

Budget Proposal Narrative

2023 Strategic Budgeting Process

Please carefully review the [Call for Proposals](#) with particular attention to the evaluation criteria before beginning this application. Criteria should be addressed throughout the proposal narrative.

Section 1: Proposal Title and Department Contact

Proposal Title: MS Neuroscience

Division: Academic Affairs

College/Unit: CHSS/Psychology

Department Contact: Jeff Grimm

Section 2: Proposal Summary and Problem Statement

Check the most relevant box (one selection only).

Priority Program and Service Areas:

- Graduate Programs
- Inclusive Student Success

Identified Structural or Legacy Funding Needs (to be used sparingly and in conjunction with Division VP)

- Core Infrastructure, Safety, and Regulatory Compliance
- Remaining funding needs from partially funded prior request
If checked, please identify original funding request amount and actual funding received in narrative section
- Other [Click here to enter text](#)

Statement of Purpose (One Page or Less):

What are the challenges or opportunities being addressed? How will the new investment(s) in this proposal address this challenge or opportunity? What are the expected outcomes if this proposal is funded?

What are the challenges or opportunities being addressed?

1. Need for Life Sciences credentialed workers in Washington state (WA)

Over half of our population will experience a mental illness in their lifetime; 20% will suffer in a given year (CDC, 2023). Mental illnesses occur across the lifespan, and are more prevalent with the Covid pandemic and aging population. Washington State can get ahead of this growing public health crisis by training and credentialing a workforce with skills to investigate and understand the neurobiology of mental illness. Advances in knowledge will lead to effective prevention strategies and treatments.

These will include advances in both behavioral and biological approaches including brain-machine interfaces (neuroprosthetics) and advanced psycho-pharmacotherapeutics.

Public and Private State stakeholders have adopted a goal of 70% of the workforce credentialed by 2023 (WA Roundtable, 2021; WSAC, 2021). While this includes Associate and Bachelor level degrees, graduate degrees are a solid means for individuals to upskill and advance in their career (WSAC, 2021). A recent report provides more context for this challenge. A key finding of this report is that despite the internationally-recognized status of WA as a technology giant (including biomedicine), the state ranks low in the production of STEM graduate degrees. Two-thirds of future jobs in the state will require mid-level or higher degrees; these degrees, including Master’s degrees, allow more flexibility for workers in the evolving work landscape (WSAC Joint Agency Report, 2020).

A MS in Neuroscience provides graduates access to a range of careers in education, healthcare, biological sciences, pharmacy, biotechnology, and applied technical fields. Sample occupations include: research associate, clinical lab technician, tissue and cell biologist, MRI technician, neuroscience sales representative, data analyst, and user experience designer. The MS degree also provides a pathway to doctoral studies and advanced career opportunities in teaching, research, pharmaceutical development, and biotechnology. From a review of primary target occupations based on the quarterly census of employment and wages from the Bureau of Labor Statistics and the Bureau of Economic Analysis using the economic modeling tool Lightcast (Q4 dataset 2022), graduates with a MS in Neuroscience will qualify for 3711 Washington State jobs in 2021. This is 17% above the national average, with 352 active position openings in 2021. From 2021-2026, the overall percentage growth in these occupations is anticipated to be approximately 6%. Primary occupational areas, total jobs, annual openings, median earnings, and projected growth are presented below:

Occupation	2021 Jobs*	Annual Openings*	Median Earnings	Growth (2021 - 2026)*
Medical Scientists, Except Epidemiologists	1,326	118	\$47.91/hr	+7.62%
Natural Sciences Managers	754	61	\$75.94/hr	+4.91%
Clinical Laboratory Technologists and Technicians	462	37	\$29.34/hr	+6.93%
Biological Scientists, All Other	434	43	\$39.03/hr	+3.92%
Biological Technicians	383	51	\$23.83/hr	+2.87%
Life, Physical, and Social Science Technicians, All Other	148	20	\$29.88/hr	+3.38%
Biochemists and Biophysicists	140	17	\$37.92/hr	+12.14%
Magnetic Resonance Imaging Technologists	63	6	\$47.18/hr	+7.94%

*Filtered by the proportion of the national workforce in these occupations with a Master's degree

In summary, there is high current and future demand for workers with advanced MS-level training in Neuroscience in WA, in particular in biomedical research and development.

2. MS-level training in Neuroscience and Western’s Positioning

There is no recognized master's level program in Neuroscience currently offered in Washington state. Both the University of Washington-Seattle and Washington State University offer doctoral programs in Neuroscience. While students may be awarded a Master's degree if they stop-out of these programs, they are not intentionally designed to train students for the high-demand positions that exist for MS Neuroscience graduates in the state. On average, the University of Washington confers approximately 10 doctorates per year, Washington State University confers 4. Moreover, there are also only a handful of MS in Neuroscience programs nationwide. In its most recent survey of programs, the Society for Neuroscience, the largest and most influential professional international organization for Neuroscience, reported on 17 programs in the United States (SFN, 2022a).

