Educational outline

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Introduction

This sample is a complete demonstration of a Neuropsychology course, including its content and the necessary materials and resources required for both student and instructor success. As well, I have included the option of instructor notes. Initially, my goal was to submit a hypothetical “Unit 1: Lesson Plan." However, if the main goal is to implement a course, I am more driven to submit a complete project that may add quality and more context to the project. Adhering to high-quality educational and academic standards, ethics, and methods while aligning with national and global initiatives, this course may be eligible for accreditation. Each detail was researched, analyzed, and designed to target objectives and ensure learning outcomes (LOs). Meta-analyses were reviewed prior to selecting the appropriate instructional design method to approach the inquiry from Dr. Brian Adams, CEO of The Brain Institute of America, to write a lesson plan.

Workflow

In order to produce a cohesive lesson plan for a higher learning course, several dimensions must first be considered:

- Course syllabus
- Target audience
- Textbook(s) and course materials
- Learning objectives in alignment with learning outcomes (LOs)

- Developed schedules
- Developed assessments
- Lectures
- Course webpage to access materials and news from
- Instructing platforms and creating transferable content (in-person, remote, or hybrid)
- Course evaluations
- Policies and procedures

Assumed objectives: to build proficiency in students about neurological conditions and how they affect behavior and to arouse student and community interest in psychology, neurology, and related areas so they may be equipped to contribute to the investigation of neurological conditions such as brain tumors through the comprehension of behaviors they present.

Length of course: 15 weeks, tentative

Audience: The target audience for this course is assumed to be higher education learners with completed prerequisites or demonstrated introductory competence in Biology and/or Psychology in order for the student to comprehend the level of technicality. Prior achievement should be submitted, as it is a powerful predictor of student LOs and placement.

Design: Plans must be created with a form of differentiation—the process of tailoring instruction to meet the individual needs of students/individuals. This can be done by providing different levels of support, challenge, or interest to students. The curriculum should align with the

institution's mission—to advance public understanding of the human brain and improve quality of life through research, education, treatment, and advocacy. Today's educational goals are a collaboration of guidelines, including the "21st Century Learning Framework," the "Universal Learning Design (UDL)," and guidance from the Council for the Advancement of Standards in Higher Education (CAS) (*CAS Standards,* n.d.; Abuhassna & Alnawajha, 2023). As such, this syllabus was designed using diverse backward method planning and multiple strategies (CAST, 2018).

Potential instructional designs (IDs) and models were analyzed and compared:

- **ADDIE**
- Inquiry-based
- SOLO taxonomy (commonly used alongside instructional designs)
- Bloom's Taxonomy (commonly used alongside instructional designs)
- SAM
- Kirkpatrick's Four Level Model (commonly used alongside instructional designs)
- **Backwards design**
- Differentiated instruction
- Merrill's Principles of Instruction
- Gagne's Nine Events of Instruction (Abuhassna & Alnawajha, 2023; Khodabandelou & Samah, 2012; Itsarangkul & Damrongpanit, 2022; Cook et al., 2012; Smith, 2023; Reiser, 2001; Clark, 2015; Bouchrika, 2023; Center for Neuroscience and Behavioral Medicine, n.d.; Easel Lab & Partnership for 21st Century Learning, 2015)

Ultimately, I chose a multimodal pedagogy—the backwards method using the ADDIE strategy to review and revise—due to their ease of modification, integration with one another, and flexibility of instruction. It is goal or challenge-oriented, integrating core knowledge with vital competencies to form a direct educational experience. Further investigation for this project includes a brief interview with Dr. Jiang Wu of the Center for Pain Relief at UW Medical Center, John Hopkin's Medicine research, BioEd Online, consultation with Dr. Lederman, an experienced educator and academic administrator who reviewed the initial curriculum for SUNY Empire State College prior to its opening, and insight from personal acquaintances in education. In addition, I obtained accredited certifications in "Instructor Research Navigation," "Mastering Grading and Providing Feedback," "Advanced Learning Outcomes," "ADDIE Method Certification," "Effective Curriculum Drafting," "Critical Thinking and Taxonomy Models," "Advanced Research Essentials," "Educational Program Design," "Writing Effective Learning Outcomes," and "Mastery in Goal Setting."

In creating the contents, I dissected the open-source course details from The American Academy of Neurology's Behavioral Neurology Core Curriculum, the University of New England - Center for Excellence in the Neurosciences, Yale College of Medicine, the UW Center for Neurotechnology, MIT, Carnegie Mellon University, and UCF. A cross analysis discovered gaps and unnecessary content in some programs, prompting me to modify and replace the perceived gaps, such as "course fluff." Technology requirements are listed under UDL requirements, as are accessibility and differentiation accommodations for students requiring them. Program Quality Reviews (PQR) and Annual Curriculum Reviews (ACR) will need to be implemented. I first drafted the main objectives and tested them against UCF's "Objective Builder Tool" for

educators to ensure their strength and viability. It is my opinion that this tool is capable of building thoroughly applicable targets and exists as a strong tool for educators in lesson planning to reverse engineer their organically produced material for accuracy.

Deliverables

- Course outline/Syllabus
- Weekly schedule
- Assessments
- Lesson plans
- Course content
- Materials and resources (Textbook, built modules/units, assignments, discussion topics, activities, projects, and a possible capstone)

Alignment to Standards

- Council for the Advancement of Standards in Higher Education (CAS)
- Brain Institute of America's mission—to advance public understanding of the human brain and improve quality of life through research, education, treatment, and advocacy.
- Universal Learning Design
- 21st Century Learning Framework

Framework for 21st Century Learning

This course incorporates the following skills:

- Critical thinking - analyzing neuropsychological cases, evaluating research

- Communication - class discussions, presenting research
- Collaboration - group projects, peer review
- Information literacy - finding/evaluating neuropsychology sources
- Media literacy - analyzing media portrayals of neuropsychological disorders
- Creativity - designing informational brochures
- Innovation - proposing new applications of neuropsychology
- Flexibility - adapting to evolving topics and discoveries
- Leadership - organizing awareness initiatives
- Initiative - self-directed case study analysis
- Productivity - managing timelines for research papers
- Social skills - networking with classmates and professionals

References

Abuhassna, H., & Alnawajha, S. (2023). Instructional Design made Easy! Instructional design models, categories, frameworks, educational context, and recommendations for future work. *European Journal of Investigation in Health, Psychology and Education, 13*(4), 715–735. https://doi.org/10.3390/ejihpe13040054

