Information on the course

Department: Human Development & Family Studies

Course Name: Brain and Human Behavior
(Otak dan Tingkah Laku Manusia)

Course Code: FEM 4100

Credit Hours : 3 (3+0)
This course comprises three hours of lectures a week, which adds up to 42 hours of lectures per semester. In order to complete the course requirement, each student is expected to complete an equivalent of six to nine hours of reading a week and complete related assignments.

Course Description

This course emphasizes on the detailed analysis of the brain and how it influences human behavior. It discusses the neuron structure, brain anatomy and its functions, communication within the brain and across the nervous system as well as brain damage and recovery.
Course Objectives:

At the end of the course students can:

1. Describe brain anatomy and its functions;
2. Describe the development of the nervous system;
3. Explain the relationship between the nervous system and human behavior under normal and stressful conditions.
4. Discuss brain damage, plasticity and rehabilitation.

Learning Outcome:

Course Content

<table>
<thead>
<tr>
<th>Topics</th>
<th>Content</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction: Brain Biology &amp; Human Behavior</td>
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<tr>
<td></td>
<td>• Brain: Source of control and behavior</td>
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<td></td>
<td>• Genes, brain and environment</td>
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<td>2</td>
<td>The Anatomy of the Brain</td>
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<td></td>
<td>• Brain structure</td>
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<td></td>
<td>• Neuron structure</td>
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<td></td>
<td>• Spinal cord</td>
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<td>• Central nervous system structure</td>
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<td>3</td>
<td>Impulse Conduction: Sending &amp; Receiving Messages</td>
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<td></td>
<td>• Synapse</td>
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<td>• Chemical activity between neurons</td>
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<td>• Neurotransmitters and human behavior</td>
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<td>4</td>
<td>Brain Development</td>
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<td></td>
<td>• Brain development before and after birth</td>
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<td>• Stimulus and brain development</td>
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<td></td>
<td>• Effects of experience on brain development</td>
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<td></td>
<td>• Brain laterization and function</td>
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<td></td>
<td>• Mental retardation: autism and Williams syndrome</td>
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<tr>
<td>Topics</td>
<td>Content</td>
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</tbody>
</table>
| 5      | Perception: Mechanism, Awareness & Attention  
  - Principles of sensory system organization, brain waves and perception  
  - Vision and brain processes  
  - Audition and brain processes  
  - Somatosenses and brain processes |
| 6      | Sensorimotor System  
  - Principles of sensorimotor function  
  - Sensorimotor association cortex  
  - Primary motor cortex  
  - Secondary motor cortex  
  - Pons, medulla and midbrain  
  - Cerebellum and basal ganglia  
  - Sensorimotor spinal circuits and reflexes |
| 7      | Circadian Rhythms, Sleep & Dreams  
  - Neural sleep mechanism  
  - Biological cycles: neural and molecular mechanismular  
  - Physiology of sleep: REM and sleep  
  - Psychology of sleep: what and why?  
  - Sleep medication  
  - Sleep disorders |
| 8      | Language, Cognition & Intelligence  
  - Brain laterization and *split brain*  
  - Locations of language areas: The *Wernickel-Geschwind model*  
  - The modern cognitive neuroscientific approach  
  - Dyslexia  
  - Intelligence |
| 9      | Memory Storage & Information Processing  
  - Neural memory object recognition  
  - Hippocampus and space for memory location  
  - Synapse in learning and remembering  
  - Types of remembering and remembering strategies  
  - Amnesia |
| 10     | Psychological Disorders  
  - Anxiety disorders  
  - Mood disorders  
  - Schizophrenia  
  - Somatoform disorders  
  - Sexual disorders |
# Suggested Student Centered Learning Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Readings</th>
<th>Student Centered Learning</th>
</tr>
</thead>
</table>
| 1    | **Introduction**                                 | Pinel, ch. 1        | Assignment 1: The strange tale of Phineas Gage  (4%)  
Assignment 2: Label the brain parts. (2%) |
| 2-3  | **The Anatomy Of The Brain**                     | Ch. 2               | Assignment 3: How does Einstein’s brain differ from most of us? (3%)  
Assignment 4: How do murder a neuron? (6%) |
| 4-5  | **Neural Impulse Conduction**                    | Ch. 3               | Assignment 3: How does Einstein’s brain differ from most of us? (3%)  
Assignment 4: How do murder a neuron? (6%) |
| 6    | **Brain Development**                            | Ch. 7               | Assignment 5: Optimizing the brain potential. (5%) |
| 7-8  | **Perception: Mechanism, Awareness & Attention** | Chapter 4 - 5       | Assignment 6: Beware of what you wish for! (8%) |
| 9    | **The Sensorimotor System**                      | Chapter 6           | Assignment 7: A critical look at acupuncture. (3%) |

