

**USC** Dornsife  
College of  
Letters, Arts and  
Sciences

**Course ID and Title:** HBIO 250G – The Pharmacology of Performance-Enhancing Drugs

**Units:** 4

**Term – Day – Time:** Fall 2024 – MWF – 10:00 – 10:50 a.m.

**Location:** THH 102

**Lecture:** Monday/Wednesday/Friday 10:00 a.m. – 10:50 a.m.

**Location:** SLH 102

**Instructor:** Kurt E. Kwast, Ph.D.

**Office Hours:** Wednesday 12:10 p.m. – 1:40 p.m., Thursday 11:00 a.m. – 12:30 p.m. via Zoom (Meeting ID: 981 665 0147 Passcode: HBIO), and by appointment

**Office Hour Location:** AHF 251

**Office:** AHF B39

**Contact Information:** [kwast@usc.edu](mailto:kwast@usc.edu)

**Discussion Leaders and Times:**

**Alexander “Zander” Bashaw:** Monday 12:00 a.m. – 12:50 a.m. (38430R)

**Logan Lauer:** Wednesday 2:00 – 2:50 p.m. (38431R)

**Katherine Merklng:** Thursday 2:00 – 2:50 p.m. (38432R)

**Katherine Merklng:** Friday 12:00 – 12:50 p.m. (38433R)

**Location:** PED 203

**Office Hours:** TBA

**Office Location:** TBA

**IT Help: Dornsife Technology Services**

**Hours of Service:** TBA

**Contact Info:** <https://dtssupport.usc.edu>, 213-740-2775

## Course Description

The science of drugs, nutritional supplements, and ergogenic aids that are purported to enhance human athletic performance and the ethical issues surrounding their use. Students will develop an appreciation of the complex, emotive, potentially dangerous, and illegal use of performance-enhancing drugs in sports concentrating on the science behind specific drug use in particular sporting events as well as its ethical, social, political, and administrative context.

## Learning Objectives

Upon the successful completion of this course, students will be able to describe and explain the effects of pharmacological and ergogenic agents on human performance in sports. Specific learning objectives include the following:

- Identify and describe the structure and function of the body's muscular, neuromusculoskeletal, and cardiorespiratory systems, their responses to exercise, and how pharmacological agents alter their responses.
- Explain the general effects and any short- and/or long-term adverse effects of commonly used performance-enhancing drugs, including illegal, recreational, prescription, and over-the-counter drugs as well as dietary supplements.
- Construct and diagram the regulatory structure of anti-doping in sports.
- Describe and use the World Anti-Doping (WADA) Code and be able to explain inclusion criteria and the categories and classification of substances as well as methods that appear on the WADA Prohibited List.
- Place performance enhancement in sports into a physiological, sociological, and ethical context.
- Apply pharmacological knowledge to solve conceptual and real-world problems in sports physiology and performance enhancement.

## Technological Proficiency and Hardware/Software Required

This course is utilizing the university's new Learning Management System (LMS), [D2L Brightspace](#), which has now replaced Brightspace as the university-wide LMS. *Prior to the start of the course*, please make sure that you have access to the lecture and laboratory Brightspace pages, and that you take some time to familiarize yourself with the Brightspace platform. Follow the instructions below to log in to Brightspace, and, should you have any questions or concerns, we encourage you to contact the course instructor and/or the Brightspace ITS team (at [brightspace@usc.edu](mailto:brightspace@usc.edu), or call (213) 740-5555, choose option 2 then 2).

## Brightspace Login Instructions

1. Go to <https://brightspace.usc.edu/d2l/login>
2. Enter your USC Net ID to access your organization homepage
3. Begin navigating through Brightspace

## USC Technology and Loaner Program

If students need resources to successfully participate in this class, such as a laptop or internet hotspot, you may be eligible for the university's loaner program. Please see the following links for additional relevant information: [USC Computing Center Laptop Loaner Program](#); USC Technology Support Links: [Zoom information for students](#), [Brightspace help for students](#), [Software available to USC Campus](#).

## Required Materials

***Drugs in Sport*, 7<sup>th</sup> or 8<sup>th</sup> edition**, edited by David Mottram & Neil Chester, Routledge Press, London, 7<sup>th</sup> 2018 ISBN-13: 978-0415789417; 8<sup>th</sup> 2022 ISBN: 978-1003096160. New paperback copies are available at the campus bookstore. Used and electronic copies are available from various online resources including the publisher's website. Purchasing options will be covered in the first introductory lecture.

