last revised: May., 2005

Syllabus
EXRS 4200/6200
Biomechanics I

Instructors:

Instructors	Responsibility	Phone no.	e-mail	Office	Office hours
Dr. Kathy Simpson	Professor	542-4385	ksimpson@uga.edu	115H Ramsey	upon appointment
Scott Arnett	Lab Instructor	542-3142	sarnett@uga.edu	103 Ramsey	see lab syllabus

Course Description: The analysis and application of the mechanical principles involved in human motion.
This course is intended for exercise science majors.

Text: Hall, S. *Basic Biomechanics*, 2003, WCB McGraw-Hill

Objectives: The student will be able to:

1. Apply biomechanical principles to human movement situations: performance, training, rehab, injury prevention, etc.
2. Evaluate movement technique using a movement analysis model.
3. Evaluate the mechanics of exercises and activities as they affect the human body.
4. Evaluate external devices used for activities of daily living, exercise and sport.
5. Apply principles related to internal tissue loading to improving tissue structure and function, and to injury prevention.

Evaluation:

* Grading:

A	B	C	D	F
89.5 - 100	**79.5 - 89.4**	**69.5 - 79.4**	**59.4 - 69.4**	**below 69.4**

* Evaluation methods: EXRS 4200 EXRS 6200

Information for SUCCESS:

Maximal performance	A career on the line	Quizzes	Tests	Assignments	Laboratory	Research Project	Extra credit	BONUS PTS!

EXRS 4200 Evaluation

Evaluation tool	Proportion of grade
Quizzes & Assignments	15%
Test #1	20%
Test #2	20%
Test #3	25%
Project	20%
(Extra credit)	(max 2%)

EXRS 6200 Evaluation

Evaluation tool	Pts toward grade
Quizzes and Assignments	10
Test #1	20
Test #2	20
Test #3	20
Research Project	20
Contract Activity[1]	10
Total Pts	100
(Extra credit)	(max 2%)

[1]Graduate students are expected to complete additional work compared to the undergraduate students. Either individually, or as a group of no more than 3 people, you will choose what activities/products you would like to complete for this portion of the grade. "Contract Activity" refers to this proposed activity whose terms we agree upon by signing your submitted **contract**.

Contract Activity Information:

General steps:

*Dream up an activity that is based on biomechanical principles/concepts/knowledge/applications that is of interest to you-
a product that can be used in your job; a pilot study related to your research interests; work w/clients; a piece of a larger
project that you're doing for some other purpose (as long as it's clear that it's not just pure duplication for work in another
class); it can be related to your research project for this class.

*Decide what you want for a final product, the steps necessary to complete the product, and how it should be evaluated for credit. Discuss ideas w/me or lab TA before finalizing.

*Fill out the **contract.** Both of us sign it.

*Revise contract if desired. Both of us sign the new contract.

*Do the work, turn in the final product along with your evaluation pt breakdown you developed.

1. Proposed product: There are a variety of choices for your *proposed product*, including but NOT limited to:

> small research experiment
> activities that utilize biomechanical principles to be used directly by your clients, e.g., newsletter explaining
different types of abdominal exercises and the pros and cons of each, based on biomechanical principles
> short term paper (about 10 pages-depends on topic and topic)
> multimedia product that incorporates or teaches a biomechanical principle (Interactive Physics allows you to develop
simulations very easily; PowerPoint slide show)

2. No. of people: Contract activity can be done either individually or as a group of no more than 3 people. Obviously, an individual project can be 'smaller' in scope than a group project. However, some projects are best done (although not impossible) with a group.

3. Contract: In order for you and I to be in agreement as to the expectations and evaluation, please complete the **contract** <click on "contract>"

4. Consider discussing your proposal with me and/or a lab TA prior to writing up the contract. Idea is to propose
an activity of optimal complexity, depth and time required to complete activity for the credit.

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INFORMATION FOR SUCCESS

STRATEGIES TO MAXIMIZE YOUR SUCCESS

*** MOST IMPORTANT: Understand the concepts as we go through them.**

Understanding the concepts and being able to apply the information to any movement situation is the MAIN GOAL. (Just reading the book and notes and memorizing things is a poor use of your time.)

If you understand the concepts as we go through the material, you shouldn't have to study very much just prior to the test!!!

*** For a given course topic/lecture:**

Prior to class:

a) Check the learning objectives to find out exactly what you need to read and know. Most lectures are available for downloading prior to class.

b) Check WebCT for lecture announcements.

c) Do the reading for that topic listed in course objectives/outline/topics. Put the relevant info into your notes- use of concept maps or some form of organizational structure will be best- write information in your own words and/or pictures. Leave room in your pre-class concept maps/notes for additional information to be added either during class or later.<Note- I expect people to have done the reading- I ask questions & expect to move quickly through the lecture part when we're defining a concept in order to have more time to apply it>.

During class: please always feel free to get clarification or ask for examples. Be sure it makes sense as we go along. Self test your understanding- restate concepts in your own words, think of a new situation and see if the concept fits.