Assignments 1-4 due.  
Midsemester examination (chapters 1-3)  
Assignments 5 - 7 due.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Readings</th>
<th>Student Centered Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-11</td>
<td><strong>Circadian Rhythms, Sleep &amp; Dreams</strong>&lt;br&gt;• Suprachiasmatic nucleus&lt;br&gt;• EEG waves and sleep&lt;br&gt;• REM and dreams&lt;br&gt;• Sleep disorders</td>
<td>Chapter 7</td>
<td>Assignment 8: Does hypnosis work? Can we avoid being hypnotized? (3%)</td>
</tr>
<tr>
<td>12</td>
<td><strong>Language, Cognition &amp; Intelligence</strong>&lt;br&gt;• Brain hemispheric differences&lt;br&gt;• Dyslexia and dysgraphia</td>
<td>Ch 14</td>
<td>Assignment 9: Do most of us have some amount of dyslexia? (3%)</td>
</tr>
<tr>
<td>13</td>
<td><strong>Memory Storage &amp; Information Processing?</strong>&lt;br&gt;• synaptic plasticity and long-term potentiation (LTP)&lt;br&gt;• amnesia disorders</td>
<td>Ch. 9</td>
<td>Assignment 10: Do we want to maximize our memory power or is it more blessed to forget? (5%)</td>
</tr>
<tr>
<td>14</td>
<td><strong>Psychological Disorders</strong>&lt;br&gt;• brain injury and tumors&lt;br&gt;• neurodegenerative diseases</td>
<td>Ch. 8</td>
<td></td>
</tr>
</tbody>
</table>

Assignments 8 - 10 due<br>Final Examination (Chs. 7-10)
Evaluation Criteria and Procedures

Your final grade will be calculated based on a semester total of 100 percent. The points are determined as follows:

**Mid-Term Exam**  
Total marks: 25%  
Topics 1 – 3  
Consists of  
- 30 multiple choice questions (15%) and 5 short answer questions (choose 5 from 8 questions) (15%)

**Final Exam**  
Total marks: 30%  
Topics 4 – 10  
Consists of  
- 30 multiple choice questions (15%) and 5 short answer questions (choose 5 from 8 questions) (15%)

**Assignments:**  
Total marks: 45%  
- Consists of 10 response papers and exercises. Please refer to descriptions in the assignment section for the details on the assignments and marks allocated.

Suggestions for student activities include several types of activities:

1. **Module activities and self-tests:** Designed as a supplement in the text to enhance the student’s understanding of the content and to assist them in their preparation for their examinations.
2. Assignment Activities: (Total Marks 45%)

Designed to reinforce the material in the module. Individual works are suggested throughout the manual. You have a total of ten assignments, which adds up to 45% of the course marks. Each assignment should be about 4-6 pages in length, single-spaced, typed in Arial 11-point font, with 1 inch margin. In order to receive useful feedback from me, which will help you improve your assignments and maximize your marks for each assignment, please e-mail your assignments directly to me. Refer to the tentative schedule of events and complete the assignments according to the suggested weeks, in order to pace your work and optimize your learning.

Assignment One: The strange tale of Phineas Gage (5%)

Phineas Gage worked as the foreman of a railway construction gang in Vermont. At just twenty-six years old, Gage was already a success story. He was well liked by the men in his charge, and his superiors were impressed with his skill at handling dangerous explosives. He was their most efficient and capable man. Gage had a combination of intelligence and athletic ability that made him perfect for the task of clearing rock from the path of the coming railroad.

