EXSS XXX-001: Data Science and Elite Athlete Performance

Fall 2026

Meeting Time: T/TH 11:00 AM - 12:15 PM
Location: Woollen Gym, Rm 301
Instructor: Malia Blue, PhD
Email: mblue@unc.edu
Office: Fetzer Hall, Rm 216
Office Hours: Wednesday: 11:00 AM – 1:00 PM or by appointment via zoom

Course Description.

Are you passionate about sports and interested in how data science can be used to maximize athletic performance? This comprehensive course will delve into the dynamic world of data science and its application in optimizing athlete strength, conditioning, physiology, psychology, nutrition, and overall wellness.

In this course, you will gain a deep understanding of how data-driven approaches are revolutionizing the world of sports. From tracking an athlete's physical capabilities and performance metrics to analyzing the psychological factors influencing their success, you will explore the full spectrum of factors that contribute to peak athletic performance. *Prerequisites: MATH 110.*

Course Objectives/Learning Outcomes.

1. Gain an understanding of the type of data collected across sport performance disciplines (e.g., strength and conditioning, nutrition, sport psychology) to support elite athlete performance.
2. Connect data science measures to the physiological and psychological elements of athlete performance.
3. Explore the multitude of devices and systems available to collect data and best practices for implementation for individual and team performance.
4. Learn the fundamentals of data analysis, visualization, and interpretation.

Textbook.

NSCA's Essentials of Sport Science. 1st Edition. Human Kinetics.

Teaching Methods.

The course may include a combination of lectures, data collection, data observations, discussions, problem sets, and case studies. Reading assignments and video viewing may also be required. Some sections of text and assigned reading material may not be discussed in complete fullness during class.

Canvas Statement.

It is the student's responsibility to check Canvas regularly for course announcements, changes in class or test schedules, assignments, data observation opportunities, or any other change from this document. Failure to do so could result in the student missing some aspect of this class.

Grading Components.

In Class Work + Participation:	30%
Assignments:	20%
Section Projects + Presentations:	25%
Final Project:	25%
Total:	**100%**

Summary of Course Assessments.

In-Class Work Days + Participation. Students will be expected to actively participate during guest lecturers, lab tours and hands-on data experiences. In class work days may also include worksheets, article discussions, etc. assigned during class. Actively engaging in and completing these tasks as well as providing reflections on learned material will be incorporated into your grade.

Assignments. A combination of videos, individual case studies and supplemental questions may be used to expose students to the type of measurements and data collected in sport performance. Supplemental questions and construction of figures/tables will assess students 1) ability to synthesize and visualize data, 2) critical thinking skills and 3) ability to apply course material.

Section Project + Presentations. *In groups,* students will complete a data science method (e.g., technology, questionnaire) overview for 2 sections of their choice (e.g., S&C, Nutrition, Sports Medicine). Students will construct a brief "blog" post and 5-minute presentation introducing the class to a method to measure an identified outcome (e.g., speed, workload, resilience).

Final Project. Students will select an area of data science for sports performance measured by the Oura Ring. In Groups, students will synthesize course material by going through the steps of data collection, cleaning, analysis, interpretation and visualization. Students will complete a write up and presentation discussing the importance of their selected outcome, how the data is collected, and how it can be applied to improve elite performance.

Final Grade Distribution.

A	≥ 93%	C+	<80-77%
A-	<93-90%	C	<77-73%
B+	<90-87%	D+	<70-67%
B	<87-83%	D	<67-60%
B-	<83-80%	F	<60%

Grade Appeal Process: If you feel you have been awarded an incorrect grade, please discuss with me within the first 7 days of the grade being posted. If we cannot resolve the issue, you may talk to our departmental director of undergraduate studies or appeal the grade through a formal university process based on arithmetic/clerical error, arbitrariness, discrimination, harassment, or personal malice. To learn more, go to the Academic Advising Program website.

Policies.

Code of Conduct. All students are expected to follow the guidelines of the UNC Honor Code. In particular, students are All students are expected to adhere to University policy and follow the guidelines of the UNC Code of Conduct. Additional information can be found at https://studentconduct.unc.edu/.

Artificial Intelligence (AI) Use Policy. Use of generative AI tools of any kind is not permitted in this course for any work submitted for a grade. Any use of these tools will be considered an instance of academic dishonesty and will be referred to the Honor System.

University 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
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).

*The UAAO website provides information and FAQs related to University Approved Absences.

Class Attendance Policy. Students are expected to attend all classes. Please communicate with me early about potential absences. Any material missed due to absence or tardiness is the responsibility of the student to obtain, no additional lectures will be held, and this material will not be retaught during office hours.

Missed Assignments. You may not make-up concept checks, review assignments, or class participation activities. If you are absent from class you will earn a "0" for that particular activity. If you foresee an issue with completing an assignment on time, notify me BEFORE the assessment is due, but that does not guarantee the option to make up missed work.

Course Policies

1. Course content will be provided via pdf. Some updates may be made to previously posted materials; updates will be communicated via Canvas.
2. Do not have your mobile phones out during class (unless they are being used for some type of class activity) or you may be asked to leave class.
3. Be respectful of other people around you.
4. Computers are allowed for taking notes and class-related activities. It is expected you will not use your device for activities outside of the realm of this class. If this becomes a consistent issue or distraction, you may be asked to leave class.
5. Hats/Caps, hoods, headphones/earphones will not be allowed to be worn during quizzes and exams. All phones, tablets, notes, etc. not required for the exam must be placed in your bag.
6. When possible, please let me know ahead of time if/when you plan to come to office hours.

Within the first 2 weeks of class, students whose UNC-sponsored extracurricular activities require a class absence due to event travel must present their official schedule from their coach/faculty sponsor to the instructor for noted "excused" absences and/or make-up exam/report/lab arrangements. Failure to present

this documentation will result in "unexcused" absences for your official UNC-sponsored activities. Employment schedules (UNC or "other") needs to be worked out in advance to accommodate your class attendance requirements.

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

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 (see contact info at safe.unc.edu) or the Equal Opportunity and Compliance Office, or online to the EOC at https://eoc.unc.edu/report-an-incident/.

Diversity Statement. I value the perspectives of individuals from all backgrounds reflecting the diversity of our students. I strive to make this classroom an inclusive space for all students. Please let me know if there is anything I can do to improve. I appreciate suggestions.

Services and Student Support.

Equal Opportunity and Compliance – Accommodations
Equal Opportunity and Compliance Accommodations Team (Accommodations - UNC Equal Opportunity and Compliance) receives requests for accommodations for disability, pregnancy and related conditions, and sincerely held religious beliefs and practices through the University's Policy on Accommodations. EOC Accommodations team determines eligibility and reasonable accommodations consistent with state and federal laws.

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 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 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/. Please contact the University's Title IX Coordinator (Elizabeth Hall, interim – titleixcoordinator@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at safe.unc.edu.

Additional Help.

The Learning Center is available to help optimize study time. Visit UNC's Learning Center at 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. Additionally, 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.

Strategies for Success.
Everyone has their own way of studying, completing coursework, preparing for exams, etc. Although positive results cannot be guaranteed, the below list provides some recommended strategies that have helped students succeed.

- Read the assigned text prior to class. Take notes as you read to ask questions in class.
- Come to class and actively engage in taking notes. Do not solely rely on lecture slides.
- Following the class, rewrite your text and lecture notes (e.g., write key concepts on note cards)
- Find a class "buddy" to review class material with, to help with notes you may have missed and to study with. Try to teach the material to them to see if you can fully explain a concept.
- Test yourself frequently to help with retention. Put your notes away and see what you can recall.
- Schedule an appointment with me to ask questions.
- Be proactive with your grade; if you are starting to feel behind in your understanding, schedule an appointment with me sooner rather than later.

Tentative* Course Outline.

*The professor reserves the right to make changes to the syllabus, including assignment and test dates. These changes will be announced as early as possible in class and/or on Canvas.

Week	Date	Topic	Reading	Assignment
1	8/15	**Introduction to Data Science** *What is it?* *How and when can it be used to define elite performance?*		
	8/17	**Introduction to Data Science** *Subjective v. Objective measures* *Individual v. team*		
2	8/22	**Strength and Conditioning** *Performance and injury prevention outcomes* *Physiological basis for outcomes*		
	8/24	**Strength and Conditioning** *Technology to measure performance and injury prevention outcomes*		
3	8/29	**Strength and Conditioning** *Tracking team and individual changes across a season, career, return to play*		
	8/31	**Strength and Conditioning** *Strength and Conditioning Coach Q and A* *How do they use the data? What's collected?* *How were they trained?*		
4	9/5	No Class		
	9/7	**Strength and Conditioning** *Data analysis, visualization and interpretation* *Case Study – Individual across season data*		
5	9/12	**Strength and Conditioning** *Sport Performance Lab Tours* *Data analysis, visualization and interpretation Cont.*		
	9/14	**Nutrition** *Performance and injury prevention outcomes* *Physiological basis for nutrition outcomes*		

6	9/19	**Nutrition** *Technology, diaries, questionnaires to measure nutrition outcomes*		
	9/21	**Nutrition** *Tracking team and individual changes across a season, career, return to play*		
7	9/26	No Class		
	9/28	**Nutrition** *Sport Dietician Q and A* *How do they use the data? What's collected?* *How were they trained?*		
8	**10/3**	**Nutrition** *Data analysis, visualization and interpretation* *Case study – tracking changes following supplement intervention*		
	10/5	**Sport Psychology** *Performance and return to play psychology outcomes* *Psychological and physiological basis for outcomes*		
9	10/10	**Sport Psychology** *Technology and screening tools to measure performance and return to play psychology*		
	10/12	**Sport Psychology** *Sport Performance Psychology Specialist Q and A* *How do they use the data? What's collected?* *How were they trained?*		
10	10/17	**Sport Psychology** *Psychology of Injury Laboratory visit* *Data analysis, visualization and interpretation*		
	10/19	**Sport Psychology** *Data analysis, visualization and interpretation* *Team Report Card of Sport Psychology outcomes*		

11	10/24	**Sports Medicine** *Performance and return to play psychology outcomes* *Psychological and physiological basis for outcomes*		
	10/26	**Sports Medicine** *Technology and screening tools to measure performance and return to play psychology*		
12	10/31	**Sports Medicine** *Sport Performance Psychology Specialist Q and A* *How do they use the data? What's collected? How were they trained?*		
	11/2	**Sports Medicine** *Data analysis, visualization and interpretation* *Team Report Card of Sport Psychology outcomes*		
13	11/7	**Sleep & Recovery** *Sleep and Recovery for Performance Outcomes* *Psychological and physiological basis for outcomes*		
	11/9	**Sleep & Recovery** *Technology and screening tools to measure sleep and recovery for performance* *Introduction and distribution to the Oura Ring*		
14	11/14	**Sleep & Recovery** *Sleep & Recovery Specialist Q and A* *How do they use the data? What's collected? How were they trained?*		
	11/16	**Sleep & Recovery** *Oura Ring Data Cleaning and Analysis*		
15	11/21	**Sleep & Recovery** *Oura Ring Project Work Day*		
	11/23	**Thanksgiving Break**		
16	11/28	Final Project Presentation		
	11/30	Final Project Presentation		