Prior to the next class:

a) go through the class notes- still make sense? Need to add concept maps or drawings, modify old ones? Test your understanding of the topic- try stating the concepts in your own words; apply the concept (s) to new examples not listed in book/notes.

b) Between class meetings, make it a habit to apply that day's concept (and prior concepts) to as many movements as you can. Spend time assessing performers' movements as often as possible- at tennis courts, sports events, clinics, gym; observe people walking, lifting weights, performing rehab, etc. While you do daily tasks, consider the biomechanics of your movements.

c) Get together in small study groups- pay attention to the processes that other people use to solve movement problems as well as their interpretation/application of the concepts. I'm happy to help with you establish more effective problem solving strategies.

A CAREER ON THE LINE...

We expect that you are preparing for an occupation working with clients whose health/safety is in your hands.

In addition, if your professional goals are related to medicine, health-allied and/or physical activity careers, you will belong to one or more professional organizations that expects you and its other members to abide by their proscribed professional ethics.

Therefore, the Department of Exercise Science faculty expect you, as an emerging professional, to develop and adhere to ethical standards in the Exercise Science program (and realize that we're often asked to evaluate you on this and other personal and professional attributes when we write you recommendations for jobs or entrance into advanced degree programs, so we want to be able to extol your virtues).

Expectations:

~***Academic honesty*** in all work: See "Academic Honesty," the UGA handbook on academic honesty. I will take action according to policies described in this handbook for situations involving academic dishonesty. http://www.uga.edu/ovpi/academic_honesty/culture_honesty.htm

Example: Referencing outside material (notes, books, professionals, videotapes, websites, etc.) properly is required when using other people's information in your work. Failure to do so is plagiarism. So, give credit to authors when making statements taken from their material.
Giving credit where credit is due:

"Farley (1996) stated that the primary cause of spiral humeral fractures is..."

"The primary cause of spiral humeral fractures is .... (Farley, 1996)."

~***Ethical treatment of people related to this class***, e.g., regard for the health and safety of your research project participants and your lab partners; contributing to research project as much as other project members; contributing to a supportive learning environment; etc.

TESTS:

a) ***What to bring to test:*** #2 pencil, eraser; for some tests, bring: calculator, protractor (optional)

b) ***Format:*** primarily multiple choice, true/false, and sometimes, short answer questions.
c) ***Higher level cognitive skills required:*** Application, synthesis. Focused on application of concepts to various movement situations, not regurgitation.

Often for a given movement, two situations are given- you are asked to compare them using a biomechanical principle. Example:

"Two identical twins (same mass, height, etc.) were going to race each other on a grass field. Given: The *only factor different* between the two twins in this situation is that they had footwear whose soles had different compositions. At the start of the race, both performed identical movements, and pushed in the posterior direction with 1200 N of force and downwards in the vertical direction with 600 N of force. Twin A was able to move forward, Twin B slipped and fell. Based on the factors that influence static friction, what must be true about Twin B's situation compared to Twin A's?
a. Twin B's shoes had a lower coefficient of static friction.
b. Twin B had a lower maximal value of static friction than Twin A.
c. Twin B had less normal force.
d. a, b
e. a, b, c

d) How to study:
~***Use the Objectives/Readings*** provided for each module of material to structure your review. This objectives state exactly what you need to know from notes and readings on your own;to review how you are required to demonstrate mastery of material.

Example. If an objective states that you must be able to determine what type of muscle action is occurring at a joint for a given movement situation, then expect that is how the question will be framed. Could look like this:

"On the diagram shown for a participant performing the down phase of a squat exercise, what is the type of muscle action for the quadriceps muscle group about the knee joint?
a. concentric b. eccentric c. isometric d. isodynometric"

~Generally speaking, ***use your notes as the primary foundation,*** with your book to a lesser degree, UNLESS the material is noted to be covered ONLYon your own or in lab. For example, if material is to be learned is "on own", then the reading material becomes primary. (Note. The outline tells you location of primary method you need to use to obtain the material, e.g., "on own" or "lab only").

~***Concepts covered only in lab:*** If the concept is listed in the course objectives/readings for a module, then even if it's only covered in lab, you need to know it. Ex. "Which plane and axis does the leg move in during a goobadoob movement?" Planes and axes are only reviewed in lab.

~***Study with a small group by***: making up examples to practice based on the course objective for the topic, using questions at the end of the chapter, practice examples given in class, practice review sheet questions BEFORE the review session (if review questions are provided).

~***Understand/practice the material as we go along***. Practice, practice, practice observing and applying your knowledge during your everyday and professional life. (if you do it right, you should have very little studying to do the night before the test, as it's not about memorization)

e) Tests are given only at the scheduled dates/times. Exceptions will apply only for extreme emergencies, i.e., major illness, death in family. Make arrangements PRIOR to missing test if feasible.

f) Test taking strategies:
~***Look through entire test*** before starting to gauge your time.
~***As you come to a question,*** if you can answer it without much thinking, complete the answer. If you can figure some of it out, but are not sure and find yourself spending much time on it, write notes to yourself on the test, put a big "? in margin, go on. Do not spend too much time stuck on one question- oftentimes, you'll become unstuck when you come back.
~***If something doesn't make sense,*** you're not sure about what is being stated or asked, or suspect that there's an error, A) check the whiteboard for corrections, B) ASK!!!

