

1. Purpose and Nature of Program

Provide a brief program description. Include the distinctive features of the program that make it unique. Neuroscience is concerned with understanding the structure and functioning of the nervous system and its relation to behavior. As a field it is highly interdisciplinary in nature, spanning all levels of biological analysis with interfaces to many fields, such as mathematics, law and engineering. The diversity of fields represented in modern Neuroscience requires students to master depth in one field yet be exposed to information from several disciplines. Mastering depth and diversity will train students to work in highly collaborative and interdisciplinary basic and translational research programs that are now pushing the field of Neuroscience forward at a rapid, accelerating pace. It will also enable students seeking to enter biomedical fields – MD, Nursing, DVM, etc. - to integrate developing outcomes from the research community into their practice. The BS degree in Neuroscience will build on rigorous, in-depth training in cellular, molecular, and systems Neuroscience. With this broad depth of fundamental knowledge, students will move into different areas of specialization that reflect the diverse areas of study that are now parts of the field.

2. Student Learning Outcomes and Assessment Methods

A. Knowledge, competencies, and skills

List the knowledge, competencies, and skills students should have when they graduate from the proposed degree program. (You can find examples of program Learning Outcomes at (<http://www.asu.edu/oue/assessment.html>)

Students will demonstrate a fundamental understanding of the field of neuroscience at all levels of biological analysis, from molecular through cellular, neural circuits, and systems and behavior. Graduates from the Neuroscience program will be able to integrate the knowledge they gain with knowledge from other disciplines relevant to the field. In particular, students will understand issues that are important in translating basic research to applications in clinical programs. Students will demonstrate an understanding of how to write scientific publications and grant applications to public and private agencies. Students will also understand how to integrate computational techniques and computer simulations into Neuroscience research.

B. Assessment

Describe the plan and methods to assess whether students have achieved the knowledge, competencies and skills identified in the Learning Outcomes. (You can find examples of assessment methods at (<http://www.asu.edu/oue/assessment.html>)

Outcome 1. Students will be able to apply knowledge to evaluate research relevant to current needs of basic and applied (translational) Neuroscience

Measure 1.1. Students will be required to read and use primary literature to produce a written, analytical essay about a recently published peer-reviewed paper.

Performance criterion 1. 80% of students will attain scores of at least 4 using the rubric below. Essays will be graded on content, organization and clarity of the writing.

5- Greatly exceed expectations: Student presents the background for the paper, including a review of the field to set up the context and importance of the work, who the authors are, what their previous work is, and what has been done on the topic before. Student critically evaluates all aspects of the paper, including study design, statistical analysis and power, results, interpretations and limitations. Student critically evaluates how generalizable results are and the relative impact of the paper. Student demonstrates an awareness of what new studies could be done based on the results.

4 - Exceeds expectations: Student presents the background for the paper as above. Student critically evaluates most aspects of the paper, but misses some important elements. However, their evaluation is thoughtful and accurate.

3 - Expectations: Student presents the background for the paper, but it may be incomplete, for example, by not setting the context for the research or understanding the authors and previous work. Student critically evaluates most aspects of the paper, but may have inaccuracies in their thinking. May have missed important elements or flaws in interpretation or statistical analysis.

2- Below expectations: Student tries to critically evaluate paper, but is not able to evaluate most of the paper. Did not present any background for the context of paper.

1- Greatly below expectations: Student has not read the paper, presents inaccurate findings about the paper, or does not critically evaluate any component of the paper. Did not present any background for the paper.

Measure 1.2: Students will be able to lead a discussion among students and faculty of the chosen article to communicate critical reasoning that led to the research and outcomes reported.

Performance criterion 2. 80% of students will meet or exceed the performance criteria outlined above for content. In addition, organization of a presentation (e.g. Powerpoint) will be evaluated according to the following criteria:

5- Greatly exceeds expectations: Information is presented in a logical sequence and appropriately references material used to make the presentation. The problem is explained clearly and concisely, and technical aspects of the work are clearly explained. There is a clear conclusion laying out future work that is needed based on the research reported. Speaker maintains good eye contact and speaks in a clear, audible manner. The presentation visual aid is well-organized and presented within the allotted time. The student asks the audience probing questions to keep listeners engaged.

4 - Exceeds expectations: Student presents the background for the paper as above. Student critically evaluates most aspects of the paper, but misses some important elements. However, their evaluation is thoughtful and accurate and the presentation meets criteria outlined above.

3 - Expectations: Student presents the background for the research, but it may be incomplete, for example, by not setting the context for the research or understanding the authors and previous work. Student critically evaluates most aspects of the paper, but may have inaccuracies in their thinking. May have missed important elements or flaws in interpretation or statistical analysis. The presentation is not well organized or presented (e.g. student does not speak audibly and/or does not engage the audience with eye contact).

2- Below expectations: Presentation is missing several of the elements outlines in '5' above,

1- Greatly below expectations: Student fails to meet criteria above.

