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College of Life Sciences

Department of Exercise Sciences



Functional Anatomy and Kinesiology ExSc 400

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TA: Various Lab sections

Required Study Manual:

- *Musculoskeletal Functional Anatomy Myrer, J.W.*

Suggested Reference Texts:

- You will need access to an anatomy atlas or to a computer based program such as...
 - Primal 3D (which may be found in the LRC in the SFH)
 - Anatomy TV (which may be found through links from the library)
- An Atlas of Human Anatomy such as...
 - *McMinn's Color Atlas of Human Anatomy,*
 - *Netter's Atlas of Human Anatomy,*
 - *Clemente, Rohen & Yokochi, Grant's, etc.*
 - *Note---* If you are going on to graduate school in medicine, dentistry, physical therapy or other medically related professions I strongly encourage you to get at least one of these atlases. I had four that I used in physical therapy school. If you are not going to graduate school in a medical area you would still benefit from one of these in this class.
- Other references that would be useful
 - *Thieme Atlas of Anatomy General and Musculoskeletal (ISBN 1-58890-387-7)*
 - *Atlas of Anatomy Taj Books (ISBN 1-902328-40-X)*
 - *Clinically Oriented Anatomy 5th ed, Keith Moore and Arthur Dalley (ISBN 0-7817-3639-0)*
 - *Human Anatomy Martini Timmons & McKinley (ISBN 0-13-010011-0)*
 - *Hollinshead's Textbook of Anatomy (ISBN 0-06-141263-5)*
 - *Gray's Anatomy*
- See also the list available at the SFH LRC Anatomy and Science Reference at the end of the syllabus

Course Description

- Advanced examination of structure and function of skeletal, articular, muscular, and peripheral nervous systems with clinical and active learning applications
- Cadaver lab included

Course Purpose

ExSc 400 Expected Learning Outcomes:

1. Students will demonstrate understanding of the human body (functional anatomy) in preparation for further education at the graduate level or for employment related to exercise science; and that it is “sacred, the veritable tabernacle of the divine spirit”. (See *Outcomes: 1, 2, 4, 5, 6 and Direct measure: 1, 3, 5, 6 under course policies, page 9*)
2. Students will apply knowledge of human anatomy with emphasis on the skeletal, articular, muscular and peripheral nervous systems as it relates to human function/movement. (*Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6*)
3. The student will demonstrate increased understanding of human movement and students will use proper terminology to describe movement and the interrelation between anatomical structures studied. (*Outcomes: 1, 2, 3, 4, 5, 6 Direct measure: 1, 3, 5, 6*)
4. The student will develop a base of knowledge that can be built upon as they continue their study of the human body, and as they prepare for development into to professionals in the medical community and in other aspects of life. (*Outcomes: 1, 2, 4, 5, 6 Direct measure: 1, 3, 4, 5, 6*)
5. The student will demonstrate ability to assess one’s own efforts and to be responsible for their own individual learning. (*Outcomes: 4 Direct measure: 5, 6*)

What I want you to learn:

- I want you to learn the musculoskeletal system knowing the structure and also understand as many of **the inter-relations** that exist between the structures that affect function, structure, and form. Questions on quizzes and exams will try and bring out these relationships. It is not just identifying structure, but going on beyond that to understanding how a certain structure relates to another in function and structure.
- **This is what is expected in medical/dental/physical therapy related professional training and practice.**

What You Want to Learn (Student Learning Goals):

- You are encouraged to set personal goals for the course and to refer to them often through the semester. Please write them here.
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Classroom Procedures

- This course will include lecture, group learning assignment and presentations.
- There is a cadaver lab. Students are expected to attend course lectures and laboratory sessions.
- It is strongly encouraged that students study in groups and hold study sessions outside of class.
- Review group assignments will be given and class time made available to do these assignments.

Participation and Recommended Study Habits & Tips

Medical practice requires team work among many professionals. It is therefore recommended that you form and work with other students in the course. 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, which will ultimately deepen your own learning.

Student Outcomes (Specific)

Upon completion of each Unit **you** will be able to accomplish the following:

1. Unit One—Introduction:

- List and explain the basic terminology dealing with position and movement.
- List and explain basic anatomical terminology with reference to word roots, combining forms, prefixes and suffixes.
- Explain the two classification systems of the abdominal region and list the major structures within each region for each classification system.

2. Unit Two—The Skeletal System

- List and discuss the five major functions of bones.
- Identify and classify bones according to their shape.
- Discuss the gross and microscopic anatomy of bone.
- Locate and identify the bones and their major landmarks of the axial and appendicular skeleton.
- Identify the five regions of the vertebral column and discuss the characteristics of each.
- Discuss the parts of the rib cage and differentiate between the three types of ribs.
- Identify and discuss the structure of the shoulder and pelvic girdles.
- Describe the structural differences between the male and female pelvis.

