# Syllabus for STOR 538-001
# Sports Analytics
# Spring 2024

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| **Head Coach:** | Dr. Mario Giacomazzo | **Press Conference**: | Wednesday |
| | E-mail: mgiacoma@email.unc.edu | | 9AM – 11AM |
| | Phone: 480-489-1398 | | 12PM – 2PM |
| | Office: Hanes 134 | | |

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| **Personal Trainer:** | Kendall Thomas | **Training Days:** | Monday, 1PM – 3PM |
| | Email: ketho@unc.edu | | |
| | Office: Hanes B-30 | | |

**Game Days:** TTh from 12:30PM to 1:45PM in Gardner 105

**Course URL:** Website: https://supermariogiacomazzo.github.io/STOR538_WEBSITE/

**Description:** Survey the application of statistics and mathematics to the sports industry exploring the history of analytics across various sports, understanding the advantages of sports analytics for both on-field performance and off-field business decisions, and examining current research to encourage creative thought of future development.

The course will be organized by sport to ensure a comprehensive exploration of sports analytics. We will start with in-depth studies in Baseball, Basketball, American Football, Hockey, and Soccer. Later in the course, we will branch out according to the diverse interests of the class.

The statistical programming language R will be used to generate visualizations and perform basic modeling.

**Prerequisites**: UNC STOR Master's Student / STOR 320 / STOR 455 (Required)

Proficient at Statistical Programming in R, Python, etc. (Recommended)

Proficient at Data Cleaning, Data Visualization, Data Modeling (Recommended)

Familiar with Linear Regression Models, Model Selection Methods, Cross-Validation, Probability (Recommended)

**Software:** A personal laptop with **R** or **Python** would be useful.

**Required Textbooks:** *Mathletics Second Edition,* Winston Et al., 2022 (ISBN: 9780691177625)
*Handbook of Statistical Methods and Analyses in Sports,* Albert, Glickman, Et al., 2017 (ISBN: 9781498737364)

**Final Grade:**    Attendance (5%)
    Practice (5%)
    Gameday Speeches (10%)
    Regular Season (20%)
    Playoffs (40%)
    Championship (20%)

**Attendance:**    Attendance will be taken every class using the UNC Check-in App. You will need to install the UNC Check-in app to your mobile device and bring it to every class. Starting at the beginning of class, you will have 15 minutes to check-in using the mobile app. Instructions for installing and using the UNC Check-in App are available at https://unccheckin.unc.edu/. Go to this website to learn more. You need to attend **at least 70%** of the lectures to get credit for attendance, otherwise you will receive a 0 for your attendance grade. If you need to miss class for a reason permitted by the university and you don't want to be penalized, you will need to get a university approved absence at https://uaao.unc.edu/. If you cannot get a university approved absence and don't want to be penalized, you must notify your instructor of the reason and provide documentation of the reason in email. The reason should line up with UNC'S definition of a university approved absence. For example, a job interview would not be approved by the university or me.

**Practice:**    There will be **at least one assignment** designed to test proficiency in data science. This class involves group projects that require strong data science skills. These assignments will require you to perform data science tasks with data and must be done **individually** without the help of any other students in the course. The work required for these assignments will **not** be taught in the course but will come from material and topics taught in STOR 320 and/or STOR 455 and/or other provided material. These assignments will be submitted to either Canvas or Gradescope by the due date. You will receive a 25% penalty for less than one day late, 50% penalty for less than two days late, and 75% penalty for less than three days late. After three days, practice assignments will not be accepted.

**Gameday Speeches:**    **Gameday speeches** are to be done in teams. **Biweekly**, I will give you a journal article(s) from a refereed journal to read and summarize in a **7 slide** gameday speech using summarized bullet points. First slide should contain the title of the article, the names of the author(s), and the name(s) of the presenters. Second and third slide should summarize the overarching theme of the article(s). Fourth, fifth, and sixth slide should summarize the methodology used. The seventh slide should conclude with points in the article you found interesting, confusing, and/or problematic. The presentation should be submitted on Canvas before class starts on the due date. On gameday, I will use a random number generator to pick **2 groups** to present. All groups will be graded based on the criteria, but only 2 groups will present. Groups that

present can add 0 to 3 bonus points. If your group gets selected to present, and you are not present, you don't get the bonus points and receive a penalty of 3 points.

**Regular Season:** The **regular season** consists of **biweekly** quizzes on the material presented in class over the previous two weeks. This includes what was taught in lecture, what was in the reading, and what was presented during gameday speeches. You will be given at least 15 minutes to complete in class.

**Playoffs:** There will be two rounds of playoffs during the semester both of which can be considered as miniature team projects. Both projects will have detailed rubrics.

*Round 1:* The **first round** will be a data gathering and summary report. Imagine you are an analyst working for the coach or athlete and want to discover insights that would bring a competitive edge. You will have to establish a research goal, watch or play an event/game, gather the data, and summarize your results using statistics and visualization. All of your findings will be submitted in a **paper of 3 to 5 pages**.

*Round 2:* The **second round** will be a sports betting project in which you will gamble **$0**. I will supply you with data, and then you will be required to analyze data for the purpose of making bets against point spreads. You are required to use form of statistical modeling or machine learning. In a **paper of 3 to 5 pages**, you will summarize the data you used, the methodology employed, and your final picks based off prediction.

**Championship:** The **Championship** will consist of a **7 to 12 paged research paper** with a minimum of **10 citations** studying a sport of interest that is not of focus in the course. You will need to submit the assignment by **4PM** on **Monday, May 6.** Like the playoffs, this final assignment will be done in a team. Sometime during the scheduled final exam time, **May 6** between **4PM** and **7PM,** your team will be able to meet with me to discuss your experience in this class and your paper. The paper will be organized in the following subsections:

*Introduction***:** Describe the sport selected by writing about how it is played, when is it played, where is it most popular, how much capital is invested, and why you chose it.

*Literature Review:* Discuss how analytics have been used historically in the sport, what types of metrics are used to evaluate performance on the field and/or off the field, who are the best athletes/teams/organizations based off those metrics. Many obscure sports do not have an extensive history of complex analytics, but all sports track information in order to evaluate performance. Talk about any implementation of gambling and what types of bets exist.

*Future Work:* Critically think about where you see ways in which analytics can be used to improve the sport. Think about ways in which analytics from other more popular sports could be applicable in the sport you selected. Try to creatively design metrics that could be of use to evaluate performance. This section is the most important and should test your ability to innovate in areas primarily ignored that require innovation for growth. What information does the sport have or not have that could help the organizations, managers, or athletes that are financially invested in the sport you selected.

*Conclusion:* Summarize your paper and discuss what appreciation you gained for this sport after your in-depth analysis.

**Team Projects:** Many of the assessments in this course will be done in a team of **5 or 6 students** randomly chosen. For each team-based assignment, you will be given a different team. This will force you to interact with the majority of the class throughout the semester. After each team-based assignment, you will grade the contribution of your teammates on a scale from **0 to 3** and this will contribute to your overall grade for the given assignment. A decent portion of your final grade will be influenced by this.

**Grade Scale:** The below grading scale is guaranteed.

| A | 93 to 100 | B | 83 to 86.99 | C | 73 to 76.99 | D | 60 to 66.99 |
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| A- | 90 to 92.99 | B- | 80 to 82.99 | C- | 70 to 72.99 | F | 0 to 59.99 |
| B+ | 87 to 89.99 | C+ | 77 to 79.99 | D+ | 67 to 69.99 | | |

**UNC Attendance Policy**: As stated in the University's Class Attendance Policy, no right or privilege exists that permits a student to be absent from any class meetings, except for these University Approved Absences:

1. Authorized University activities: University Approved Absence Office (UAAO) website provides information and FAQs for students and FAQs for faculty related to University Approved Absences

2. Disability/religious observance/pregnancy, as required by law and approved by Accessibility Resources and Service and/or the Equal Opportunity and Compliance Office (EOC)

3. Significant health condition and/or personal/family emergency as approved by the Office of the Dean of Students, Gender Violence Service Coordinators, and/or the Equal Opportunity and Compliance Office (EOC).

Instructors may work with students to meet attendance needs that do not fall within University approved absences. For situations when an absence is not University approved (e.g., a job interview, illness/ flu or club activity), instructors are encouraged to work directly with students to determine the best approach to missed classes and

make-up assessment and assignments. Dr. Mario will require digital documentation in situations that are not University approved, but instructor approved. Without documentation, approval to miss class will definitely not be given, and Dr. Mario has the right to inspect the validity of the documentation. Dishonest documentation is a violation of UNC's honor code.

**Technology Use:** Students are required to bring their cell phone and computer to every class. Students will have to uses computers to take quizzes and perform presentations.

**Time Limit for Grade Disputes:** You only have 1 week after the grading of an assessment is complete to dispute your grade and possibly receive points back for that assessment. The only grade that should be disputed and modified after the last day of class is the final exam. Dr. Mario makes mistakes and desires that all students receive a fair grade that is correct. However, it is the student's responsibility to review their grades on assignments in a timely manner so that Dr. Mario can make fair decisions and modify grades quickly.

**Accessibility Resources:** Accessibility Resources and Service (ARS – ars@unc.edu) receives requests for accommodations, and through the Student and Applicant Accommodations Policy determines eligibility and identifies reasonable accommodations for students with disabilities and/or chronic medical conditions to mitigate or remove the barriers experienced in accessing University courses, programs and activities.

ARS also offers its Testing Center resources to students and instructors to facilitate the implementation of testing accommodations.

Faculty and instructors with any concerns or questions about accommodations and/or their implementation, are invited to reach out to ARS to discuss.

**Undergraduate Testing Center:** The College of Arts and Sciences provides a secure, proctored environment in which exams can be taken. The center works with instructors to proctor exams for their undergraduate students who are not registered with ARS and who do not need testing accommodations as provided by ARS. In other words, the Center provides a proctored testing environment for students who are unable to take an exam at the normally scheduled time (with pre-arrangement by your instructor). For more information, visit http://testingcenter.web.unc.edu/.

**Honor Code:** Remember that as a student of UNC-Chapel Hill, you are bound by the University's Honor Code, which states that "It shall be the responsibility of every student at The University of North Carolina at Chapel Hill to obey and support the enforcement of the Honor Code, which prohibits lying, cheating, or stealing when these actions involve academic processes or University students or academic personnel acting in an official capacity." An especially serious Honor Code violation is plagiarism. You may wish to take a tutorial on plagiarism that was developed by librarians at UNC, Duke, NCSU, and NCCU. If you have questions, please consult your instructor.

You are not permitted to download or upload any content from this course to the web in any form, including but not limited to Chegg, Course Hero, Coursera, Google Drive, etc. If you post my course content, you may be violating my intellectual property rights. If you post your own work from this course, you are allowing sites to profit from your intellectual property. In utilizing web sources to upload or download course content, you risk violating the University's Honor Code.

**IT Acceptable Use Policy:** By attending the University of North Carolina at Chapel Hill, you agree to abide by the University of North Carolina at Chapel Hill policies related to the acceptable use of IT systems and services. The Acceptable Use Policy (AUP) sets the expectation that you will use the University's technology resources responsibly, consistent with the University's mission. In the context of a class, it's quite likely you will participate in online activities that could include personal information about you or your peers, and the AUP addresses your obligations to protect the privacy of class participants. In addition, the AUP addresses matters of others' intellectual property, including copyright. These are only a couple of typical examples, so you should consult the full Information Technology Acceptable Use Policy, which covers topics related to using digital resources, such as privacy, confidentiality, and intellectual property.

Additionally, consult the Safe Computing at UNC website for information about data security policies, updates, and tips on keeping your identity, information, and devices safe.

**Counseling and Psychological Services:** UNC-Chapel Hill is strongly committed to addressing the mental health needs of a diverse student body. The Heels Care Network website is a place to access the many mental health resources at Carolina. CAPS is the primary mental health provider for students, offering timely access to consultation and connection to clinically appropriate services. Go to their website https://caps.unc.edu/ or visit their facilities on the third floor of the Campus Health building for an initial evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate assistance.

**Title IX and Related Resources:** Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC at https://eoc.unc.edu/report-an-incident/ or by contacting the University's Title IX Coordinator (Elizabeth Hall, titleixcoordinator@unc.edu) or the Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu). Confidential resources include Counseling and Psychological Services and the Gender Violence Services Coordinators (gvsc@unc.edu). Additional resources are available at safe.unc.edu.

**Policy on Non-Discrimination:** The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's [Policy Statement on Non-Discrimination](#) offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (email [reportandresponse@unc.edu](mailto:reportandresponse@unc.edu) or see additional contact info at [safe.unc.edu](http://safe.unc.edu)) or the Equal Opportunity and Compliance Office at [https://eoc.unc.edu/report-an-incident/](https://eoc.unc.edu/report-an-incident/).

**Learning Center:** Want to get the most out of this course or others this semester? Visit UNC's Learning Center at [http://learningcenter.unc.edu](http://learningcenter.unc.edu) to make an appointment or register for an event. Their free, popular programs will help you optimize your academic performance. Try academic coaching, peer tutoring, STEM support, ADHD/LD services, workshops and study camps, or review tips and tools available on the website.

**Writing Center:** For free feedback on any course writing projects, check out UNC's Writing Center. Writing Center coaches can assist with any writing project, including multimedia projects and application essays, at any stage of the writing process. You don't even need a draft to come visit. To schedule a 45-minute appointment, review quick tips, or request written feedback online, visit [http://writingcenter.unc.edu](http://writingcenter.unc.edu).

**Legal:** Dr. Mario reserves the right to make changes to the syllabus, including all due dates. These changes will be announced as early as possible so that students can adjust their schedules.