

Neuromuscular Physiology: KINS 4690 / 6690**Instructor: Owais Khan**

Meeting: Room 202, Ramsey Center
(face-to-face format)

Monday + Wednesday + Friday, 12.40pm – 1.30pm

Course Description:

This course aims to provide an overview of the **structure** (*functional anatomy*), **function** (*physiology*) and **clinical relevance** (*pathology, pathophysiology*) of **skeletal muscles**. For ease of communication and simplicity, the course content is divided into two sections, namely (1) **skeletal muscle structure and function**, and (2) **applied skeletal muscle physiology** related to exercise, illness and disease.

Course Theme:

The division mentioned above is superficial at best; throughout the course, the pre-eminent focus will be on **exploring a common theme: form follows function**.

“Whether it be the sweeping eagle in his flight, or the open apple-blossom, the toiling workhorse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the coursing sun, **form ever follows function, and this is the law. Where function does not change, form does not change**” – Architect Louis Sullivan

Course Prerequisites:

None, although some exposure to basic college-level biology/anatomy/physiology may help.

Course Instructor:

Owais Ahmed Khan (he/him/his)- I prefer Owais (pronounced Oh-ways), or simply Mr. ‘O’

Office: Ramsey Centre - Room 348

owais.khan@uga.edu → this is my preferred means of communication, **please do not send me emails via eLC** as these do not show up as notifications on my inbox!

Phone: 706-773-9229

Office Hours:

By appointment – please email me at the campus email above to set up a meeting.

I also plan to be present in the classroom 15-20 minutes before class starts, and 15-20 minutes following the end of each class. Please drop in with questions, doubts or just to say hello and chat about your day 😊

Course Attendance: Attendance for all class sessions is mandatory. If for some reason you cannot attend a specific class session in-person, please email me with a valid reason for your absence before noon (12:00pm) on the day of the class. Once I approve your absence, I may provide you with a copy of the lecture video. Class participation comprises 20% of your final grade, so unexcused absences can severely impact your grade!

Course Textbook: None required, all course material will be provided via eLC.

Supplementary (optional) textbooks for this course:

1. **Skeletal Muscle Structure, Function, and Plasticity – by Richard L. Lieber** – 3rd Edition. Lippincott Williams and Wilkins (2009) → This richly detailed book is an excellent resource on muscle function, with emphasis on relevance to rehab (PT/OT) and clinical practice.
2. **Skeletal Muscle: Form and Function - by MacIntosh, Gardiner, McComas** – 1st or 2nd Edition → Provides excellent line drawings and illustrations that complement course material.

NOTE: Please let me know if you have difficulty obtaining any reading material or textbook!

Course Evaluations:

Assessment	Scheduled	Grade %
1. Active Attendance!	Every class session	20% of total grade
2. Scheduled Quizzes:	Weekly or every 2 weeks	20% of total grade
3. Class Quizzes:	End of class (TBD)	20% of total grade
4. *Mid-term Report:	Mid-semester	20% of total grade
5. *End-term Paper/Presentation:	Last day of semester	20% of total grade

*The details of the mid-term report and end-term paper/presentation will be discussed in class.

NOTE: You are **allowed to drop one (1) scheduled quiz AND one (1) class quiz** from your final grade. This is to offer you some flexibility into your schedule. I *may* modify an in-class quiz to a take-home or participation quiz. I *may* also offer correction opportunities for quizzes!

Late submissions: You must use your flexi-drop before requesting an extension (in writing) for a scheduled quiz. **If no extenuating circumstance → - 1point (or -10%) per day (24-hour)!**

Course Grading (see [here](#) for conversion to GPA score)

% Total Grade	Final Letter Grade
≥ 92.50 %	A
90.00 – 92.49 %	A-
87.50 – 89.99 %	B+
85.00 – 87.49 %	B
82.50 – 84.99 %	B-
80.00 – 82.49 %	C+
77.50 – 79.99 %	C
75.00 – 77.49 %	C-
72.50 – 74.99 %	D (lowest passing grade)

IMPORTANT: Teaching Philosophy and Extra Credits

My teaching philosophy can be summarized as follows:

Philosophy 1: Ensure all students receive ample opportunities to demonstrate their grasp of concepts and course material.

How I will practice this:

- (a) **Bonus questions on quizzes** will allow you to make up for dropped points
- (b) Flexible drop: You are **allowed to drop one (1) scheduled quiz AND one (1) class quiz** from your final grade. No explanation is needed - life happens and I get it.
- (c) **Different assessment methods will be used for class quizzes**, like writing reflections, drawing activities, answering questions out loud, explaining concepts to fellow students etc.

Philosophy 2: Ensure students receive ample opportunities to communicate with colleagues and peers, build relationships and support each other throughout the course.

How I will practice this:

- (a) **Classroom participation has been given equal importance (20% total grade)** as quizzes and mid-/end-term evaluations. I aim to provide you the opportunity to voice your opinions, share your experiences and get to know your peers through classroom discussion.
- (b) **Opportunities for team-based, collaborative submissions for the end-term project** will be provided. I encourage you to collaborate with people from outside your lab / field of expertise, so you can develop an appreciation for interdisciplinary team-work.
- (c) Class interactions and quizzes. I aim to **provide different avenues for expression**, depending on your learning preference and comfort with communication.

