GENERAL STUDIES COURSE PROPOSAL COVER FORM

Course information:
Copy and paste current course information from Class Search/Course Catalog.

College/School: College of Health Solutions
Department/School: Speech and Hearing Science
Prefix: SHS Number: 230 Title: Peering into the Human Brain

Units: 4

Course description:

Is this a cross-listed course? No
If yes, please identify course(s): 

Is this a shared course? No
If so, list all academic units offering this course:

Note- For courses that are crosslisted and/or shared, a letter of support from the chair/director of each department that offers the course is required for each designation requested. By submitting this letter of support, the chair/director agrees to ensure that all faculty teaching the course are aware of the General Studies designation(s) and will teach the course in a manner that meets the criteria for each approved designation.

Is this a permanent-numbered course with topics? Yes

If yes, all topics under this permanent-numbered course must be taught in a manner that meets the criteria for the approved designation(s). It is the responsibility of the chair/director to ensure that all faculty teaching the course are aware of the General Studies designation(s) and adhere to the above guidelines.

Chair/Director Initials

Requested designation: Natural Sciences—SG

Mandatory Review Yes

Note- a separate proposal is required for each designation.

Eligibility: Permanent numbered courses must have completed the university’s review and approval process. For the rules governing approval of omnibus courses, contact Phyllis.Lucie@asu.edu.

Submission deadlines dates are as follow:
For Fall 2018 Effective Date: October 1, 2017
For Spring 2019 Effective Date: March 10, 2018

Area(s) proposed course will serve:
A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study.

Checklists for general studies designations:
Complete and attach the appropriate checklist

Literacy and Critical Inquiry core courses (L)
Mathematics core courses (MA)
Computer/statistics/quantitative applications core courses (CS)
Humanities, Arts and Design core courses (HU)
Social-Behavioral Sciences core courses (SB)
Natural Sciences core courses (SQ/SG)
Cultural Diversity in the United States courses (C)
Global Awareness courses (G)
Historical Awareness courses (H)

A complete proposal should include:
☒ Signed course proposal cover form
☒ Criteria checklist for General Studies designation being requested
☒ Course catalog description
☒ Sample syllabus for the course
☒ Copy of table of contents from the textbook and list of required readings/books

It is respectfully requested that proposals are submitted electronically with all files compiled into one PDF.

Contact information:

Name: B. Blair Braden E-mail: bbbraden@asu.edu Phone: (480) 727-3414

Department Chair/Director approval: (Required)

Chair/Director name (Typed): Nancy Sherer Date: 3-6-18

Chair/Director (Signature): Nancy Sherer

Rev. 3/2017
Arizona State University Criteria Checklist for

NATURAL SCIENCES [SQ/SG]

Rationale and Objectives

Public scientific literacy, critical for sound decisions on scientifically infused issues such as climate change, includes understanding of basic science concepts, such as the fundamental behavior of matter and energy. It also includes the understanding that “science” is not an encyclopedic collection of facts. Rather, it is a process of exploration that embraces curiosity, inquiry, testing, and communication, to reduce uncertainty about nature. Absent understanding of scientific concepts and of the nature of science, science and pseudoscience are difficult to distinguish, and normal scientific disagreements may be misinterpreted as ideological or political disputes. The goal of the natural sciences (SQ/SG) requirement, including the laboratory requirement, is to instill understanding of basic science content and of the nature of science in every ASU graduate.

10/1989
Proposer: Please complete the following sections and attach appropriate documentation.

### ASU--[SQ] CRITERIA

#### I. - FOR ALL QUANTITATIVE [SQ] NATURAL SCIENCES CORE AREA COURSES, THE FOLLOWING ARE CRITICAL CRITERIA AND MUST BE MET:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Identify Documentation Submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **A.** Course emphasizes the mastery of basic scientific principles and concepts.
- **B.** Addresses knowledge of scientific method.
- **C.** Includes coverage of the methods of scientific inquiry that characterize the particular discipline.
- **D.** Addresses potential for uncertainty in scientific inquiry.
- **E.** Illustrates the usefulness of mathematics in scientific description and reasoning.
- **F.** Includes *weekly* laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.
- **G.** Students submit written reports of laboratory experiments for constructive evaluation by the instructor.
- **H.** Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity.

#### II. - AT LEAST ONE OF THE FOLLOWING ADDITIONAL CRITERIA MUST BE MET WITHIN THE CONTEXT OF THE COURSE:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Identify Documentation Submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **A.** Stresses understanding of the nature of basic scientific issues.
- **B.** Develops appreciation of the scope and reality of limitations in scientific capabilities.
- **C.** Discusses costs (time, human, financial) and risks of scientific inquiry.