## Optional Materials

***William Llewellyn's Anabolics*, 11<sup>th</sup> edition**, Molecular Nutrition, LLC, Jupiter, FL, 2017. ISBN-13: 978-0999062111 (hardcover) or ISBN-13: 978-0999062104 (softcover). New and used copies are available from various online resources including the publisher's. NOTE: Even though I will be presenting some material from this text, it is not necessary for you to purchase this book.

***Run, Swim, Throw, Cheat: The Science Behind Drugs in Sport***, Cooper, C. Oxford University Press, Oxford, UK, 2012 (ISBN-13: 978-0199678785). New and used copies are available from various online resources including the publisher's. NOTE: Even though I will be presenting some material from this text, it is not necessary for you to purchase this book.

## Description and Assessment of Assignments

**Written Exams** will be administered in person on specific days during the class period (see Course Schedule below). Exams may be delivered electronically and, if so, will require installation of [Respondus Lockdown Browser](#) on a PC or Mac computer (Chromebooks are not supported). Exams will be used to access all of the learning objectives. Exams may include multiple choice, multiple answer, true or false, fill-in-the-blank, short answer, or essay questions. A request to take a make-up exam must be accompanied by evidence of a university-sanctioned excused absence (*e.g.*, a letter from a doctor, athletic release, etc.) and must be made before the date of the scheduled exam. Make-up exams may be given in a different format from that of the scheduled exam (*e.g.*, essay). Should the university allow asynchronous students to enroll, online exams may be administered at a different time or day. Asynchronous students who live in a time zone in which taking exams synchronously would be highly inconvenient should contact me the first week of class to discuss arrangements.

**In-Class Work** will largely be unscheduled and used to access all learning objectives, especially the last two. Work may include small group assignments, polls, a summary of lecture points, open-note or closed-note quizzes, problem solving in groups, a submitted question of a "muddy point," or other individual assignments to be submitted or reported on by the end of class. When working in groups, all members will receive the same score for the work product. Students who miss an assignment as a result of either arriving late or leaving early will not have the opportunity to make up the work. However, the lowest three in-class assignments will be dropped to allow for occasional absences. Should the university allow for students to attend remotely, students who live in a different time zone in which synchronous in-class assignment completion would be extremely inconvenient should contact me during the first week of class to discuss accommodations for in-class work.

One of the purposes of having a **Discussion Section** beyond the clarification of content covered in lecture is to lay out expectations and help develop the **term paper**, which will account for 20% of your grade. In brief, the term paper will be a 4 – 5 page (double-spaced) "cause and effect" literature review research paper on a specific drug or ergogenic agent of your choice with purported performance-enhancing qualities. The discussion leader will provide a detailed description of the paper, which will include supporting documentation of its performance-enhancing qualities and citations from

recent primary research articles. A rubric for grading will be provided by the discussion leader. The term paper is due November 2<sup>nd</sup> and will be submitted on Brightspace for grading by the discussion leader.

### Grading Breakdown

| Assignment   | Points      | % of Grade |
|--|-------------|------------|
| Pop Quizzes/In-Class Work  | 100         | 10         |
| Midterm 1  | 150         | 15         |
| Midterm 2  | 150         | 15         |
| Midterm 3  | 150         | 15         |
| Final Exam   | 200         | 20         |
| Discussion In-Class Work (50 points) and Term Paper (200 points) | 250         | 25         |
| <b>Total</b>   | <b>1000</b> | <b>100</b> |

### Grading Scale

| Letter Grade | Point Ranges | Grade Point Value |
|--------------|--------------|-------------------|
| A            | 930-1000     | 4.000             |
| A-           | 900-929      | 3.667             |
| B+           | 870-899      | 3.333             |
| B            | 830-869      | 3.000             |
| B-           | 800-829      | 2.667             |
| C+           | 770-799      | 2.333             |
| C            | 730-769      | 2.000             |
| C-           | 700-729      | 1.667             |
| D+           | 670-699      | 1.333             |
| D            | 630-669      | 1.000             |
| D-           | 600-629      | 0.667             |
| F            | <600         | 0.000             |

Individual exams, quizzes, in-class assignments, and the term paper will be scored but not assigned a letter grade. Only the final point tally will be used to assign a letter grade. Additional details about grading and the possible application of a final point total curve will be discussed during the first introductory lecture.

### Late Work

All in-class assignments will be due as indicated during class when delivering the assignment, typically by the end of class, and they cannot be made up unless there is a university-sanctioned excuse for missing class. Similarly, any pre-

lecture or homework assignments will have published due dates and will not be accepted late. Late submission of the term paper will result in a 2% reduction in the total score per day after the due date.

