Understanding how your brain works empowers you to empower it, notably in mental optimization, mental health, and spiritual growth.

Description


In this W-certified course students identify a peer-reviewed science or theological jour article and on alternate weeks write either an essay or summary, posted in an on-line discussion forum. The writing should emphasize how neuroscience and religion inform each other. Students present and discuss their work in class. Pre-requisites: Co-enrollment in VIBS 407, "Core Ideas in Neuroscience." Junior or Senior classification.

Benefits Students Can Expect. Improved Ability to:

- Find primary research literature in a given field and extend its conceptual applications.
- Understand primary research literature and interpret it outside the original context.
- Recognize the inter-relationships of brain function and religious beliefs and practices.
- Communicate, both in writing and oral presentation.
- Understand attitudes and behaviors of oneself and others.

Of all the science courses I have taken, this is the one where I learned the most about what matters most.
— Senior Biomedical Science major

Syllabus Contents
Synopsis

"The unexamined life is not worth living" -- Socrates

The life examination urged by Socrates has to be accomplished by the brain. Neuroscience is the science of brain and mental processes. Neuroscience can illuminate how humans cultivate their sense of self, beliefs, attitudes, feelings, biases, knowledge, understandings, decisions, conclusions, habits, and behaviors.

The so-called conflict between science and religion typically arises from a fixation on a few lines of text in Genesis I and II. What should matter infinitely more from both secular and religious perspectives is personal. Neuroscience and religion are not in conflict but rather are complementary. Both perspectives aim to show how we humans can be better people, more honorable, more devoted to helping others, more fulfilled, and more capable in our quest to not only "have life but to have life more abundantly." Neuroscience can enrich our understanding of the roadmap by which we travel on life's journey of self-examination, personal growth and, yes, even religious beliefs.

Of course, there are many people of faith and scientists who prefer to focus on the issue of the conflict between creationism and evolution. This focus has appeal to both groups: 1) it can be debated in the abstract without demanding much personal introspection or change, and 2) both sides are able to prefer the issue and advocate their respective arguments.

Ever since 1859 when Charles Darwin and his "bulldog" Thomas Huxley ushered the theory of evolution into public debate, science has been progressively challenging ancient religious doctrines.

People today tend to think of science and religion with one or more of three propositions:

1) both science and religious faith are valid for their adherents, yet are cognitively dissonant,

2) science lures people away from religion to become agnostics or atheists,

3) science might prove to be a new source of religious revelation.

Students in this course will come from multiple academic majors, such as neuroscience, biology, psychology, philosophy, religious studies, anthropology, and others. Students are encouraged to have completed introductory biology and chemistry courses, because neuroscience is based on these sciences. It is not necessary to have had neuroscience courses as co-enrollment in VIBS 407 is required.

Upper-division enrollment is a pre-requisite because this kind of course requires maturity and significant academic experience.

In this course's context of religious belief, there are two basic perspectives. One approach is to seek neural correlates, epitomized by seeking "God
Neuroscience is central to these issues because belief systems come from the mind. This course will emphasize the biology of human mind, where it comes from, how it operates, what it does, where it goes when we sleep, and how and why it comes back when we awake. All religious doctrines require certain beliefs and behaviors, some of which are in harmony with what is known about the brain and some which are not. The course should remind people of faith of how much we know and science majors of how little we know.

Neuroscience has implications for all major world religions, past and present. Basically, this course is about "belief neuroscience." Belief is a general property of brain function, not limited to religious belief.

The "God-spot" approach elaborates the basic notion of neuronal correlates of consciousness. Many such correlates have been identified, including some by the professor, and more such discoveries are likely. But correlates do not necessarily explain anything. The other, and probably more promising perspective, is to explore how past experiences, secular and religious, train the brain to respond to experiences in spiritual ways and determine the neurobiology of emotional and cognitive processes by which the brain comes to believe anything it accepts as valid. Clearly, people differ enormously in this regard. Even animal research could be relevant, as animals also have many beliefs, though unlikely to be religious ones.

The focus of this course is on why and how the brain conceives of, represents, accepts, and interacts with gods or other supernatural agents. We are especially interested in the underlying neuroscience that influences specific beliefs, such as degree of self-actualization, past experiences, emotional predilections and states, educational level, and reasoning capacity.

**Learning Outcomes** Each Student Will:

1. Complete VIBS 407 and pass its weekly quizzes and final exam on neuroscience.
2. Recognize, understand, and communicate how neuroscience and religion can inform each other. Students will able to demonstrate through their essays, summaries, comments on other students’ writing, and class discussion that they have become more introspective about their human nature and mind and more open to new perspectives, both scientific and religious.
3. Gain insight into their own religious beliefs, particularly how they are affected by biology and brain function.
4. Develop writing and communication skills.
5. Develop public speaking and leadership skills by leading class discussions of their essays.
Class Operations

At the beginning of each week, students will complete the requirements in the co-enrolled VIBS 407 course. By mid-week students should have completed their 407 assignments.