On September 13, 1848, an explosion drove a three-foot long iron rod at high speed into Gage’s left cheekbone, through his skull and out the top of his head. It landed nearly 300 feet away. Amazingly, Gage survived the terrible blow. His men picked him up and took him by ox cart to a nearby hotel, where they summoned one of the town’s physicians, Dr. John Harlow. Gage was still conscious at the time of the exam and able to answer questions about his accident, but his survival was not yet assured. Dr. Harlow did not have the benefit of antibiotics in treating Gage. However, he was knowledgeable enough about infection to understand its life-threatening risk and kept vigilant watch over Gage’s wound, cleaning and draining it regularly. Gage’s youth and previous health proved stronger forces than the infection, and within two months he was cured. Or was he?? Describe what remained and what changed with Phineas Gage after the incident.

Mounting research indicates that deficiencies in the frontal or pre-frontal regions of the brain often correlate with various forms of violence and impulsivity that can lead to criminal acts. Deficiencies in other brain areas play a role in contributing to behaviors that are categorized as “criminal.” Read on scientific literature talks about the concept of a "criminal brain" and relate them to Gage’s story.
Assignment Two: Label the brain parts (2%)
Assignment Three: How was Einstein's Brain Different from the rest of the other genius? (3%)

Einstein died of a ruptured aneurysm of the abdominal aorta in 1955 at the age of 76 years. Thomas Harvey, a doctor at the hospital where Einstein died, removed the famous scientist's brain and kept it with him over the next four decades. Harvey wanted to know what made Einstein a genius. Scientists have long sought to understand the nature of genius and before computers and imaging technology, they had few options other than studying the actual brain.

Within 7 hours of his death, his brain was removed at necropsy, fresh weight was measured, perfusion of 10% formalin by injection into the internal carotid arteries was carried out, and the whole brain was then freely suspended in 10% formalin for fixation and subsequent study. No significant neuropathology was seen on examination (gross or microscopic). After fixation, caliper measurements were made directly from the brain. The cerebral hemispheres were cut into approximately 240 blocks, each about 10 cm cubed. The blocks were embedded in celloidin, and histological sections were made.

Harvey gave some of the pieces to Harry Zimmerman, and placed the remainder in two formalin-filled jars, which he stored in the basement of his house in Princeton. In the early 1980s, Diamond heard about the existence of Einstein's brain. Diamond published her findings under the title "On the Brain of a Scientist: Albert Einstein" in an obscure journal called Experimental Neurology in 1985. From then on, many other scientists examined Einstein's brain. Discuss the findings and conclusions made regarding the uniqueness of Einstein's brain?
## Assignment Four: How do you murder a neuron? (6%) 

<table>
<thead>
<tr>
<th>TECHNIQUE</th>
<th>RESULT</th>
<th>EXPLAIN WHAT HAPPENS</th>
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</thead>
<tbody>
<tr>
<td>Starve it</td>
<td>Heart Attack Arteriosclerosis Thrombosis or embolism Starvation Insulin overdose</td>
<td>Cells that are without oxygen may release excessive glutamate (Please read section on neurotoxins for examples).</td>
</tr>
<tr>
<td>Suffocate it</td>
<td>Heart Attack Arteriosclerosis Thrombosis or embolism Drowning Carbon monoxide poisoning</td>
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<tr>
<td>Squish it</td>
<td>Crush skull Insert something into skull that takes up space Hydrocephaly Hematoma Use the skull to stop a brain that is moving at high speed</td>
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<tr>
<td>Poison it</td>
<td>Heavy Metals Mercury Lead Arsenic</td>
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<tr>
<td>Cut it</td>
<td>Gun shot wound or other projectile entering brain or nervous system Surgery</td>
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<tr>
<td>Infect it</td>
<td>Syphilis Rabies Mumps Herpes Chicken Pox</td>
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<tr>
<td>Mutate it</td>
<td>Down's Syndrome Huntington's Chorea</td>
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<td>Over stimulate it</td>
<td>Grand mal seizures</td>
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<td>Expose it</td>
<td>Multiple sclerosis Amyotrophic lateral sclerosis</td>
<td></td>
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<tr>
<td>Attack it</td>
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</tbody>
</table>
Assignment Five: Optimizing the brain potential. (5%)

Dr Berry Brazelton of Harvard University believes that all babies are born geniuses. Lewis Lipsitt, professor at Brown University, agreed that the newborn period is that in which man has the greatest learning capacity. About fifty years ago, Dr Makoto Shichida and Dr Glen Doman announced to the world that they have discovered the secret of making any baby a genius! Describe these secrets.