Given the longstanding success of Western's BS in Behavioral Neuroscience (BNS), workforce profile data shows Western Washington University already has an established position in serving regional employment needs. WWU has 735 alumni working regionally in the SOC codes of Medical Scientists, Except Epidemiologists; Natural Sciences Managers; Biochemists and Biophysicists; Biological Scientists; Biological Technicians; Life, Physical, and Social Science Technicians; Clinical Laboratory Technologists and Technicians; and, Magnetic Resonance Imaging Technologists. These 735 alumni represent 2.65% of regional profiles working in these occupations, which ranks Western Washington as third among regional talent providers behind the University of Washington and Washington State University. WWU BNS graduates have gained employment throughout the Pacific Northwest (PNW) including positions at Adaptive Biotechnologies, Alder Biopharmaceuticals, Allen Brain Institute, Alpenglow Biosciences, Bellingham, Ferndale, Sedro Woolley school districts, Cajal Neuroscience, Central Washington University, Chan Zuckerberg Initiative, Fred Hutchinson Cancer Research Center, Harborview Medical Center, Health-focused journalism (freelance), Labcorp, Medtronic, Neuralynx, Northwest Labs, Northwest Pathology (Avero Diagnostics), Omeros Corporation, Oregon Health and Sciences University, PeaceHealth, Puget Sound Blood Center, Seattle Childrens, SeattleNTC (Neuropsychiatric Treatment Center), SightLife, UW research labs (various), and Western Institute for Neurodevelopmental Studies and Intervention. Despite this success, many BS BNS graduates several years in the workforce are finding they "ceiling out" in their positions in terms of advancement. A MS degree is needed to move into the next level of responsibility and compensation. Not only does a MS provide upward mobility to higher paid jobs and more responsibility, it gives a competitive advantage in landing a first job. MS Neuroscience graduates will be ready to accept positions requiring technical skill and responsibility across the biomedical and health sciences and services industries and public sector. In addition to research and diagnostic technicians and laboratory managers, graduates will be competitive to be a health services manager or healthcare project manager. Some might consider pursuing nursing, counseling, social services, and medical degrees. A big strength of this degree is its adaptability across a wide range of employment and professional development opportunities that also serve basic and applied healthcare needs of Washington State.

Interest in a MS in Neuroscience degree at WWU also suggests a sound-footing for enrollment. The WWU BNS program faculty recently conducted surveys on interest in a MS in Neuroscience degree at WWU. Populations were WA statewide public and private sector stakeholders, and current and recent graduates of WWU BNS, Biology, Chemistry, Computer Science, and Health and Human Development (HHD) majors. Thirteen of 21 stakeholders (62%) indicate a need for a new MS in Neuroscience program in WA. Eighty-one percent of these stakeholders also indicate they would consider hiring a MS in Neuroscience graduate. Interest in completing a MS in Neuroscience at WWU by students varies by major with the most indicated as 84% of 37 current BNS and Biology majors responding they are interested in completing a dual degree (BS/MS).

3. Substantial Opportunity

There is nothing like the proposed MS Neuroscience currently available on the west coast. The dearth of MS Neuroscience degree competition in the region provides an opening for Western to establish a unique graduate degree that can address workforce demand in the state and beyond. Western’s well-regarded Behavioral Neuroscience undergraduate program and strength as a regional talent provider further positions the program for success. The enrollment pipeline is supported by internal interest in a BS-MS and MS degree program, and a market review suggests high current and future demand across a variety of industries and occupations. The Society for Neuroscience has also noted positive career outcomes for MS recipients (SFN, 2022a). In Washington, graduates will be able to find living-wage positions in most major cities across the state as seen in the current job postings by city below:

City	Total/Unique (Jan 2022 - Dec 2022)	Posting Intensity	Median Posting Duration
Seattle, WA	3,348 / 975	3 : 1	31 days
Bothell, WA	534 / 226	2 : 1	29 days
Redmond, WA	173 / 65	3 : 1	25 days
Medical Lake, WA	73 / 60	1 : 1	n/a
Everett, WA	191 / 51	4 : 1	45 days
Spokane, WA	132 / 51	3 : 1	21 days
Pullman, WA	113 / 45	3 : 1	20 days
Tacoma, WA	68 / 41	2 : 1	23 days
Bellevue, WA	73 / 35	2 : 1	20 days
Vancouver, WA	54 / 27	2 : 1	30 days

The programs surveyed by the Society for Neuroscience reported positive career outcomes for their Master’s recipients. Programs were most likely to report graduates taking positions in biotech/pharmaceutical companies, scientific non-profit/NGOs, hospitals, and government organizations; a smaller, but significant number pursued another scientific degree (SFN, 2022a).

Given these positive outcomes, the need for increasing the WA state Life Sciences Career Job candidate pool, the fact that WWU is the top Master’s granting institution in the Pacific Northwest, and the already successful undergraduate program in BNS at WWU, this is an ideal moment to offer a Master’s in Neuroscience at WWU.

How will the new investment(s) in this proposal address this challenge or opportunity?

The new MS in Neuroscience program will address these challenges and opportunities by providing rigorous, Accessibility Diversity Equity Inclusion Belonging (ADEIB)-infused curriculum and a mentored

research experience. Opportunities will be provided for students to consider various career pathways; opportunities include a Global Mentor program.

This will be a 2-year MS with research project (thesis) with a pathway to the MS allowed for select students as a BS/MS with the BS in BNS. In the future, the BS could be in other majors, such as Biology, Chemistry, Computer Science, or Health and Human Development (HHD).

New graduate courses will include the following, aligning with Core Competencies in Graduate Neuroscience Training of the Society for Neuroscience (SFN, 2022b): Offered once per academic year (15 seats each): Neurobiology, Neurochemistry, Neuroanatomy, Neuropsychopharmacology, a Seminar series (including Affiliated Faculty and experts from off campus), and Global Neuroscience (ADEIB, careers, mentorships). Hands-on laboratory-intensive coursework will also be an integral part of graduate training.

There are several **efficiencies** in the proposed curriculum and associated WWU facilities:

Using existing course offerings:

Allow existing MS coursework from within Psychology (e.g. statistics)

Allow select elective MS coursework from outside departments and programs

Cross-list (stacked) select 400-level BNS courses as 500-level with appropriate rigor and enhancement

Integrate existing BNS lab techniques classes

Allow select 400-level courses to count towards the MS

Two pathways to the MS: a traditional 2-yr program with research project thesis or BS/MS where students are admitted to the BNS undergraduate BS program and then are selected for admission to the BS/MS where the entire degree program could be completed in 4+1 years. A non-thesis option could be offered for either pathway.