Outcome 2. Students will be able to integrate the use of quantitative techniques and computer simulations to demonstrate how neurons and neural circuits work, and how simulations can guide formulation and testing of hypotheses.

Measure 2.1. Students will analyze heterogeneous neuroscience data using widely-used software, such as freesurfer, NEO, and MATLAB.

Performance criterion 1. 80% of students will obtain a score of 4 or above on oral and written report of results of data analysis activities using the following criteria.

5- Greatly exceeds expectations: The student reports on the details of data analysis results for different data types including imaging studies, cell morphology, and time series electrophysiology data. Results are explained clearly and concisely, and the theoretical aspects of the work are clearly explained. There is a clear connection between results and the biological meaning. The report is well-organized with appropriate figures, tables, and references.

4 - Exceeds expectations: Student explains most aspects of the data analysis, but misses some important elements. However, their explanation is thoughtful and accurate in most areas of the criteria above.

3 - Expectations: Student reports on some of the basic ideas, but it may be incomplete. Student critically evaluates most aspects of the results, but may have inaccuracies in their thinking. May have missed important elements or flaws in their interpretation of results. The report is not well organized or well written.

2- Below expectations: Report is missing many of the elements outlined in '5' above.

1- Greatly below expectations: Student fails to meet criteria above.

Measure 2.2. Students run appropriate neuron and neural circuit simulations using widely-used open source software such as NEURON or NEST and effectively interpret results in the context of hypotheses.

Performance criterion 1. 80% of students will obtain a score of 4 or above on oral and written report of results of simulation studies using the following criteria.

5- Greatly exceeds expectations: The student reports on the details of computational studies of neuron models under different simulation protocols with a variety of parameter values, as well as results from circuit model simulations. Results are explained clearly and concisely, and the theoretical aspects of the work are clearly explained. There is a clear connection between particular parameter values and simulated results. Student demonstrates an understanding of the contributions of the biophysical mechanisms and can connect simulated results to biological meaning. Students are able to relate biological meaning to hypotheses. The report is well-organized with appropriate figures and references.

4 - Exceeds expectations: Student explains most aspects of simulation results, but misses some important elements. However, their explanation is thoughtful and accurate in most areas of the criteria above.

3 - Expectations: Student reports on some of the basic ideas, but it may be incomplete, for example, by not describing the contributions of all possible parameter values. Student critically evaluates most aspects of the results, but may have inaccuracies in their thinking. May have missed important elements or flaws in their interpretation of results. The report is

not well organized or well written.

2- Below expectations: Report is missing many of the elements outlined in ‘5’ above.

1- Greatly below expectations: Student fails to meet criteria above.

3. Academic Curriculum and Requirements

A. Major Map.

Attach a copy of the “proposed” major map for this degree program and each concentration(s) to be offered. Instructions on how to create a “proposed major map” in BAMB can be found in the Build a Major Map Training Guide.

B. Summary of credit hours required for this program

Total credit hours must be 120 and include first year composition, general studies, core/required courses, program specific electives, and any additional requirements (e.g., concentration credits).

Requirements	Credit Hours
First Year Composition	6
ASU 101 (or Equivalent)	1
General Studies	15
Core/required courses	13
Program specific electives	17
Additional requirements	35
Other; please explain	33
Total	120

C. Core/Required Courses.

i. Total required and/or core course credit hours:
13

ii. List the name, prefix, and credit hours for each required/core course for this program

Core (13 credit hours)

- BIO/KIN/PSY/SHS 400 Topics in Neuroscience (3)
- BIO 476 Cellular & Molecular Neuroscience (3)
- BIO 477 Systems & Behavioral Neuroscience (3)
- PSY 426 Neuroanatomy (4)

D. Program Specific Electives.

i. Total required program elective credit hours:
17

ii. List the name, prefix, and credit hours for any program specific electives for this program:

Major Electives (17 credit hours)

Students may choose courses in any combination from any of three organizational tracks

Sensormotor Control and Physical Rehabilitation

- KIN 345 Motor and Developmental Learning (3)
- KIN 421 Human Motor Control (L) (3)
- KIN 422 Motor Control in Special Populations (L) (3)
- KIN 423 Motor Control and Aging (L) (3)

Behavioral Neuroscience

- BIO 331 Animal Behavior (3)
- PSY 320 Learning and Motivation (3)
- PSY 420 Analysis of Behavior (L) (3)
- PSY 470 Psychopharmacology (3)
- PSY 498 Behavioral Neuroendocrinology (3)

PSY 498 Neurobiology Learning and Memory (3)

Cognitive Behavioral Neuroscience

SHS 310 Anatomical and Physiological Bases of Speech (3)

SHS 311 Hearing Science (3)

SHS 350 Brain Memory and Language (3)

SHS 367 Language Science (SB) (3)

SHS 375 Speech Science (3)

SHS 465 Speech and Language Acquisition (SB) (3)

SHS 485 Acquired Speech and Language Disorders (3)

E. Additional Program Requirements, if any:

List and describe any capstone experiences, milestone, and/or additional requirements.