III. - [SQ] COURSES MUST ALSO MEET THESE ADDITIONAL CRITERIA:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Identify Documentation Submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>A.</strong> Provides a substantial, quantitative introduction to fundamental principles governing behavior of matter and energy, in physical or biological systems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>B.</strong> Includes a college-level treatment of some of the following topics (check all that apply below):</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>a.</strong> Atomic and molecular structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>b.</strong> Electrical processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>c.</strong> Chemical processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>d.</strong> Elementary thermodynamics</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>e.</strong> Electromagnetics</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>f.</strong> Dynamics and mechanics</td>
</tr>
</tbody>
</table>

[SQ] REQUIREMENTS CANNOT BE MET BY COURSES:

- Presenting a qualitative survey of a discipline.
- Focusing on the impact of science on social, economic, or environmental issues.
- Focusing on a specific or limiting but in-depth theme suitable for upper-division majors.
Proposer: Please complete the following section and attach appropriate documentation.

### ASU--[SG] CRITERIA

#### I. FOR ALL GENERAL [SG] NATURAL SCIENCES CORE AREA COURSES, THE FOLLOWING ARE CRITICAL CRITERIA AND MUST BE MET:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Identify Documentation Submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>☐</td>
<td>1. Course emphasizes the mastery of basic scientific principles and concepts. Syllabus; Text Book Table of Contents</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>2. Addresses knowledge of scientific method. Syllabus; Text Book Table of Contents</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>3. Includes coverage of the methods of scientific inquiry that characterize the particular discipline. Syllabus; Text Book Table of Contents</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>4. Addresses potential for uncertainty in scientific inquiry. Syllabus; Text Book Table of Contents</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>5. Illustrates the usefulness of mathematics in scientific description and reasoning. Syllabus</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>6. Includes weekly laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material. Syllabus; Supp. Material: Example Lab Description</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>7. Students submit written reports of laboratory experiments for constructive evaluation by the instructor. Syllabus; Supplemental Material: Example Lab Assignment</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>8. Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity. Syllabus; Text Book Table of Contents</td>
</tr>
</tbody>
</table>

#### II. AT LEAST ONE OF THE ADDITIONAL CRITERIA THAT MUST BE MET WITHIN THE CONTEXT OF THE COURSE:

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>Identify Documentation Submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>☐</td>
<td>A. Stresses understanding of the nature of basic scientific issues. Syllabus; Text Book Table of Contents</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>B. Develops appreciation of the scope and reality of limitations in scientific capabilities. Syllabus; Text Book Table of Contents</td>
</tr>
</tbody>
</table>
C. Discusses costs (time, human, financial) and risks of scientific inquiry.
<table>
<thead>
<tr>
<th>[SG] REQUIREMENTS CANNOT BE MET BY COURSES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>∙ Presenting a qualitative survey of a discipline.</td>
</tr>
<tr>
<td>∙ Focusing on the impact of science on social, economic or environmental issues.</td>
</tr>
<tr>
<td>∙ Focusing on a specific or limiting but in-depth theme suitable for upper-division majors.</td>
</tr>
<tr>
<td>Criteria (from checksheet)</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>1. Course emphasizes the mastery of basic scientific principals and concepts.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2. Adresses knowledge of scientific method.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>3. Includes coverage of the methods of scientific inquiry that characterize the particular discipline.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>4. Addresses the potential for uncertainty in scientific inquiry.</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Criteria (from checksheet)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 5. Illustrates the usefulness of mathematics in scientific description and reasoning.    | In Week 3, students learn a basic understanding of how mathematics are applied to brain research. We then spend an entire lecture on the functional brain imaging techniques, fMRI and EEG. Here, students are given a clear demonstration and appreciation of how mathematics (statistics) are necessary to interpret findings, and that the way statistics are implemented can alter the results. Ethical implications of this are discussed. In Lab 13, students put what they’ve learned into practice by completing a field assignment of data collection on cognitive test in participants of both sexes. Lab 14 is an in class demonstration and participation using mathematical statistics to interpret the results. | Syllabus: Course overview  
Syllabus: General topic schedule: Week 3: Brain research methods and imaging the brain; Week 13: Sex differences experiment; Week 14: Lab Activity: Sex differences data analysis  
Text Book: Chapter 3                                                                 |
| 6. Includes weekly laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material. | Students complete either a weekly laboratory or field session that provides hands-on exposure to cognitive and language brain function phenomena and methodology. An example laboratory instructions and assignment has been submitted as Supplemental Material. | Syllabus: General topic schedule: Lab Activities  
Syllabus: Course grading: Methods of evaluation and Description of assessments  
Supplemental Material: Example lab description                                                                 |
| 7. Students submit written reports of laboratory experiments for constructive evaluation by the instructor. | Students submit weekly reports of either a laboratory or field session. Each report is graded by the instructor and given constructive feedback. | Syllabus: General topic schedule: Assignments  
Supplemental Material: Example lab assignment  
Syllabus: Course grading: Methods of evaluation and Description of assessments |
<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Course Description</th>
<th>Syllabus</th>
<th>Text Book</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity.</td>
<td>This 200-level course provides an overview of many brain research techniques and the types of typical versus disorder/disease-related cognitive processes. The topics change frequently, with no more than one lecture devoted to each in order to provide a general introduction of this large field.</td>
<td>Syllabus: General topic schedule: Lecture topics</td>
<td>Text Book: Chapters 1 - 14</td>
</tr>
<tr>
<td>A. Stresses understanding of the nature of basic scientific issues.</td>
<td>Understanding human behavior is fundamental to our existence. This course illustrates how understanding the human brain is a necessary scientific issue towards our quest of understanding human behavior.</td>
<td>Syllabus: Course overview and Learning outcomes</td>
<td>Text Book: Chapter 1 and 14</td>
</tr>
<tr>
<td>B. Develops appreciation of the scope and reality of limitations in scientific capabilities.</td>
<td>Each week, students are exposed to the many amazing discoveries of the human brain and the vast limitations of our current methodology and understanding.</td>
<td>Syllabus: Course overview and Learning outcomes</td>
<td>Text Book: Chapter 1 and 3</td>
</tr>
<tr>
<td>C. Discusses cost (time, human, financial) and risks of scientific inquiry.</td>
<td>Each brain research method is contextualized by the level of invasiveness (i.e. cost and risk). Further, a detailed history of brain research methods is presented which demonstrates the evolution of ethical considerations in the field. The costs/risks of scientific inquiry are visiting again and again throughout the semester. In our quest to understand human behavior, we must consider resources and the risks to the humans we are studying. This is highlighted for understanding split brain, autism and brain development, schizophrenia, dementia, Parkinson’s disease, depression, aphasia, sex differences, and agnosia). The discussion is pushed further into the future of considering the</td>
<td>Syllabus: General topic schedule: Week 3: Brain Research Methods; Week 4: Split-Brain; Week 6: Schizophrenia and autism; Week 9: Dementia; Week 10: Parkinson’s disease; Week 11: Depression; Week 12: Aphasia; Week 13: Sex difference; Week 15: Agnosia</td>
<td>Text Book: Chapters 1, 3, 4, 10, 11, 13, and 14</td>
</tr>
</tbody>
</table>
application of brain research in legal realms when applicable.
Peering into the Human Brain
SHS 230

