



College of Life Sciences

Department of Exercise Sciences



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ExSc 460—Orthopedic Impairment and Therapeutic Exercise

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DESCRIPTION

Fundamentals of body mechanics and therapeutic exercise, coupled with kinesiological principles for detection and correction of basic neuromusculoskeletal anomalies. ExSc 460 is a course designed to prepare the prospective medical, allied health professionals and exercise scientist to identify and correctly describe disorders of body posture and movement. The use of exercise will be emphasized to correct postural and movement disorders. I view this class as an opportunity to incorporate and synthesize your learning in Exercise Sciences to this point. I feel this course will be useful to those students who do not go onto professional programs or a career in exercise science by helping learn about the human body. This includes knowledge of posture and movement that will be a benefit to themselves and their families. It is hoped that these students will be able to recognize conditions that will benefit from therapeutic exercise or from timely referral to appropriate medical professionals. It is also hoped that they will understand the benefits of maintaining an active lifestyle in order to minimize the effects of basic neuromusculoskeletal anomalies.

EXPECTED LEARNING OUTCOMES

Have a basic Knowledge of biomechanics and physiology, which includes:

1. Students will demonstrate a basic understanding of biomechanics, posture and movement as it relates to common exercises used in the correction of physical deficits. Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6
2. Students will demonstrate an understanding of biomechanics, posture and movement as it relates to development of common musculoskeletal disorders (including lever classification, summing force vectors, interplay of multiple joints, etc. Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 2, 3, 5, 6
3. Students will demonstrate a working knowledge of functional gross anatomy and how it relates to musculoskeletal disorders. Students are expected to use the appropriate terms to describe the body parts and to describe their relationship and motion.
Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 2, 3, 5, 6
4. Students will perform an evaluation of posture, both grossly and at individual joints, recognizing normal posture and movement; students will be able to recognize common postural problems as discussed in class. We will analyze each others' posture in the class and will develop an exercise based treatment strategy to correct abnormal postures. Students will be able to describe movement of major joints in the body. As noted above general posture will be assessed in the class; we will also study and be able to identify and discuss common abnormal postures of the limbs, feet and hands. Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6
5. Students will show understanding of movement terminology by describing normal movement both osteokinematically and arthokinematically using the proper terminology. We will be able to name these movements in each of the major joints of the body. We will be able to identify the direction of glide and roll of each major joint in the body in order to determine the direction of joint mobilization that enhances recovery of range of motion. Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6
6. Students will recognize and properly describe normal and abnormal gait. Students will evaluate each other's gait, including measurement of various parameters of gait. Students will observe and note (record and explain common mechanisms) abnormal gait patterns. Students will demonstrate an understanding of the neuromuscular mechanisms of common gait anomalies. Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6

7. Students will show ability to recognizing disorders requiring referral to the appropriate medical professional. Outcomes: 1, 2, 5 Direct measure: 1, 3, 5, 6
8. Students will demonstrate understanding of physiological and neurological aspects of therapeutic exercise including improvement of muscular strength, neuromuscular, coordination, soft tissue compliance. Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6
9. Students will complete laboratory and writing assignments that demonstrate a basic understanding of the proper use of physical exercises and other modalities in the correction of postural and movement abnormalities (including gait and conditions affect the joints of the body). Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6

Note: This course is highly dependent on group participation and study. Lab assignments require work in groups in order to facilitate team work found in the medical community and to enhance learning. If you choose to not participate in lab assignments and group projects it will be hard to earn an A or B in the class. We are to see “that when ye are ^bassembled together ye shall ^cinstruct and ^dedify each other” (D&C 43:8) I expect that you as a member of your group are prepared and able to contribute to the group in completing the assignments, helping others in your group with their learning and understanding of the concepts, and ultimately deepening your own learning.

EXAM

There will be two mid-term exams and a final exam that will cover topics learned in the course. I have typically weight the mid-term(s) and final higher (2x) when calculating your grade at the end of the semester. There will also be a number of mini-exams or quizzes that will cover each body area or topic discussed in the class.

