

**Cellular Basis of Neuromuscular Physiology KINE 458**  
**Spring 2022, MWF 10:00-10:50**

Professor: Michael Deschenes, Ph.D.  
Telephone: 221-2778  
E-mail: [mrdesc@wm.edu](mailto:mrdesc@wm.edu)

Office: Adair 404A  
Office Hours: please email

Course Objectives

By participating in this course, students will be able to:

- 1) describe the development of the neuromuscular system.
- 2) demonstrate an understanding of how the nervous system and muscular system interact during the process of muscle contraction.
- 3) describe and explain basic principles of biochemistry, i.e. glycolysis, the krebs cycle, oxidative phosphorylation, as they relate to the neuromuscular system.
- 4) describe and explain basic principles of cell biology, i.e. organelles, compartmentalization, myofiber types, as they apply to the neuromuscular system.
- 5) demonstrate an understanding of selected biochemical and cellular acute responses to exercise.
- 6) demonstrate an understanding of selected biochemical and cellular adaptations to exercise training.
- 7) describe the biochemical processes involved in muscular fatigue.
- 8) demonstrate an understanding of effects of aging and disuse on neuromuscular system.

Required Textbook

*Biochemistry Primer for Exercise Science, 4th edition, Tiidus, P.M., Tupling, A.R., and Houston, M.E., Human Kinetics (2012)*

Course Evaluation

Final grades will be based on the following:

First exam = 30%

Second exam = 30%

Final exam (comprehensive) = 40%

Schedule for Lecture Topics

- A) development and design of skeletal muscle
- B) contractile process
- C) innervation of muscle fibers
  - 1. recruitment patterns
  - 2. effects of exercise
- D) muscle fiber types
  - 1. different classification schemes
  - 2. effects of exercise

#### EXAM 1

- E) ATP metabolism (glycolysis, glycogenolysis, TCA cycle,  $\beta$ -oxidation) – chapters 3, 4
- F) exercise induced adaptations of ATP metabolism – chapter 2
- G) substrate utilization and effects of exercise – chapters 5, 6, 7

#### EXAM 2

- H) lactate production and utilization
  - 1. fiber type differences
  - 2. effects of exercise
- I) causes of fatigue
  - 1. neural
  - 2. neuromuscular
  - 3. local
  - 4. effects of exercise
- J) effects of disuse on neuromuscular system
- K) effects of aging on neuromuscular system

#### FINAL EXAM (comprehensive)

**Diversity Vision Statement:** The Department of Kinesiology & Health Sciences places a high value on inclusiveness in order to create an optimal environment in which our students learn, and our faculty and staff carry out their professional responsibilities. We aim to faithfully support, and be fully consistent with the objectives and aims of the Diversity Plan of Arts & Sciences. Our definition and view of diversity is wholly compliant with that of Arts & Sciences. That is, we see diversity as encompassing variability in age, cultural identity, ethnicity, gender, faith, neurological characteristics, geographic background, political and ideological perspectives, race, sexual orientation, social and economic status, as well as military status.

**Kinesiology Mental Health Statement:** Mental health can pose significant challenges to student success at W&M, both in and outside of the classroom environment. The Kinesiology Department wants students to flourish during their time at W&M. If you are struggling with concerns, including, but not limited to, relationships, anxiety, alcohol or drug use, feeling down, trouble concentrating and/or lack of motivation, we hope you will reach out to campus resources, such as the Counseling Center, which is available for walk-ins during business hours and by phone after hours (757-221-3620). You can learn more about their services via this link <https://www.wm.edu/offices/wellness/counselingcenter/>