~***Before answering a question, determine*** *what principle is being applied; *what quantities/ information are "given"; *keep the question and known information simple- assume other factors unrelated to the quantities in a principle are fixed or not relevant (or you'll go crazy); *write on the test- formula or principle- below, leave room to write information about what you know about each quantity in the formula, and how the quantities vary between the 2 given situations. MAKE A LITTLE TABLE if necessary including all given information and comparing the 2 situations.

Example of keeping life simple: Go back to question about the Twins running a race on grass.

Principle: "The greater the coefficient of friction and/or the normal force, the more static friction can be generated before slipping (high max. static friction value).

Formula: maximum static friction = (coefficient of friction) x (normal force). Thus, you're interested in

information that directly influences friction, particularly the maximal value of static friction.

Given information: The key statement about what quantities are "given", "relevant" and/or fixed/same for both twins: "Given: all quantities except the following are the same for both twins' situations...." This tells you DON'T agonize about information that ain't there, like "was the grass the same for both people?" (Grass is same because it was given that everything is same except for the footwear.)

Notes you might write to yourself when writing down given information and information you deduce:

" Friction max. = coeff. fric. x normal force
Twin B vs A: higher higher same "

KEEP IT SIMPLE- DO NOT OVERANALYZE.

~Oftentimes, in the answer choices, ***I'll underline the key element(s)*** that you are evaluating.

Example answer option:
"...a. The predominant muscle group acting at the knee joint at time at 10 s. is the hamstrings."

The underlined word, "hamstrings," tells you that you're trying to determine if it is true that the hamstrings muscle group is the correct answer to the question, "the predominant muscle group is _____."

g) BONUS PTS!! If you've read all of the above, you deserve to know about bonus pts on tests!

How to get them during a test: *be first to find an error of content, and/or *answer the bonus question(s) at end of test.

*First test: will give extra 2% (not pts, %!) if I can recall your name when you turn in your test to me. (With so many students, courses and my brain requiring much repetition and/or use of associations to store information in my name bank, you'll have to do what you can to help me. Check to be sure I know your name before the day of the test)

QUIZZES:

a) how often: No more than 1/week, and no fewer than one every other week.
No quiz will be given during the week of a test or when a sizeable assignment is due.
b) length: Approximately 10 min. Most often at beginning of class; sometimes at end of class.
c) material on quizzes: Course outline topics covered/assigned since last quiz/test AND simple knowledge of that day's lecture topic.
d) what resources you CAN use: your notes, including whatever information you write in your notes, handouts given in class or downloaded from WebCT that are part of a lecture.

e) resources NOT usable: text, lab manual, any form of material from other people's efforts.
f) format: Mostly multiple choice, true/false; some short answer questions, completing diagrams.
g) NO makeups are given. The lowest quiz/assignment grade will be dropped worth a weight of 2 or less; hence if you need to miss one quiz, it will not hurt your grade. (Note. Sometimes opportunities to win a free quiz pass come up, too).
h) For some quizzes, you may be given the choice of working with a partner (that means NO MORE THAN 2 PEOPLE) or alone.

LABORATORY:

a) Attending laboratory is mandatory can pass the course only if you pass the laboratory. Your lab TA will provide you with a lab syllabus containing the laboratory policies, expectations, and grading procedures.

b) The laboratory manual can be downloaded and/or printed via Acrobat Reader from WebCT laboratory folder. Files are
"pdf" files- a file type that can be read by any platform (Mac or Windows).

ASSIGNMENTS:

Practice, practice, practice the concepts, and you'll do great in the course (and not need to cram the night before a test => recipe for failure). That's the purpose of the assignments.

a) Several assignments will be completed- some in class, others outside of class. An inclass assignment is assigned a weight of 1 toward final assignment/quiz grade. There are 3 major assignments; these have much higher weights as they're more involved.

b) Check announcements on WebCT for assignment information; **check your grades** on WebCT often for accuracy.

c) Assignment/quiz weights: A simple assignment has a weight of 1, most quizzes = wt of 2. More intellectually rigorous assignments are weighted more (e.g., maybe a weight of 3, therefore worth 3 times the points of a simple assignment) and evaluated more stringently.

d) Late assignments - accepted only with documentation. Score goes down by 10%, 20% and 30% if turned in late on same day as due date, one day, and two days, respectively. Nothing accepted after two days (Sat. & Sun. also are considered days).Turn late assignments in to my mailbox.

e) Assignments (unless done in class) must be ***typed*** (figures can be hand drawn) and ***stapled***. Top page: major assignments: top page = evaluation form; full name(s) of participant(s), write "EXRS 4200" and

name of assignment if no evaluation form exists.

EXTRA CREDIT

Up to 2% extra credit added to your grand total (as expresssed in percent) may be obtained through a variety of opportunities, including ideas of your own that are related to biomechanics or professional growth in exercise science.

Extra credit information & form