ACTIVITY FOR +1 BONUS POINT!

In this course, we like our discussions to be informed, respectful, thoughtful, and engaged. These are the ground rules we should follow to make this happen.

Ground Rules for KINS 4690/6690**For Lectures****For Discussions**

Things we like

**How we will encourage these
(DOs)**

Things we dislike

**How we will discourage these
(DON'Ts)**

Diversity and Inclusivity Policy

UGA is committed to creating a dynamic, diverse, and welcoming learning environment for all students and has a non-discrimination policy that reflects this philosophy. Our class will respect all students regardless of race, color, sex (including sexual harassment and pregnancy), sexual orientation, gender identity, ethnicity or national origin, religion, age, genetic information, disability, or veteran status. Ideas are open to critique; individuals are not.

Accommodations for Disabilities

If you plan to request accommodations for a disability, please register with the Disability Resource Center. They can be reached by visiting Clark Howell Hall, calling 706-542-8719 or by visiting <http://drc.uga.edu>.

Once you have contacted the DRC, please reach out to me over email (owais.khan@uga.edu) ASAP if you need any assistance or are seeking accommodations. I will do my best to provide you the support you need to learn and thrive in our class.

University Honor Code and Academic Honesty Policy

All academic work must meet the standards contained in "A Culture of Honesty." Each student is responsible to inform themselves about those standards before performing any academic work. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

UGA Student Honor Code: "I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others."

The University's policy and procedures for handling cases of suspected dishonesty, can be found at www.uga.edu/ovpi.

Mental Health and Wellness Resources:

- If you or someone you know needs assistance, you are encouraged to contact Student Care and Outreach in the Division of Student Affairs at 706-542-7774 or visit <https://sco.uga.edu/>. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services.
- UGA has several resources for a student seeking mental health services (<https://www.uhs.uga.edu/bewelluga/bewelluga>) or crisis support (<https://www.uhs.uga.edu/info/emergencies>).
- If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA (<https://www.uhs.uga.edu/bewelluga/bewelluga>) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center. • Additional resources can be accessed through the UGA App.

Course Schedule:

Topics to be Covered (Tentative schedule attached below)

- | | |
|---|-------------------------------|
| 1. Introduction to Skeletal Muscle | 12. Mitochondria |
| 2. Connective Tissue in Skeletal Muscle | 13. Resistance Training |
| 3. Muscle Function and Movement | 14. Disuse Muscle Atrophy |
| 4. Muscle Development (?may assign for study) | 15. Aging and Skeletal Muscle |
| 5. Cell Communication | 16. Muscular Dystrophy |
| 6. Neuromuscular Junction (NMJ) | 17. Muscle injury |
| 7. Membrane Excitability (RMP, Ions, Pumps) | |
| 8. Excitation-Contraction (EC) Coupling | |
| 9. Sarcomere and Cross-bridge Cycling | |
| 10. Fiber Types and Motor Units | |
| 11. Properties of Muscle Contraction | |

Course Schedule:

Week	Week beginning	Topic	Evaluation
1	8/17	- Course Introduction - Introduction to Skeletal Muscle - I	
2	8/22	- Introduction to Skeletal Muscle - II - Connective Tissue in Skeletal Muscle	Scheduled Quiz 1: Skeletal Muscle Intro + Connective Tissue
3	8/29	- Muscle Function and Movement - Muscle development (?video assigned)	
4	9/07 (Mon 5 th Sept Holiday)	- Cell Communication	Scheduled Quiz 2: Muscle function and Movement + Cell Communication (+/- Muscle development)
5	9/12	CATCH-UP + REVIEW 1 (Mon 12th Sept) - Neuromuscular Junction (NMJ)	Scheduled Quiz 3: Neuromuscular Junction
6	9/19	- Membrane Excitability (RMP, Ions, Pumps)	
7	9/26	- Excitation-Contraction (EC) Coupling	Scheduled Quiz 4: Membrane Excitability + EC Coupling
8	10/03	- Sarcomere and Cross-bridge Cycling	
9	10/10	- Fiber Types and Motor Units	Mid-Term Submission Deadline (11.59pm 10/10/22)
10	10/17	- Properties of Muscle Contraction	Scheduled Quiz 5: Sarcomere & Cross-bridge cycling + Fiber Types & Motor Units
11	10/24 (Fri 28 th Oct Holiday)	CATCH-UP + REVIEW 2 (Mon 24th Oct) - Mitochondria - I	
12	10/31	- Mitochondria - II - Resistance Training	Scheduled Quiz 6: Mitochondria + Resistance Training
13	11/7	- Disuse Muscle Atrophy	
14	11/14	- Aging and Skeletal Muscle	Scheduled Quiz 7: Disuse Muscle Atrophy + Aging & Skeletal Muscle
15	11/21 only (Wed + Fri Holidays)	- Muscular Dystrophy - I	
16	11/28	- Muscle Dystrophy - II - Muscle Injury	Scheduled Quiz 8: Muscle Dystrophy + Muscle Injury
	12/05 and 12/06 only	END-TERM PRESENTATIONS	End-Term Presentation - Submission Deadline (11.59pm on 12/04/22)

Note: The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.