



Sports Data Analytics

COSC 4342 / CSCI 5342

Fall - 2021

Course Description

Prerequisites: MATH 1342 and MATH 1343, or other statistics course. Identifying the metrics, types of analyses and making sense of sports-related data from a managerial business perspective. Use of industry tools to gather, learn, make predictions and visualize large sports data sets.

Class Time

Tuesdays and Thursdays 11:00am – 12:20pm
COB 255

Instructor Information

Dr. Robert P. Schumaker
Professor, Computer Science Dept.
rschumaker@uttyler.edu

Office Hours

DM through Slack (preferred), Zoom, email
If your inquiry is grade-related, please make a Zoom or physical appointment.
No appointment needed for Tuesdays and Thursdays 9:30am – 11:00am in COB 315.05

Textbook Information

Required

Sport Analytics – Fried and Mumcu, 2018 ISBN: 978-1138667136

Recommended

Mathletics – Winston, 2009 ISBN: 978-0691154589
Analytic Methods in Sports – Severini, 2020 ISBN: 978-0367469382

Course Objective

This course is designed with the following goals:

- Identify a broad range of methods used in sports data acquisition, representation, analysis and reporting
- Demonstrate an understanding of statistics and their application to sport
- Develop the ability to recognize, formulate and analyze decision-making in sport
- Improve overall problem solving/analysis skills and critical thinking
- Conduct sports data acquisition, representation and prediction activities
- Assess current sports analytics trends and how they can apply to new areas

Computer Account Access

Students will need a Patriot account and password for computer access. This information can be found at <http://www.uttyler.edu/ccs>

Course Documents and Slides

This class will use Canvas for course documents, slides and other class-related materials. Students are encouraged to check the website frequently during the course of the semester to keep up to date about class changes.



Course Grading

Course evaluation will be based on the following:

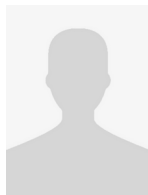
MLB Playoff Decision Analysis Report (Tentative)	20
Fantasy Football Decision Analysis Report (Tentative)	20
Topic Report (Undergraduates)	20 or
Sports Analytics Project (Graduates)	20
Case Discussion (5 cases @ 5 points)	25
Lifelong Learning	5
Class Participation	10
Total Points	100

Grading Scale

A	90.0 points or more
B	80.0 to 89.999 points
C	70.0 to 79.999 points
D	60.0 to 69.999 points
F	59.999 points or less

Course Policies

1. MLB Decision Analysis Report – Students will use their analytics skill to determine the winners of each round of MLB playoffs. Students will make predictions of winning teams using quantitative evidence from multiple analytic techniques and defend their choices. The report will be evaluated based on backtesting on the prior year's playoffs (5 points), spelling/grammar (5 points) and correctly picking matchups (10 points, +1 for every correct pick) with a possibility of 5 bonus points. More details will be given during the semester. Students that correctly pick their entire bracket will also be immortalized in this syllabus forever.



Your name here
(2021)

Favorite quote that won't land either of us in the Dean's Office

2019 – Matthew Skaggs was 2 picks away from immortalization, but failed.
2020 – The entire class picked the Twins and lost in the first round. 😊

2. Fantasy Football Decision Analysis Report – Students will put their analytics skill to the test by competing against each other in a fantasy football league. Students will keep a diary of every decision made in managing their team. The report will be evaluated based on depth of their pre-draft strategy (5 points), each week's lineup selection rationale (5 points, +1 for each week), spelling/grammar (5 points) and winning (5 points, +1 for every win), with a possibility of bonus points based upon their end of season ranking. More details will be given during the semester.
3. Topic Report (Undergraduates) – Each student will produce a report on a current, state-of-the-art topic in sports analytics. Topics can be obtained from a news article, webpage, blog, or other source. This is an opportunity for the students to learn more about a cutting edge technology. Students must have approval from the instructor fourteen days in advance (5 points) and will be further evaluated on depth of research (5 points), spelling/grammar (5 points) and references (5 points, +1 each).
4. Sports Analytics Project (Graduates) – Graduate students will work in groups to produce a sports analytics project. Students will work with the Instructor to identify a project, determine overall project



goals, expected individual contributions and a project grading rubric. This project will be software/programming related and commensurate in difficulty to graduate student education. Undergraduate students **may** elect the sports analytics project in lieu of a topic report.