Related Area (Prerequisite) Courses (35 credit hours)

BIO 181 General Biology I (SQ) or (4)

BIO 281 Conceptual Approaches to Biology for Majors I (SQ)

BIO 182 General Biology II (SG) or (4)

BIO 282 Conceptual Approaches to Biology for Majors II

BIO 360 Animal Physiology (3)

CHM 113 General Chemistry I (SQ) (4)

CHM 116 General Chemistry II (SQ) (4)

MAT 251 Calculus for Life Sciences (MA) or (3-4)

MAT 265 Calculus for Engineers I (MA) or

MAT 270 Calculus with Analytic Geometry I (MA)

PSY 101 Introduction to Psychology (SB) (3)

PSY 230 Introduction to Statistics (CS) or (3)

STP 226 Elements of Statistics (CS) or

STP 231 Statistics for Life Science (CS)

PSY 290 Research Methods (L or SG) (4)

PSY 325 Physiological Psychology (3)

F. Concentrations

I. Are any concentrations to be established under this degree program? **No, concentrations will not be established.**

II. If yes, are concentrations required? (Select One)

III. List courses & additional requirements for the proposed concentration (s):

Concentration Name	Total credit hours	Core/Required Courses for Concentration (Prefix, # & Title)	Total Core credit hours	Program Specific Electives (include course name and prefix)	Total Elective credit hours	Additional Requirements (i.e. milestones, capstones)

4. New Course Development

A. Will a new course prefix (es) be required for this degree program? No

If yes, list prefix name(s) (i.e. ENG- English)

*Note: A request for a New Prefix form must be completed for each new prefix required and submitted with this proposal:
http://provost.asu.edu/files/shared/curriculum/Prefix_Request.doc.*

B. New Courses Required for Proposed Degree Program.

List all new courses required for this program, including course prefix, number and course description.

BIO/KIN/PSY/SHS 400 Topics in Neuroscience (3)

Course will cover in depth important and emerging developments in neuroscience, emphasizing lectures that include readings of recent reviews and contemporary publications in peer-reviewed journals. There will be a significant writing component, and students will learn skills for writing scientific publications and grant applications.

BIO 476 Cellular & Molecular Neuroscience (3)

This course will explore the cellular and molecular neurobiology of the central nervous system across many levels (genetic, molecular, cellular, and network), by examining the principles underlying the function of individual neurons and how these principles give rise to integrated neuronal networks. Emphasizes critical thinking and problem solving in all evaluation exercises, including daily class participation.

BIO 477 Systems & Behavioral Neuroscience (3)

This course will explore the functions of the nervous system across many levels (genetic, molecular, cellular, and network) in regard to how neural systems produce behavior, and how problems (injury, disease, etc.) of the CNS arise and can be overcome. Examines principles underlying the function of individual neurons and how these principles give rise to integrated neuronal networks. Emphasizes critical thinking and problem solving in all evaluation exercises, including daily class participation.

Note: New course requests must be submitted electronically via Curriculum ChangeMaker and undergo all internal university review and approval steps including those at the unit, college, and university levels.

5. Program Need

Explain why the university needs to offer this program (include target audience and market).

The field of neuroscience is growing at a very fast rate, with major investments from the public sector (e.g. the recent presidential BRAIN initiative) as well as from the private sector. This creates a fast growing demand for a trained workforce in basic research, biomedicine and the biotech industry. With this growth has come a corresponding growth in neuroscience in several academic programs at ASU. This program will provide training in neuroscience around a common, core body of knowledge in the field.

6. Impact on Other Programs

List other academic units that might be impacted by the proposed program and describe the potential impact (e.g., how the implementation of this program might affect student headcount/enrollment, student recruitment, faculty participation, course content, etc. in other programs). Attach letters of collaboration/support from impacted programs.

It is to be expected that students enrolling in the neuroscience degree program will by and large be affiliated with one of the following programs:

College of Liberal Arts and Sciences: School of Life Sciences; Department of Psychology; School of Mathematical and Statistical Sciences

Fulton Schools of Engineering: School of Biological and Health Systems Engineering

College of Health Solutions: Speech & Hearing Sciences

We do not anticipate that the major will draw students away from any of these programs. Rather, it will add value to the students' existing degree programs with the specific emphasis on neuroscience.

7. Projected Enrollment

How many new students do you anticipate enrolling in this program each year for the next five years?