Catalog Description
An introductory look into the cognitive and language functions of the human brain, and the resulting behavioral consequences of injury, disease, and disorders.
Peering into the Human Brain
SHS 230
Lecture and Lab Syllabus

Faculty Information
Name: Dr. B. Blair Braden
Office: Coor 3410
Phone: (480) 727 - 3414
Email address: bbbraden@asu.edu
Office hours: Arranged via email

Course Information
Course Number
SHS 230

Course Title
Peering into the Human Brain

Credit Hours
4

Course Modality
Face-to-Face Course

Course Meeting Information
TBD
Tempe Campus

Prerequisites
• None

Corequisites
• None

Catalog Description
An introductory look into the cognitive and language functions of the human brain, and the resulting behavioral consequences of injury, disease, and disorders.

Course Overview
It is only by peering into our own brain that we can begin to understand the biology of what makes us human. “Under the hood” we find the most complex object in the world that we are only beginning to understand. In this class, we will cover the basics of healthy brain functioning and typical cognitive and language processing as well as the impact of brain damage and brain-based disorders, such as autism, amnesia, dyslexia, and aphasia. We will emphasize the basic scientific principles and concepts that allow us to deduce brain-cognition relationships. In particular, we will explore how the scientific method and statistics apply to neuro-imaging
techniques, case study research, and hands-on experiments, and the possibility for uncertainty in scientific inquiry.

**Learning Outcomes**
At the completion of this course, students will be able to:

- Understand the basic scientific principles of cognitive and language brain functions, and the resulting behavioral consequences of injury, disease, and disorders.
- Ability to apply the scientific method to cognitive and language brain science questions.
- Describe current methods used to understand cognitive and language brain science.
- Identify the many scientific uncertainties of how the brain performs human cognitive and language functions.
- Ability to apply basic statistics to analyze neuropsychological data.

