
CLRES 2530

Course instructor:

New and Emerging Techniques in Aging Research

Stephanie Studenski MD MPH

Faculty:

Stephanie Studenski MD MPH
3471 Fifth Ave Suite 500
412 692 2360
sas33@pitt.edu

Guest faculty: Jennifer Brach PT PhD, Mary Ann Sevick RN PhD Dan Buysse MD PhD, Martica Hall PhD Thayer PhD, Bret Goodpaster PhD Rakie Cham PhD Julie Price MD Chet Mathis MD Howard Aizenstein MD PhD Anne B Newman MD MPH Abbe deVallejo PhD Susan Greenspan MD

I. Course description:

This 1 credit course provides students with an introduction to novel and emerging technologies used in aging research, presented by the researchers who use them in their own studies. Students will gain knowledge useful for critical appraisal of existing literature and for incorporating techniques into their own research. This course is required for completion of the Aging Concentration in the Clinical Research Training Program.

II. Course objectives:

1. Become familiar with techniques that can be used to study processes underlying clinical phenomena in older adults.
2. Understand the fundamental concepts and approaches used by these techniques.
3. Consider the match between the demands of the studies and the target population of older adults.

III. Course requirements:

Completion of Introduction to Patient Oriented Research in Aging or permission of instructor

IV. Location:

Parkvale 305A

Tuesdays 4-6 pm April 13-May 15 EXCEPT April 24

V. Course credits and contact hours:

1 credit; 16 contact hours; 1 session/week for 6 weeks (2 hours per session, plus 240 minutes for site visits)

VI. Grading:

Letter grade, based on assignments:

Class participation	20%
Critical Assessment of a published article using the technique	30%
Report on observation of the technique in use in a local study	30%
Power point presentation on a technique of interest to you	20%

VII. Readings:

Readings are listed for each session separately below and were selected by the speakers to 1) provide an overview of the technique, its uses and limitations and 2) give an example of an application from the speaker's own work.

VIII. Teaching methodology:

Lectures and classroom discussions will be supplemented with readings directed at core concepts and applications of emerging and novel techniques used to study aging phenomena. Researchers who are currently conducting studies using these techniques will lead sessions. Students will observe and report on a technique or methodology of interest to them.

IX. Major Assignments

1. Two short reports and a power point presentation based on a technique of interest to you using the attached formats. All are due for class 6.

Session 1 Orientation, **Recording behavior in natural settings:**
Physical activity monitors, PDAs

Date 4/3/07

Topics:

1. Physical Activity Monitors in Aging Research: types, uses, interpretation, challenges and the future: Brach
2. PDAs: types, uses, interpretation, challenges and the future; special issues for the older adult: Sevick

Readings:

Required

Berlin Storti Brach Using Activity Monitors to Measure Physical Activity in Free-Living conditions Physical Therapy 2006:86-1137-1145

Sieck Rogers Connelly Fat Finger Worries: How older and younger users physically interact with PDAs In: Costabile and Paterno (Eds) INTERACT 2005 267-280

Optional

Sevick et al ENHANCE study manuscript draft for class use

Connelly Rogers Sieck Designing a PDA interface for dialysis patients ? publishing info N/A

Assignment

Consider options for your choice of a technique to study in detail. Notify instructor by session 3. Begin to contact research sponsors to arrange visits.

Session 2 **Sleep and Autonomic Function**

Date 4/10/07

Topics:

Sleep and Aging: what to measure, how to measure, pros and cons of various techniques: Buysse

Autonomic Function and Aging: what to measure, how to measure; pros and cons of various techniques including heart rate and blood pressure variability: Hall and Thayer

Readings:

Required

Buysse DJ, Strollo PJ, Black JE, Zee P, and Winkelman JW: Sleep Disorders, In: Hales RE, Yudofsky SC, Gabbard G (Eds), The American Psychiatric Publishing Textbook of Psychiatry, Fifth Edition, APPI Press, Washington, DC, (in press).

Thayer Noninvasive assessment of autonomic influences on the heart in press

Optional

Buysse DJ: Introduction. In: DJ Buysse (ed.) Sleep Disorders and Psychiatry, (JM Oldham, MB Riba, series editors) American Psychiatric Publishing Advances in Psychiatry. Arlington, VA: American Psychiatric Publishing, Inc., 1-28, 2005.