### **Communication Policies**

Students are *strongly* encouraged to contact the instructor in regard to all matters involving course content or policy during office hours. Should you have a question about specific course content and cannot attend office hours, students are encouraged to submit their question to the course blog. Should you need to communicate with the instructor outside of class or office hours about a question other than course content, please email the instructor from your USC email account *making sure to include in the subject line the course number* (expect significant delays or no response if this information is omitted). Simple questions will be answered by email but for more complex discussions students may be instructed to visit office hours. Best attempts will be made to answer all emails within 48 hours, 72 hours over a weekend and the work day following a holiday. Note that the instructor may not respond to non-emergency emails 24 hours preceding an exam and may not respond to emails sent from non-USC accounts.

To promote independence and critical thinking, students are encouraged to work through the following process for obtaining answers to course-related questions before contacting the instructor. First, consult the course syllabus. If you cannot find the answer you need, next please consult a classmate. If you still cannot find a satisfactory answer, email the instructor using your USC email *making sure to include the course number in the subject line*. In your email, please indicate the steps you have gone through to seek the answer for your question. Use your USC email account for all correspondence with the instructor.

### **Technology Policies**

It is expected that students will use any internet-enabled device(s) to participate in activities guided by the instructor alone. Such activities include looking up terms, doing research, and completing in-class assignments. Please make sure all electronic devices are silenced so as not to disturb classmates or the instructor during class. Use of electronic devices for other purposes during class is strongly discouraged and you may be asked to put a device away should your instructor deem it to be disruptive. If you require an internet-enabled device, please see the “Technological Proficiency and Hardware/Software Required” section above.

### **Lecture Participation**

Students are expected to attend lectures in-person and to participate in in-class activities, which may include as noted above small group assignments, polls, a summary of lecture points, open-note quizzes, problem solving in groups, a submitted question of a “muddy point,” or other individual assignments to be submitted or reported on by the end of class unless otherwise noted.

### **Diversity, Equity, and Inclusion Statement**

I and your discussion leader are committed to the creation and maintenance of inclusive learning spaces in which you will be treated with respect and dignity and where all individuals are provided equitable opportunity to participate, contribute, and succeed. In HBIO 250, all students are welcome regardless of race/ethnicity, gender identities, gender expressions, sexual orientation, socio-economic status, age, disabilities, religion, regional background, Veteran status, citizenship status, nationality and other diverse

identities that each of you and the faculty bring to class. I view the diversity that all of us bring to this class as a resource that cultivates strength and benefit.

Your success at USC and beyond is enhanced by the innovation and creativity of thought that inclusive classrooms facilitate. The success of an inclusive classroom relies on the participation, support, and understanding of you and your peers. I encourage you to speak up and share your views, but also to understand that you are doing so in a learning environment in which we all are expected to engage respectfully and with regard to the dignity of all others.

It is my intent that all students be well served by this course and that your learning needs be addressed both in and out of class. If your needs are not being met, please talk to me or the appropriate resource provider listed at the end of this syllabus.

### **Classroom Norms**

At all times, students are expected to promote and support a positive learning environment, to listen actively and attentively, to follow best practices of inclusivity, to be respectful of the instructors' and fellow students' views and opinions, and to only provide *constructive* criticisms and critiques when asked to do so.

### **Zoom Etiquette (if applicable)**

In order to simulate an in-class-room experience during any synchronous Zoom sessions, one that promotes positive interactions and feedback to the instructor and fellow students, students are strongly encouraged to attend the sessions dressed in classroom attire and to turn on their webcams if they are located in a learning-appropriate environment. So as to circumvent Zoom bombing, synchronous Zoom sessions will be password protected and students will only be allowed to enter through the USC's Brightspace site when displaying their full name as it appears in the class roster (aliases are not permitted). Microphones should be muted unless actively asking questions or involved in discussion. In-meeting chat will likely be enabled but actively monitored for disruptive or inappropriate posts and recorded for further review. Disruptive or inappropriate behavior will not be tolerated and anyone engaging in such behavior shall be removed from the session. Should bandwidth be an issue, try joining with the video from your webcam and use your cellphone for the audio. If you have any questions or concerns about complying with these policies, please email the instructor.

### **Synchronous Session Recordings**

If we are instructed to do so by the administration, all synchronous sessions save for office hours will be recorded and posted on Brightspace, typically within a few hours of the session. Should the university not require lectures to be recorded, it will be up to your course instructor and discussion leader to decide based upon factors such as in-person attendance.

### **Sharing of Course Materials Outside of the Learning Environment is Strictly Prohibited**

USC has a strict policy (SCampus Section 11.12[B]) that prohibits sharing of *any* synchronous and asynchronous course content outside of the learning environment. Any student who violates this policy will be prosecuted to the maximum extent allowable by the USC Student Conduct Code, including failure of the course and suspension from the University.

*Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy).*

## Tentative Course Schedule

| DATE     | TOPIC, EVENT, OR HOLIDAY   | MOTTRAM & CHESTER, 7 <sup>th</sup> |
|----------|--|------------------------------------|
| Aug. 26  | Introduction   |                                    |
| Aug. 28  | What is a Performance Enhancing Drug (PED) and Ergogenic Factor?       | Ch. 1                              |
| Aug. 30  | PEDs & Limits to Human Performance and Influence of Drugs              | Ch. 1 - 2                          |
| Sept. 2  | <b>LABOR DAY HOLIDAY</b>   |                                    |
| Sept. 4  | History of Doping, Oversight and Current Regulations (IOC, WADA, etc.) | Ch. 3 - 5                          |
| Sept. 6  | History of Oversight Continued Pharmacology                            | -                                  |
| Sept. 9  | Pharmacology, Pharmacodynamics, & Pharmacokinetics                     | -                                  |
| Sept. 11 | Pharmacology Continued & Skeletal Muscle Architecture and Organization | -                                  |
| Sept. 13 | Skeletal Muscle Architecture and Organization Continued                | -                                  |
| Sept. 16 | Skeletal Muscle Design II Skeletal Muscle Growth Pathways              | -                                  |
| Sept. 18 | Skeletal Muscle Growth Pathways  | -                                  |
| Sept. 20 | Review of Material for Midterm Exam 1                                  |                                    |
| Sept. 23 | <b>MIDTERM EXAM 1</b>  |                                    |
| Sept. 25 | Skeletal Muscle Excitation-Contraction Coupling                        | -                                  |
| Sept. 27 | Motor Unit Recruitment, Types of Contractions & Bioenergetics          | -                                  |
| Sept. 30 | Bioenergetics Continued  | -                                  |
| Oct. 2   | Respiro-Cardiovascular System  | -                                  |
| Oct. 4   | Respiro-Cardiovascular System Continued                                | -                                  |
| Oct. 7   | Anabolic Agents  | Ch. 9 +12                          |
| Oct. 9   | Peptide Hormones   | Ch. 10                             |
| Oct. 11  | <b>FALL RECESS</b>   |                                    |
| Oct. 14  | $\beta$ -2 Agonists  | Ch. 11                             |
| Oct. 16  | Diuretics and Masking Agents   | Ch. 13                             |
| Oct. 18  | Oxygen Transport (Hemoglobin / RBCs / EPO)                             | Ch. 14                             |
| Oct. 21  | Blood Doping, EPO and O <sub>2</sub> Carriers                          | Ch. 14                             |
| Oct. 23  | Narcotics  | Ch. 18                             |

|            |  |             |
|------------|--|-------------|
| Oct. 25    | Review of Material for Midterm Exam 2                      |             |
| Oct. 28    | <b>MIDTERM EXAM 2</b>                                      |             |
| Oct. 30    | Cannabinoids   | Ch. 19      |
| Nov. 1     | Glucocorticoids  | Ch. 20      |
| Nov. 4     | Alcohol  | Ch. 21      |
| Nov. 6     | Beta Agonists & Antagonists                                | Ch. 22      |
| Nov. 8     | Caffeine & Other Stimulants                                | Ch. 17 + 25 |
| Nov. 11    | <b>VETERAN'S DAY HOLIDAY</b>                               |             |
| Nov. 13    | NSAIDS and OTC Drugs ( <b>Term Paper Due</b> )             | Ch. 23      |
| Nov. 15    | Supplements for High-Intensity Exercise/Exercise Nutrition | Ch. 24      |
| Nov. 18    | Other Supplements  | Ch. 24      |
| Nov. 20    | Gene Doping  | Ch. 16      |
| Nov. 22    | Review of Material for Midterm Exam 3                      |             |
| Nov. 25    | <b>MIDTERM EXAM 3</b>                                      |             |
| Nov. 27&29 | <b>THANKSGIVING BREAK</b>                                  |             |
| Dec. 2     | Muscle Adaptations to Increased Use I                      | -           |
| Dec. 4     | Muscle Adaptations to Increased Use II                     | -           |
| Dec. 6     | Wrap Up and Final Exam Review                              |             |
| Dec. 16    | <b>8:00 a.m. – 10:00 a.m. FINAL EXAMINATION</b>            |             |

## Statement on Academic Conduct and Support Systems

### Academic Integrity:

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, comprises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (*e.g.*, falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.



For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

### **Students and Disability Accommodations:**

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at [osas.usc.edu](https://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

### **Support Systems:**

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-5086 or (213) 821-8298

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.