**Course Materials**

**Required Materials**
- Online content populated in Blackboard to complete some lab assignments.

**Optional Materials**
- Additional freely available online content populated in Blackboard.

**General Topic Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
<th>Lab Activities</th>
<th>Assignments</th>
</tr>
</thead>
</table>
| Week 1 | • The parts of the neuron  
• Neuronal communication | • Ion tennis ball game | • Read Ch. 1 & 2  
• Lab report |
| Week 2 | • Neuroanatomy  
• Neurotransmitter systems | • Real-life brain dissections | • Read Ch. 5  
• Lab report |
| Week 3 | • Brain research methods  
• Imaging the brain | • Brain imaging in the media | • Read Ch. 3 & 14  
• Lab report  
• Quiz |
| Week 4 | • Lateralization/hemispherectomy  
• Traumatic brain injuries | • Split-brain experiments | • Read Ch. 4  
• Lab report |
| Week 5 | • Frontal & parietal lobes  
• Executive functions | • Working memory span testing | • Read Ch. 7 & 12  
• Lab report  
• Quiz |
| Week 6 | • Schizophrenia  
• Autism | • Building neural networks | • Read Ch. 13  
• Lab report |
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
<th>Lab Activities</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 7</td>
<td>• Review</td>
<td>• Virtual brain dissections</td>
<td>• Lab report</td>
</tr>
<tr>
<td></td>
<td>• Mid-Term</td>
<td></td>
<td>• Mid-term</td>
</tr>
<tr>
<td>Week 8</td>
<td>• Temporal lobe &amp; synaptic plasticity</td>
<td>• Episodic memory field assignment</td>
<td>• Reach Ch. 9</td>
</tr>
<tr>
<td></td>
<td>• Long-term memory</td>
<td></td>
<td>• Lab report</td>
</tr>
<tr>
<td>Week 9</td>
<td>• Amnesia</td>
<td>• H.M. &amp; Wearing case studies</td>
<td>• Lab report</td>
</tr>
<tr>
<td></td>
<td>• Dementia</td>
<td></td>
<td>• Quiz</td>
</tr>
<tr>
<td>Week 10</td>
<td>• Basal Ganglia &amp; Cerebellum</td>
<td>• Mirror tracing test</td>
<td>• Read Ch. 8</td>
</tr>
<tr>
<td></td>
<td>• Parkinson’s &amp; procedural memory</td>
<td></td>
<td>• Lab report</td>
</tr>
<tr>
<td>Week 11</td>
<td>• Limbic System: Emotional Memory; Depression</td>
<td>• Psychedelics as therapeutics</td>
<td>• Read Ch. 10</td>
</tr>
<tr>
<td></td>
<td>• Right Hemisphere Damage</td>
<td></td>
<td>• Lab report</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Quiz</td>
</tr>
<tr>
<td>Week 12</td>
<td>• Language neuroanatomy</td>
<td>• Neuroimaging stroke case study</td>
<td>• Read Ch. 11</td>
</tr>
<tr>
<td></td>
<td>• Aphasia</td>
<td></td>
<td>• Lab report</td>
</tr>
<tr>
<td>Week 13</td>
<td>• Spatial processing/memory</td>
<td>• Sex differences experiment</td>
<td>• Lab report</td>
</tr>
<tr>
<td></td>
<td>• Hormones &amp; sex differences</td>
<td></td>
<td>• Quiz</td>
</tr>
<tr>
<td>Week 14</td>
<td>• Facial and Emotional Processing</td>
<td>• Sex differences data analysis</td>
<td>• Read Ch. 6</td>
</tr>
<tr>
<td></td>
<td>• Vision Pathway</td>
<td></td>
<td>• Lab report</td>
</tr>
<tr>
<td>Week 15</td>
<td>• Agnosia</td>
<td>• Optical illusions</td>
<td>• Lab report</td>
</tr>
<tr>
<td></td>
<td>• Review</td>
<td></td>
<td>• Final</td>
</tr>
</tbody>
</table>

**Course Grading**

**Methods of Instruction**

This course uses Blackboard™ for the facilitation of communications between faculty and students, submission of assignments, and posting of grades. The course site can be accessed at [http://my.asu.edu](http://my.asu.edu) or [http://myasucourses.asu.edu](http://myasucourses.asu.edu). All required materials, including readings, videos, and interactive activities, will be posted on the class Blackboard site. Thus, it is very important that you check the site regularly and that the email account associated with Blackboard is able to receive and send messages in a timely manner. We will send out important email messages with reading lists, websites, updated summary outlines, and changes to schedules.

