

Fall, 2014 (IL: ANSC 592; TTU: ANSC 5318; ANSC 5001, section 010)

Topics in Stress, Behavior and Welfare: Brain Mechanisms of Stress

Syllabus

Janeen Salak-Johnson, Associate Professor, Animal Sciences, University of Illinois;
johnso17@illinois.edu

John J. McGlone, Professor, Animal and Food Sciences, Texas Tech University:
john.mcglone@ttu.edu

Brittany Backus, Animal Care Services, Texas Tech

Course Objective

The objective of this course is to allow students to become familiar with the state of science in areas of stress, with an emphasis on brain mechanisms/pathways and the consequences in terms of animal health, food safety, meat, memory, reproduction, and overall welfare.

Learning Outcomes

Students are expected to immerse themselves in the topics of stress and the brain. Students are expected to understand:

- General principles of stress and how they impact animal biology, including
 - Models of stress
 - Immunology
 - Learning and memory
 - Developmental and trauma effects on stress systems
- Brain and peripheral regions and organs that are involved in stress responses
- Neuroendocrine and endocrine responses during stress

Assessment of Learning Outcomes

Students will have their understanding of material presented in class assessed by the following means:

- Interactive questions during 10 teleconference classes
- Written answers to written questions provided by the instructors
- A summary of papers reviewed in the form of half-page abstracts
- A written (Powerpoint) and oral presentation in the area of their interest related to the topics
- A final written exam

Course Format

Students will read and summarize papers in a simple literature review format. Literature review will contain 2 sections: (1) is background information discussed in the course and (2) student's topic of interest. Students will be required to prepare an abstract of each paper (half-page, single spaced with complete citation) and students will prepare a short (15-20 min) seminar relating to their specific topic of interest. Faculty will discuss mechanisms and students will discuss effects of stress on a system. Student's seminar topic should relate to two aspects—cause and effects. For example, the cause may be a brain or an endocrine mechanism (ex., Amygdala, CRF, catecholamines, glucocorticoids) and the effects may be a system of interest of interest, including, but not limited to PTSD, addiction, learning and memory, immunity, reproduction, behavioral problems, fear, meat quality, food safety, etc. Students will participate in a weekly on-line discussion and will submit written assignments and they will also present a lecture/seminar on their topic area. Course meeting time will be by arrangement.

At TTU:

Aug 25th, 2014

Dec 3rd

Dec 5-10

First class

Last day of classes

Final exams

At UIL:

Aug 25th

Dec 10th

Dec 12-17

Grading

Grades will follow the standard break points:

90.0% A

80.0-89.9% B

70.0-79.9% C

60.0-69.9% D

Below 60.0% F

Source of points

Written answers to questions and on-line/phone participation	200
Student written and oral presentation	200
Final exam	<u>100</u>
Total	500

Course Topics

- General models of welfare, stress, homeostasis, and allostasis
 - A review of animal welfare issues (Backus et al., 2014 review)
 - A review of allostasis by McEwen (2011)
- Brain and endocrine anatomy and physiology review
 - Hypothalamus
 - Hippocampus
 - Amygdala
 - Adrenal gland
 - CRF/CRH and glucocorticoid systems
 - Central and peripheral catecholamines
- Application of stress models to animal and human health problems (example papers)
 - A review of epigenetics in stress and development (Roth and Sweatt, 2011)
 - A review of developmental stress (Frodl and O'Keane, 2012)
 - A review of stress and its role in addiction (Koob, 2008)
 - A review of stress effects on learning and memory (Schwabe et al. 2011)
 - A review of stress and immunity in farm animals (Salak-Johnson and McGlone, 2006)
- Student interests (to be relevant and approved by instructor), examples may include:
 - Meat quality
 - Animal health
 - Stress effects on behavior
 - Stress in the mother and neonate
 - Pain
 - Reproduction
 - Addiction
 - Learning and memory
 - Others

Class technical information

The weekly teleconference will be from 2-3:30 Tuesdays. The instructor will send call-in information before class meeting times. We will use the Lync system. This allows both telephone and webcam meeting. Computer screens can be shared as well.

Students must select their topics by September 9, 2014 for instructor approval.

Class meeting times (can be adjusted depending on schedules) and general dates. Student abstracts (1/2 page each) are due before class

Date	Topic	Lead Instructor	Reference materials
Sept 2	Introduction and system test	John McGlone and Janeen Salak-Johnson	Syllabus
Sept 9	Overview of Animal welfare issues and Allostasis	John McGlone	1, 2
Sept 16	Hypothalamus, amygdala, hippocampus anatomy	John McGlone and Janeen Salak-Johnson	4,5,7,8
Sept 23	CRF systems	Janeen Salak-Johnson	
Sept 30	Developmental and epigenetic effects	Brittany Backus	6
Oct 7	Addiction, learning and memory, PTSD	Brittany Backus	
Oct 14	Stress and immunity	Janeen Salak-Johnson	3
Oct 21	Review and summary	All	
Oct 28	Student papers/reports		
Nov 4	Student papers/reports		
Nov 11	Student papers/reports		
Nov 18	Student papers/reports		
Nov 25	No class	Thanksgiving	
Dec 2	Final exam sent to students by email	Due by 8 pm Central time by e-mail	

Papers for Student Reviews

1. Backus, B., J McGlone, and K. Guay. 2014. Animal welfare: stress, global issues, and perspectives. In: Neal Van Alfen, ed., Encyclopedia of Agriculture and Food Systems. Vol 1, San Diego: Elsevier. Pp 387-402.
2. McEwen, BS and PJ Gianaros. 2010. Stress- and Allostasis-Induced brain plasticity. Annual reviews of medicine. 62:5.1-5.15.
3. Salak-Johnson, JL and JJ McGlone. 2007. Making sense of apparently conflicting data: Stress and immunity in cattle and swine. J Anim Sci 85:E81-E88.
4. Ettrup, KS, J Christian Sorensen and CR Bjarkam. 2010. The anatomy of the Gottingen minipig hypothalamus. A Chem Neuroanatomy. 39:151-165.
5. Sah, P, SL Faber, M Lopez de Armentia and J Power. 2003. The amygdaloid complex: Anatomy and Physiology. Physiol Rev 83:803-834.
6. Gunnar, M and K Quevedo. 2007. The Neurobiology of stress and development. Annu Rev Psychol. 58:145-173.
7. Smith, SM and WW Vale. 2006. The role of the hypothalamic-pituitary-adrenal axis in neuroendocrine responses to stress. Dialogues in Clinical Neuroscience 8:383-395.
8. Thammaroj, J, C. Santosh and JJ Bhattacharya. 2005. The hippocampus: modern imaging of its anatomy and pathology. Practical Neurology. June 2005: 150-159.

TTU University Policies:

ADA Statement

Any student who because of a disability may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary accommodations. Students should present appropriate verification from Student Disability Services during the instructor's office hours or by appointment with the instructor. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact Student Disability Services office at 335 West Hall or (806) 742-2405.

Withdrawal from a Course

The last day to drop a course without academic penalty is September 10th. Students will receive an automatic "W" regardless of the current grade in the class. There is no longer a grade of "WF." Last day to drop a course with academic penalty is September 26th. Last day to withdraw from the University is November 26th.

Scholastic Dishonesty

It is the aim of the Texas Tech University faculty to foster a spirit of complete honesty and high standards of integrity. The attempt by students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, misinterpreting the facts, taking cell phones pictures of an exam/quiz, and any act designed to give unfair academic advantage to the student or the attempt to commit such an act. Further information can be found in the Student Handbook.

Absence for Observance of a Religious Holiday

A student who intends to observe a religious holy day should make that intention known to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holiday shall be allowed to take an examination or complete an assignment scheduled for the day within a reasonable time after the absence. A student may not be penalized for the absence, but the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.