Sneider et al Sex influences and heritability of two indices of heart rate dynamics Twin Studies and Human Genetics Vol 2 April 2007

Session 3 **Energy/Metabolism and Biomechanics**

Date 4/17/07

Topics:

Energy metabolism in the older adult: what to measure, how to measure; pros and cons of available and emerging techniques: Goodpaster

Basic Biomechanics of walking and movement in the older adult: the role of the human movement laboratory: current and emerging techniques: Cham

Readings:

Required

Pandy Integrating modeling and experiments to assess dynamic musculoskeletal functioning in humans *Experimental Physiology* 2006

Zajac et al biomechanics and muscle coordination of human walking *Gait and Posture* 2003

Optional

Horak F Postural orientation and equilibrium Age and Aging 2006 35:S2

Maki control of rapid limb movements for balance recovery Age and Aging 2006 35:S2

Redfern Cham et al Biomechanics of slips ergonomics 2001

Assignment

Plans for visits should be completed today

Session 4 Neuroimaging

Date 5/1/07

Topics:

PET scanning; current and future capacity, opportunities and challenges: Mathis

MRI, fMRI: current and emerging capacity; opportunities and challenges: Aizenstein

Readings:

Required

Meltzer et al Positron Emission Imaging of the Aging Brain Neuroimaging Clinics of North America 2003 759-767

Thayer et al Noninvasive assessment of autonomic influences on the heart: impedance cardiography and heart rate variability in press

Optional

Klunk et al Imaging Brain Amyloid in Alzheimers Disease with Pittsburgh Compound B Ann Neurol 2004 306-309

Sneider et al Sex influences and heritability of two indices of heart rate dynamics Twin Research and Human Genetics Vol 2 April 2007

Assignment

Session 5: Vascular and Immune Function

Date 5/8/07

Topics:

Strategies for the assessment of the vascular system: uses, strengths and limitations: Newman
Immune function and aging: what and how to measure: deVallejo

Readings:

R Chaves et al Subclinical Cardiovascular Disease in Older Adults Am J Geriatric Cardiology 2004; 13:137-151

Optional

Newman AB et al Dementia and Alzheimer's Disease Incidence in Relationship to Cardiovascular Disease in the Cardiovascular Health Study Cohort JAGS 2005 53: 1101-1107

Newman AB et al Successful Aging Arch Int Med 2003 163:2315-2322

equired

Optional

Assignment

Session 6 Bone density, Student presentations

Date 5/15/07

Topics:

Bone density: approaches in current and emerging use; pros and cons: Greenspan

Student presentations (15-20 minutes each)

Readings:

Required

Lewiecky and Laster Clinical Review: Clinical Applications of Vertebral Fracture Assessment by Dual Energy Xray Absorptiometry J Clin Endo Metab 2006: 4215-4222

Blake and Fogelman Role of Dual Xray Absorptiometry in diagnosis and treatment of osteoporosis 2007: 102-110

Optional

Assignment

All assignments due today

Format for assignments on research techniques in aging research

Assignment 1: Critical Appraisal

1. Your name
2. Technique or technology addressed
3. In 2-3 pages, critique a published article using this technique. Describe the research question, methods and results of the study. Would you recommend this or another technique to address the research question? Would you process or interpret the results the same way or differently? Are there methodological issues related to the technique that influence your interpretation of the findings?

Assignment 2: Observation of the technique in an ongoing study

1. Your name
2. Technique or technology addressed
3. In 2- 3 pages, describe your experience with the technique. What did you observe about the feasibility and validity of data collection and data processing? How might you improve the quality of research using this technique by altering equipment, sampling, data processing or other contributors to a good measure?

Assignment 3: Power point presentation

1. Identify the technique of interest
2. Summarize the main points of your critical assessment and lab visit.
3. What are the most important next steps in the development of the technique for use in aging research?
4. How might you use this technique in your own research?

Date, Speaker, Topic summary

date	time	Speaker	topic	Readings/ Materials
4/3	4	Brach	Physical activity	PDF of PA
	5	Sevick	PDA's	PDF, Word, Power point
4/10	4	Buyse	Sleep	PDF, Word
	5	Hall and Thayer	Autonomic measures	
4/17	4	Goodpaster	Energy expenditure	
	5	Cham	biomechanics	
5/1	4		PET	
	5	Aizenstein	Neuroimaging/MRI	
5/8	4	Newman	Vascular system and aging	
	5	Vallejo	Immune function	
5/15	4	Greenspan	Bone density	PDF, Word
	5	Student presentations		