Activities in this course include discussion/presentations; textbook and supplemental readings; individual and group laboratory activities; and case scenarios.
Methods of Evaluation

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Number in Course</th>
<th>Total Course Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Reports</td>
<td>15</td>
<td>150 points/30%</td>
</tr>
<tr>
<td>Quiz</td>
<td>5</td>
<td>150 points/30%</td>
</tr>
<tr>
<td>Mid-Term</td>
<td>1</td>
<td>100 points/20%</td>
</tr>
<tr>
<td>Final</td>
<td>1</td>
<td>100 points/20%</td>
</tr>
</tbody>
</table>

Description of Assessments

- **Lab Reports**: Written report of laboratory and/or field sessions that provide hands-on exposure to cognitive and language brain function phenomena and methodology.
- **Quizzes**: Closed-note, 10-20 questions covering lectures, reading materials, online materials, and videos covered since the last quiz/mid-term. These are *not* cumulative.
- **Mid-Term**: The mid-term exam will cover lectures, reading materials, online materials, videos, labs, and field research presented in the first half of the course. It will consist of multiple-choice, fill-in-the-blanks, and short answer questions.
- **Final**: The final exam will cover lectures, reading materials, online materials, videos, labs, and field research presented from the entire semester, but with a greater focus on the second half of the course. It will consist of multiple-choice, fill-in-the-blanks, and short answer questions.

Grading Procedure

Grades reflect your performance on assignments and adherence to deadlines. Graded assignments will be available within one week of the due date via the My Grades tab in Blackboard.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Points Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 – 100%</td>
<td>448 - 500</td>
</tr>
<tr>
<td>B</td>
<td>80 – 89%</td>
<td>398 - 447</td>
</tr>
<tr>
<td>C</td>
<td>70 – 79%</td>
<td>348 - 397</td>
</tr>
<tr>
<td>D</td>
<td>60 – 69%</td>
<td>398 - 347</td>
</tr>
<tr>
<td>E</td>
<td>Below 60%</td>
<td>297 and below</td>
</tr>
</tbody>
</table>
Course Policies & Procedures

Technology Enhanced Course
This is a face-to-face course that requires attendance in face-to-face meetings and utilization of online resources.

Communicating With the Instructor
When you have a general question about the course, please check with the syllabus, Blackboard announcements, and your classmates. If you do not find an answer, you may e-mail the class TA or me. You can expect a response within 48 hours.

Email and Internet
ASU email is an official means of communication among students, faculty, and staff (http://www.asu.edu/aad/manuals/ssm/ssm107-03.html). Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned email regularly.

All instructor correspondence will be sent to your ASU email account.

Campus Network or Blackboard™ Outage
When access to Blackboard™ is not available for an extended period of time (greater than one entire evening) you can reasonably expect that the due date for assignments will be changed to the next day (assignment still due by 11:59pm).

If an outage occurs, it is expected that you will confirm that the outage is with the University and not your local internet service provider. To monitor the status of campus networks and services, please visit the System Health Portal (http://syshealth.asu.edu/). If a system-wide ASU outage is NOT listed, you are responsible for contacting the ASU Help Desk to report and troubleshoot the issue. By contacting the help desk, a request case number will be created for you, which serves as an important documentation of your attempt to resolve any technical problems in a timely fashion. You may be required to forward this documentation to your instructor.

Course Time Commitment
This four-credit course requires approximately 180 hours of work. Please expect to spend 4 hours each week in class and around 8 hours each week completing homework and preparing for the class time.

Late or Missed Assignments
Notify the instructor BEFORE an assignment is due if an urgent situation arises and the assignment will not be submitted on time. Published assignment due dates (Arizona Mountain Standard time) are firm. Please follow the appropriate University policies to request an accommodation for religious practices (http://www.asu.edu/aad/manuals/acd/acd304-04.html) or to accommodate a missed assignment due to University-sanctioned activities (http://www.asu.edu/aad/manuals/acd/acd304-02.html).

Submitting Assignments
All assignments, unless otherwise announced, MUST be submitted to the designated area of Blackboard™. Do not submit an assignment via other methods unless specifically directed.
**Drop and Add Dates/Withdrawals**
This course adheres to a set schedule and may be part of a sequenced program, therefore, there is a limited timeline to drop or add the course ([https://students.asu.edu/academic-calendar](https://students.asu.edu/academic-calendar)). Consult with your advisor and notify your instructor to add or drop this course. If you are considering a withdrawal, review the following ASU policies:

- Withdrawal from Classes ([http://www.asu.edu/aad/manuals/ssm/ssm201-08.html](http://www.asu.edu/aad/manuals/ssm/ssm201-08.html))
- Medical/Compassionate Withdrawal ([http://www.asu.edu/aad/manuals/ssm/ssm201-09.html](http://www.asu.edu/aad/manuals/ssm/ssm201-09.html))
- Grade of Incomplete ([http://www.asu.edu/aad/manuals/ssm/ssm203-09.html](http://www.asu.edu/aad/manuals/ssm/ssm203-09.html))

**Grade Appeals**
Grade disputes must first be addressed by discussing the situation with the instructor. If the dispute is not resolved with the instructor, the student may appeal to the department chair per the University Policy for Student Appeal Procedures on Grades ([https://catalog.asu.edu/appeal](https://catalog.asu.edu/appeal)).