Affiliated Faculty: invite faculty collaboration from across campus without needing to create additional faculty lines; include Affiliated Faculty from outside Psychology (and outside CHSS) to participate by mentoring a graduate student in their laboratory and advise a research project with financial support from the new program, participate as a presenter in the Seminar series course, and apply to teach one of the core courses or propose an elective using program course buyout funds.

Teaching Assistants: graduate TAs will work closely with faculty in the delivery of undergraduate BNS courses including courses in the research design and statistical methods sequence, and laboratory-intensive courses. The BNS program currently has the equivalent of one graduate TA position (from Psychology) to help with BNS research methods and statistics classes. That resource will synergize with TAs provided for the MS program. Beyond facilitating delivery of courses, these appointments will develop leadership and organizational skills, and also provide opportunities for faculty to develop mentoring skills. Although not in this proposal, future TA positions to support the vivarium and use of campus instrumentation (WWU Scientific Technical Services) could provide additional support to the MS Neuroscience program. These would be unique training opportunities, developing skills quickly translatable to the professional workplace.

ADEIB Specialist: a position will be shared across the Psychology department to provide training and consultation for the new MS Neuroscience major along with existing majors: MS Experimental Psychology, MS Mental Health Counseling, MS School Counseling, BS Psychology, BAE Human Development, and BS Behavioral Neuroscience.

Certifications: while not formally part of this proposal, the MS Neuroscience program will be well-suited to develop and administer certifications to enrolled students and possibly to non-majors that complete a specific set of courses and/or mentored activities. These might include certifications of specific laboratory techniques. Given the tremendous success of the BNS Medical Internship program (neurodiagnostic, neurosurgery, psychiatry, transcranial magnetic stimulation (TMS)), development of a certificate(s) related to these clinical areas will also be conceivable. There is the additional possibility of treatments-focused certificates in substance use disorder treatment and behavioral modification. The current Medical Internship program is a partnership between WWU, PeaceHealth, SeattleNTC, and Fourth Corner Neurosurgical Associates.

Facilities: WWU has several resources available that will support a MS Neuroscience program. The BNS program includes several research laboratories, a large vivarium, a laboratory classroom, and shared equipment in the **Academic Instruction Center (AIC)** (2009). The recent addition of the **Interdisciplinary Science Building** (2022), funded by State dollars to increase the number of pre-healthcare and STEM graduates in Washington State, houses several large laboratory classrooms that will facilitate delivery of new MS Neuroscience courses and provide more flexibility in delivery of TA-supported undergraduate BNS courses. The new MS Neuroscience program may also be enhanced with the **WWU Technology, Engineering, and Computer Science Facility** that will be under construction later this year. There are also equipment resources provided at no additional cost to faculty and students as part of WWU Scientific Technical Services and the Biology department. Equipment that will be available to MS Neuroscience students and faculty includes state-of-the-art microscopes for scanning and scanning/transmission electron microscopy, laser confocal microscopy, and light microscopy in addition to Q-TOF and MALDI-TOF mass spectrometry instruments.

Existing BNS program structure: The BS BNS program has a Director, Administrative Services Manager, Classroom Support Technician, Vivarium Manager, and several faculty with active research programs dedicated to the program. The MS Neuroscience program would use these same personnel resources with some additional support including reclassification of the Administrative Services Manager to Program Manager, addition of a Vivarium Technician, and more protected time for the Director.

What are the expected outcomes if this proposal is funded?

Specific details of the curriculum include training opportunities for students beyond what is offered in the current BS. Opportunities will include increased time and guidance to develop bench top skills including sterile technique and a variety of molecular assays, conduct behavioral pharmacology studies with rats and mice, conduct human cognitive neuroscience studies, conduct aseptic surgery on rodents, manage data sets and perform statistical procedures, and refine scientific writing skills.

Benefits to WA public and private employers will be well-trained, critical thinking scientists ready to collaborate with scientists from a variety of backgrounds tackling the public mental health crisis from the neuroscience perspective. The program will initially graduate 8-10 students per year. These will be

graduates with the liberal arts/STEM background needed to be active participants at all levels of the work needed to be done, including planning studies, conducting research, interpreting data, and communicating findings effectively. MS in Neuroscience graduates will be competitive for mid-level positions in biomedical and allied fields including careers as a laboratory research associate and/or laboratory manager. The MS in Neuroscience degree will also be excellent preparation for continued education in professional (medical, dental, nursing, physical therapy) and academic graduate training (PhD in Neuroscience or related field). In addition, depending on the curriculum students could move into computational areas including artificial intelligence and medicinal chemistry.

Summary of Proposed New Investments:

Summarize the new investments included in this proposal (total monetary amount, number of FTE and type of positions, and other expenses). Explain the need for any goods and services or professional contracts.

This proposal has a one-time investment of \$946,346 and annual investment of \$831,063.

Recurring FTE costs include:

- 3 new 1.0 FTE faculty lines and associated expenses (3 @ \$113,403 including benefits = \$398,403; \$8,000 in one-time faculty recruitment costs; 3 @ \$2,500 = \$7,500 in recurring costs for faculty travel; plus 2 @ \$6,500 recurring costs in faculty summer research stipends),
- 1 new 0.5 FTE ADEIB Specialist/Program Coordinator (\$43,221 including benefits),
- 1 new Vivarium Technician (\$56,673 including benefits),
- reclassification of an existing Administrative Services Manager for BNS to 0.938 FTE Program Manager for the graduate program and BNS (additional cost of \$7,741 including benefits),
- a 0.13 faculty summer Program Director (\$25,523 including benefits).

Recurring lab costs for the graduate program includes:

- vivarium supplies, \$1000 annually
- program supplies, \$10,000 annually
- seminar series support, \$1,500 annually
- student thesis research support, \$16,000 annually

One-time costs for research and equipment startup include:

- wet lab faculty startup, \$130,000
- non-wet lab faculty startup, \$184,000
- program startup, \$524,346

There is also recurring support for 4 new graduate Teaching Assistantships. One-time costs are for renovation of a prep area to serve as one faculty wet lab research space and costs to provide equipment to enhance the current BNS program resources to accommodate a graduate program. Other recurring costs are for faculty development, degree administration, graduate research support, and supplies for the research courses and vivarium.

The proposal is for a MS degree program that will initially admit and graduate an average of 8-10 students per year (15-20 students at “build-out”). A goal will be to grow the program to 30 students or more. Students will matriculate into the MS either as post-baccalaureates, or by first being admitted to

the BNS BS and then transitioning into the BS/MS program in their junior year. Initially the BS will be in BNS but left open is the possibility of the BS being in other majors in the future (e.g. Biology, Chemistry, Computer Science, HHD). WWU faculty from outside Psychology with a research program overlapping with the neurosciences will be invited to become Affiliated Faculty of the MS in Neuroscience program. Affiliated Faculty will be eligible to mentor graduate students in the program and receive financial support for that research, participate in the Seminar course, and be considered to teach a section in the program supported by a teaching release to their department from the program.

Impact of New Investment on ADEIB and Sustainability:

Please provide data or an analysis to support this request and illustrate the anticipated impact of this investment, including in advancing accessibility, diversity, equity, inclusion, and sustainability.

As noted under Challenges/Opportunities in this Section, and in Section 3, data regarding interest in offering a MS in Neuroscience at WWU was collected by survey of current BNS and Biology undergraduate majors, recent BNS alumni, and WA stakeholders including representatives of health care, biotechnology, and biomedical research entities. Meetings were held with the Dean of CHSS and the Dean and administrative staff of the graduate school as well as with the Psychology faculty. The Dean of CSE and Chairs of Chemistry, Biology, Computer Science, and HHD were contacted with a brief survey. Strong support for developing a MS was provided from all of these constituents.

In addition, as noted under Challenges/Opportunities in this Section, the Society for Neuroscience surveyed Master's in Neuroscience programs nationwide and reported successful placements of graduates in biotech/pharmaceutical companies, scientific non-profit/NGOs, hospitals, and government organizations; a smaller, but significant number pursued another scientific degree (SFN, 2022a).

Overall anticipated impact of this investment: Graduates will be upskilled to be competitive in the tech-savvy WA job market with the potential for high salaries with enhanced upward mobility. These new graduates will contribute to the Public Health needs and growing and increasingly diverse WA economy as highly educated individuals trained with flexibility for changing economic conditions.

Anticipated impact on accessibility: In addition to anticipated positive impacts on ADEIB (below), the program will have increased accessibility due to the 2 pathways to the MS (the MS and the BS/MS), possibility of other BS degrees at WWU feeding into the BS/MS in the future, and ADEIB-considered recruitment and application procedures.

Anticipated impact on accessibility, diversity, equity, inclusion, and belonging (ADEIB): The program will be resourced to support ADEIB for students and faculty. The ADEIB Specialist will work with faculty to integrate ADEIB into new and existing coursework including a Global Neuroscience course designed to develop ADEIB competencies, neuroethics, and assist with career planning. The ADEIB Specialist will also coordinate a Global Mentor program connecting students with diverse mentors worldwide. These and other emphases will produce graduates ready to make positive contributions in an increasingly diverse workplace. Other impacts will include ADEIB-informed recruiting for both new students and faculty. The intention will be to build a more diverse and inclusive program. The ADEIB Specialist also will bring equity to faculty as this will be a staff appointment; the weight of promoting ADEIB will not fall on one faculty member. Finally, the current undergraduate BNS has been successful (e.g. 2021 BNS

was 75% female; compares to 39% in STEM undergraduate programs nationwide, 2019 data; 2021 BNS was 23% students of color; compares to 22% in STEM undergraduate programs nationwide, 2016 data) (NSF, 2019). It is intended that the program leads to sustained representation by females and increased representation by students and faculty of color. The MS Neuroscience program will be a platform for dedicated research, training, and mentorship that may not otherwise be as available to individuals of marginalized identities due to systemic inequities in their undergraduate experience, but yet is so critical for advancing to a STEM career or furthering their graduate training.

Anticipated impact on sustainability: WWU values sustainability and this program will incorporate best practices in our labs and lab classes for decreasing our environmental footprint. The new program will follow the current successful recycling and composting procedures. It will also be emphasized in animal research to consider the Reduction “R” of the “Principles of Humane Experimental Technique” (Russell and Burch, 1960). For research projects with a health outcomes focus, students will be encouraged to consider how findings from the lab could reduce disease burden on the healthcare system. Finally, the new program builds on an already successful undergraduate program with associated physical plant, curriculum, and faculty.

Section 3: Performance Outcomes and Risk Mitigation

Expected Outcomes and Evaluation of Success:

Please explain how the success of the proposal will be measured, if funded. What metrics might indicate that the intended impact was achieved? How can the expected outcomes be directly tied to the investment being proposed?

Specifically, provide the targets and explain which method(s) will be used to track progress (refer to the Provost’s [Overall Metrics to track progress toward University’s Strategic Plan](#)), estimated return on investment (such as enrollment increases or efficiencies), divisional KPI’s, recruitment and retention especially specifics for historically marginalized populations.

Advancing Inclusive Success:

Enrollment by student attribute. A target goal will be to sustain enrollment of females (currently 75% of the undergraduate program) and increase enrollment of students of color (currently 23% of the undergraduate program) and students of underrepresented racial and ethnic groups each by up to 10% per year.

Increasing WA Impact:

Degrees awarded in high-demand areas. A target goal will be to graduate 8 students per year from the MS and 2 students per year from the BS/MS.

Percentage of fall students who are students of color. A target goal will be to increase the percentage of fall students who are students of color within the program by up to 10% per year.

Enhancing Academic Excellence:

Percentage of TT who are people of color. A target goal will be to hire people of color for all 3 new faculty lines. Having a ADEIB Specialist will facilitate not only recruitment of these individuals, but increase retention post-hire.

Students graduating with high-impact experiences. The program requires high-impact research experiences for all graduates.

Impact on Recruitment, Retention, and Satisfaction of Diverse Faculty, Staff, and Administrators:
For proposals that include personnel resources, explain how the proposal improves recruitment, retention, and satisfaction of diverse faculty, staff, and administrators.

The proposal includes opportunities to increase recruitment, retention, and satisfaction of diverse faculty, staff, and administrators. These include a ADEIB Specialist staff position charged with facilitating including ADEIB in course content, producing educational programming for faculty and staff, and connecting students to diverse mentors world-wide. As the ADEIB Specialist is a staff member, faculty equity is enhanced as ADEIB is no longer on the shoulders of a single faculty member. Intentional and enthusiastic approaches to recruitment of diverse faculty and staff will result in recruitment of diverse faculty and staff. Finally, overall increasing diversity through hiring and infusing diversity into the curriculum should have a positive effect on satisfaction and retention of diverse faculty, staff, and administrators. Although not part of the proposal, the new program will build on successful fundraising efforts by the BS BNS program that have led to summer research stipends for underrepresented students (2 for summer 2023). A similar graduate student summer stipend will be an immediate goal for the new MS program.

Risk to Desired Outcomes:

What might occur to prevent the desired outcomes even if funding is obtained? How will these risks be mitigated? Beyond new funding, what other criteria or external factors need to occur in order for this proposal to be successful (e.g., economic or demographic factors, etc.).

The perception of BNS faculty is that this program is ready to go, with appropriate funding. Enthusiasm is also high for current majors, alumni, and stakeholders surveyed, as well as across the Psychology faculty. Factors that might prevent outcomes, even with funding, would be a major disruption to the national economy spurring potential applicants to postpone graduate training. Mitigating this is including a 4+1 option to facilitate recruitment of students already “on campus” and the fact that the pedagogy is geared towards preparing graduates with flexible skill sets for an ever-changing economic environment. The cost of graduate school will also be an impediment to applicants, particularly those of low socioeconomic backgrounds and/or from underrepresented groups. This could impact the diversity goals of the program. Mitigation to help overcome this will include 1) ensuring equitable access to TAs, 2) creating an efficient path through the program to limit tuition costs, and 3) training MS program mentors on strategies to support students along an efficient training path. A separate potential risk is aging programmatic and individual principal investigator research equipment. Equipment failure could slow or prevent research progress for a student. One way to mitigate this problem, while simultaneously bolstering scientific growth, is to plan for collaborative engagement among the research faculty so that a MS student could continue their research progress but use alternative approaches provided by collaborating faculty in addition to WWU core research equipment that is maintained by WWU.

Anticipated Consequences if Proposal is Not Funded:

What are the anticipated consequences of not funding this proposal?

Not funding this proposal will be a missed opportunity. This is a moment where there is high interest in the undergraduate BNS BS; we are not able to accept into the program all of the competitive

applicants. There is high interest in a MS as well, and this has been demonstrated for current students and alumni and also WA State stakeholders. Funding the new program will be moving ahead of the curve in developing new MS programs nationwide. Neuroscience is truly a final frontier in basic and applied research and has clear health science implications. Funding a MS in Neuroscience program at WWU will create a tremendous opportunity for WA, the University, and its students. It will also garner intense interest from potential students from out of state and abroad.

Not funding the proposed program will lead to missing out on not only these opportunities, but also the ADEIB-enhancing opportunities intrinsic to the structure of the program (ADEIB Specialist, curriculum, mentoring program, recruitment).

Section 4: Process and Development

Describe Collaborations and Stakeholder Engagement:

What stakeholders were involved, and in what role/capacity? Which groups were engaged and at what stages? How were concerns addressed? What process have you followed to identify unintended consequences that may result from this proposal? Is the issue being addressed a broader issue across the university?

BNS faculty have been discussing for the past 10 years creation of a Master's level program to train graduate students in neuroscience. The Psychology Department has a Master's degree in Experimental Psychology. While the current MS Experimental Psychology degree offers statistics and topic courses relevant to neuroscience, the overall program does not provide a curriculum consistent with best practices in neuroscience graduate education. Students mentored by BNS faculty in this program did well and thrived but found they had not been in a program that best suited their interests and goals.

To prepare for this proposal, formal outreach was conducted with the Psychology department and detailed surveys were conducted with current BNS and Biology undergraduate majors, recent BNS alumni, and WA stakeholders including representatives of health care, biotechnology, and biomedical research entities. Initially, meetings were held with the Dean of CHSS and the Dean and administrative staff of the graduate school. The Dean of CSE and Chairs of Chemistry, Biology, Computer Science, and HDD were contacted with a brief survey. Follow-up meetings (December 2022) were recently held with the Deans of the graduate school and CHSS, the Vice Provost for Outreach and Continuing Education, and with staff members of WWU Space Administration and Planning (Ellen Kuhlman and Forest Payne).

As noted in Section 1, 13 of 21 stakeholders (62%) indicate a need for a new MS in Neuroscience program in WA. Eighty-one percent of these stakeholders also indicate they would consider hiring a MS in Neuroscience graduate. Interest in completing a MS in Neuroscience at WWU by students varies by major with the most indicated as 84% of 37 current BNS and Biology majors responding they are interested in completing a dual degree (BS/MS).

Chairs and Deans all indicated support for a MS in Neuroscience in principle, and the proposal was positively received by the graduate school. Psychology faculty voted on the merit of advancing a proposal with 100% support.

Concerns within WWU were about resources. Understandably, will a new program impact resource allocation across units? This proposal addresses these concerns in three ways. First, 3 new faculty lines will support current course offerings in Psychology and allow new graduate course offerings for the MS in Neuroscience. Second, designation of interested faculty as Affiliated Faculty from across campus will allow them to participate in the program as graduate student mentors with support for research projects from the new program. Allowing Affiliated Faculty expands the scope of the program without the need for additional faculty lines. And third, Affiliated Faculty will be allowed to participate in the Seminar Course and to apply for teaching a course in the new degree program supported by a teaching release to their home department from the new program. Again, the potential increased participation by faculty will come at a minimal expense compared to creating additional faculty lines to distribute across campus. All this being said, **this program is an investment**; a MS program like this will not fit into a self-sustaining model. The program requires State support but there will be a large return on investment. The revenue is educating individuals to contribute to economic development and supporting mental health in WA State. Unintended consequences beyond resource competition have not been identified.

Explain how this proposal will leverage resources or commitments from other sources:

Identify any current resources in place, any new commitments, or potential funding partnerships with external entities that have been identified. If exploration is currently underway, note any conversations with university development officers, funding agencies, the Vice Provost for Research, etc.

This proposal is for a new MS program. The program will possibly leverage the use of existing undergraduate courses (either 400-level or 400/500-level stacked), MS Experimental Psychology statistics courses, and other 400-level and graduate courses across campus if warranted and possible. The core faculty for the new program already exist within BNS/Psychology including laboratory and teaching spaces in the AIC. Establishing Affiliated Faculty within the new program will allow use of already existing expertise at WWU from across campus. Use of the new Interdisciplinary Science Building and existing core computing, imaging, and mass spectrometry facilities are also key efficiencies of the proposal.

The primary units affected will be the Department of Psychology and CHSS. The proposal includes a plan to invite Affiliated Faculty from across the university to participate in mentoring graduate students and participating in some courses, once the program is established. Funds are budgeted to support these activities. A joint proposal is not out of the question, however bridging a program across departments/colleges was unfortunately problematic for the BNS undergraduate program. A main issue was resource allocation and management. The Affiliated Faculty approach may be an ideal means to move forward with a graduate program that incorporates expertise from across campus without introducing unnecessary cross-departmental bureaucracy or a center or institute. It also allows resource management to be focused on the program itself, without resources being subject to often necessary changes in resource priorities within individual departments.

Has your department previously submitted this proposal?

If so, briefly outline any significant changes and indicate the feedback received during that budget process.

This proposal was first submitted in January 2022. The current proposal is a revised version of the initial proposal. As noted, feedback has been extremely positive. Concerns were about resources. This concern has been addressed by reiterating the need to consider a MS Neuroscience program as an investment. It needs state funding to succeed. The return on this investment is highly educated and laboratory trained individuals supporting high technology and healthcare-focused economic growth in WA State. Several efficiencies and leveraging opportunities are built into the proposal, described in various sections. These will reduce the overall financial impact of the program on WWU and the State and at the same time, enhance the cross-disciplinary (e.g. Affiliated faculty, Certifications) and cross-major success (e.g. stacked courses, MS TAs working with BS students) of Neuroscience at WWU.

Describe any funding alternatives that have been explored.

Note both alternative approaches in addressing the problem, as well as alternatives to new funding (repurposing existing divisional funding or one-time fund use). If these alternatives are not being pursued, explain why.

In the past 20 years, faculty (now BNS) have mentored several graduate students matriculating through the Biology MS or Experimental MS programs. The focus of scholarship for these students is Neuroscience but their coursework is not. In addition, any graduate research has to be funded using resources typically dedicated to undergraduates or from external funding (with the exception of some WWU small grant internal funding for graduate students). This has led to the BNS faculty group being mostly left out of graduate training. This inequity will only be rectified with a MS in Neuroscience program. As noted above, new funding from the State is required to create and maintain this program.

Section 5: Fulfillment of WWU's Strategic Plan's Core Themes and Goals

Please explain how your proposal and the anticipated outcomes will advance the Core Themes and Goals of [WWU's 2018-2025 Strategic Plan](#) and the strategic priorities set for this budget cycle. How does this allocation or withdrawal of funding advance or hinder access to Western, academic excellence, and/or inclusive achievement?

Core Themes

Advancing Inclusive Success

The relevant performance metric is Enrollment by student attribute. As noted in Section 1, the new MS program will build on success with diversity within the undergraduate program (e.g. 2021 BNS was 75% female; compares to 39% in STEM undergraduate programs nationwide, 2019 data; 2021 BNS was 23% students of color; compares to 22% in STEM undergraduate programs nationwide, 2016 data) (NSF, 2019). Recruitment and retention will be facilitated with a ADEIB Specialist. Key demographics to increase will be students of color. For the new MS program the goal will be to match or exceed the WWU goal ([WWU's 2018-2025 Strategic Plan](#)) of 30-35% students of color/underrepresented students.

Increasing Washington Impact

The relevant performance metrics are Degrees awarded in high-demand areas and Percentage of fall students who are students of color. The MS program will increase MS degrees awarded in the high-demand area of degrees and credentials leading to careers in a Life Sciences Career Job, including as mental health professionals. By increasing students of color represented in the program, there will be an increase in the number of students of color at WWU.

Enhancing Academic Excellence

The proposal includes 3 new faculty lines. This will be an opportunity to recruit people of color to join the WWU faculty. It is understood by current BNS faculty that increasing the representation of faculty of color will not only likely enhance recruitment of students of color to the program, but through increased diversity also enhance the experience of all students and faculty. By design, the program will require high-impact research experiences. This will be quantifiable as the number of graduates along with their research presentations and publications.

Goals

Western will provide a transformational education grounded in the liberal arts and sciences and based on innovative scholarship, research, and creative activity.

Neuroscience is a unique, distinctive discipline that by definition is interdisciplinary. Modern Neuroscience is a nexus of social and natural sciences and computer science; there is no other field like this. A MS in Neuroscience, as with the successful BS at WWU, will further bring this forward-thinking discipline to the mainstream. Graduates will have a technical STEM degree including hands-on technical skill and research development rooted in the liberal arts.

Western will advance a deeper understanding of and engagement with place.

While the core of the Neuroscience degree is understanding the nervous system, the proposed program includes elements designed to develop scholars appreciating the role of science in society and their place as informed citizen educators. Specifically, in the Global Neuroscience course students will be encouraged to consider how scientific knowledge impacts human health and well-being, including how impacts are uneven across demographics including socioeconomic and geographical factors. How science is done across places will also be considered; students will participate in a Seminar course with presentations from Affiliated Faculty across campus and by speakers invited from outside WWU. How we conduct scholarship varies by department here at WWU and also by institution. This idea of scientific place will also be a critical piece of the Global Mentor Program where we connect students with investigators worldwide. Students will be exposed to investigators representing various geographical, cultural, and socioeconomic situations.

Western will foster a caring and supportive environment where all members are respected and treated fairly.

The proposal is for a new graduate program emerging out of a successful undergraduate program. Thus far, the undergraduate BNS experience has been one where students experience comradery as they study together in tough chemistry and biology courses, collaboration in small intensive laboratory skills classes in neuroscience, and for some, close mentorship experiences with faculty in their laboratories. The program also works closely with successful undergraduate clubs: the Neuroscience Research Driven Students (NeRDS), the Molecular Bioscience Club, and Students for Sensible Drug Policy. The proposed MS degree will expand these opportunities to graduate students, especially in the intensity of mentored scholarship. Building community will be central to the new program with an office/collaborative space for graduate students, a shared seminar experience, and cohort model for moving through core coursework. Development of courses and recruitment of faculty will also be ADEIB-informed with help of the new ADEIB Specialist who will encourage and define best practices to create a caring and supportive environment for both the faculty and student population.

Western will pursue justice and equity in its policies, practices, and impacts.

The MS in Neuroscience program will be intentional in emphasizing justice and equity in its policies, practices, and impacts. The Global Neuroscience course and Global Mentor program will expose students to inequities in access to education and resources for scholarship. These experiences could help to build empathy to carry forward into their careers where they likely will find themselves in positions of leadership. The ADEIB Specialist will also facilitate incorporating justice and equity into other key elements of the program beginning with recruitment and retention of students and faculty. Having a ADEIB Specialist in a staff position introduces equity in itself—it is common for Universities to assign faculty to this role. While all faculty have a key role in ADEIB, appointing one faculty member to be a ADEIB Specialist often introduces inequity as it is typical for faculty of underrepresented groups to be most burdened with promoting and informing programs on ADEIB issues.

Section 6: Space Planning, Capital, and Maintenance Considerations

Major Equipment of Software Needs

If the proposal includes new major equipment or software (>\$25K), please indicate its anticipated useful life, and associated operating costs such as service contracts or annual licenses.

There is a startup budget for this new degree. In that budget there are 6 equipment items \$25K or greater:

1. Cage rack for vivarium

This is needed to expand space available for one of the new faculty PI's research. The rack is anticipated to have a useful life of 15-20 years. A service contract will not be required.

2. Imaging system

This is needed to allow student researchers to image a variety of molecular endpoints including from gel electrophoresis and slice preparations. The system has an expected life of 10-15 years. These devices are mostly solid-state requiring minimal service. Therefore, a service contract is welcome but not necessary. There will be an initial software license fee; it is not expected there will be an annual license fee.

3. Animal behavior analysis system

This system is needed to allow student researchers to pursue research questions using a variety of animal models of human behavior including learning and memory, impulse control, addiction behaviors, motivation, and perseveration. The system has an expected life of 20 years. A service contract is not necessary, but occasionally parts will need to be replaced; this will be covered with the annual supplies budget. There will be an initial software license fee, but no annual fee.

4. Stereology upgrade for existing shared microscope

This mostly software upgrade to an existing microscope is needed to allow detailed reconstruction of synaptic projections in brain tissue. This technology will be applied in laboratory courses and used in graduate student research projects. The system upgrade will have an expected life of 10 years. A service contract will not be required.

5. Electrophysiology (portable slice electrophysiology; 3 setups)

These setups allow students in a laboratory classroom conduct electrophysiology stimulation and recording experiments using rodent brain slices. This technology is not usually available to students. Gaining hands-on experience with electrophysiology fulfills a key element of skill development for a core aspect of the program.

6. Microscope stage incubator for worm and whole cell imaging

This device will integrate with an existing confocal microscope maintained by the BNS program. The stage incubator will allow in vivo whole cell (neuron) and *C. elegans* (worm animal model) imaging developing skills for students that will be quickly transferable to research and development positions in the biomedical field.

Space or Infrastructure Upgrades

Do you believe new space, space modifications, or infrastructure upgrades will be required? If so, please provide the following as best you can.

Please note that Capital Planning and Development will review and evaluate the request after the proposal is submitted to determine options.

- **Scope:** Repurpose a shared prep room space to be a wet laboratory for a new faculty FTE hire; requires recapturing hall space to relocate ultra freezers
- **Square Footage:** 400 square feet
- **Cost for capital component:** \$100,000.00

- **Scope:** Laboratory space for 2 other faculty outside wet lab/vivarium research space (e.g. for cognitive neuroscience, computational neuroscience, experimental psychology)
- **Square Footage:** 650 square feet for each laboratory space
- **Cost for capital component:** Allocate existing space in AIC or nearby building

- **Scope:** Graduate student space for office work and collaboration
- **Square Footage:** 800 square feet for a shared space
- **Cost for capital component:** Allocate existing space in AIC or nearby building

- **Scope:** Faculty (3) office space
- **Square Footage:** 150 square feet for each office space
- **Cost for capital component:** Allocate existing space in AIC or nearby building

Changes to the Use of Existing Space

If existing space is being repurposed, explain how the proposed activities will be accommodated within existing space. For how long? Who will need to approve the proposed new use of this space?

Existing spaces to be utilized include spaces that are part of the BNS program within the department of Psychology. For coursework, the neuroscience classroom will be used for both the undergraduate BNS BS and the graduate Neuroscience MS. One common prep area will be renovated to serve as a wet lab for one of the requested faculty lines. The proposed activities will be accommodated in these spaces (and other requested spaces) for the life of both programs. Approval has been given by BNS program faculty for graduate use of the neuroscience classroom and renovation of the common prep area.

Incorporation of Physical Accessibility and Cultural Inclusion

For proposals that include capital development or IT infrastructure, please explain how physical accessibility and cultural inclusion (beyond statutory requirements) will be resourced as foundational elements of project development.

Not applicable

References

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SFN (2022a). <https://www.sfn.org/careers/higher-education-and-training/neuroscience-training-program-survey>

SFN (2022b). <https://www.sfn.org/careers/higher-education-and-training/core-competencies/core-competencies-in-graduate-neuroscience-training>

WA Roundtable (2021).

https://www.waroundtable.com/wp-content/uploads/2017/03/WKWJ_FINAL_Report.pdf

WA Student Achievement Council (2021).

<https://wsac.wa.gov/sites/default/files/2021-Strategic-Action-Plan.pdf>

WSAC Joint Agency Report (2020).

<https://wsac.wa.gov/sites/default/files/2019-20.WASkilledEducatedWorkforce.pdf>

Proposal Title: MS Neuroscience

Divison: Academic Affairs

Department: CHSS/Psychology

Department Contact: Jeff Grimm, Behavioral Neuroscience Program Director

Salary and Benefits	Description	Fiscal Year 2024					Fiscal Year 2025				
		FTE	Salary	Benefits	One-Time Costs	Total	FTE	Salary	Benefits	One-Time Costs	Total
Faculty Positions		3.08	\$285,000	\$113,403	\$0	\$398,403	3.08	285,000	113,403	\$0	398,403
Professional/Exempt Positions		0.13	\$21,608	\$3,915	\$0	\$25,523	0.13	21,608	3,915	\$0	25,523
Classified Positions		1.59	\$64,710	\$42,925	\$0	\$107,635	1.59	64,710	42,925	\$0	107,635
Student Salaries (Graduate Assistants, Hourly Student, etc)		4.00	\$64,000	\$4,537	\$0	\$68,537	4.00	64,000	4,537	\$0	68,537
Total Salaries and Benefits		8.80	\$435,318	\$164,780	\$0	\$600,098	8.80	435,318	164,780	\$0	600,098

Non-Personnel Expenses	Description	Units	Price per Unit	Recurring Costs	One-Time Costs	Total	Units	Price per Unit	Recurring Costs	One-Time Costs	Total
Other	Wet lab faculty startup	1	\$130,000		\$130,000	\$130,000				\$130,000	\$130,000
Other	Non-wet lab faculty startup	2	\$92,000		\$184,000	\$184,000				\$184,000	\$184,000
Other	Program startup	1	\$524,346		\$524,346	\$524,346				\$524,346	\$524,346
Other	Annual program supplies	1	\$10,000	\$10,000		\$10,000	1	\$10,000	\$10,000		\$10,000
Other	Seminar series support	1	\$1,500	\$1,500		\$1,500	1	\$1,500	\$1,500		\$1,500
Other	Thesis research support	1	\$16,000	\$16,000		\$16,000	1	\$16,000	\$16,000		\$16,000
Other	Faculty recruitment	2	\$4,000		\$8,000	\$8,000				\$8,000	\$8,000
Travel	Faculty travel support	3	\$2,500	\$7,500		\$7,500	3	\$2,500	\$7,500		\$7,500
Other goods and services	Faculty summer stipends plus 30% tax	2	\$6,500			\$0					\$0
Capital Facility Expenses (New Space or Space Modifications)	Remodel lab space	1	\$100,000		\$100,000	\$100,000				\$100,000	\$100,000
Total Non-Personnel Expenses				\$36,000	\$946,346	\$982,346			\$36,000	\$0	\$36,000

University Indirect Costs	Description	Include?	Recurring Costs	One-Time Costs	Total	Recurring Costs	One-Time Costs	Total
Academic Support Services/Student Support Services	3% of Recurring Direct Costs	YES	\$19,083	\$0	\$19,083	\$19,083	\$0	\$19,083
Institutional Support	2% of Recurring Direct Costs	YES	\$12,722	\$0	\$12,722	\$12,722	\$0	\$12,722
Plant Operation and Maintenance	3% of Recurring Direct Costs	YES	\$19,083	\$0	\$19,083	\$19,083	\$0	\$19,083
Graduate TA Waiver	Input amounts for new TA Positions	YES	\$34,077	\$0	\$34,077	\$34,077	\$0	\$34,077
Total Indirect Costs			\$194,965	\$0	\$194,965	\$194,965	\$0	\$194,965

Total Proposal, All Direct and Indirect Costs	FTE	Head Count	Recurring Costs	One-Time Costs	Fiscal Year Total	FTE	Head Count	Recurring Costs	One-Time Costs	Fiscal Year Total