GROUP PROJECT

A postural assignment will be done in groups. Each group is asked to identify a postural condition and develop a treatment plan for this condition. The group will research and develop the exercise program, demonstrate the exercises, and report any outcomes after 3 to 6 weeks of exercise intervention. The group will then submit a written report of their project, group will want to include picture of the exercises to demonstrate their understanding of the exercises. This will be due before the end of the semester.

HOMEWORK ASSIGNMENTS

Various homework assignments and readings may be given during the semester.

QUIZZES

Quizzes will be given for each groups presented material. These will most likely occur the week following the presentation. These will typically be given in the LRC in the Smith Field house or on blackboard. These quizzes are to help guide study and mastery of course material.

LAB ASSIGNMENTS

These are in class assignments (may need to be finished outside of class) that will be done in small groups or with your assigned group. These will be worth about 15 points each. If you do not participate in or turn in the lab assignments the highest grade you will receive for the course will be a C+.

TEXT

Recommended: **Magee Orthopedic Physical Assessment (5th edition), published by W.B. Saunders Company. (a couple of copies are available in the LRC)**

Learn Resource Center: the LRC has resources that will enhance your learning in this class. **There is a book (Gait analysis) with CD that has video of normal gait and gait pathologies that may help your understanding.** Anatomy resources are available if you need to review or study, including a 3-D anatomy program. I have placed a few books related to the course in the LRC as well.

EVALUATION

Grade Ranges:

A 94-100%

A- 90-93%

B+ 87-89%

B 83-86%

B- 80-82%

C+ 77-79%

C 73-76%

C- 70-72%

D+ 67-69%

D 60-66%

E less than 60%

Unexcused late work, quizzes or exams will receive a 10% deduction the 1st week, 25% the 2nd week, and 50% the 3rd week

Suggested point values of exams and quizzes

Exam 1	200	Posture quiz	30
Exam 2	200	Gait quiz	30
Final	300	Shoulder quiz	20
Ankle foot quiz	20	Elbow/hand quiz	10
Knee quiz	20	Journal article review	30
Hip quiz	20	Posture Paper	25
Spine quiz	20	Self assessment	30

H1N1 Flu

"Alert your professors through email or by telephone if you have the flu or are showing signs of the flu. You should not come to class ill, since your attendance will risk further spread of a serious virus. Communicate with your professors the seriousness of your illness and discuss ways you can submit work and make up any missed work without attending class."

We have been asked to add the following to the course syllabus

1. Use course attendance policies that allow for the possibility of unusually high rates of student absenteeism. **Absences due to the flu will not be counted against your score.**
2. Insert a disclaimer in your syllabi that allows for changes mid-semester in deadlines and policies if circumstances warrant. **Effort will be made to allow alterative deadlines and modes of taking quizzes and exams as needed. Scheduled exams, quizzes and assignment dates and deadlines may change during the semester due to flu related factors.**
3. Facilitate distribution of student contact information (email addresses, cell phone numbers) to enable students to share class notes and daily information with ill students. **You are encouraged to form study groups and encourage to support students through email etc to share notes with other students who may have missed class due to the flu.**

Employ appropriate ways for ill students to submit work and keep up with lecture material, handouts, and other activities. **It is anticipated that blackboard and email will be useful means to disseminate and collect class information and quizzes and assignments.**

Department of Exercise Sciences Classroom Policies

Academic Honesty

The first injunction of the BYU Honor Code is the call to "be honest." Students come to the university not only to improve their minds, gain knowledge, and develop skills that will assist them in their life's work, but also to build character. President David O. McKay taught that "character is the highest aim of education" (*The Aims of a BYU Education*, p. 6). It is the purpose of the BYU Academic Honesty Policy to assist in fulfilling that aim. BYU students should seek to be totally honest in their dealings with others. They should complete their own work and be evaluated based upon that work. They should avoid academic dishonesty and misconduct in all its forms, including but not limited to plagiarism, fabrication or falsification, cheating, and other academic misconduct.

Preventing Sexual Harassment

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU's policy against sexual harassment extends not only to employees of the university, but to students as well. If you encounter unlawful sexual harassment or gender based discrimination, please talk to your professor; contact the Equal Employment Office at 801-422-5895 or 801-367-5689 (24-hours); or contact the Honor Code Office at 801-422-2847.

Students with Disabilities

Brigham Young University is committed to providing a working and learning atmosphere, which reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the University Accessibility Center (UAC) Office (801-422-2767). Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. Services are coordinated with the student and instructor by the UAC Office. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the Equal Employment Office at 801-422-5895, D-285 ASB.

Diversity

A classroom is similar to the workplace. In the workplace, it is illegal to discriminate based on race, color, religion, gender, national origin, disability, or age. Furthermore, we believe Christ would never belittle anyone based on their race, color, religion, gender, national origin, disability, or age. Therefore, we feel strongly that no one in a classroom should be belittled for any reason. If you experience such an offense in any class in this Department (caused either by the instructor or a fellow student), we strongly encourage you to contact the Department Chair.

Exercise Science BS degree

The Exercise Science program is designed to prepare students for entry into graduate school in one of the disciplines related to exercise science or one medical, dental, nursing, physician assistant, physical or occupational therapy, optometry, podiatry, homeopathic medicine, or chiropractic school. Study of the exercise sciences conveys a healthy-lifestyle and preventive-medicine health care perspective. For those students not intending to pursue a graduate education, the Exercise Science program prepares students for employment as an exercise specialist in community, corporate, or clinical settings.

Students majoring in Exercise Science explore how the body functions during physical activity and exercise. Principles and concepts taught in human anatomy and physiology, exercise physiology, biomechanics, motor learning, chemistry, physics, and nutrition are mastered to help understand how the body responds to acute bouts of exercise and how it adapts to chronic physical activity and exercise. The impact that physical activity and exercise have on one's capacity to do work, physical performance, health, and disease, makes study of this discipline rewarding.

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Alignment with the BYU Aims

The BS Exercise Science program supports the Brigham Young University's mission to "assist individuals in their quest for perfection and eternal life" and the AIMS of a BYU education.

Spiritually Strengthening: Students participate in a program where students, faculty, and staff value and understand the importance of enlarging their minds with skills and knowledge, mentored by scholars who "keep [their] subject matter bathed in the light and color of the restored gospel."

Intellectually Enlarging: Students are challenged in the classroom and laboratories to acquire and expand academic skills of intellectual curiosity, critical thinking, effective oral and written communication, and quantitative reasoning, and problem solving. The Exercise Science program helps students understand the depth and breadth of knowledge necessary to more fully appreciate the exercise sciences, its history, and development.

Character Building: Students are taught the importance and necessity of "intellectual integrity of fine academic discipline with the spiritual integrity of personal righteousness." The moral virtues of "integrity, reverence, modesty, self-control, courage, compassion, and industry" are intertwined with the professional philosophies and ethics of the various disciplines pursued by Exercise Science students.

Lifelong Learning and Service: For many students in the Exercise Science program, the BS degree "is a beginning, not an end, pointing the way to constant learning." Many students pursue graduate school in the exercise sciences or one of the many health professions. Other students enter the work place upon graduation. Professionals in the exercise sciences and health care professions engage in lifelong learning to maintain credentials, stay abreast of emerging knowledge and technologies, and provide the expected standard of care. Students in the exercise sciences and health care professions use their knowledge, skills, and abilities to serve others.

[BYU Mission Statement](#)

Career Opportunities

Students graduating with a BS in Exercise Science are competitive applicants for entrance into graduate school in the exercise sciences; physical (PT) and occupational (OT) therapy school; chiropractic school; physician assistant (PA) programs; medical (MD, DO), dental, or optometry school; nursing programs; and alternative medicines.

Students with a BS degree in Exercise Science have career options in **Community Fitness** (personal training, club management, sales, program coordinator, or director with entry level salaries ranging between \$20 - \$30,000), **Corporate Fitness/Wellness** (exercise specialist, program coordinator or director, education specialist with entry level salaries ranging between \$25 - \$35,000), and **Clinical Fitness/Exercise Science** (exercise specialist or physiologist, exercise testing, program coordinator or director, clinical supervisor, research assistant, technician, radiology technician, or cardiac or pulmonary rehabilitation with entry level salaries ranging between \$25-45,000). Clinical employment opportunities exist in wellness centers, fitness institutes, research centers, hospital and individual clinics (cardiology, pulmonary, nutrition, gastroenterology, diabetes, endocrinology, cancer) working with inpatients or outpatients or the community.