**Student Conduct and Academic Integrity**
ASU expects and requires its students to act with honesty, integrity, and respect. Required behavior standards are listed in the Student Code of Conduct and Student Disciplinary Procedures ([http://www.asu.edu/aad/manuals/ssm/ssm104-01.html](http://www.asu.edu/aad/manuals/ssm/ssm104-01.html)), Computer, Internet, and Electronic Communications policy ([http://www.asu.edu/aad/manuals/acd/acd125.html](http://www.asu.edu/aad/manuals/acd/acd125.html)), ASU Student Academic Integrity Policy ([http://provost.asu.edu/academicintegrity](http://provost.asu.edu/academicintegrity)), and outlined by the Office of Student Rights & Responsibilities ([https://eoss.asu.edu/dos/srr](https://eoss.asu.edu/dos/srr)). Anyone in violation of these policies is subject to sanctions.

Students are entitled to receive instruction free from interference by other members of the class ([http://www.asu.edu/aad/manuals/ssm/ssm104-02.html](http://www.asu.edu/aad/manuals/ssm/ssm104-02.html)). An instructor may withdraw a student from the course when the student's behavior disrupts the educational process per Instructor Withdrawal of a Student for Disruptive Classroom Behavior ([http://www.asu.edu/aad/manuals/usi/usi201-10.html](http://www.asu.edu/aad/manuals/usi/usi201-10.html)).

Appropriate online behavior (also known as netiquette) is defined by the instructor and includes keeping course discussion posts focused on the assigned topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board posts may be deleted by the instructor.

The Office of Student Rights and Responsibilities accepts incident reports ([https://eoss.asu.edu/dos/srr/filingreport](https://eoss.asu.edu/dos/srr/filingreport)) from students, faculty, staff, or other persons who believe that a student or a student organization may have violated the Student Code of Conduct.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at
As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish discuss any concerns confidentially and privately.

**Prohibition of Commercial Note Taking Services**
In accordance with ACD 304-06 Commercial Note Taking Services (http://www.asu.edu/aad/manuals/acd/acd304-06.html), written permission must be secured from the official instructor of the class in order to sell the instructor's oral communication in the form of notes. Notes must have the note taker’s name as well as the instructor's name, the course number, and the date.

**Course Evaluation**
Students are expected to complete the course evaluation. The feedback provides valuable information to the instructor and the college and is used to improve student learning. Students are notified when the online evaluation form is available.

**Syllabus Disclaimer**
The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. Please remember to check your ASU email and the course site often.

---

**Accessibility Statement**

**Disability Accommodations**: Qualified students with disabilities who will require disability accommodations in this class are encouraged to make their requests to me at the beginning of the semester either during office hours or by appointment. Note: Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required. Disability information is confidential.

**Establishing Eligibility for Disability Accommodations**: Students who feel they will need disability accommodations in this class but have not registered with the Disability Resource Center (DRC) should contact DRC immediately. Students should contact the Disability Resource Center, campus-specific location and contact information (https://eoss.asu.edu/drc/contactus) can be found on the DRC website. DRC offices are open 8 a.m. to 5 p.m. Monday – Friday. Check the DRC website (http://eoss.asu.edu/drc) for eligibility and documentation policies.

Email: DRC@asu.edu  
DRC Phone: (480) 965-1234  
DRC FAX: (480) 965-0441

---

**Technical Requirements & Support**

**Computer Requirements**
This course requires Internet access and the following:

- A web browser. Please use only Google Chrome (https://www.google.com/chrome) or
Computer Skills Requirements
It is expected that you will be able to do at least the following tasks on a computer:

- Use the Blackboard™ Learning Management System (see https://myasu.force.com/akb?id=kA3d00000004jh4 for assistance)
- Using ASU email
- Creating and submitting files in commonly used word processing program formats (specifically Microsoft Word)
- Copying and pasting text
- Downloading and installing software
- Using spreadsheet programs (specifically Microsoft Excel)
- Using presentation and graphic programs

Technical Support
This course uses Blackboard™ to deliver course content. It can be accessed through MyASU at http://my.asu.edu or the Blackboard™ home page at http://myasucourse.asu.edu/.

To monitor the status of campus networks and services, visit the System Health Portal at http://syshealth.asu.edu/ or via Twitter by following @ASUOutages.