Today billions of money have been spent on brain based research. This research is driven by the idea that today’s power no longer lies in weapon, but in optimizing the brain potential. Drawing on the recent findings on brain development and the details described by Schichida and Doman, discuss the strategies you can come up with to optimize your child’s brain potential.

Assignment Six: Beware of What You Wish For! (8%)

If you could see better, what would you see? If you could hear better, what would you hear? If your chemical senses, taste and smell, were better than they are, how would you be affected? Describe five types of extrasensory perceptions that people have experience.

What is the difference between telepathy, clairvoyance, precognition, retrocognition, dejavu and mediumship? Can you communicate with your loved ones over a distance without using the conventional means, like a telephone? Or have you ever had a dream that came true? Or called a friend at the exact moment he was calling you? Or have you ever felt that “I’ve been through this before.” Most of us have had some sort of paranormal experience. Describe evidences about the existence of ESP (personal experiences or experiences of people you know or read about).
Assignment Seven: A Critical Look at Acupuncture (3%)

More than two thousand years ago the Chinese developed the idea that an imbalance between the two vital forces, yin and yang can cause discomfort, illness, and pain. To treat such problems they developed acupuncture, a unique therapy which uses needles inserted at special points in channels where the vital forces were thought to flow. One of the most controversial aspects of Chinese medical research today is the question as to whether the 'meridians', or energy channels which are supposed to link the hundreds of prescribed acupuncture points in the body, actually exist, or whether they are just a convenient way of memorizing the points at which the needles should go in. But without the meridian theory, it is difficult to explain the effect of acupuncture in producing anaesthesia or therapy in some far removed part of the body: for instance, placing needles in the arm and knee to treat a stomach ulcer. How does acupuncture work? What might explain the elevated endorphin levels that acupuncture patients exhibit?

Assignment Eight: Does hypnosis work? Can we avoid being hypnotized? (3%)

The practice of hypnotism dates back centuries. Some people swear that it works! Different cultures have different names of it. Perhaps in South-East-Asia, it is well-known as “pukau”. Whether you’re a skeptic or a believer, hypnosis is an interesting phenomenon. Describe how it works. In Freudian terms and other techniques you might have read. Check it out -- and let us know if you start to purr like a cat when your hypnotist tells you to.
Assignment Eight: Do most of us have some amount of dyslexia? (5%)

Dyslexia is an inability to read or write despite normal or superior intelligence. It may be developmental or acquired. It is a common disorder, affecting about 15% of males and about 5% of females. Surface dyslexia occurs when patients lose their lexical skills, whereas deep dyslexia occurs when patients lose their phonetic reading skills. Although we may not be legally diagnosed as dyslexic, most of us have some form of dyslexia. What causes dyslexia? Describe the different types of dyslexia and its symptoms. What are some form of dyslexia that you or someone you know might suffer?

Assignment Ten: Do we want to maximize our memory power or is it more blessed to forget? (5%)

Many of us wish we have perfect memory, especially when we have to memorize our texts for an examination. If our brains were computers, we could simply add a chip to upgrade our memory. The most effective study strategies require processing the meaning of information. Emotional experiences stimulate the amygdala, resulting in more vivid memories than nonemotional experiences. Context is a potential aid for memory reconstruction when you is actively trying to recall something, such as the details of a crime. Of the many types of memory improvement techniques that you read in the internet, describe three types that you find the most interesting.

The ability to forget information is as crucial to remembering. Sometimes you really want to forget, like a memory of being physically abused by your father. Such forgetting is motivated as a means of protecting yourself from painful or unpleasant memories. Forgetting may also result from errors in how the memory was framed or how it was recalled (retrieval failure). Which of the many types of amnesia do you find the most interesting? Have you ever known anyone who had the symptoms of amnesia? Describe what you might feel if you woke up one morning and had amnesia.
How to do well in this class

Attend face-to-face meetings and participate. Attendance, per se, is not part of your grade, but attending class is essential for you to do well. In addition to talking about ideas not in your module, you’ll hear discussions about people and the disorders. These will make the material "come alive."