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Center for Neuroscience and Behavioral Medicine. (n.d.). *Center for neuroscience and behavioral medicine | children's national hospital.* Children's National. https://childrensnational.org/departments/center-for-neuroscience-and-behavioral-medicine

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Itsarangkul, T., & Damrongpanit, S. (2022). A Meta-Analysis of instructional management models Affecting Creative thinking Development. *European Journal of Educational Research, 11*(4), 2069–2085. https://doi.org/10.12973/eu-jer.11.4.2069

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Syllabus

Explore the Neural Bases of Human Behavior: An Introduction to Neuropsychology

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Overview

This course provides an in-depth introduction to neuropsychology, the study of the structure and function of the brain as they relate to specific psychological processes and behaviors. Students will examine neuroanatomy, neurophysiology, neural transmission, neuroplasticity, neurodevelopment, assessment techniques, common neurological disorders, ethical issues, emerging topics, and research methods. There is a focus on understanding the biopsychosocial factors underlying normal and abnormal human behavior.

Objectives:

To build proficiency in students about neurological conditions and how they affect behavior and to arouse student and community interest in psychology, neurology, and related areas so they may be equipped to contribute to the investigation of neurological conditions such as brain tumors through the comprehension of behaviors they present.

Learning Outcomes (LOs)

Upon completion of this course, students will be able to:

1. Describe functional neuroanatomy and physiology and their relationship to behavior.

2. Explain neuronal communication, neuroplasticity, and critical periods of neurodevelopment.
3. Recognize symptoms, causes, and treatments for neurological disorders.
4. Apply the biopsychosocial perspective to understand contextual factors influencing behavior.
5. Discuss ethical, cultural, and methodological issues in neuropsychology.
6. Demonstrate information literacy in searching, comprehending, and communicating neuropsychology information.
7. Propose innovative applications of neuropsychological research.

Assessments

- Quizzes and exams assess content knowledge, comprehension, and critical thinking through multiple choice, short answer, matching, diagram labeling, and essay questions.
- Writing assignments assess application, analysis, synthesis, information literacy, media literacy, and communication skills via an annotated bibliography, research paper, case study analysis paper, and public awareness brochure.
- Online discussions assess participation, writing, critical thinking, and collaboration via responses to prompts and peer feedback.
- Individual and group class presentations assess communication skills and content knowledge.
- The final project is a culmination of skills demonstrated through an inquiry-based investigation of an approved neuropsychology topic presented in a medium of the student's choice.

Required Texbook

- Kolb, B., & Whishaw, I.Q. (2020). Fundamentals of Human Neuropsychology (8th ed.). Macmillan Learning.

Weekly Schedule

Week 1 – Introduction

Week 2 – Neuroanatomy

Week 3 - Neurophysiology

Week 4 – Neuroplasticity and Development

Week 5 – Research Methods

Week 6 – Biological Bases of Behavior

Week 7 - Sensation and Perception

Week 8 – Learning and Memory

Week 9 - Language and Hemispheric Lateralization

Week 10 – Executive Functions

Week 11 – Emotion and Motivation

Week 12 – Assessment Techniques

Week 13 - Neurodevelopmental Disorders

Week 14 – Neurocognitive Disorders

Week 15 – Ethics and Future Directions

Weekly Modules

Week 1: Introduction to Neuropsychology

Required Reading:

1. Kolb & Whishaw (2020) Fundamentals of Human Neuropsychology, Ch 1 & 2
2. Gazzaniga et al. (2019) Cognitive Neuroscience: A Reader, Ch 3 - History of Neuropsychology

Resources:

- Timelines and biographies of key figures in history of neuropsychology
- Excerpts from historical texts representing mind-body dualism
- Videos on neuroimaging techniques
- Debate guidelines and sample arguments

1. Activity 1: Founders Exhibit

Create a PowerPoint Presentation of no less than ten slides on an early founder of neuropsychology. Include a brief biography and their contribution to neuroscience. You will use your text and two scholarly resources to complete this activity. As always, utilize APA 7 standards.

ALTERNATIVE ACTIVITY

Historical Timeline

In small groups, create a timeline depicting key events, discoveries, and figures in the history of neuropsychology. Include dates, descriptions, and images. Present timeline to class.

2. Assignment 1: Mind-Body Philosophy Analysis

Analyze excerpts from two philosophical texts representing mind-body dualism (e.g. Descartes, 1641/1993; Stillings et al., 1987). Explain how modern neuroscience addresses these concepts in a 4-5 page paper. Rubric provided.

ALTERNATIVE ASSIGNMENT

Phrenology Analysis

Examine and critique primary source excerpts from phrenological texts. For each claim, explain what we now know about brain function in those areas. Cite modern research. Papers should integrate at least 5 properly referenced examples.

3. Assessment 1: Approaching Debate

In a civil debate, students will argue assigned positions on holistic vs. reductionist approaches using evidence and rebuttals. The grading rubric covers logic, evidence integration, rebuttals, and speaking skills.

ALTERNATIVE ASSESSMENT

Mind-Body Debate

In a structured Oxford style debate, individuals will be assigned positions to argue regarding neuropsychology concepts of mind-body separation. Students will be graded on logic, rebuttals, use of evidence, and speaking skills in their two-minute opening statements.

Week 2: Neuroanatomy

Readings:

1. Kolb & Whishaw (2020) Fundamentals of Human Neuropsychology, Ch 3 & 4
2. Sorensen (2009) Anatomy and physiology of the brain.

Resources:

- Anatomical brain models and atlases
- Blank diagrams of brain structures
- Neuroanatomy coloring books
- Microscope slides and images of neurons
- Clinical case studies demonstrating localization of function

1. **Activity 1: Interactive Brain Map**

   Draw and label diagrams of neurons, brain subdivisions, cross-sections, and specific structures. Use provided templates, detailed instruction sheets, and examples. Peer review for accuracy.

2. Assignment 1: Neuroanatomy Teaching Tool

Create a creative visual teaching tool focused on the organization and functions of a specific region of the brainstem, cerebrum, or cerebellum. Utilize the informational texts and multimedia resources provided. Include an annotated bibliography.

ALTERNATIVE ASSIGNMENT

Public Education Brochure

Create an informational brochure explaining parts of the brain and functions. Include major regions, cellular components, and neurotransmitters. Use graphics and accessible language. Cite reputable sources. Brochures will be graded using detailed rubric.

3. Assessment 1: Neuroanatomy Quiz

A quiz will assess identification of key neuroanatomical structures and functions. It will include labeled diagram identification, multiple choice, short answer, and listing of parts and their purposes. Study guide will be provided.

Week 3: Neurophysiology

Readings

1. Kolb & Whishaw (2020) Fundamentals of Human Neuropsychology, Ch 5
2. Bear et al. (2020) Neuroscience: Exploring the Brain, Ch 3 - Neurophysiology

Resources:

- Animation videos and simulations of neural signaling
- Sample action potential graphs
- Neurotransmitter molecule models
- Pharmaceutical case studies (agonists, antagonists)
- Diagramming templates for signaling pathways

1. Activity 1: Synaptic Transmission Model

Using the provided art materials, create a 3D model of synaptic transmission and neuron signaling. Label all components. Present a model to the class.

ALTERNATIVE ACTIVITY

Kinesthetic Modeling

Use movements and gestures to model processes of neuronal depolarization, action potential conduction, neurotransmitter release and reuptake. Teach your sequence to a peer.

2. Assignment 1: Neurotransmission Concept Map

Create a concept map depicting the process of neurotransmission. Include relevant terminology, chemicals, and sequential steps. Reference texts are provided.

ALTERNATIVE ASSIGNMENT

Drug Effect Presentation

Research a pharmaceutical drug that affects neurotransmission. In a 10 minute presentation, explain its mechanism of action using key neurophysiology concepts. Include proper citations. A detailed grading rubric is provided.

3. Assessment 1: Neurophysiology Exam

An exam covering concepts of membrane potential, action potentials, neurotransmitters, reuptake, and receptor binding. Includes multiple choice, fill-in-blank, short answer, and labeling questions.

Week 4: Neuroplasticity and Development

Readings:

1. Kolb & Whishaw (2020) Fundamentals of Human Neuropsychology, Ch 6 & 7
2. Tau & Peterson (2010) Normal development of brain circuits

Resources:

- Illustrations of neurogenesis and synaptic pruning
- Critical period research in language, vision, etc.
- Enriched environment animal research
- Neuroplasticity exercises and activities
- Neurodevelopment milestone charts

1. **Activity 1: Critical Period Timelines**

Construct an illustrated timeline of neurodevelopmental milestones. Indicate the dominant plasticity mechanisms and vulnerabilities at each stage. Use the provided resources.

2. **Assignment 1: Enriched Environment Proposal**

Propose an enriched environment intervention for a specific age group that utilizes principles of neuroplasticity. Explain the neural benefits in a 5-page paper. Rubric provided. You will use your text and three additional scholarly references. As always, submit in APA 7 format.

ALTERNATIVE ASSIGNMENT

Public Service Announcement (PSA) Video

Create a 60-90 second video explaining a concept related to developmental plasticity, such as early language acquisition or music training's effects on the brain. Script and storyboard a video creatively using course concepts. A detailed grading rubric is provided.

3. **Assessment 1: Neuroplasticity Quiz**

A quiz covers concepts related to neurogenesis, synaptic pruning, critical periods, lateralization, and lifespan neuroplasticity changes.

ALTERNATIVE ASSESSMENT

Neurodevelopment Quiz

An online quiz will assess comprehension of concepts related to neurogenesis, pruning, critical periods, lateralization, and lifespan neuroplasticity. It will contain 20 randomized multiple choice and true/false questions. Students can retake the quiz once to improve their score.

Week 5: Research Methods

Readings:

1. Kolb & Whishaw, Chapter 8 - Research Methods in Human Neuropsychology
2. Banerjee, M., & Chaudhury, S. (2010). Statistics without tears: Populations and samples. Industrial Psychiatry Journal, 19(1), 60–65. https://doi.org/10.4103/0972-6748.77642 ↗

Resources:

- Empirical research articles demonstrating different methods like MRI studies, animal models, case studies, etc.
- Animations demonstrating experimental procedures and controls
- Worksheets analyzing and critiquing sample study methodologies

1. Activity 1: Research Method Activities

Rotate through stations, completing experiential activities modeling different research methods: surveys, observations, case studies, interviews, analogical modeling, and experiments. Compare the strengths and limitations of each.

2. Assignment 1: Literature Comparison Paper

Compare the research methods used in four peer-reviewed empirical studies on a neuropsychology topic. Analyze approaches, strengths/weaknesses, and ethical issues in a 5-7 page paper in APA 7 format. A formal paper grading rubric is provided.

3. Assessment 1: Research Methods Exam

An in-class exam with 40 multiple choice questions will assess comprehension of concepts related to designs, sampling, controls, measures, analysis, limitations, and ethics in neuropsychology research.

Week 6: Biological Bases of Behavior

Readings:

1. Kolb & Whishaw, Chapters 9 & 10 - Neuroanatomical and Neurochemical Substrates of Behavior
2. Carlson, N.R. (2018). Foundations of Physiological Psychology (10th ed.). New York, NY: Pearson.

Resources:

- fMRI and lesion studies illustrate neural correlates of behaviors
- Background on genetics, epigenetics, and evolutionary factors
- Debate data on nature vs. nurture

1. Activity 1: Nature vs. Nurture Debate

In teams or pairs, researchers gather evidence on the relative contributions of genetic and environmental influences on complex behaviors. Engage in an organized debate with an opposing team.

2. Assignment 1: Biological Basis Video Essay

Create a 2-5 minute video essay explaining the biological basis of one type of neuropsychological disorder. Analyze relevant brain structures, neurotransmitter systems, and neural processes involved. A formal grading rubric is provided.

3. Assessment 1: Biological Bases Quiz

A 30 minute online quiz will assess comprehension of key concepts related to behavioral neuroscience, including neural substrates, neurotransmitters, hormonal influences, and genetics involved in normal and abnormal behaviors.

Week 7: Sensation and Perception

Readings:

1. Kolb & Whishaw, Chapter 11 - Organization of Sensory and Perceptual Systems
2. Goldstein, E.B. (2014). Sensation and perception (9th ed.). Stamford, CT: Cengage Learning.

Resources:

- Psychophysics research on sensory thresholds
- Visual illusions and perceptual phenomena
- Case studies of perceptual disorders

1. Activity 1: Sensory Threshold Lab

Work in pairs to determine sensory thresholds using the provided materials. Record thresholds for faint tactile and auditory stimuli. Analyze and compare results.

2. Assignment 1: Sensory Disorder Brochure

Create an informational brochure about a specific sensory or perceptual disorder. Explain the neurological basis, symptoms, and treatments. Use visuals and citations. A formal brochure grading rubric is provided.

3. Assessment 1: Sensation and Perception Exam

An in-class exam with multiple choice, short answer, and diagram labeling questions will assess comprehension of concepts related to sensory systems, thresholds, illusions, attention, and influences on perception.

Week 8: Learning and Memory

Readings:

1. Kolb & Whishaw, Chapter 12 - Learning, Memory, and Amnesia
2. Nadel, L., Hupbach, A., Gomez, R., & Newman-Smith, K. (2012). Memory formation, consolidation and transformation. Neuroscience & Biobehavioral Reviews, 36(7), 1640-1645.

Resources:

- Examples of learning paradigms
- Mnemonic strategies and techniques
- Amnesia case studies

1. **Activity 1: Mnemonics Workshop**

Practice and present memory-enhancing mnemonic devices like acronyms, chunking, rhymes, and visual imagery. Teach a strategy to the class.

2. **Assignment 1: How Memory Works Infographic**

Create an engaging infographic poster explaining the processes involved in memory storage and retrieval. Include types of memory, encoding strategies, consolidation, forgetting curves, and factors affecting retention.

3. **Assessment 1: Learning and Memory Quiz**

An online quiz of 30 multiple choice and true/false questions will assess comprehension of concepts related to habituation, conditioning, memory encoding, storage types, retrieval cues, interference, and amnesia.

Week 9: Language and Hemispheric Lateralization

Readings:

1. Kolb & Whishaw, Chapter 15 - Organization of Language Functions in the Brain
2. Fedorenko, E. & Thompson-Schill, S.L. (2014). Reworking the language network. Trends in Cognitive Sciences, 18(3), 120-126.

Resources:

- Aphasia case studies
- fMRI of language processing

- Literature review materials

1. Activity 1: Aphasia Case Analysis

In small groups, review neuropsychological case studies of patients with different types of aphasia. Complete a worksheet identifying symptoms, affected brain regions, and specific language deficits. Present your findings to the class.

2. Assignment 1: Language Lateralization Literature Review

Conduct a literature review on four recent peer-reviewed articles examining hemispheric lateralization of language functions. Synthesize findings in a 5-7 page paper. Include an introduction, an annotated summary of each article, a discussion of themes/results, and implications. APA formatting is required. A formal paper rubric is provided.

3. Assessment 1: Language Processing Quiz

A quiz will assess knowledge of language processing differences between the left and right hemispheres. The format will include matching labeling of the brain diagram, multiple choice questions, and short written responses. Study guide provided.

Week 10: Executive Functions

Readings:

1. Kolb & Whishaw, Chapter 13 - Executive Functions and Frontal Lobes
2. Diamond, A. (2013). Executive functions. Annual Review of Psychology, 64, 135–168.

Resources:

- Cognitive training tools
- Frontal lobe disorder case studies
- Website design platforms

1. **Activity 1: Multitasking Challenge**

Complete a complex multitasking activity requiring the use of executive functions like task switching, inhibition, and working memory. Track mistakes and the time to completion. Discuss neural correlates.

2. **Assignment 1: Executive Dysfunction Informational Website**

Create a multi-page informational website on a disorder involving executive dysfunction, like OCD or ADHD. Explain symptoms, causes, treatments, and resources. Include multimedia elements. A detailed website rubric is provided.

3. **Assessment 1: Executive Functions Exam**

An exam with 50 multiple choice questions and two short, pointed essays will assess comprehension of executive function roles in cognition, normal development, disorders, and research findings. Study guide provided.

Week 11: Emotion and Motivation

Readings:

1. Kolb & Whishaw, Chapter 14 - Emotions, Motivation, and the Limbic System
2. Phelps, E.A. & LeDoux, J.E. (2005). Contributions of the amygdala to emotion processing: from animal models to human behavior. Neuron, 48(2), 175-187.

Resources:

- Emotion regulation strategies
- Video production equipment

1. Activity 1: Emotion Regulation Practice

Apply strategies like cognitive reappraisal, distraction, and mindfulness meditation to regulate reactions to emotional stimuli and scenarios. Compare effectiveness.

2. Assignment 1: Fear Conditioning Video

Produce a 3-5 minute educational video explaining the neural processes involved in fear conditioning and extinction. Script, storyboard, film, and edit video. A detailed video project rubric is provided.

3. Assessment 1: Emotion and Motivation Quiz

An online quiz will assess knowledge of brain structures, pathways, neurotransmitters, and physiology related to emotional and motivational processes and disorders.

Week 12: Assessment Techniques

Reading:

1. Kolb & Whishaw, Chapter 16 - Principles of Neuropsychological Assessment and Rehabilitation
2. Hebben, N. & Milberg, W. (2009). Essentials of Neuropsychological Assessment (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Resources:

- Neuropsychological test manuals
- Scoring software
- Case studies

1. Activity 1: Role Play Neuropsychological Assessments

Practice administering sample test batteries for cognitive functioning, memory, executive skills, attention, language, visuospatial abilities, etc. Record 'results' and interpret the findings.

2. Assignment 1: Assessment and Recommendation Report

Analyze a case study and recommend appropriate neurocognitive tests, expected results, and implications. Write a professional 3-5 page assessment report. A formal report rubric is provided.

3. Assessment 1: Neuropsychological Testing Quiz

The quiz covers the properties, administrations, interpretations, strengths/weaknesses of various neurocognitive assessments and measurement techniques.

Week 13: Neurodevelopmental Disorders

Readings:

1. Kolb & Whishaw, Chapter 17 - Developmental Disorders
2. Thapar, A. & Rutter, M. (2019). Do prenatal risk factors cause psychiatric disorder? Be wary of causal claims. The British Journal of Psychiatry, 214(2), 100-102.

Resources:

- Diagnostic criteria checklists
- Early intervention techniques
- Standardized assessment batteries

1. Activity 1: Diagnostic Criteria Comparison

In small groups, review and compare DSM diagnostic criteria for neurodevelopmental disorders like ADHD, intellectual disabilities, and autism spectrum disorder. Create comparison charts identifying similarities and differences in symptoms.

2. Assignment 1: Neurodevelopmental Disorder Literature Review

Conduct a literature review on the neurological correlates of a chosen neurodevelopmental disorder. Synthesize findings from four relevant empirical studies in a 5-7 page paper. A formal paper rubric is provided.

3. Assessment 1: Childhood Disorders Quiz

A quiz covers the characteristics, causes, diagnosis, prevalence, treatments, and prognosis of major childhood developmental disorders. Mixture of multiple choice, true/false, short answer questions.

Week 14: Neurocognitive Disorders

Readings:

1. Kolb & Whishaw, Chapter 18 - Neuropsychology of Aging and Age-Related Disorders
2. Veitch, D.P., Friedl, K.E. & Weiner, M.W. (2013). Military risk factors for cognitive decline, dementia and Alzheimer's disease. Current Alzheimer Research, 10(9), 907–930.

Resources:

- Dementia screening tools
- Caregiver guides and support groups
- Residential care facility visits

1. Activity 1: Dementia Case Study Analysis

In small groups, collaboratively analyze in-depth case studies of patients with neurocognitive disorders like Alzheimer's disease. Identify symptoms, disease features, assessment findings, and treatment recommendations.

2. Assignment 1: Dementia Care Brochure

Design an informative brochure for caregivers of dementia patients explaining the disease process, strategies for caring and communicating, resources, and support options. Include graphics. Brochure rubric provided.

3. Assessment 1: Neurocognitive Disorders Exam

An exam with 50 multiple choice questions and 2 short essays covers classifying, diagnosing, treating, and managing disorders involving cognitive decline.

Week 15: Ethics and Future Directions

Readings:

1. Kolb & Whishaw, Chapter 19 - Neuroethics, Neurodiversity, and the Future of Neuropsychology
2. Farah, M.J. (2015). An ethics toolbox for neurotechnology. Neuron, 86(1), 34-37.

Resources

- Case studies on ethics
- Emerging technologies like VR and neural implants
- Career counseling activities

1. Activity 1: Ethical Principles Case Analysis

Evaluate multicultural case scenarios using ethical principles of beneficence, nonmaleficence, autonomy, justice, and fidelity. Discuss tensions between principles.

2. Assignment 1: Ethics Code Comparison Paper

Compare and contrast the APA and INS codes of ethics for neuropsychologists. Analyze differences in content, structure, enforceability, and cultural relevance in an 8–10-ppage paper. A formal paper rubric is provided.

3. Assessment 1: Ethics and Standards Quiz

A quiz covers the application of ethical principles and professional codes of conduct to various neuropsychological research and clinical practice scenarios. Short answers and essay responses.

Note: There is an additional final project in “Additional Assignment Examples.”

Supplemental Course Readings and Resources:

Empirical research articles, government and NGO reports, news articles, documentaries, TEDtalks, etc.

THIS IS YOUR BRAIN (VIDEO)

- Dr. Paul Bloom is the speaker for this Open Yale course lecture. This lecture introduces students to two broad theories of how the mind relates to the body: Dualism and Materialism. This lecture reviews arguments explaining why materialism has become the predominant theory of mind in psychology. A fundamental overview of the neurophysiology of the brain follows this discussion. A link to the PowerPoint slides used during the lecture is also available.

THE CHEMICAL MIND (VIDEO)

- This is a Crash Course video on neurons, neurotransmitters, and hormones.

MEET YOUR MASTER: GETTING TO KNOW YOUR BRAIN (VIDEO)

- This is a Crash Course video on the brain.

BRAIN COMPONENTS (VIDEO)

- This is a short MedLine Plus video that shows the cerebrum, cerebellum, and brain stem.

NEUROSCIENCE: PERSONALITY PEDAGOGY

- Personality Pedagogy provides a list of hyperlinked articles, activities, and multimedia.

THE HUMAN BRAIN: ANNENBERG LEARNER

- Annenberg Learner provides an interactive brain activity in which students explore the human brain, and learn about its main areas and their functions in regulating everyday life.

RIGHT BRAIN VS. LEFT BRAIN (VIDEO)

- Scientific American Frontiers: Left Brain vs. Right Brain is a video about a man who underwent surgery to sever his corpus callosum and the unique paradigms that researchers used to assess his abilities. Provides students with a real-life look at not only left vs right brain abilities in action, but experimental design as well.

HIDDEN MOTIVES (VIDEO)

- Scientific American Frontiers: Hidden Motives is a video that shows an implicit association test.

HOW DOES FMRI BRAIN SCANNING WORK AND THE LIMITS OF FMRI BRAIN SCANNING (VIDEOS)

- These two videos show how fMRI brain scanning works and what the limitations of fMRI are.

THE AMYGDALA AND POSTTRAUMATIC STRESS DISORDER (VIDEO)

- In this short video, Daniel Pine explains that the amygdala is involved in learning to respond to a fearful experience fear-learning. There is evidence that the same response can lead to PTSD.

HOW YOUR BRAIN TELLS YOU WHERE YOU ARE (VIDEO)

- This TED talk explains the neural mechanisms that map the space around us, and how they link to memory and imagination.

THE BRAIN AS EXPLAINED BY JOHN CLEESE (VIDEO)

This video featuring John Cleese is a fun way to introduce neuroanatomy.

Additional Assignment Examples

WEEK 1:

Analyze a TED Talk or YouTube video related to neuropsychology. Outline at least 3 real-world examples from the video that demonstrate applications of neuropsychology concepts or research. For each example, describe the relevant biopsychosocial factors.

SAMPLE VIDEO: Phineas Gage brain injury case study

EXAMPLES:

- Injury to left frontal lobe resulted in personality changes due to role of prefrontal cortex in emotions and decision making. Psychological distress and social functioning also impacted.
- Neuroplasticity contributed to some recovery of functioning over time. Gage eventually worked as stagecoach driver again.
- Case study method allowed researchers to map localization of cognitive functions.

WEEK 2:

Create an educational brochure explaining parts of the brain and their functions to the general public. Include the major regions and lobes, basic cellular components, and neurotransmitters. Use graphics and non-technical language. Cite sources.

EXAMPLE BROCHURE TOPICS:

- The frontal lobe controls planning and decision making
- The hippocampus stores memories
- Dopamine regulates pleasure, motivation, and focus

WEEK 3:

Write a 3-5 page debate paper on the ethics of using pharmaceutical enhancers that alter neurotransmission. Outline pros/cons, address counterarguments. Cite at least 3 scholarly sources.

EXAMPLE ESSAY STRUCTURE:

Intro: Ritalin use on college campuses

Body: Argues risks outweigh benefits

Conclusion: Recommends regulation and education over prohibition

WEEK 4:

Interview an individual about how their brain and abilities have changed over their lifespan. In a reflective paper, identify specific examples of neuroplasticity and describe biological, psychological, and social factors that may have influenced changes.

EXAMPLE INTERVIEW TOPICS:

- Learning to play piano as an adult
- Progress in therapy addressing phobia
- Perceived memory changes over time

WEEK 5:

Administer two brief neuropsychological tests to a peer (ex: ASL fingering, color-word interference). Provide the instructions, score their performance, and write a summary interpreting their results.

EXAMPLE TESTS:

- WAIS-IV Digit Span subtest
- Trail Making Test Part A & B
- Rey-Osterrieth Complex Figure Drawing

WEEK 6:

Create an informational pamphlet about dementia geared towards caregivers and family members. Describe types, symptoms, causes, and tips for care and communication. Cite sources.

EXAMPLE PAMPHLET SECTIONS:

- Explaining behaviors related to disinhibition
- Stages of Alzheimer's progression
- Adapting the home environment

WEEK 7:

Watch a documentary about traumatic brain injury in sports, soldiers, or civilians. In a paper, summarize the key insights about TBI mechanics, diagnosis, treatment, and outcomes. Discuss biopsychosocial factors related to prevention and recovery.

EXAMPLE DOCUMENTARIES:

- Head Games: The Global Concussion Crisis
- Hear and Now (about use of cochlear implants after hearing loss)

WEEK 8:

Design a public health brochure about reducing risk factors and recognizing symptoms of stroke. Outline the FAST mnemonic for identifying stroke. Highlight lifestyles choices that promote brain health.

EXAMPLE BROCHURE CONTENT:

- The FAST method for stroke detection
- Warning signs like facial drooping
- Activities and diets to reduce clotting risks

WEEK 9:

Create an informational website that outlines resources, services, and supports available to families of children with developmental disabilities. Include descriptions and contact details of relevant local and national organizations.

EXAMPLE WEBSITE TOPICS:

- Early intervention speech therapy programs
- Parent support groups for autism
- 504 educational accommodations

WEEK 10:

Develop a brochure explaining the neurobiology of addiction to educate the general public and reduce stigma. Describe the reward pathways and brain changes. Discuss bio-psycho-social treatment implications.

EXAMPLE CONTENT:

- Role of dopamine in addiction

- Neural basis for cravings and withdrawal
- How therapy can rewire reward circuits

WEEK 11:

Write an editorial article for a neuroscience journal highlighting concerns about lack of diversity in research samples. Discuss resulting biases and propose methods to improve inclusion.

EXAMPLE PROPOSALS:

- Recruit subjects from varied ethnic communities
- Provide cultural competency training for researchers
- Analyze results across demographic factors

WEEK 12:

Imagine a hypothetical future neurotechnology like memory manipulation or transplantation. In a short story, describe plausible individual and societal consequences. Address ethical considerations.

EXAMPLE TECHNOLOGIES:

- Memory erasure after trauma
- AI neural link to instantly access info

WEEK 13:

Compare quantitative and qualitative methods for studying a topic in neuropsychology. In a paper, analyze the relative strengths and limitations of each approach as applied to your topic. Suggest mixed methods.

EXAMPLE TOPIC COMPARISONS:

- Statistics on TBI prevalence vs. case study interviews
- A correlational study on memory and age vs. phenomenological study on subjective memory experiences

WEEK 14:

Design a creative presentation proposing an innovative application of neuropsychology research to address a problem in society. Explain the relevant research and how it could inform interventions.

EXAMPLE PRESENTATIONS:

- Applying neuromarketing to promote healthy behaviors
- Using VR to treat phantom limb pain after amputation
- Designing brain-computer interfaces to restore communication

WEEK 15: Final Project

For your final project, choose an approved topic in neuropsychology to explore independently through the medium of your choice. Synthesize course concepts and outside research.

EXAMPLE MEDIUMS:

- Video documentary
- Original research proposal
- Training manual for clinicians
- Art exhibit with informational brochure

In-class Activity Examples

TOP TEN MYTHS ABOUT THE BRAIN

- Consider a pre-test at the beginning of this unit to assess students' starting points and inform your approach on some of the most common myths about the brain.

THE SOCCER MOM: A CASE STUDY ON THE NERVOUS SYSTEM

- The National Center for Case Study Teaching in Science – a library of engaging case studies to introduce and reinforce many concepts in Psychology. This case study tells the story of a patient experiencing MS.

A BOTCHED BOTOX PARTY IN THE HAMPTONS

- This case study provides more information about how Botox can cause unintended consequences. This is also relevant to ethics and whether patients who receive it are always fully informed of potential side effects.

TEACHING NEUROSCIENCE

- Many ideas and resources are available in this free ebook from STP -M. Birkett (Ed.). Teaching Neuroscience: Practical activities for an engaged classroom. Retrieved from the Society for the Teaching of Psychology web site:

TRAUMATIC BRAIN INJURY & CONCUSSION

- The Centers for Disease Control has extensive resources relevant to concussions and the impact on the brain.

BASIC GENETICS

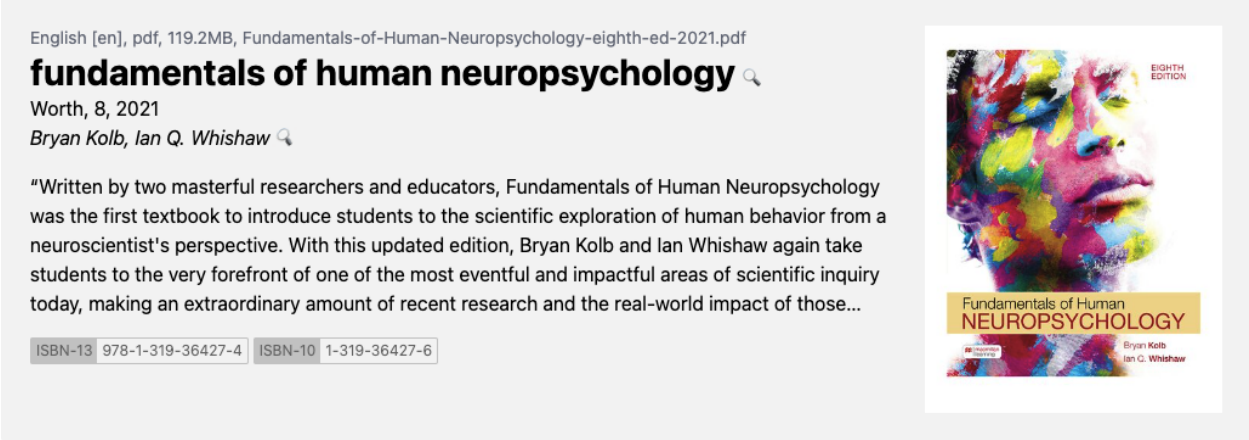
- This site has extensive resources and videos that instructors could show in class, post online, or assign out-of-class to help students with some of the basics on behavioral genetics (there are also many helpful resources for other neuroscience topics)