5-YEAR PROJECTED ANNUAL ENROLLMENT					
	1st Year	2nd Year (Yr 1 continuing + new entering)	3rd Year (Yr 1 & 2 continuing + new entering)	4th Year (Yrs 1, 2, 3 continuing + new entering)	5th Year (Yrs 1, 2, 3, 4 continuing + new entering)
Number of Students Majoring (Headcount)	50	100	200	200	200

8. Accreditation or Licensing Requirements

If applicable, provide the names of the external agencies for accreditation, professional licensing, etc. that guide your curriculum for this program, if any. Describe any requirements for accreditation or licensing.

N/A

9. Faculty & Staff

A. Current faculty

List the name, rank, highest degree, area of specialization/expertise and estimate of the level of involvement of all current faculties who will teach in the program.

Faculty who will participate in the undergraduate program

Ira A. Fulton Schools of Engineering

- Stephen Helms-Tillery, PhD - Associate Professor - neural control of movement and neuro-electronic hybrid systems (School of Biological and Health Systems Engineering)
- Jeffery Kleim, PhD - Associate Professor - neural plasticity supports learning in the intact brain and “relearning” in the damaged or diseased brain School of Biological and Health Systems Engineering
- Chris Buneo, PhD - Associate Professor - motor control, neurophysiology, neural prosthetics (School of Biological and Health Systems Engineering)
- James Abbas, PhD - Professor - neurorehabilitation in spinal cord injury, Parkinson’s disease and cerebral palsy (School of Biological and Health Systems Engineering)
- Sarah Stabenfeldt, PhD - Assistant Professor - engineering novel targeted diagnostic and therapeutic (‘theranostic’) biomaterials for neural injury/disease (School of Biological and Health Systems Engineering)
- Jennie Si, PhD - Professor - learning and approximate dynamic programming, estimation and filtering of stochastic processes, (School of Electrical, Computer and Energy Engineering)

College of Liberal Arts and Sciences

- Brian H Smith, PhD – Professor - animals learn about odors in order to predict important events, such as an encounter with food, a mate or predator (School of Life Sciences)
- Salvatore Oddo, PhD - Associate Professor - molecular mechanisms underlying memory deficits in Alzheimer’s disease (School of Life Sciences)
- Janet Neisewander, PhD – Professor - neural mechanisms of drug abuse (School of Life Sciences)
- Foster Olive, PhD - Associate Professor - behavioral neuroscience drug abuse (Department of Psychology)
- Heather Bimone-Nelson, PhD – Professor – memory and aging (Department of Psychology)
- Federico Sanabria, PhD – Associate Professor – timing, memory associative learning (Department of Psychology)
- Cheryl Conrad, PhD – Professor – neurobiology of stress (Department of Psychology)
- Sharon Crook, PhD – Associate Professor – computational modeling (Science, Mathematics and Social Science)

College of Health Solutions

- Julie Liss, PhD – Professor – motor speech disorders (Department of Speech and Hearing Science)
- Tamiko Azuma, PhD – Associate Professor – Interactions between memory and language processing (Department of Speech and Hearing Science)
- Yi Zhou, Assistant PhD – Professor – neural basis of hearing (Department of Speech and Hearing Science)Corinne Rogalsky, PhD – Assistant Professor – (Department of Speech and Hearing Science)
- Ayoub Daliri, PhD – Assistant Professor – neural mechanisms underlying speech production and stuttering (Department of Speech and Hearing Science)
- Xin Luo, PhD – Assistant Professor – mechanisms of pitch perception in both acoustic and electric hearing

(Department of Speech and Hearing Science)

B. New Faculty:

Describe the new faculty hiring needed during the next three years to sustain the program. List the anticipated hiring schedule and financial sources for supporting the addition of these faculty members.

None

C. Administration of the program.

Explain how the program will be administered for the purposes of admissions, advising, course offerings, etc. Discuss the available staff support.

Advising will be handled in the School of Life Sciences with additional mentoring by faculty in the areas of the major electives where appropriate. There will be an oversight committee composed of one faculty member from each of the participating units, who will be appointed by the unit head. This committee will be responsible for reviewing students for admission to the program and for regular program review and assessment reports.

The School of Life Sciences will perform administrative tasks for maintenance of the program, such as catalog and program map review each year.

10. Resources (necessary to launch and sustain the program)

A. Required resources:

Describe any new resources required for this program's success, such as new support staff, new facilities, new library resources, new technology resources, etc.

Current resources are adequate

B. Resource acquisition:

Explain how the resources to support this program will be obtained.

N/A

APPENDIX
OPERATIONAL INFORMATION FOR UNDERGRADUATE PROGRAMS

(This information is used to populate the Degree Search/catalog website.)

1. Program Name (Major): Neuroscience

2. Program Description (150 words maximum)

Neuroscience is concerned with understanding the structure and functioning of the nervous system and its relation to behavior. The field spans all levels of biological analysis with interfaces to many fields such as mathematics, law and engineering.