To contact the help desk you have two options:

- Website: assessed through the MyASU Service Center at http://my.asu.edu/service
- Chat: assessed through the MyASU Service Center at http://my.asu.edu/service
- Call toll-free at 1-855-278-5080

This syllabus and all other course materials (powerpoint slides, handouts, assignments, quizzes, exams, digital recordings, etc.) are intellectual property of Arizona State University and are not to be publicly distributed or otherwise commercialized since these materials are copyright protected. Publishing, uploading, linking, redistributing, and/or downloading course material may subject students to penalties for academic misconduct. Such materials are for sole use in that designated semester. It cannot be used in any other form unless via a written statement of approval from the instructor of record. Commercial note taking services are prohibited without written permission from the instructor of record in accordance with ACD 304-06 available at http://www.asu.edu/aad/manuals/acd/acd304-06.html. This includes powerpoint slides and powerpoint slides with audio.
Table of Contents

**Brief Overview**

**PART I  Background and Methods**
1. A Brief History of Cognitive Neuroscience  2
2. Structure and Function of the Nervous System  22
3. Methods of Cognitive Neuroscience  70

**PART II  Core Processes**
4. Hemispheric Specialization  120
5. Sensation and Perception  162
6. Object Recognition  218
7. Attention  272
8. Action  326
9. Memory  378
10. Emotion  424
11. Language  468

**PART III  Control Processes**
12. Cognitive Control  506
13. Social Cognition  558
Overview: In this lab assignment, students use beads, string, scissors, and tape to symbolize neural networks according to the eight stages of neural development. One half of the class will construct a typical neural network and the other half of the class will construct an “autism-like” neural network. This will happen sequentially, so the entire class will be engaged and participating in the planning and designing of each network.

“Typical” Neural Network:
1. White foam balls which represent the proliferation of stem/neural progenitor cells are passed out to about half of the students.
2. White string is given to the same students and they are asked to connect with a student who does not have a white foam ball. This represents radial glia that the neural progenitor cells will use to migrate to their appropriate place in the brain. Students place string through the white foam balls and move them to the end of the string.
3. Multi-color wooden beads are passed out to all students to replace the white foam balls. This represents differentiation into specific neural types.
4. Students are asked to work together to aggregate all like-colored neurons together.
5. Green and red string is passed out to all students to begin synaptogenesis. Students form connections between neurons. Care is taken to make sure there is a balance of green and red string to symbolize the necessary balance of excitation and inhibition. Further, care is taken to ensure there are a balance of short and long connections.
6. Some neurons are collected from the students to represent the normal cell death that occurs in development.
7. Some strings are cut to represent the normal synaptic pruning that occurs in development. Again, care is taken to make sure there is a balance of green and red string and short and long connections.
8. Finally, yellow tape is placed along some connections to represent myelination. In particular, long range connections are heavily myelinated.

“Autism Spectrum Disorder-Like” Neural Network:
1. Proliferation happens unevenly with too many stem/neural progenitor cells passed out to in some places and not enough in others.
2. Migration is disorganized in some cases, where the neural progenitor cell does not follow the path of its radial glia and ends up in another location. In other cases, migration happens as it should.
3. A different balance of multi-color wooden beads are passed out to students which represents that in differentiation some cells may not become the “right” cell.
4. When students are aggregating all like-colored neurons together, some intentional mistakes are made to represent that some neurons may not group together appropriately.
5. Green and red string is passed out to all students to begin synaptogenesis. Students form connections between neurons. In this case, less care is taken to make sure there is a balance of green and red string. There will be slightly more green string to symbolize the over-excitation that can occur in autism. Further, less care is taken to ensure there are a balance of short and long connections, and the end result is too many short connects, not enough long.

6. Some neurons are collected from the students to represent the normal cell death that occurs in development, but in this case many neurons may be taken from one area and very few from another. This illustrates how in autism some brain structures end up with more neurons than typical and some with less than typical.

7. Some strings are cut to represent the normal synaptic pruning that occurs in development. Again, less care is taken to make sure there is a balance of green and red string. There will be slightly more green string to symbolize the over-excitation and more short connects to symbolize over “local” connectivity and under long-range connectivity.

8. Finally, less yellow tape is placed along the connections to represent less myelination that is characteristic of autism.

Pictures: Students take pictures of each of the neural networks to turn in with their lab assignment.

Lab Assignment: Students draw the eight steps of neural development, a “typical” developed neural network, and an “autism-like” neural network. Finally, students list three differences between networks.
SHS 230: Peering into the Human Brain
Lab Assignment – Neural Network Development and Autism

2/15/18

Name:

Draw each step of neural network development:

1. Proliferation

2. Migration

3. Differentiation

4. Aggregation

5. Synaptogenesis

6. Cell Death

7. Synaptic Pruning

8. Myelination
Draw a typical neural network and an “ASD” neural network:

Typical

ASD

List three differences between the two networks:

1.

2.

3.
SHS 230: Peering into the Human Brain
Lab Assignment – Brain Research in the Media

Name:

Being an informed consumer of scientific research will help you navigate our ever-expanding world of knowledge. Thinking critically about research studies is a key component to using new information in your personal and maybe even professional life. This lab exercise is meant to help you understand 1) how brain research studies are designed, 2) what type of techniques are used, 3) how research may be misrepresented in the media, and 4) limitations of current methods.

