball analytics in practice
- Is "Moneyball" dead?

Reading

N/A

Assignment/Lab

Sign up for article report

Week 4 (Week of Feb 3) – Football Decision Making

- Going for it on fourth down
- Player valuation

Reading

Chapter 18-21

Assignment/Lab

Questions for guest speaker

Book Review Quiz #1

Week 5 (Week of Feb 10) – Guest Speaker [football] (Robert Mays/Tim Chou)

- Student article reports

Reading

Chapters 28-30

Assignment/Lab

N/A

Week 6 (Week of Feb 17) – Basketball Decision Making

- Four factors
- Linear Weights
- Student article reports

Reading

Chapters 28-30

Assignment/Lab

Questions for guest speaker

Week 7 (Week of Feb 24) – Guest speaker [basketball] (Larry Coon)

- Analytics in basketball player valuation
- The CBA
- Student article reports

Reading

Kirk Goldsberry Sloan research paper

Rajiv Maheswaran Sloan research paper

Assignment/Lab

Questions for guest speaker

Book review quiz #2

Week 8 (Week of Mar 3) – Data Visualization / Guest speaker [data visualization] (Rajiv Maheswaran)

- CourtVision
- Software packages

Reading

Chapter 42

Assignment/Lab

N/A

Week 9 (Week of Mar 10) – March Madness / Final Project Description

- Selection Criteria
- RPI / BPI
- Select groups for final project
- Student article reports

Assignment/Lab

NCAA Bracket (extra credit)

Guest speaker questions

Final project groups

Week 10 (Week of Mar 24) – The Business of Sports Analytics / Guest Speaker [Ben Alamar]

- Management, business, hiring and sports analytics
- Student article reports
- Extra curricular: Watch NCAA Tournament game (place, time TBD)

Reading

N/A

Assignment/Lab

N/A

Week 11 (Week of Mar 31) – Special Topics

- Player drafting / Evaluation
- Gambling / Vegas lines
- Student article reports

Reading

N/A

Assignment/Lab

Guest speaker questions
Final project check-up

Week 12 (Week of Apr 7) – Sports Analytics and the Media / Guest speaker [media] (J.A. Adande/Kevin Arnovitz)

- Attitudes about sports analytics
- The changing nature of sports coverage

Reading

N/A

Assignment/Lab

Guest speaker questions

Week 13 (Week of Apr 14) – Sports Analytics and Technology / Guest speaker [technology] (Brian Kopp)

- Player tracking
- "Big Data"
- The future of technology in sports analytics

Reading

N/A

Assignment/Lab

N/A

Week 14 (Week of Apr 21) – Project Presentations

- Student presentations of final project (depending on class size)

Reading

N/A

Assignment/Lab

N/A

Week 15 (Week of Apr 28) – Project Presentations

- Student presentations of final project (depending on class size)

Reading

N/A

Assignment/Lab

N/A

Week 16 (Week of May 5) – Turn in Final Project

Date, Time, and Place

According to the final exam schedule on the Schedule of Classes