Alternative LOs

- Describe the major structures and functions of the central nervous system.
- Explain how neurons communicate through electrical and chemical signaling.
- Discuss neuroplasticity and critical periods in brain development and learning.
- Recognize symptoms, causes, and treatments for common neurological disorders such as stroke, Parkinson's disease, and traumatic brain injury.
- Apply the biopsychosocial model to understand the complex interactions between biological, psychological, and social factors influencing human behavior and outcomes.
- Analyze the relationship between brain function and various psychological processes including perception, memory, emotion, motivation, and language.
- Compare and contrast different theoretical perspectives and research methods used in the field of neuropsychology.
- Discuss ethical issues faced by neuropsychology professionals related to assessment, research, and clinical practice.
- Demonstrate effective scientific communication skills through writing assignments and oral presentations using APA 7 format.
- Propose innovative applications of neuropsychological research that can benefit individuals and society.
- Evaluate neuroscience findings reported in popular media with a critical, evidence-based lens.

Required and Recommended Resources

TEXTBOOK: Kolb, B., & Whishaw, I.Q. (2020). Fundamentals of Human Neuropsychology (8th ed.). Macmillan Learning. (LINKED)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fundamentals of human neuropsychology

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RECOMMENDED RESOURCES:

CELLS OF THE NERVOUS SYSTEM

This is the section of the OpenStax textbook that describes the anatomy of neurons, neural communication, and neurotransmitters.

PARTS OF THE NERVOUS SYSTEM

This is the section of the OpenStax textbook that introduces the parts of the nervous system and explains the branches of the peripheral nervous system.

THE BRAIN AND SPINAL CORD

This is the section of the OpenStax textbook that describes the structures/ functions of brain areas, and provides a limited overview of brain imaging techniques.

THE ENDOCRINE SYSTEM

This is the section of the OpenStax textbook that explains the structures/ functions of the endocrine system.

THE BRAIN

This is the module of the NOBA website that provides an introductory overview of the brain, including some basic neuroanatomy, and brief descriptions of the neuroscience methods used to study it.

HORMONES AND BEHAVIOR

This is the module of the NOBA website that introduces students to the topic of hormones and behavior.

THE NERVOUS SYSTEM

This is the module of the NOBA website that explains the components of the nervous system and methods used to study the nervous system. It also includes three videos that introduce students to basic brain anatomy and neuronal function.

BRAINS, BODIES & BEHAVIOR

This is the University of Minnesota Libraries Publishing open text chapter on “Brains, Bodies, and Behavior”.

Sample Lesson Plan

Here is a detailed lesson plan on the relationship between neurological disorders and human behavior using the backward design method and referencing the course textbook:

Neurological Disorders and Human Behavior Lesson Plan

Students will…

- analyze how neurological disorders impact human behavior, emotion, cognition and development.
- apply knowledge of brain-behavior relationships to interpret symptoms and deficits resulting from neurological damage and disease.
- will demonstrate a biopsychosocial perspective by considering biological, psychological, and social factors influencing disorders.

Textbook Readings:

- Kolb, B., & Whishaw, I.Q. (2020). Fundamentals of Human Neuropsychology (8th ed.).

Chapters 17-19 on developmental, aging-related, and other neurological disorders.

Assessment Evidence:

- Case study analysis worksheet synthesizing learning by diagnosing behavioral manifestations of a disorder

- Essay exam synthesizing knowledge of multiple disorders, symptoms and neural correlates

- Oral presentation on a selected disorder demonstrating in-depth understanding

Learning Activities:

- Gallery walk analyzing depictions of historical neurological conditions and effects on patients
- Jigsaw reading on causes, symptoms and treatments for assigned neurological disorders
- Interactive lecture on biopsychosocial model and mind-body connections
- Case study worksheet diagnosing sample patient behavioral deficits
- Student oral presentations on self-selected neurological disorders
- Review game matching disorders, behaviors and neural structures impacted

Lesson Sequence:

1. Intro: Survey common misconceptions about neurological disorders and mind-body dualism
2. Gallery walk, debrief, and discussion on historical neuroscience images
3. Jigsaw readings and group teach on neurological disorders
4. Lecture on biopsychosocial model and disorder examples
5. Case study analysis worksheet activity
6. Student presentations on selected neurological disorders
7. Jeopardy review game on disorders, symptoms and neural correlates
8. Essay exam on neurological disorders and human behavior

Instructions

Gallery Walk:

- Various historical paintings, drawings, and photos depicting neurological disorders will be posted around the room
- Students will walk around in pairs or small groups analyzing the images and discussing observations
- Images will include things like phrenology diagrams, asylum patients, wild boy of Aveyron, hydrocephalus, etc.
- Students will complete a worksheet identifying disorders, inferred symptoms, and effects on behavior for each image
- The class will debrief key takeaways from the gallery walk related to mind-body connections

Case Study Worksheet:

A written case study of a patient with a neurological disorder will be provided

Using a guiding worksheet, students will play role of neuropsychologist and diagnose the probable disorder based on described deficits and symptoms

The analysis will require applying knowledge of localization of brain function and behavioral manifestations of damage. Students will outline the case details, list indicated assessments, diagnose likely neurological factors, and recommend treatments

Presentations:

- Students will select a neurological disorder not covered in class readings
- They will research the causes, symptoms, neural correlates and treatments using academic sources
- An 8-10 minute PowerPoint presentation will be created and presented in class
- Presentations should connect the neural degeneration/damage to resulting behavioral and cognitive deficits
- A rubric will be provided covering content, visual aids, and public speaking skills

Jigsaw Readings:

Students will be divided into 5 groups, and each group will be assigned one of the following neurological disorders to research:

- Stroke
- Parkinson's Disease
- Alzheimer's Disease
- Traumatic Brain Injury
- Epilepsy

Each group will read a short article or textbook chapter on their assigned disorder, becoming "experts" on it

The articles will cover background, causes, symptoms, neural correlates and treatments

Students will take notes using a provided graphic organizer to summarize key learnings

After reading, new groups will be formed with one "expert" on each disorder from the original groups

Experts will each teach a 5 minute mini-lesson to the new group on the disorder they read about, ensuring all students gain core knowledge on each one