The BS degree program in neuroscience consists of rigorous, in-depth training in cellular, molecular, and systems biology. With this broad depth of fundamental knowledge, students will move into different areas of specialization in neuroscience. Students will be prepared for highly collaborative and interdisciplinary research and teaching positions in neuroscience. The training will also enable students to enter biomedical fields that prepare students for careers medicine, nursing or veterinary medicine and to integrate developing outcomes from the research community into their practice.

3. Contact and Support Information

Building Name, code and room number: (<i>Search ASU map</i>)	LSA 131
Program office telephone number: (<i>i.e. 480/965-2100</i>)	480/727-6277
Program Email Address:	sols.advising@asu.edu
Program Website Address:	https://sols.asu.edu

4. Delivery/Campus Information Delivery: On-campus only (ground courses and/or iCourses)

Note: Once students elect a campus or On-line option, students will not be able to move back and forth between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online.

5. Campus/Locations: indicate all locations where this program will be offered.

Downtown Phoenix Polytechnic Tempe Thunderbird West Other:

6. Additional Program Description Information

- A. Additional program fee required for this program? No
B. Does this program have a second language requirement? No

7. Career Opportunities & Concentrations

Provide a brief description of career opportunities available for this degree program. If program will have concentrations, provide a brief description for each concentration. (150 words maximum)

The degree in neuroscience, especially when paired with complementary programs, prepares students for work in fields such as:

- academic research
- bioengineering
- biotechnology
- medicine
- medical research
- pharmaceutical development
- physical rehabilitation
- speech rehabilitation

8. Additional Admission Requirements

If applicable list any admission requirements (freshman and/or transfer) that are higher than and/or in addition to the university minimum undergraduate admission requirements.)

none

9. Keywords

List all keywords used to search for this program. Keywords should be specific to the proposed program.

Neuroscience, Bioengineering, Biotechnology, Rehabilitation, Pharmaceutical, Medical

10. Advising Committee Code

List the existing advising committee code to be associated with this degree.

UGASLS

Note: If a new advising committee needs to be created, please complete the following form:

[Proposal to create an undergraduate advising committee](#)

11. First Required Math Course

List the first math course required in the major map.

MAT 251 or 265 or 270

12. WUE Eligible:

Has a request been submitted to the Provost by the Dean to consider this degree program as eligible for WUE? No

Note: No action will be taken during the implementation process with regards to WUE until approval is received from the Provost.

13. Math Intensity:

a. List the highest math course required on the major map. (This will not appear on Degree Search.) MAT 251 or 265 or 270

b. What is the math intensity as indicated by the highest math required on the major map? Math intensity categorization can be found here: <https://catalog.asu.edu/mathintensity> Moderate

14. CIP codes

Identify CIP codes that should be displayed on Degree Search. CIP codes can be found at:

<http://www.onetonline.org/crosswalk/CIP/>.

14-0501 Bioengineering and Biomedical Engineering

60-0426 Physical Medicine and Rehabilitation Physicians

41-0101 Biology Technician/Biotechnology Laboratory Technician

26-0204 Molecular Biology

60.0584 Physicians and Surgeons

51-2001 Pharmacists

51-2314 Rehabilitation Science

Are any specific career codes (SOC/ONET codes) to be omitted from the CIP codes selected above? (i.e. "Omit 25-10312.00 Engineering Teachers, Postsecondary from CIP code 14.0501 Bioengineering and Biomedical Engineering.")

omit 11-9041 from 14-0501

omit 11-9121.02 from 26-0204

15. Area(s) of Interest

A. Select **one (1)** primary area of interest from the list below that applies to this program.

- | | |
|--|--|
| <input type="checkbox"/> Architecture & Construction | <input type="checkbox"/> Health & Wellness |
| <input type="checkbox"/> Arts | <input type="checkbox"/> Humanities |
| <input type="checkbox"/> Business | <input type="checkbox"/> Interdisciplinary Studies |
| <input type="checkbox"/> Communications & Media | <input type="checkbox"/> Law, Justice, & Public Service |
| <input type="checkbox"/> Computing & Mathematics | <input checked="" type="checkbox"/> STEM |
| <input type="checkbox"/> Education & Teaching | <input type="checkbox"/> Science |
| <input type="checkbox"/> Engineering & Technology | <input type="checkbox"/> Social and Behavioral Sciences |
| <input type="checkbox"/> Entrepreneurship | <input type="checkbox"/> Sustainability |
| <input type="checkbox"/> Exploratory | |

B. Select **one (1)** secondary area of interest from the list below that applies to this program.

- | | |
|--|--|
| <input type="checkbox"/> Architecture & Construction | <input checked="" type="checkbox"/> Health & Wellness |
| <input type="checkbox"/> Arts | <input type="checkbox"/> Humanities |
| <input type="checkbox"/> Business | <input type="checkbox"/> Interdisciplinary Studies |
| <input type="checkbox"/> Communications & Media | <input type="checkbox"/> Law, Justice, & Public Service |
| <input type="checkbox"/> Computing & Mathematics | <input type="checkbox"/> STEM |
| <input type="checkbox"/> Education & Teaching | <input type="checkbox"/> Science |
| <input type="checkbox"/> Engineering & Technology | <input type="checkbox"/> Social and Behavioral Sciences |
| <input type="checkbox"/> Entrepreneurship | <input type="checkbox"/> Sustainability |
| <input type="checkbox"/> Exploratory | |

PROVOST OFFICE APPROVAL(S)

This proposal has been approved by all necessary Provost office levels of review. I recommend implementation of the proposed organizational change.