Read the text before coming to class. Our class time will be lecture/discussion based. It’s harder to discuss this material well if you haven’t read it first. When you read the chapter first you’ll have a better understanding of class material, and the questions that you ask will be more useful for you and your classmates.

Get involved! As you read the text or listen to class discussions, make it interesting and become involved! Relate the ideas to yourself, your friends, and your families. Think about those places where the material applies – and those where it doesn’t. Wonder about what puts people at risk, as well as what makes others resilient in the worst possible situations. Actively read the material by thinking about, applying and using it, rather than only passively reading it.

Visit your text’s website. Pearson at http://www.ablongman.com offers a variety of services, such as companion websites, to make your learning the material easier. Take the online quizzes to assess how you’re doing; check out the video segments; use the flashcard and notes, etc. These will help you process the material more deeply and check your understanding of it.

Read over your notes every day. Doing so will eliminate the "need to cram," which is almost impossible with this much information. It’s hard to forget something that you use every day.

Put time and energy into this course. For a 4000 level course, you should spend a minimum of 2-3 hours outside of class for every credit hour required for the class, in order to do well. For a class like this one that meets 3 hours/week, you need to spend an additional 6-9 hours on the course each week.
Get together with other students to study together. Helping someone else understand something is an excellent way to learn. And, if you get lost somewhere along the way, it's helpful to have some friends who can help you out. Besides, it's fun and can increase your motivation for the understanding the course content!

Check out these websites for helpful study skills information. There are numerous sites containing information on test-taking, time management, note-taking (both in class and from the text), etc.

- Study Strategies (University of Minnesota - Duluth): http://www.d.umn.edu/student/loon/acad/strat/
- Academic Success Center (George Washington University): http://gwired.gwu.edu/counsel/asc/

How-to-Study.com
Texts and Suggested Readings:

Main Text:

Additional References:

Weblinks:
Web Link P.4 Advanced Biological Psychology Tutorials
Athabasca University
I would highly recommend referring to these tutorials for every section of the course. The diagrams and explanations are very good. So are the self-testing materials.

Web Link P.5 Neuroscience Tutorial
[http://thalamus.wustl.edu/course/](http://thalamus.wustl.edu/course/)
The Washington University School of Medicine
An illustrated guide to the essential basics of clinical neuroscience created in conjunction with the first-year course for medical students.

**Web Link P.6 Biocompare.com**
This site has a news page with articles of new research in biology (including neuroscience. You can subscribe to get a periodic email message with a listing of article links. These are brief and often very interesting.

**Web Link P.7 Neuropsychology Central**
http://www.neuropsychologycentral.com/
site I have been able to find. It has information about all strands of neuropsychology as well as links to organizations, newsgroups, jobs, assessment procedures and free neuropsychology software.

**Web Link P.8 World Wide Web Virtual Library for Neuroscience**
http://neuro.med.cornell.edu/VL/
A collection of neuroscience references

**Web Link P.9 Cognitive Neuroscience Resources (Archives)**
http://www.cnbc.cmu.edu/Resources/archives.html
A list of links providing resources for the cognitive neuroscientist

**Web Link P.10 Yahoo Neurology**
http://dir.yahoo.com/Health/Medicine/Neurology/
Yahoo is one of the Internet’s premier search engines—this is the result of its best website matches for neuroscience

**Web Link P.11 Wisconsin/Michigan State Brain Collection**
http://brainmuseum.org/
A collection of images of mammalian brain sections

**Web Link P.13 The Harvard Brain**
http://hcs.harvard.edu/~husn/BRAIN/index.html
An impressive Internet magazine on the brain, designed and written by Harvard neuroscience undergraduates.

**Web Link P.14 Brain and Mind: Electronic Magazine on Neuroscience**
http://www.epub.org.br/cm/home_i.htm
Includes an online course in the history of Neuroscience.