Three specific tasks are indicated below:

1. Each week, each student will be assigned to find a peer-reviewed neuroscience or theological publication that is relevant to that week's topic. On alternate weeks, each student will either write a one paragraph summary of the information source or write an original 500-800 word essay that provides explanation and insight on the relationships of science and religion, with particular emphasis on how they inform each other. Summaries and essays will be posted in the forum of Texas A&M's eCampus, open only to class enrollees. No one will be allowed to audit this course.

   - The summary should include the student's view of how the academic paper could assist in integrating neuroscience and religion.
   - The essay should summarize the key ideas and data of the selected paper, but emphasize related literature as appropriate and the student's perspective and critical and creative thinking.

   All students will see the writings of all other students and are expected to engage in discussion of these writings, in the eCampus forum and in the class meeting at the end of the week.

   Student posts should focus on the linkage between neuroscience (or science in general) and religion, not on explaining or proselytizing a given religious belief system. Two rules apply to all essays, summaries, and class presentations and discussions: 1) plagiarism is not allowed and students must provide original interpretations in their own words, and 2) proselytization is not allowed.

2. Each student must also post each week at least two comments on the posts of classmates. Anonymous posts are not acceptable. On-line commentary on the posts is an integral aspect of student participation. Comments should contribute to the ideas involved.

   Each week (see Class Weekly Schedule) students will integrate one or more neuroscience topics covered that week with appropriate religion topics, some of which are identified in the schedule. These topics will guide the students to discover relevant academic literature. All posting (summary or essay) for a given week must occur before by noon Thursday. Delayed posting will not be accepted for credit. Based on the quality and relevance of student essays, several students will be selected for the recitation class period to summarize their essay and lead a class discussion on the same day of posting.

3. Each student must post in the personal journal (on the eCampus control panel). Having a journal to write identify and clarify key ideas especially helps remembering and understanding and is a study source. This course has a "participation" grade (25%) of the final grade, which includes diligent journal entries, discussion in class, and oral presentations of essays. The journal entry each week should list in bullet format three key ideas from the essays of four other students that week that you think are important enough to remember and reflect upon. The purpose is to ensure that you are engaged with each essay. The entries will help you remember important ideas. You will get full credit each week for a proper entry. Being late or incomplete will result in grade deduction.

   Each class period will end with a brief, eyes-closed, period of silence, in which all students are
required to participate according to their preference. One purpose is to reflect on what just transpired in the class and to promote memory consolidation. This silence period can also be used for silent meditation and prayer.

4. Other requirements:

- Courtesy and tolerance to other students and their perspectives is expected.
- Proselytization will not be permitted.

Class Weekly Schedule Student Writing Should Integrate Multiple Perspectives

If the publication is scientific, the author is expected to integrate its ideas with religion. If the paper is theological, students should integrate with neuroscience.

<table>
<thead>
<tr>
<th>Weekly Theme (Lecture Topic)</th>
<th>Possible Assignment Topics Neuroscience Perspectives</th>
<th>Possible Assignment Topics Religious Perspectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Historical background</td>
<td>Evidence-based beliefs; materialist neuroscience; the “God particle,” “God spot” in the brain; biology of beliefs.</td>
<td>Culture; doctrines and creeds; ancient Egypt, Babylon, Greek Roman, Mayan religions; Neo-Platonists; prophets; major contemporary religions; Satanism; evil; dualism.</td>
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<tr>
<td>2. Evolution</td>
<td>Evolution of the nervous system; early hominids; Darwin/Huxley; Scopes trial; Leakey; nature vs. nurture; population genetics, genetic drift, punctuated equilibrium</td>
<td>Creationism; creation myths; Intelligent Design; Genesis I; Genesis II (Adam and Eve); ensoulment, faith instinct; evolution of religion; “dominion over animals.”</td>
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<tr>
<td>3. Atoms of mind</td>
<td>Neural basis of mind; action potentials; synaptic transmission; nature of information and processing, “God spots” in the brain,</td>
<td>Descartes; dualism; monism; “Ghost in the Machine,” “God spots in the brain;” neuronal representations of belief; spiritualism; selfhood.</td>
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<tr>
<td>4. Brain development</td>
<td>Brain development in utero; topographical mapping; fetal sleep and “dreaming;” development of sense of self; pro-choice</td>
<td>When human life begins; birth defects, eugenics; childhood vs. adult faith.</td>
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<tr>
<td>Environment</td>
<td>Brain energetics; neuroplasticity; membrane lipids; inflammation; anti-oxidants, supplements; malnutrition; drugs; epigenetics.</td>
<td>Dominion over animals; vegetarianism; food, drink, and substance taboo; repentance, “born again;” salvation; “Mark of</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
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<td>5. Sensation</td>
<td>Neural representation of stimuli; modalities; receptive field; feature extraction; sense of self; perceptual illusions/distortions/hallucinations; binding; mirror neurons; sense of self, phantom limbs, personal space.</td>
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<tr>
<td>6. Neural drives, motivation</td>
<td>Limbic system; positive and negative centers in the brain; delayed gratification; fear; suicide; endogenous opiates; euphoria; anxiety; drug and substance abuse; PTSD; sex differences in the brain; homosexuality; oxytocin.</td>
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<tr>
<td>7. Agency</td>
<td>Stochastic/deterministic processes; determinism; intention; illusory free will; Ben Libet’s experiments; focused attention; non-linearity/chaos theory; Bayesian probability; unilateral neglect; stereotyped movements; motor planning.</td>
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<tr>
<td>8. Executive functions</td>
<td>ADHD; attentiveness; discipline; self-control; visceral control; biofeedback training; prefrontal cortex; selective attention; mindfulness; expectations/placebo/nocebo; decision-making; indoctrination; behavioral arrest; stereotyped movements; confirmation bias; EEGs and meditation, attentiveness, behavioral inhibition, self-control.</td>
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<tr>
<td>9. Learning &amp; memory</td>
<td>Attention; conditioning; schemas; memory mechanisms; false memory; neuroplasticity.</td>
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<tr>
<td>10. Social neuroscience</td>
<td>Propaganda; herd behavior; tribalism; social hierarchies; empathy; theory of mind, mirror neurons; personal space;</td>
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</tbody>
</table>

Cain,” evil, death

Unseen mysteries; illusions; miracles; ritual (laying on of hands, faith healing, icons, chants, hymns, incense); asceticism; representational preference, style and capacity.

“Child of God;” fear of damnation; "original sin;" love; empathy/Golden Rule; forgiveness; fear of damnation; salvation; anxiety; stress; faith healing; Buddhism/ “inner peace;” religious terrorism; religious ecstasy.

Sense of agency; predestination/the “elect;” free will; personal responsibility; obedience; personal responsibility; judgment; repentance; forgiveness; worship (hymns, rituals, prayer); expectations; intention; motor planning;

Prayer; meditation; empathy; forgiveness; grace; ethics; honor; obedience; sacrifice; charity; asceticism, religious rituals; preaching; evangelism; worship practice.

Religious indoctrination; cults; dissonant beliefs; scripture; Quranic memorization; ritual and memory; evangelism; scripture; response to spiritual experiences; parochial schools; madrassas; monasteries.

Alienation/loneliness; group dynamics; charity; agape love; culture; rituals; priesthoods;
<table>
<thead>
<tr>
<th>11/12. Consciousness and Religion</th>
<th>Neural basis; quantum consciousness; zombies; robots; alternative theories; “God spots” in the brain, what consciousness does.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts 1 and 2</td>
<td>Cognitive dissonance; dreaming; hallucinations; abnormal states; near-death experiences.</td>
</tr>
<tr>
<td></td>
<td>Monism/dualism; spiritual awareness; moral codes; ethics; unconscious beliefs; hallucinations/visions; speaking in tongues; zombies/voodoo; hypnosis/transcendental meditation; faith healing; role of language; blasphemy; spiritual representation and responsiveness; prayer; spiritual possession/exorcism; doctrinal preference; solipsism; science and religion conflicts.</td>
</tr>
</tbody>
</table>

| 13. Sleep, Dreaming             | Need for sleep, sleep centers; sleep cycles; dream hallucinations; insanity.                                  |
|                                  | Sabbath as day of rest; dream revelation; visions; sleepiness and religious doubts; sleep paralysis; Sabbath as a day of rest; religious anxieties toward sleep; demons in night terrors; sleep deprivation and mind control; dying during sleep. |

| 14. Neuronal Diseases, Death    | Neuronal group selection; apoptosis; circuit sculpting; oxidative stress; aging/dementia.                    |
|                                  | Morality of birth control/abortion/legal execution; euthanasia or suicide; body (brain) as temple of the soul; nirvana/heaven; eternal life. |
Instructor Information

W. R. Klemm, D.V.M., Ph.D., Senior Professor of Neuroscience
Web site
Phone: 845-4201
e-mail: wklemm@cvm.tamu.edu

Recent pertinent books:
Core Ideas in Neuroscience (required text in VIBS 407)
Mental Biology
Making a Scientific Case for Conscious Agency and Free Will

Webs: www.cvm.tamu.edu/wklemm,
http://thankyoubrain.com
http://thankyoubrain.blogspot.com
http://www.psychologytoday.com/blog/memory-medic
http://vetmed.tamu.edu/ARR-teaching
Linkedin neuro-education discussion group

Science Columnist, Bryan-College Station Eagle, Psychology Today

Return to Contents

Grading (traditional letter grading)

Class attendance is mandatory. See attendance policy at end of syllabus.