Office of the University Provost

Signature

Date:

/ /20

Note: An electronic signature, email, or a PDF of the signed signature page is acceptable.

The following fields are to be completed by the Office of the University Provost.




CIP Code: _____





Plan Code:




2017 - 2018 Major Map

Neuroscience, (Proposed)

School/College:
PRLDRLU

Term 1 0 - 14 Credit Hours Critical course signified by 	Hours	Minimum Grade	Notes
<u>CHS 101: The ASU Experience for Health Solutions Students</u> OR			
 <u>LIA 101: Student Success in the College of Liberal Arts and Sciences</u>	1		<ul style="list-style-type: none"> • An SAT, ACT, Accuplacer, or TOEFL score determines placement into first-year composition courses • ASU Math Placement Exam score determines placement in Mathematics course • Students not testing into MAT 251, MAT 265 or MAT 270 should complete MAT 117 or MAT 170 and take subsequent MAT course in term 2 instead of an elective • ASU 101 or College specific equivalent First Year Seminar required of all freshman students • Students are encouraged to use electives to complete prerequisites for upper division track courses
 <u>PSY 101: Introduction to Psychology (SB)</u>	3	C	
<u>BIO 181: General Biology I (SQ) OR BIO 281: Conceptual Approaches to Biology for Majors I (SQ)</u>	4	C	
<u>ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition</u>	3	C	
<u>MAT 251: Calculus for Life Sciences (MA) OR MAT 265: Calculus for Engineers I (MA) OR MAT 270: Calculus with Analytic Geometry I (MA)</u>	3-4	C	
Term hours subtotal:	14-15		

Term 2 15 - 31 Credit Hours Critical course signified by 	Hours	Minimum Grade	Notes
 <u>CHM 113: General Chemistry I (SQ)</u>	4	C	<ul style="list-style-type: none"> • Students planning to complete courses fin the Computational Neuroscience track should complete MAT 265 or MAT 270 no later than term 2. • Select your <u>career interest area</u> and play <u>me3@asu.edu</u>.
 <u>PSY 230: Introduction to Statistics (CS) OR STP 231: Statistics for Life Science (CS) OR STP 226: Elements of Statistics (CS)</u>	3	C	
<u>BIO 182: General Biology II (SG) OR BIO 282: Conceptual Approaches to Biology for Majors II</u>	4	C	
<u>ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition</u>	3	C	
<u>Elective</u>	3		
 Complete ENG 101 OR ENG 105 OR ENG 107 course(s).			
Term hours subtotal:	17		

Term 3 32 - 44 Credit Hours Critical course signified by 	Hours	Minimum Grade	Notes
<u>CHM 116: General Chemistry II (SQ)</u>	4	C	<ul style="list-style-type: none"> • Students are encouraged to consult with an academic advisor to select upper division track courses and use electives to complete appropriate prerequisites for their chosen course of study. • Create a first draft <u>resume</u>.
<u>Social-Behavioral Sciences (SB) AND Global Awareness (G)</u>	3		
<u>Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S. (C)</u>	3		
<u>Elective</u>	3		
 Complete First-Year Composition requirement.			
 Complete Mathematics (MA) requirement.			
Term hours subtotal:	13		

Term 4 45 - 60 Credit Hours Critical course signified by 	Hours	Minimum Grade	Notes
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❖ <u>PSY 290: Research Methods (L or SG)</u>	4	C	<ul style="list-style-type: none"> • Explore an <u>internship</u> or volunteer <u>experience</u>.
❖ <u>BIO 360: Animal Physiology</u>	3	C	
<u>Humanities, Arts and Design (HU) AND Historical Awareness (H)</u>	3		
<u>Complete 2 courses:</u> <u>Elective</u>	6		
Term hours subtotal:	16		

Term 5 61 - 75 Credit Hours <u>Necessary course signified by</u> ★	Hours	Minimum Grade	Notes
★ <u>PSY 325: Physiological Psychology</u>	3	C	<ul style="list-style-type: none"> • Work with an advisor to discuss upper division track electives that best fit our personal plan of study. • Elective credit hours can be used to complete prerequisites for upper division track electives. • Develop your <u>skills</u>.
★ <u>BIO 476: Cellular and Molecular Neuroscience</u>	3	C	
<u>Upper Division Social-Behavioral Sciences (SB) OR Upper Division Humanities, Arts and Design (HU)</u>	3		
<u>Complete 2 courses:</u> <u>Elective</u>	6		
Term hours subtotal:	15		