1. Find and read a lay internet article aimed to the general public that describes some type of brain research (preferably about language or memory brain areas or related disorders).
   a. Example websites: CNN, Google News, New York Times, BBC news, USA Today, etc. (example articles are on the next page).

2. Find and read (at least skim) the original peer-reviewed research article from the scientific journal. Typically, the internet article will give you information about the author, title, and/or journal it was published in or have a link to the original article. This link may not give you access to the whole thing, but it should at least give you the title and abstract. Once you have info about the original article, to find the full text:
   a. Log into my.asu.edu
   b. Go to https://scholar.google.com/, search for the title, authors, journal, or keywords
   c. Click on the links to the right of the article (circled in red):
Popular article: Headline, writer, publication/website, date

Scientific article: Title, researchers, publication, date

Answer these questions based ONLY on what you read in each article. If you can’t tell what it is or if there is not enough information (which will sometimes be the case for the popular article), you should put “not enough information provided.”

<table>
<thead>
<tr>
<th>Popular Article</th>
<th>Scientific Article</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe the participants (who was tested or studied, how many were there, and how were they selected)?</td>
<td></td>
</tr>
<tr>
<td>Describe the design of the study (Correlational, experimental, quasi-experimental)</td>
<td></td>
</tr>
<tr>
<td>What were the researchers studying, aka independent variable (e.g., a drug, a therapy, a clinical condition)? What was their research question or hypothesis?</td>
<td></td>
</tr>
<tr>
<td>What type of research technique did they use to examine the brain, aka dependent variable (e.g., MRI, DTI, fMRI, EEG, PET, etc.)?</td>
<td></td>
</tr>
<tr>
<td>What were the important conclusions or findings of the study?</td>
<td></td>
</tr>
</tbody>
</table>
Then answer these questions:

1. How well did the information in the popular article and the scientific article match up? What were some specific differences in how the study was described in the popular article vs. the scientific article (and don’t just say that the scientific article was longer and had more details)?

2. Do you think the popular article represented the scientific article’s findings accurately or do you think it was somewhat misleading or even just wrong? Explain your answer.

3. What did you discover in comparing a popular article with the original research article?
Name:

You are going to collect data from 4 ADULT participants (2 male and 2 female) under the age of 40 on the verbal and spatial tasks below. Test each person INDIVIDUALLY.

For the Verbal Task: Follow the instructions on the sheet. DO NOT SHOW THEM THE SHEET. You will be reading them words and recording their verbal responses. Do the first 3 trials then go on to the spatial tasks.

For the Spatial Tasks: Make sure you have access to a computer. Go to https://www.123test.com/spatial-reasoning-test/ Have each person answer the 10 questions. They can ask you if they have questions. You can’t tell them the right answer but you can verify that they understand the instructions correctly. They have 20 minutes to work on this task. At the end of 20 minutes tell them time is up!

After the Spatial Tasks, go back to the Verbal Task for the delay trial: DO NOT READ THE WORDS AGAIN. Just ask them to tell you all the words they remember from the first list you read, the one you read them twice times.

Record final data in table below:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Sex</th>
<th>List 1 Total Correct</th>
<th>List 2 Total Correct</th>
<th>List 3 Total Correct</th>
<th>List 1-2 Total Correct</th>
<th>List 4 Total Correct</th>
<th>Spatial Total Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Verbal Learning and Memory Task

Tell the participant, “I am going to read you a list of words. Try to remember as many words as you can and when I’m finished, repeat back all the words you remembered. You can repeat them back in any order. Ready?”

Read the list of 10 words at a pace of about 1 second a word. When you are finished write down all of the words the participant says back. Repeat this for Trials 2.

For Trial 3 say, “I am going to read you a NEW list of words. Try to remember as many words as you can from this NEW list and when I’m finished, repeat back all the words you remembered. You can repeat them back in any order. Ready?”

***DON’T TELL THEM TO KEEP THE WORDS IN MIND***

*DON’T TELL THEM YOU WILL BE ASKING THEM ABOUT THE WORDS AGAIN*

***GO ON TO SPATIAL TASK***

After the participant completes the spatial task say, “Remember those words I read you a few minutes ago? Can you repeat them back to me?” Record the answers

<table>
<thead>
<tr>
<th>List - 1</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>List - 2</th>
<th>Trial 3</th>
<th>Trial 4 – Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Van</td>
<td>1. Watch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Song</td>
<td>2. Rod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Apple</td>
<td>3. Stitch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Promise</td>
<td>4. Pepper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Key</td>
<td>5. Baby</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Plant</td>
<td>6. Ocean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Cabbage</td>
<td>7. Tire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Bead</td>
<td>8. Train</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Snail</td>
<td></td>
<td>10. Fire</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number Correct: