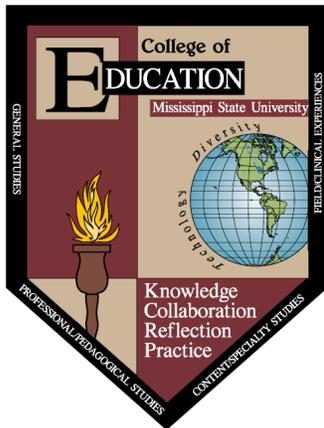


**MISSISSIPPI STATE UNIVERSITY
COLLEGE OF EDUCATION**

**DEPARTMENT of KINESIOLOGY
COURSE SYLLABUS**

Course Prefix & Number:	EP 8263
Course Title:	Exercise Biochemistry
Credit Hours:	Three (3) semester hours
Course Type:	Lecture
Catalogue Description:	An advanced review of exercise metabolism with special emphasis on aerobic processes during muscular effort.

College of Education Conceptual Framework:



The faculty in the College of Education at Mississippi State University are committed to assuring the success of students and graduates by providing superior learning opportunities that are continually improved as society, schools, and technology change. The organizing theme for the conceptual framework for the College of Education at Mississippi State University is educational professionals - dedicated to continual improvement of all students' educational experiences. The beliefs that guide program development are as follows:

1. **KNOWLEDGE** - Educational professionals must have a deep understanding of the organizing concepts, processes, and attitudes that comprise their chosen disciplinary knowledge base, the pedagogical knowledge base, and the pedagogical content knowledge base. They must also know how to complement these knowledge bases with the appropriate use of technology.
2. **COLLABORATION** - Educational professionals must continually seek opportunities to work together, learn from one another, forge partnerships, and assume positions of responsibility.
3. **REFLECTION** - Educational professionals must be willing to assess their own strengths and weaknesses through reflection. They must also possess the skills, behaviors, and attitudes necessary to learn, change, and grow as life-long learners.
4. **PRACTICE** - Educational professionals must have a rich repertoire of research-based strategies for instruction, assessment, and the use of technologies. They must be able to focus that array of skills on promoting authentic learning by all students or clients, while exhibiting an appreciation and commitment to the value and role of diversity.

Course Objectives:

1. Demonstrate an understanding of energy transfers. #CFPO 1,3,5,10,13,14
2. Demonstrate an understanding of energy storage in the body. #CFPO 1,3,5,10,13,14
3. Describe the classes of nutrients and their role in biological energy transfer. #CFPO 1,3,5,10,13,14
4. Describe the function and structure of ATP. #CFPO 1,3,5,10,13,14
5. Demonstrate an understanding of the role of enzymes and catalysts. #CFPO 1,3,5,10,13,14
6. Discuss the metabolism of carbohydrates, lipids, and protein, and understand their relationship to the various metabolic pathways. #CFPO 1,3,5,10,13,14
7. Discuss the various energy systems and demonstrate an understanding of the regulation of these metabolic pathways. #CFPO 1,3,5,10,13,14
8. Demonstrate an understanding of the integration between metabolism and function of the physiological system. #CFPO 1,3,5,10,13,14
9. Discuss the impact of hormonal variations on metabolism. #CFPO 1,3,5,10,13,14
10. Demonstrate an understanding of the impacts genetics, age, gender, and disease have on metabolism. #CFPO 1,3,5,10,13,14
11. Discuss metabolic aspects related to adaptation, performance, and fatigue. #CFPO 1,3,5,10,13,14

Topics to Be Covered:

Methods to study exercise metabolism – 3 hours
Control of the Internal Environment and Maintaining Homeostasis – 3 hours
Bioenergetics – 3 hours
Fuel Sources/Nutrients – 3 hours
Metabolism
 Energy Sources – 2 hour
 Anaerobic Metabolism – 4 hours
 Aerobic Metabolism – 9 hours
Hormonal Influence on Metabolism – 3 hours
Influence of Genetics, Obesity, and Disease on Metabolism – 3 hours
Influence of Age and Gender on Metabolism – 3 hours
Metabolic Factors in Fatigue – 3 hours
Metabolic Adaptation to Training – 3 hours
Ergogenic Aids Influence on Metabolism – 3 hours

Recommended Texts:

- Brooks, G.A., Fahey, T.D., & Baldwin, K.M. (2005). *Exercise physiology: Human bioenergetics and its application*. 4th Edition. McGraw-Hill. Boston, MA.
- Hargreaves, M., & Spriet, L. (2006). *Exercise metabolism*. 2nd Edition. Human Kinetics. Champaign, IL.