Term 6 76 - 91 Credit Hours <u>Necessary course signified by</u> ★	Hours	Minimum Grade	Notes
★ <u>PSY 426: Neuroanatomy</u>	4	C	<ul style="list-style-type: none"> • Students will complete a minimum of 17 credit hours in any combination of upper division track courses. • Explore options for graduate study. • Discuss letters of recommendation with faculty. • Develop your <u>professional online presence</u>.
★ <u>BIO 477: Systems & Behavioral Neuroscience</u>	3	C	
<u>Upper Division Literacy and Critical Inquiry (L)</u>	3		
<u>Complete 2 courses:</u> <u>Upper Division Track electives</u>	6	C	
Complete Cultural Diversity in the U.S. (C) course(s).			
Complete Global Awareness (G) course(s). Complete Historical Awareness (H) course(s).			
Term hours subtotal:	16		

Term 7 92 - 106 Credit Hours <u>Necessary course signified by</u> ★	Hours	Minimum Grade	Notes
★ <u>BIO 400: Topics in Neuroscience</u>	3	C	<ul style="list-style-type: none"> • Students will complete a minimum of 17 credit hours in any combination of upper division track courses. Gather <u>professional references</u> • Apply to graduate and post-baccalaurate programs. • Research <u>employment opportunities</u>.
<u>Complete 2 courses:</u> <u>Upper Division Track electives</u>	6	C	
<u>Complete 2 courses:</u> <u>Elective</u>	6		
Term hours subtotal:	15		

Term 8 107 - 120 Credit Hours <u>Necessary course signified by</u> ★	Hours	Minimum Grade	Notes
★ <u>Complete 2 courses:</u> <u>Upper Division Track electives</u>	5	C	<ul style="list-style-type: none"> • Students will complete a minimum of 17 credit hours in any combination of upper division track courses. • Complete an in person or virtual <u>practice interview</u>. • Students not moving on to graduate work may wish to apply for <u>full-time career opportunities</u>.
<u>Complete 2 courses:</u> <u>Elective</u>	6		
<u>Upper Division Elective</u>	3		
Term hours subtotal:	14		

- Upper division Track Courses may have additional prerequisites. Students are encouraged to plan ahead and complete any prerequisites as electives.

Hide Course List(s)/Track Group(s)

Sensormotor Control and Physical Rehabilitation	Behavioral Neuroscience	Cognitive Behavioral Neuroscience
<u>KIN 345: Motor and Developmental Learning</u>	<u>BIO 331: Animal Behavior</u>	<u>SHS 310: Anatomical and Physiological Bases of Speech</u>
<u>KIN 421: Human Motor Control (L)</u>	<u>PSY 320: Learning and Motivation</u>	<u>SHS 311: Hearing Science</u>
<u>KIN 422: Motor Control in Special Populations (L)</u>	<u>PSY 420: Analysis of Behavior (L)</u>	<u>SHS 350: Brain Memory and Language</u>
<u>KIN 423: Motor Control and Aging (L)</u>	<u>PSY 470: Psychopharmacology</u>	<u>SHS 367: Language Science (SB)</u>
	<u>PSY 498: Behavioral Neuroendocrinology</u>	<u>SHS 375: Speech Science</u>
	<u>PSY 498: Neurobiology Learning and Memory</u>	<u>SHS 465: Speech and Language Acquisition (SB)</u>
		<u>SHS 485: Acquired Speech and Language Disorders</u>

Notes:

- Please keep in mind that the applicability of a specific transfer course toward an ASU degree program depends on the requirements of the department, division, college or school in which you are enrolled at ASU. Transfer agreements that guarantee the completion of university level requirements do not necessarily meet college and major requirements. Please consult with an advisor for more information.

Total Hours: 120

Upper Division Hours: 45 minimum

Major GPA: 2.00 minimum

Cumulative GPA: 2.00 minimum

Total hrs at ASU: 120 minimum

Hrs Resident Credit for

Academic Recognition: 56 minimum

Total Community College Hrs: 64 maximum

Total College Residency Hrs: 12 minimum

General University Requirements Legend

General Studies Core Requirements:

- Literacy and Critical Inquiry (L)
- Mathematical Studies (MA)
- Computer/Statistics/Quantitative Applications (CS)
- Humanities, Arts and Design (HU)
- Social-Behavioral Sciences (SB)
- Natural Science - Quantitative (SQ)
- Natural Science - General (SG)

General Studies Awareness Requirements:

- Cultural Diversity in the U.S. (C)
- Global Awareness (G)
- Historical Awareness (H)

First-Year Composition

General Studies designations listed on the major map are current for the 2017 - 2018 academic year.

