



EXSC 460 ORTHOPEDIC IMPAIRMENTS & THERAPEUTIC EXERCISE
Spring 2011 – Section 001
April 27 to June 13, 2011

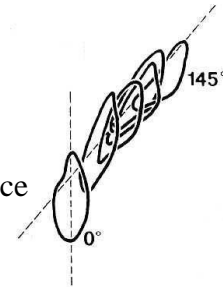
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Class to be held: M,W,F from 8:00 – 9:50 am in 277 SFH

Purpose: The purpose of this class is to introduce musculoskeletal pathologies by further building on background of anatomy and biomechanics (that should have been taken before this class). A second purpose of this class is to present principles of rehabilitation and progression in the treatment of the orthopedic conditions that will be covered.

Suggested Textbook: Magee David J, *Orthopedic Physical Assessment* (5th edition), published by W.B.Saunders Company.

Other Books: Nordin and Frankel. Basic biomechanics of the musculoskeletal system

Optional Textbook: Norkin, C.C. & Leverage, P.K. Joint Structure and Function: a comprehensive analysis.

Grading Criteria	Points	Final %	Grade
1 st exam (Friday, May 6 th)	100	95-100	A
2 nd exam (Monday, May 23 rd)	100	90-94	A-
3 rd exam (mini exam, Fri June 10 th)	50		
Lab assignments (undetermined number)	10 each	86-89	B+
Quizzes (most every day)	100	84-85	B
Final written exam (Wednesday, June 15 th , 7:00 – 9:00 am)	150	80-83	B-
		76-79	C+
		74-75	C
		70-73	C-

Written Examinations

All written examinations will be given in class. Exams will be comprised of multiple choice, true/false, matching, and short answer essay. The Final examination is to be held during the scheduled time of Finals week. I will tell you what I want you to know for each test by handing out a list of objectives you should be able to answer. There aren't many surprises, and we will have a short review at the end of class, the week before each test. Everyone of you can get an A if you just keep up on the material.

Quizzes

Quizzes will be given at the start of almost every class period. My policy is that you will **NOT** be allowed to make up missed quizzes! Don't ask, because it is only fair that I set this stringent policy. There are too many people in my classes to be able to deal the problems that this creates in trying to make up quizzes. To be fair, I will drop the lowest quiz score. Your quizzes are based on percentages when I tally your final number of points for your quizzes. I will explain this in class.

Course Objectives: Specific course objectives are listed at the end of this packet

Global Objectives

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.

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:

1. Will demonstrate the learning objectives of each class.
2. 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.
3. Demonstrate basic laboratory skills pertaining to assessments, laboratory methods, and sound experimental and analytical practices, data acquisition and reporting in the exercise sciences.

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.

Evidence of Learning—Direct Measures

Performance in individual courses that emphasize structure and function of the human body (e.g., Functional Anatomy and Kinesiology, Orthopedic 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)

Preventing Sexual Harassment

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity receiving 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 that 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) (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. 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-282 ASB.

ES 460 Specific Learning Objectives

(Brent Feland, PhD, PT)

After taking this class you should be able to:

1. Be able to describe the planes of the body.
2. Be able to list primary movements that occur in each plane.
3. Be able to identify and describe basic movement terminology (flexion, extension, dorsiflexion, plantarflexion, abduction, adduction, pronation, supination, protraction, retraction, etc.)
4. Be able to list the types of synarthrodial joints.
5. Differentiate the difference between synarthrodial and diarthrodial joints.
6. Be able to list the 5 characteristics of a synovial joint.
7. Be able to describe which movements are possible at a hinge, condyloid, gliding, saddle, and ball and socket joint.
8. Be able to define osteokinematics and arthrokinematics.
9. Be able to describe the accessory movements of osteokinematics and arthrokinematics.
10. Describe the difference between roll and glide and explain the rules of concave/convex movement with relation to roll and glide.
11. Apply concave/convex rules of motion to the joints of the body and describe roll and glide with the joints respective movement.
12. Be able to define posture
13. Be able to list the 10 points of “ideal” standing posture from a lateral view.
14. Be able to list the points of “ideal” standing posture from a posterior view.
15. Be able to discuss the varying systems involved in postural maintenance.
16. Demonstrate and explain the difference between 3 balance response patterns to perturbations.
17. Describe the difference between open-packed (resting) and close-packed positions.
18. Restate the resting and close packed positions for the glenohumeral, humeroulnar, radiocarpal, hip, knee, talocrural, and subtalar joints.
19. List and define the 7 different grades of joint mobility.
20. Describe mobilization treatment possibilities in relation to the 7 different grades of joint mobility.
21. Discuss the relationship between mobility and stability.
22. Describe the difference between gliding and traction mobilization.
23. Define laxity, instability, and disability.
24. List and define the 5 different grades of mobilization.
25. Draw the anatomy of a muscle fiber.
26. Describe the basic process of muscle contraction with relation to actin, myosin, troponin, tropomyosin and sarcomere/muscle fiber length.
27. Describe the difference between isotonic, isometric and isokinetic contractions.
28. Discuss the advantages and disadvantages of isotonic, isometric, and isokinetic exercise.
29. Describe and demonstrate the difference between open and closed kinetic chain exercise.
30. Describe the difference between concentric and eccentric contractions.
31. Describe the length-tension relationship in muscle.
32. Explain the difference between active insufficiency and passive insufficiency.
33. Demonstrate examples of active insufficiency and passive insufficiency.
34. List the factors that affect muscle function as it pertains to which movement is performed. (I.e. flexion, extension).
35. Describe the effects of immobilization and injury on muscle tissue.

36. Describe the anatomy of the foot and ankle and be able to explain which bones articulate to form the talocrural, subtalar, and midtarsal joints.
37. Explain the difference between pronation and supination in open vs. closed chain with relationship to calcaneal and subtalar joint movement.
38. Describe the axes of movement for the talocrural, subtalar and midtarsal joints.
39. Describe the accessory motions of the tibiofibular joint with plantar flexion, dorsiflexion.
40. Describe structural foot abnormalities (i.e. Rearfoot varus/valgus, forefoot varus/valgus, forefoot supinatus, plantarflexed 1st ray, pes planus etc.)
41. Demonstrate finding subtalar neutral position on a subject.
42. Explain how to analyze the presence of foot abnormalities in subtalar neutral position and standing.
43. Explain the compensations of foot abnormalities when weightbearing.
44. List which muscles perform dorsiflexion, plantar flexion, inversion and eversion at the ankle
45. List the structures that support the lateral vs. medial longitudinal arches of the foot.
46. Explain which bones make up the hindfoot, midfoot, and forefoot.
47. Define hallux valgus.
48. List the constituents of a bunion.
49. List, define and discuss the etiology, signs/symptoms and treatment of common foot problems including: plantar fasciitis, retrocalcaneal bursitis, interdigital neuromas, metatarsal stress fractures, heel bruises, os trigonum, calcaneal apophysitis, cuboid syndrome, tarsal tunnel syndrome, turf toe and sesamoiditis.
50. List the normal range of motion for movements at the ankle, hip, knee, and shoulder.
51. Define angle of inclination and angle of torsion.
52. Discuss which angles produce coxa varum, coxa valgum, femoral retroversion, and femoral anteversion.
53. Discuss the effects of coxa varum, coxa valgum, femoral retroversion, and femoral anteversion on hip movement and stability.
54. Discuss the difference between normal ROM for hip movements (flexion, extension, abduction, adduction, external rotation and internal rotation) and ROM needed for normal gait.
55. List the components of the knee joint.
56. Describe the anatomical differences between femoral condyles and its result in knee movement.
57. Explain normal ROM for knee movement and differentiate between rotation in extended vs. flexed position.
58. Explain the function of meniscii
59. Explain the anatomical difference between meniscii.
60. Describe movement of the meniscii with relation to flexion, extension and rotation at the knee.
61. List the 4 anterior bursae at the knee and describe which one is most commonly problematic.
62. Describe the function of the ACL, MCL, PCL, and LCL and which movements they check.
63. Describe the effect of lower extremity pronation/supination on the knee joint.
64. Describe Q-angle and how it is measured.
65. Explain the difference between true leg length and apparent leg length measurements
66. Explain how much leg length is significant in a sedate vs. athletic population according to Subotnick.
67. List and differentiate which muscles work to extend, flex and rotate the knee.
68. Explain and demonstrate the following tests: straight-leg-raise, Thomas test, FABER's, Hip scouring, Ober's test, anterior drawer and Lachmann's for the knee.
69. Be able to palpate the ASIS, PSIS, Iliac crests, femoral epicondyles, knee joint space, fibular head, LCL, head of the talus, navicular, cuboid and talar dome.
70. Describe the different end feels as they pertain to normal and pathological situations.