Kang, J. (2008). *Bioenergetics primer for exercise science*. Human Kinetics. Champaign, IL.

Methods of Instruction:

Lecture, class discussion, course related assignments

Suggested Student Activities:

Students will need to maintain textbook and research article reading assignments. Additionally, students will need to bring current news and lay magazine articles for class discussion identifying the application of exercise metabolism in practice. Obj 1-11

MSU Honor Code:

"As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do."

Upon accepting admission to Mississippi State University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor Code. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the MSU community from the requirements or the processes of the Honor Code. For additional information please visit: <http://www.msstate.edu/dept/audit/1207A.html>

Technology:

Presentation software will be used by students to present and discuss their papers.

Diversity:

Metabolic difference between individuals of different fitness levels, gender, and age will be addressed throughout the course, along with metabolic disorders that will alter physiological responses.

Disability:

Student Support Services seeks to provide educational access and opportunity through support, resources, advocacy, collaboration, and academic accommodations for students with disabilities (as defined by the Americans with Disabilities Act and the Rehabilitation Act of 1973) who are accepted to the University. See <http://www.sss.msstate.edu/> for more information.

Field Component: None

Evaluation of Student Progress:

Exam 1 – 35 points, Exam 2 – 35 points, Paper and Presentation – 30 points.

There will be two exams during the semester. Exams can be multiple choice, fill-in-the-blank, matching, and/or short answer.

Students will write a review paper on one of the lecture topics and teach a portion of the lecture session on the topic. Specific guidelines for writing and presenting the paper will be provided in class.

A = 90 - 100%, B = 80 - 89.9%, C = 70 - 79.9%, D = 60 - 69.9%, F = 0 - 59.9%

Bibliography:

Bagchi, D., Nair, S., & Sen, C. K. (Eds.). (2013). Nutrition and enhanced sports performance: Muscle building, endurance, and strength. Amsterdam: Academic Press.

Donovan C. M. & Pagliassoti M. J. (2000). Quantitative assessment of pathways for lactate disposal in skeletal muscle fiber types. *Medicine and Science in Sports and Exercise*, 32(4): 772-777.

Goldsmith, R., Joanisse, D. R., Gallagher, D., Pavlovich, K., Shamoan, E., Leibel, R. L., & Rosenbaum, M. (2010). Effects of experimental weight perturbation on skeletal muscle work efficiency, fuel utilization, and biochemistry in human subjects. *American Journal of Physiology Regulatory, Integrative, and Comparative Physiology*, 298(1): R79-88.

Ivy, J. L., Res, P. T., Sprague, R. C., & Widzer, M. O. (2003). Effect of a carbohydrate-protein supplement on endurance performance during exercise of varying intensity. *International Journal of Sport Nutrition and Exercise Metabolism*, 13: 388-401.

Kenney, W. L., Wilmore, J. H., & Costill, D. L. (2012). *Physiology of sport and exercise* (5th ed.). Champaign, IL: Human Kinetics.

Mathews, C. K., van Holde, K. E., Appling, D. R., & Anthony-Cahill, S. (2013). *Biochemistry* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Newsholme, E. A. & Leech, A. R. (1983). *Biochemistry for the medical sciences*. Chichester: John Wiley & Sons.

Pettitt, R. W. & Clark, I.E. (2013). High-intensity exercise tolerance: An update on bioenergetics and assessment. *Strength and Conditioning Journal*, 35 (2): 11-16.

Philp, A., Hargreaves, M., & Baar, K. (2012). More than a store: Regulatory roles for

glycogen in skeletal muscle adaptation to exercise. *American Journal of Physiology - Endocrinology and Metabolism*, 302: E1343-E1351.

Powers, S. & Howley, E. (2012). *Exercise physiology: Theory and application to fitness and performance* (8th ed.). New York, NY: McGraw-Hill Companies, Inc.

Wasserman, K. (1984). The anaerobic threshold measurement to evaluate exercise performance. *American Review of Respiratory Disease*, 129: s35-s40.