

## Human Energetics HEB 1412

Meeting times: M, W, 10:30-11:45 (**no class on Fridays**)

Room: TBA, Peabody Museum, 5<sup>th</sup> floor

Instructors: Prof Noreen Tuross, Peabody Museum 58D, [tuross@fas.harvard.edu](mailto:tuross@fas.harvard.edu)  
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In this course we will study human energy intake and expenditure, including in sports. The course will also feature case studies of extreme endurance feats and modern-day and historical explorers/adventurers. We will also review the science of some topics such as the effect of high/low carbohydrate diets and response to caloric restriction and the ultimate limits on human energy expenditure.

The course will involve a mix of lectures and paper discussions.

### **Textbook:**

The required text is: Jie Kang, Bioenergetics Primer for Exercise Science, Human Kinetics, 2008.

### **Grading Scheme and Expectations:**

Students are expected to put in a good honest effort in doing readings ahead of class and joining discussion in class. As instructors we will aim to respond to questions in a timely fashion and meet students as necessary.

The grade will consist of:

- i. Three equally-weighted tests (26.7% of grade each)
- ii. Problem sets/reading response questions to be completed online (20% of grade)

\*There will be no final exam.

The final grading letter scheme follows the Faculty of Arts and Sciences rubric:

- **A, A-** Earned by work whose excellent quality indicates a full mastery of the subject and, in the case of the grade of A, is of extraordinary distinction.
- **B+, B, B-** Earned by work that indicates a good comprehension of the course material, a good command of the skills needed to work with the course material, and the student's full engagement with the course requirements and activities.
- **C+, C, C-** Earned by work that indicates an adequate and satisfactory comprehension of the course material and the skills needed to work with the course material and that indicates the student has met the basic requirements for completing assigned work and participating in class activities.
- **D+, D, D-** Earned by work that is unsatisfactory but that indicates some minimal command of the course materials and some minimal participation in class activities that is worthy of course credit toward the degree.
- **E** Earned by work which is unsatisfactory and unworthy of course credit towards the degree.

**Late Policy & Absences:**

Problem sets/reading response questions will be assessed a 20% score penalty per 24 hour period late (or part thereof). Any absence from a test requires a note from a proper authority (such as HUHS).

**Academic Integrity:**

See the student handbook for Harvard's policies and the guide for using sources:

<https://handbook.fas.harvard.edu/book/academic-integrity>

<http://usingsources.fas.harvard.edu/icb/icb.do>

You may discuss your work-in-progress with other students; however, all work submitted must be your own. Appropriate citation of sources is required.

### Schedule (subject to change):

W	4-Sep	Introduction	LR/NT	
M	9-Sep	Introduction repeat	LR/NT	
		<b>course registration deadline</b>		
W	11-Sep	Food and Digestion	NT	Kang Chapter 11
M	16-Sep	Microbiome and Energy Harvest	NT	Barton et al, Gut, 2019; Scheiman et al 2019
W	18-Sep	Calories	NT	Kang Chapter 1 and 2
M	23-Sep	Metabolic Pathways	NT	Kang Chapters 1 and 2
W	25-Sep	Hormones and Food Intake	NT	Cummings and Overduin, 2007; Trexler et al. 2014; Kang chapter 3
M	30-Sep	Energetics Through the Lifespan	NT	Kuzawa et al 2014; Kang chapter 8 & 9
W	2-Oct	Test 1	NT	
M	7 Oct	nutrient interconversion, fed/fast cycle, starvation	LR	exerpt from Gropper; Kalm and Semba 2005
W	9 Oct	energy expenditure	LR	Kang Ch. 10, 11
M	14 Oct	<b>NO CLASS - university holiday</b>		
W	16 Oct	methods for measuring EE	LR	Kang Ch. 4, 5
M	21 Oct	EE measurement demo (Lieberman lab)	LR	
W	23 Oct	fuel sources for exercise	LR	Weber 1999
M	28 Oct	discussion: Diet, Energy Expenditure, Body Composition	LR	Hall et al. 2015
W	30 Oct	discussion: Diet, Energy Expenditure, Body Composition	LR	Ebbeling and Ludwig, 2019; Ludwig and Ebbeling 2018; Hall et al. 2018
M	4 Nov	Test 2	LR	
W	6 Nov	metabolic adaptation	LR	Fothergill et al. 2016
M	11 Nov	extreme limits/endurance	LR	Halsey & Stroud 2012; Stroud 1997; Noakes 2007 chapter
W	13 Nov	extreme limits/endurance	LR	
M	18 Nov	upper limits to EE	LR	Hammond and Diamond 1997; Thurber et al. 2019
W	19 Nov	current debates: controls on body composition, total energy expenditure	LR	Pontzer 2018/2016; Speakman 2014/2018
M	25 Nov	Test 3	LR	
W	27 Nov	<b>NO CLASS - university holiday</b>		
M	2 Dec	wrap-up	LR	