Sample Rubrics

Research Methods Literature Comparison Paper Rubric

Criteria	Exemplary	Proficient	Developing
Description of studies	Concisely summarizes key elements of each study's topic, methods, results	Describes studies adequately but misses some details	Summary lacks important details about studies
Analysis of methods	Insightfully compares and critiques research methods used in each study	Compares research methods accurately	Superficial comparison of methods with limited critique
Integrating concepts	Seamlessly integrates course concepts to explain and analyze research methods	Generally applies concepts correctly to analyze methods	Limited integration of course concepts
Organization	Logically organized with smooth transitions	Mostly organized with adequate transitions	Lacks organization and transitions
Grammar/mechanics	Virtually no errors in grammar, spelling, punctuation	Minimal errors that do not interfere with readability	Frequent errors make reading difficult

Sensory Disorder Brochure Rubric

Criteria	Exemplary	Proficient	Developing
Accuracy of information	All information presented is factually correct	Contains 1-2 minor factual errors	Several pieces of incorrect information
Explanation of disorder	Concisely yet completely explains neurological basis and symptoms	Explains disorder adequately with minor gaps	Incomplete, confusing explanation
Treatment information	Thoroughly describes evidence-based treatment options	Mentions treatments briefly	Limited/no treatment information given
Use of visuals	Creative relevant graphics enhance content	Appropriate visuals used effectively	Distracting/irrelevant visuals
Organization/layout	Logical sequence, visually appealing	Mostly organized and visually clear	Disorganized layout or cluttered
Grammar/mechanics	No spelling, grammar, or punctuation errors	Minimal errors that do not distract	Errors make brochure difficult to read

Sample Assessments per unit

Unit	Competency	Assessment
Introduction	Describe the history of neuropsychology.	Written assignment: Students will write a paper on the history of neuropsychology, discussing the major figures, theories, and developments in the field.
Neuroanatomy	Identify the major structures of the brain and their functions.	Practical exam: Students will be given a brain model and asked to identify the major structures. Written exam: Students will be given a list of brain structures and asked to describe their functions.
Neurophysiology	Explain the basic principles of neurophysiology, including the structure and function of neurons, the transmission of nerve impulses, and the organization of the nervous system.	Written assignment: Students will write a paper on the basic principles of neurophysiology. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of neurophysiology.

Neuroplasticity and Development	Describe the processes of neuroplasticity and neurodevelopment, and discuss their implications for learning and behavior.	Written assignment: Students will write a paper on the processes of neuroplasticity and neurodevelopment. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of neuroplasticity and neurodevelopment.
Research Methods	Describe the different research methods used in neuropsychology, and evaluate their strengths and weaknesses.	Written assignment: Students will write a paper on the different research methods used in neuropsychology. Practical exam: Students will be given a research study and asked to evaluate its strengths and weaknesses.
Biological Bases of Behavior	Explain the biological bases of behavior, including the role of the brain, neurotransmitters, and genetics.	Written assignment: Students will write a paper on the biological bases of behavior. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of the biological bases of behavior.

Sensation and Perception	Describe the processes of sensation and perception, and discuss their role in behavior.	Written assignment: Students will write a paper on the processes of sensation and perception. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of sensation and perception.
Learning and Memory	Describe the processes of learning and memory, and discuss their role in behavior.	Written assignment: Students will write a paper on the processes of learning and memory. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of learning and memory.
Language and Hemispheric Lateralization	Describe the organization of language functions in the brain, and discuss the role of hemispheric lateralization in language processing.	Written assignment: Students will write a paper on the organization of language functions in the brain. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of language and hemispheric lateralization.

Executive Functions	Describe the executive functions and their role in behavior.	Written assignment: Students will write a paper on the executive functions. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of the executive functions.
Emotion and Motivation	Describe the neural bases of emotion and motivation, and discuss their role in behavior.	Written assignment: Students will write a paper on the neural bases of emotion and motivation. Practical exam: Students will be given a series of tasks to complete that demonstrate their understanding of the neural bases of emotion and motivation.
Assessment Techniques	Describe the principles of neuropsychological assessment, and administer and interpret neuropsychological tests.	Written assignment: Students will write a paper on the principles of neuropsychological assessment. Practical exam: Students will be given a neuropsychological test to administer and interpret.

Rehabilitation	Describe the principles of neuropsychological rehabilitation, and develop a rehabilitation plan for a patient with a neuropsychological disorder.	Written assignment: Students will write a paper on the principles of neuropsychological rehabilitation. Practical exam: Students will be given a patient with a neuropsychological disorder and asked to develop a rehabilitation plan.
Ethics and Professional Issues	Describe the ethical and professional issues that arise in neuropsychology, and develop strategies for addressing them.	Written assignment: Students will write a paper on the ethical and professional issues that arise in neuropsychology. Practical exam: Students will be given a scenario involving an ethical or professional issue and asked to develop a strategy for addressing it.

Programmatic Themes

ETHICS

1. Discuss the treatment requirements of people whose corpus callosum was severed owing to severe epilepsy in order to understand more about the brain.
2. Discuss what a researcher might do if they discover potential medical conditions, such as symptoms of multiple sclerosis, while conducting brain scans for a study project.

APPLICATION

1. Discuss the potential effects of some gender-specific changes in brain anatomy on each gender's capacity for cognition, affect, and behavior.
2. Describe the ways in which the brains of those who have been diagnosed with schizophrenia and those who do not differ.
3. Discuss the treatment requirements of people whose corpus callosum was severed owing to severe epilepsy in order to understand more about the brain.
4. Discuss how the recovery process following a stroke or other brain injury can be better understood using our understanding of brain plasticity.

VARIANCES IN HUMAN FUNCTIONING

1. Describe the ways in which the brains of those who have been diagnosed with schizophrenia and those who do not differ.
2. Discuss the treatment requirements of people whose corpus callosum was severed owing to severe epilepsy in order to understand more about the brain.
3. Discuss how the recovery process following a stroke or other brain injury can be better understood using our understanding of brain plasticity.

SOCIAL AND CULTURAL DIVERSITY

1. Describe a few instances where brain anatomy or function varies or is comparable between genders.
2. Describe the ways in which the brains of those who have been diagnosed with schizophrenia and those who do not differ.
3. Discuss the treatment requirements of people whose corpus callosum was severed owing to severe epilepsy in order to understand more about the brain.

4. Discuss how the recovery process following a stroke or other brain injury can be better understood using our understanding of brain plasticity.