5. Case Discussion – Throughout the semester we will analyze business technology cases through Canvas. Students will post their discussion questions and answer others. More details will be provided in Canvas.
6. Lifelong Learning – It is imperative for successful individuals to continue learning throughout their lifetime. Professional organizations are a wonderful opportunity to reinvent, retool and build connections with industry leaders. Students that attend a professional technology organization meeting (and email proof of attendance) will receive credit. Upcoming meetings and events can be found on Canvas. Online webinars will be accepted.
7. Class Participation – Class Participation points will be scored by the quantity of quality discussion a student contributes regarding relevant technology-related articles. The maximum points that can be earned is ten.
8. Missed Work: Business professionals must also take responsibility for attending all scheduled meetings and activities. Attendance is absolutely necessary in order to be successful in this class. We will cover a new topic each class period and each subsequent class will build upon prior skills and concepts. If you miss a class you will miss an entire topic and any materials and assignments passed out. **Students who miss class are responsible for getting missed materials and lecture information on their own time from their peers.**
9. Time Outside of Class: This course is a computer application course that requires students to complete computer application exercises and projects. It is the responsibility of the student to make a **backup** of all assignments or application projects. *If your work is not saved and accessible by the instructor, then it cannot be evaluated and a grade of F will be given for that particular project or assignment.* BACKUPS of projects and tests are imperative in order to avoid lost or damaged data.
10. Meow. If you send the Instructor a DM through Slack of a lolcat before Sept 3 at 5pm, you will receive a bonus point. Keep this to yourself and do not share it with classmates.
11. Classroom Lab Rules
 - Please do not surf the Web during class unless instructed to access the Internet.
 - Do not access inappropriate Web sites during class. This will lead to dismissal from the class.
 - Please do not work on other computer assignments during class.
 - Please do not talk to your neighbor during class.
 - Please do not bring food or an uncovered drink into the computer classroom lab.
 - Please do not order food to be delivered to the classroom.
 - Do not use your phone during class.



Tentative Course Schedule and Assignments:

Scheduled dates may vary depending on the pace of the class.

Date	Concept	Readings	Assignments
Aug 24	Introduction and Analytics in the AFL		
Aug 26	Research Talk - Machine Learning the Harness Track		
Aug 31	Research Talk - A Study of NFL Sentiment in Twitter using Stock Market Charting		
Sep 2	Using Statistics - Mean, Standard Deviation and the DIKW Hierarchy	SA Ch 1-3	
Sep 7	Using Statistics - t-tests, p-values and Error	AM Ch 2	
Sep 9	Using Statistics - Regression and ANOVAs	AM Ch 4-5	
Sep 14	Baseball - Metrics, Pythagorean Theorem, Runs Created and Linear Weights	M Ch 1-3	
Sept 16	Baseball - Monte Carlo, ERA Forecasting and Decision Making	M Ch 4-6	
Sep 21	Baseball - Fielders, Win Averages and Value of Replacement Players	M Ch 7-9	
Sep 23	Baseball - Parks, Streakiness, Platoon Effects and Pitch Count	M Ch 10-12, 14	Case - MLB Analytics
Sep 28	Baseball Database Exploration and Discussion		
Sep 30	Football - Metrics, State & Value Analysis and Decision Making	M Ch 20-21	
Oct 5	Baseball Postseason		
Oct 7	Football - Passing, Rushing and Conversions	M Ch 23-24	
Oct 12	Football - EPA, Advanced Analytics and Visualization	AM Ch 7	Case - NFL Analytics
Oct 14	Fantasy Football		Pre-draft and Week 1 lineup
Oct 19	Basketball - Metrics, Linear Weights and +/- Ratings	M Ch 28-30	
Oct 21	60 Minutes - Basketball Analytics (Video and Discussion)		Week 2 lineup
Oct 26	How Stats Won Football from Moneyball to FC Midtjylland (Video and Discussion)		Case - NBA Analytics
Oct 28	Research Talk - Predicting Wins and Spread in the Premier League		Week 3 lineup
Nov 2	Case Discussion - Managing a Youth Soccer Organization's Data (SA pg 27)		Case - Promotion Analytics
Nov 4	How Data Analytics is Changing Professional Hockey (Video and Discussion)		Week 4 lineup
Nov 9	Case Discussion - Use of GPS to Predict Training Loads (SA pg 56)		
Nov 11	Case Discussion - Catching Managerial Issues using Analytics (SA pg 84)	SA Ch 4	Week 5 lineup
Nov 16	Case Discussion - Concessions Project Planing (SA pg 107)	SA Ch 5	Case - Concession Analytics
Nov 18	Case Discussion - Examination of a Social Media Account (SA pg 121)	SA Ch 6	Week 6 lineup
Nov 23	No Classes - Thanksgiving		
Nov 25	No Classes - Thanksgiving		
Nov 30	Case Discussion - Building an Effective Program Budget (SA pg 143)	SA Ch 7	
Dec 2	Winning at Daily Fantasy Sports Using Analytics (Video and Discussion)		Topic Report / Project

MLB Decision Analysis Report due before the first pitch of the playoffs.

NFL Decision Analysis report due 5pm, one week after the last game played.