3. Unit Three—The Peripheral Nervous System

- Discuss the function and structure of the nervous system in general.
- List the twelve pair of cranial nerves and discuss their general and specific functions.
- Describe the general distribution of the 31 pairs of spinal nerves.
- Define plexus and list the spinal nerves that comprise the four plexuses that originate from the spinal cord.
- Explain the general distribution of the cervical plexus.
- Draw and label the brachial plexus from its ventral rami to its seventeen nerves.
- List the general innervation of each of the five major nerves of the brachial plexus and the specific innervation of the other twelve nerves of the plexus.
- Discuss the distribution of the lumbar plexus (sensory and motor) with emphasis on the femoral and obturator nerves.
- Discuss the distribution of the sacral plexus (sensory and motor) with emphasis on the sciatic nerve and its various branches.
- Explain segmental innervation and what dermatomes, myotomes, and sclerotomes are.
- Differentiate between cutaneous innervation by spinal nerves and sensory distribution by the peripheral nerves.
- Explain the efferent pathways of the autonomic nervous system and define pre and post-ganglionic neurons.
- Discuss the structure and function of the sympathetic division of the ANS.

- Discuss the structure and function of the parasympathetic division of the ANS.
- 4. Unit Four—The Articular System**
- Discuss the function and structure of ligaments.
 - Explain the two classification systems of joints and categorize the major joints of the body according to each system.
 - List the structures associated with diarthrodial joints.
 - List the types of diarthrodial joints and the movements possible for each type.
 - Explain and demonstrate the basic movements possible in the body (emphasis on the diarthrodial joints).
 - Identify and discuss movement in terms of arthrokinematics and osteokinematics.
 - List and identify the major ligaments, bursae, and associated articular structures of the upper and lower extremities.
 - Discuss and compare the articulations involved with the shoulder girdle and the shoulder joint.
 - Discuss the shoulder complex and explain scapulohumeral rhythm and its importance to function.
 - Discuss the structure and function of the ligaments and associated articular structures of the trunk and pelvis, knee, ankle and foot.
 - Discuss the movements of the ankle and subtalar joints.
- 5. Unit Five—The Muscular System**
- List and discuss the characteristics of muscle.
 - Explain the major characteristics of the three types of muscle.
 - Describe the macroscopic and microscopic anatomy of skeletal muscle.
 - Explain the relationship between muscle shape and function.
 - Explain and give examples of how muscles are named.
 - Discuss the relationship between muscles and movement and explain functional muscle groups.
 - Classify muscles in terms of the number of articulations they act upon and explain what effect this has on their functional ability.
 - Identify and explain the different types of muscle contraction.
 - Discuss the concept of team work among muscles and define agonist, antagonist, stabilizer, synergist and neutralizer. Be able to give examples of each.
 - Explain what a co-contraction is and Lombard's Paradox.
 - Explain the length-tension relationship of skeletal muscle and what effect putting a muscle on stretch prior to contraction has on its ability to produce force.
 - Discuss the musculoskeletal lever system and identify the examples of each class of lever system in the body.
 - Explain mechanical advantage in the musculoskeletal lever system.
 - Discuss the relationship between type of contraction and the musculoskeletal lever system.
 - Define and list the properties of torque.
 - Solve problems dealing with muscle mechanics.
 - Determine the rotary and non-rotary forces acting on a joint during movement.
 - Be able to recognize the origins, insertions, actions and innervations of the intrinsic and extrinsic muscles of the upper and lower extremities and of the trunk.
 - List the muscles of respiration.

** All these learning objectives are measured through written and laboratory examination.**

Assignment Descriptions

There will be approximately 1050 points in the course plus quizzes

Lecture Exams: (Course Learning Outcomes: 1, 2, 3, 4)

Written examinations take the form of matching, multiple choice, listing and short answer questions.

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|--|----------------|
| 1. Introductory Material and Skeletal System | 100 pts |
| 2. Peripheral Nervous System | 100 pts |
| 3. Articular System | 100 pts |
| 4. Muscular System of the Lower Extremities | 100 pts |
| 5. Cumulative Final:
Muscular System of the Upper Extremity and Trunk,
plus a comprehensive portion. | 200 pts |
| 6. Self assessment of learning | 50 pts |
| Total: | 650 pts |

Laboratory Exams:

Laboratory exams are primarily identification of tagged structures.

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|--|----------------|
| 1. Skeletal system | 100 pts |
| 2. Peripheral Nervous System | 80 pts |
| 3. Lower Extremities: Muscular, Articular and Nervous Systems | 100 pts |
| 4. Trunk and Upper Extremities:
Muscular, Articular and Nervous Systems | 100 pts |
| 5. Quizzes | 20 pts |
| Total: | 400 pts |

Quizzes (lecture): (Course Learning Outcomes: 1, 2, 3, 4)

Announced and un-announced quizzes may be given. Additional quizzes may be given for each groups presented material. These quizzes are to help guide study and mastery of course material.

Muscle Quizzes (origin, insertion, innervations, action):

(Course Learning Outcomes: 1, 2, 3, 4)

Every few days there will be a quiz on muscle insertions and origins, innervations, and actions throughout the semester. This information **will again be tested** on the lecture sectional and laboratory exams.

Group Project:

A comprehensive final review study guide/presentation will be prepared by groups of students. This will aid in the study of the final.