Curricular Structure

The sequence of courses is designed to provide a foundation of scientific coursework in the first and second year. Added to the foundation of anatomy and physiology taken early in the major are Functional Anatomy, Exercise Physiology, Biomechanics, and Orthopedic Impairment and Therapeutic Exercise courses taken in the junior and senior years. Laboratory experiences are included in required chemistry and physics classes as well as functional anatomy, biomechanics, and exercise physiology. Some students may have opportunities to be involved in individual and faculty mentored research in the Exercise Physiology, Exercise Biochemistry, Biomechanics, or Body Composition labs.

Expected Learning Outcomes for the Exercise Major

Students graduating with a BS degree in Exercise Science will have demonstrated a mastery of the exercise sciences that will allow them to succeed in graduate studies in the exercise sciences or health care professions, or as entry level employees. It is expected that Exercise Science students will develop a passion for learning about the human body and have a greater appreciation for its development, function, and divine nature. It is expected that graduates of this program:

Students will demonstrate the learning objectives of each class.

Demonstrate a sound foundational knowledge and understanding of the principles of biology, chemistry, physics, and nutrition, and an advanced understanding of human anatomy and physiology as they relate to responses and adaptations to physical activity and exercise.

Demonstrate basic laboratory skills pertaining to assessments, laboratory methods, sound experimental and analytical practices, data acquisition and reporting in the exercise sciences.

Demonstrate requisite skills and abilities for a career or continued education in various fields related to the exercise sciences.

Understand the importance and influence of physical activity and exercise on health and be an advocate of physically active lifestyles as a means to improve quality of life and reduce the risk and prevalence of lifestyle related diseases.

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4. Demonstrate requisite skills and abilities for a career or continued education in various fields related to the exercise sciences.
5. Understand the importance and influence of physical activity and exercise on health and be an advocate of physically active lifestyles as a means to improve quality of life and reduce the risk and prevalence of lifestyle related diseases.
6. Will gain meaningful employment in exercise science related areas or pursue graduate studies in an exercise science related area or one of the health care professions.

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Evidence of Learning -- Direct Measures

Performance in individual courses that emphasize structure and function of the human body (e.g., Functional Anatomy and Kinesiology, Orthopaedic Impairments, Exercise Physiology, Kinesiology and Biomechanics) Evaluation of student learning is accomplished by exams, quizzes, lab reports, projects, and papers required in each class. (Learning Outcome #1,5)

Many students majoring in Exercise Science take national exams, such as the GRE, DAT, and MCAT, as required for acceptance into graduate or medical school. Other students take national credentialing examinations such as the American College of Sports Medicine (ACSM) certifications. These examinations measure learning in specific areas of study. (Learning Outcomes # 2,3,4).

Students majoring in Exercise Science take a group of courses that are considered capstone classes. These include EXSC 362 (Kinesiology and Biomechanics); EXSC 463 (Exercise Physiology), EXSC 400 (Functional Anatomy and Kinesiology); and EXSC 460 (Orthopedic Impairments and Therapeutic Exercise). These are required classes for all majors. These classes are designed to integrate knowledge, concepts, and skills associated with the program's sequence of study. (Learning Outcomes # 2,3,4,5).

Performance in individual and faculty mentored research projects. (Learning Outcome #3).

Evaluation of the Program is accomplished through course evaluations completed by students at the end of each semester. (Learning Outcomes #2,3,4).

Graduating seniors complete an on-line exit survey. The responses to this survey will enable the department to track the career and educational choices and outcomes of students. The survey will also be able to provide information about entrance exam results (e.g., MCAT, GRE, DAT, etc.), how students hear of the major, when students declare Exercise Science as a major, their use of academic advisors, student perceptions of the major and their preparation for graduate or medical school. (Learning Outcome #6)