From: Lynda Ransdell
Sent: Sunday, February 05, 2017 6:44 AM
To: Brian Smith
Cc: Keith Lindor
Subject: CHS enthusiastically supports the BS in Neuroscience

Brian,
I'm writing to let you know that we support the BS in Neuroscience that is being proposed by CLAS, SOLS, Engineering, and CHS. CHS looks forward to participating in this important degree and has sufficient resources to support the plan. Let me know if you need further information. Take care, LR

Lynda Ransdell, Ph.D., FACSM, CSCS
Associate Dean for Faculty Affairs
College of Health Solutions
550 North 3rd Street | Phoenix, AZ 85004
NHI2-554 | Mail Code 3020

Arizona State University
Lynda.Ransdell@asu.edu
Office: 602-496-0592 / Fax: 602-496-1873

From: Brian Smith
Sent: Sunday, March 12, 2017 4:49 PM
To: Stephen Helms Tillery
Cc: Marco Santello; James Collofello; Kyle Squires; P.F. Lengel; Jenny Smith
Subject: Re: B.S. Neuroscience support from FSOE

Thank you Steve!

From: Stephen Helms Tillery <stillery@asu.edu>
Date: Sunday, March 12, 2017 at 3:56 PM
To: Brian Smith <BrianHSmith@asu.edu>
Cc: Marco Santello <Marco.Santello@asu.edu>, James Collofello <JAMES.COLLOFELLO@asu.edu>, Kyle Squires <squires@asu.edu>
Subject: Re: B.S. Neuroscience support from FSOE

Hi Brian,

Here is Kyle's statement of support.

I hope this addresses PF's concerns.

Steve

Stephen Helms Tillery
Associate Professor
Director, Sensorimotor Research Group
School of Biological & Health Systems Engineering
Steve.HelmsTillery@asu.edu

On Mar 12, 2017, at 2:45 PM, Kyle Squires <squires@asu.edu> wrote:

Hi Steve,
Thanks for the update. FSE remains supportive.
-- Kyle

From: Stephen Helms Tillery [<mailto:stillery@asu.edu>]
Sent: Sunday, March 12, 2017 8:47 AM
To: Kyle Squires <squires@asu.edu>

Cc: Marco Santello <Marco.Santello@asu.edu>

Subject: B.S. Neuroscience support from FSOE

Hi Kyle,

Since I originally mailed this request, there has been a change to the B.S. Neuroscience degree. Specifically, it is no longer being proposed as a concurrent degree, but rather as a regular degree program. This allows us freedom eventually to implement a concurrent degree if we wish.

See text below.

ASU is proposing to create a B.S. in Neuroscience program. This program will be, by design cross-disciplinary. Required coursework will likely include undergraduate courses in systems, cellular/molecular, and developmental neuroscience. Elective coursework will include these areas, along with offerings from psychology, statistics and mathematics, FSOE, Speech and Hearing Science, many others, and can be tailored entirely to the student's interests and goals.

At the present time, SBHSE and FSOE do not offer undergraduate courses that suit the degree. However, now that our undergraduate curriculum has stabilized, we hope to have the leeway to begin developing undergraduate technical electives in the areas of systems neuroscience, cellular/molecular neuroscience, and of course neural engineering (Kleim, Helms Tillery, Greger, et al.). We would anticipate those courses to be cross-listed with the neuroscience program, and for our students who are particularly interested in neuroscience and/or neural engineering to be inclined towards possibly joining the neuroscience program in their junior years, and certainly taking those courses.

At this stage we need a note from you (email is fine) saying that EDO and FSOE support this initiative. The key contact for all of this is Brian Smith

Thank you,

Steve

Stephen Helms Tillery
Associate Professor
Director, Sensorimotor Research Group
School of Biological & Health Systems Engineering
Steve.HelmsTillery@asu.edu

From: Michelle Watson **On Behalf Of** Ferran Garcia-Pichel
Sent: Monday, February 06, 2017 2:24 PM
To: Brian Smith
Cc: Ferran Garcia-Pichel
Subject: RE: Neuro major letter of support

Hi Brian,

I support the neuroscience undergraduate major. This is a great program for prospective students in the School of Life Sciences and Department of Psychology.

Thanks!
Ferran

FERRAN GARCIA-PICHEL, PH.D.
DEAN OF NATURAL SCIENCES, COLLEGE OF LIBERAL ARTS AND SCIENCES
ARIZONA STATE UNIVERSITY
ASSISTANT: MICHELLE.WATSON@ASU.EDU 480 9658065

LAB: garcia-pichel.lab.asu.edu

From: Brian Smith
Sent: Monday, February 06, 2017 10:48 AM
To: Ferran Garcia-Pichel
Cc: Michelle Watson
Subject: Neuro major letter of support

Ferran

Sorry I am behind on this. But can you email me a brief letter of support for the neuro undergrad major? I attach an example from PF Lengel. And I attach the emails from IAFSE and CHS shortly so you can see their support.

Thanks.

Brian