Homework and learning assignments: (Course Learning Outcomes: 1, 2, 3, 4)

These assignments are meant to highlight some key points from the course and help focus your study.

Course Schedule

Days of Class Instruction -

1. Introductory material and Skeletal System—
2. Lower Extremity
 - a. Peripheral Nervous System—
 - b. Articular System—
 - c. Muscles origin, insertion, innervation and actions
3. Upper Extremity and Trunk—
 - a. Peripheral Nervous System—
 - b. Articular System—
 - c. Muscles origin, insertion, innervation and actions
4. Review for Cumulative Final—

Tentative Written Examination Schedule

1. Introductory material and Skeletal System—TBD
 2. Peripheral Nervous System— TBD
 3. Articular System— TBD
 4. Lower Extremity— TBD
 5. Cumulative Final—Upper Extremity and Trunk + Comprehensive
- **Exams are taken at the Testing Center.**

Laboratory Examination Schedule

1. **Skeletal System—TBD**
2. **Peripheral Nervous System-TBD**
All sections take test on the same day, Sign-up during lab
3. **Lower Extremity—** Muscular and Articular Systems and (some) Nervous System
TBD.
4. **Trunk and Upper Extremity—** Muscular and Articular Systems and (some)
Nervous System

*** All lab examinations will have a cumulative component to them after the 1st exam***

Laboratory Instruction Schedule

1. Introduction and Axial Skeletal System-
 - Identify **all structures** in the syllabus (pp.19-32) of the **Axial Skeleton**.
 - Plus the structures of the shoulder girdle and humerus (pp. 32 -34) of the **Upper Extremity**.
2. Appendicular Skeletal System-
 - Identify the structures of the ulna, radius, and hand of the **Upper Extremity**.
 - Plus Identify **all structures** in the syllabus (pp.37-46) of the bones of the **Lower Extremity**.
3. Lower Extremity
 - Peripheral Nervous System— Identify the nerves of the **Sacral Plexus** and **Lumbar Plexus** (pp. 59-66)
 - Identify the **six deep external hip** and the **gluteals** of the lower extremity. (pp.139-42. Muscles 28-30 and 35-40.)
 - Plus **Hip Ligaments**. And: Identify **Hip and Thigh muscles** and **hip ligaments**.(pp.134-139; Muscles 14-27 and 31-34.)
 - Identify **Lower leg and foot muscles** and **lower leg, foot and foot ligaments**. (pp.129-134. Muscles 1-13, and pp. 143-46. Muscles 41-52).

4. Upper Extremity and Trunk-

- Identify the **Cranial Nerves** and the **Brachial Plexus** (pp.51-58)
- Identify muscles of the **trunk, neck, and back.** (pp.147-59) *May not have all muscles in syllabus dissected.*
- Identify **shoulder and shoulder girdle muscles** (pp.162-168; Muscles 1-17)
- Identify the remaining **extrinsic muscles** of the upper extremity (pp.168-75; Muscles 18-38)
- Identify **intrinsic muscles** of the upper extremity (pp.176-79; Muscles 39-49)
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*****Any *articular structures* of the upper extremity which can be identified from Unit II will be pointed out and you are responsible for them, the same is true of *nerves*.*****

Grading Procedures

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%

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

Course Policies

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) (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.

SFH LRC Anatomy and Science Reference Books:

TITLE	AUTHOR	CLASS/CODE ASSIGNMENTS	BARCODE
Atlas of Anatomy (DRAWINGS)	Gilroy, MacPherson et al	Anatomy 400	13661
Atlas of Human Anatomy 2/e (DRAWINGS)	Netter	Anatomy 400, 668	9023
Cells, Tissues, and Disease: Principles of General Pathology 2/e	Majno, Joris	Anatomy 415	11761
Clinically Oriented Anatomy 3/e (DRAWINGS, PHOTOGRAPHS)	Moore	Anatomy 400	6776
COLOR ATLAS OF ANATOMY: A PHOTOGRAPHIC STUDY OF THE HUMAN BODY (DRAWINGS, PHOTOGRAPHS) 4/e 6/e	Rohen, Yokochi et al	Anatomy 400, 668	6767
			10507
Gray's Anatomy 29/e	Goss	Anatomy 400	9019
Human Anatomy	Van De Graaff	Anatomy 320	11276
McMinn's Color Atlas of Human Anatomy 4/e See also the correlating CD-ROM	Abrahams, Hutchings et al	Anatomy 400, 668	6787
Neuroscience: Exploring the Brain 2/e See also the <i>Human Neuroanatomy Interactive Guide</i> CD-ROM	Bear, Connors et al	Anatomy 362, 400, 418, 460, 470, 625	11137
Neuroscience: Fundamentals for Rehabilitation 2/e	Lundy-Ekman		11141
Physicians' Desk Reference 57/e	Thomson	Anatomy	11209
THE HUMAN BRAIN: AN INTRODUCTION TO ITS FUNCTIONAL ANATOMY 5/e Text Study Guide	Nolte	Anatomy 362, 400, 418, 460, 470, 625	11264
			11152