- **25%: Class presentations, participation, and journaling.** Students, if called upon in any given week, are expected to present a summary of their essay and lead a class discussion. Students are expected to participate in the recitation sessions by asking questions and providing their own insights. Proper journal entries are a requirement for full participation credit. Roughly equal weights are given to participation in class presentation, discussion, and journal entries.

- **25% Student summaries and comment posts.** Full credit will be given for submitting the required summary, properly formatted, and by posting at least two substantive comments each week.

- **50% Essays.** These will be graded by rubric (see below) and averaged over the seven essays.
  
  \[ \text{A} = 90-100, \text{B} = 80-89, \text{C} = 70-79, \text{D} = 60-69, \text{F} = < 60. \]

**Essay Grading Rubric**

Grand total points (100 maximum. 60 for general merit of content, 40 for communication)
Grading of essays will emphasize the student’s critical and creative thinking, the application of source material to course goals, and effectiveness of communicating ideas.

<table>
<thead>
<tr>
<th>Content</th>
<th>Low</th>
<th>Middle</th>
<th>High</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness of sources (10 pt. max)</td>
<td>Little fit with week’s theme. Sources were not relevant to relating</td>
<td>Acceptable fit with weekly theme. Sources were marginally relevant</td>
<td>Excellent fit with weekly theme. Sources were highly relevant to relating science to religion.</td>
<td></td>
</tr>
<tr>
<td>Use of neuroscience ideas and facts (15 pt. max)</td>
<td>Little or no evidence of incorporating neuroscience</td>
<td>Neuroscience ideas and facts identified and applied</td>
<td>Neuroscience ideas and facts were prominent and applied insightfully</td>
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<tr>
<td>Idea development, organization (15 pt. max)</td>
<td>Little indication of how science can inform religion or vice versa. Ideas seemed to ramble, weakly connected with each other or with over-all theme.</td>
<td>Ideas were sometimes hard to follow or failed to flow smoothly.</td>
<td>Relation of ideas clear and well-connected. Ideas flowed smoothly and logically and tightly linked to theme.</td>
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<tr>
<td>Analysis/synthesis/Insight (20 pt. max)</td>
<td>Essay seemed just to parrot the sources. Little analysis. Weak use of student generated evidence and logic.</td>
<td>Some synthesis and student's own ideas. Student arguments seem valid but could have been made stronger.</td>
<td>Original and insightful ideas, well integrated with essay theme. Deep analysis. Student ideas and arguments original and well supported.</td>
<td></td>
</tr>
<tr>
<td>Writing and Communication</td>
<td>Low (1-4)</td>
<td>Middle (5-7)</td>
<td>High (8-10)</td>
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<tr>
<td>Following instructions, formatting (10 pt. max)</td>
<td>Multiple instances of failure to follow directions.</td>
<td>Instructions followed completely.</td>
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<tr>
<td>Student's voice, audience awareness (10 pt. max)</td>
<td>All text is a restatement or paraphrase of the writings of others.</td>
<td>Complexities recognized and addressed. Student conclusions clearly discernible and based on evaluation of multiple points of view.</td>
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<tr>
<td>Word usage, syntax (10 pt. max)</td>
<td>Many ill-suited words or punctuation errors or awkwardly constructed sentences.</td>
<td>Few ill-suited words or punctuation errors or awkwardly constructed sentences.</td>
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<tr>
<td>Grammar rules, spelling (10 pt. max)</td>
<td>Many grammar or spelling errors</td>
<td>Few grammar or spelling errors.</td>
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<tr>
<td>Total</td>
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</table>

A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = < 60.

Return to Contents

Text and Resources

ADA Policy

Americans with Disabilities Act (ADA) Policy Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit http://disability.tamu.edu.

Academic Integrity Statements

“An Aggie does not lie, cheat or steal, or tolerate those who do.” For additional information, please visit: http://aggiehonor.tamu.edu.

A note on plagiarism:

It is expected that students will use ideas from the information sources they find. But cut-and-paste of the text of others is deemed a violation of the TAMU honor code (except for short quotes, so indicated). Paraphrasing can be acceptable, but the source must be cited in a reference list at the end of each essay.

Attendance Policy

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07.