71. List, define and discuss the etiology, signs/symptoms and treatment of common lower leg problems including: Acute vs. Recurrent compartment syndrome, tibiofibular synostosis, achilles tendon rupture, achilles tendonitis, flexor hallucis tendonitis, flexor digitorum longus tendonitis, tennis leg, anterior tibialis tendonitis, peroneal tendonitis, and posterior tibialis tendonitis.
72. List and describe the 8 phases of the gait cycle.
73. Define and explain; stride length, step length, double support, toe-out, base of support, and cadence.
74. Discuss the attributes of alternate gait patterns including: gluteus medius gait, gluteus maximus gait, quadriceps gait, plantar flexor gait, and anterior tibialis gait.
75. Describe the purpose of the foot in ambulation with regards to the purpose of pronation and supination.
76. List the anatomical joints that make up the shoulder girdle vs. the shoulder joint.
77. Examine and describe scapulohumeral rhythm.
78. Explain and demonstrate the sulcus test, load and shift test, apprehension test and a couple impingement tests and relate the findings to shoulder function.
79. Describe thoracic outlet syndrome (TOS).
80. Describe and demonstrate 3 different TOS provocation tests.
81. Describe the movements that occur at the sternoclavicular and acromioclavicular joints with respect to scapulohumeral rhythm.
82. List the muscles that make-up the rotator cuff and describe their respective insertions.
83. List which muscles are responsible for shoulder internal vs. external rotation.\
84. Describe the primary forces produced by the rotator cuff muscles and how they relate to shoulder stability and mobility.
85. Understand and explain the effect of a fixed scapula, inactive rotator cuff or inactive deltoid on shoulder abduction and scapulohumeral rhythm.
86. Explain the painful arc.
87. Discuss the function of the deltoid, upper/lower trapezius, serratus anterior, middle trapezius, rhomboids, teres major, latissimus dorsi and pectoralis minor on scapular movement with relation to scapulohumeral rhythm.
88. Describe the difference between the 3 grades of Acromioclavicular sprain.
89. Describe the function of coracohumeral, coracoacromial and glenohumeral ligaments on shoulder function.
90. List, define and discuss the etiology, signs/symptoms and treatment of common arm/shoulder problems including: carpal tunnel syndrome, Dequervain's syndrome, intersection syndrome, lateral epicondylitis, medial epicondylitis, trigger finger, rotator cuff tendonitis, subacromial bursitis, labral tears, and AC degeneration.
91. List the 3 components of an intervertebral disc.
92. Describe the alignment of facets in the different regions and explain the movements that primarily occur at each region.
93. Describe the anatomy of the annulus fibrosus and its importance in handling rotational and shear forces.
94. Explain the regional differences between the cervical, thoracic and lumbar vertebrae.
95. Describe Fryette's laws of motion
96. Explain the effect of movement and posture on the annulus fibrosus and nucleus pulposus.
97. Explain the effect of different postures on intervertebral disc pressure.
98. Explain the effects of facet degeneration.
99. List the 5 general functions of abdominal muscles.
100. List and explain characteristics of McKenzie's postural syndrome, dysfunction syndrome and derangement syndrome.

101. List and explain the difference between the different stages of disc herniation including: protrusion, prolapse, extrusion, and sequestration.
102. Define scoliosis and list the angles of curvature that result in surgical consideration and pulmonary dysfunction.
103. Be able to list muscles that can cause anterior and posterior pelvic tilt.
104. Be able to demonstrate and explain Gillette's test, and the long leg sitting test for the SI joint.
105. List the landmarks to be used for palpation of hip/pelvis symmetry when evaluating the SI joint.