

## 2019-2021 Biennium Internal Budget Proposal Narrative

### Division: Academic Affairs - CSE

**Evaluation Criteria:** Proposals will be evaluated on every aspect of this template. It is highly recommended that the narrative portion touch on each area. Proposals forwarded to UPRC by unit leaders will be discussed at UPRC and authors are encouraged to attend so that they may answer questions and provide clarification.

#### **Inclusive Success and Expanded Access for Physics majors and other CSE students**

- This is a revised version of a previously submitted budget proposal.  
*If box is checked please briefly outline any significant changes and/or indicate why it is being resubmitted.*

[Click here to enter text](#)

**Statement of Purpose:** *(What is the challenge or opportunity being addressed? How does the proposal address this challenge or opportunity? Limit response to 1 page – please link to any existing reports, data, supplemental materials, etc.)*

**Strategic goal/problem:** One of the main objectives of our department is to provide an inclusive and welcoming atmosphere for students from all backgrounds. This includes students from underrepresented minorities, marginalized groups and first-generation students. Our approach to equity, inclusion, and diversity is not limited to Physics majors, but also includes the about 2500 students taking introductory physics and astronomy courses. There are three areas we would like to focus new resources at: support for student-centered teaching in the PHYS 11x and 16x lectures (impact on about 2000 students), support in first year lab courses to establish a more inclusive environment (impact on about 1800 students), and recruitment and retention of more students from underrepresented groups into the physics major.

**Background:**

**Diversity:** The B.S. degree in Physics at WWU has traditionally attracted only a minority of female students (around 22%) and an even smaller fraction (11%) of students from underrepresented minorities (URM). The main struggle attracting and retaining these groups of students is in the first two years of the major. Once students are part of the Phase II cohort, almost all students from any background graduate with a B.S. degree within 2 or 3 years. Therefore our efforts need to focus on the first two years (and maybe even the zeroth year – when these students take courses in pre-calculus).

**First year labs:** Historically, first year physics labs are supervised by faculty, and undergraduate teaching assistants (UTAs) provide students with guidance through one-on-one interactions during the lab period and also grade lab reports. Additionally, due to the increased demand of first year physics courses by other majors in CSE, now faculty supervise two lab sections simultaneously. This approach has led to various short-comings in our first-year labs: less support for inexperienced TAs, less monitoring of climate in labs, more demands on faculty time. Additionally, UTA do not have sufficient training in order to promote an inclusive lab environment.

**Faculty workload:** Various faculty have participated in workshops and programs supporting student-centered and inclusive teaching such as the C-Core program and the AEES/HHMI program. These opportunities have led to a measurable up-tick of teaching approaches focused on incorporating new pedagogies into the classroom. Unquestionably, this has led to an increase in faculty workload as preparations for this kind of teaching is much more time-consuming than the traditional approach. Additionally, tied to equitable support for all physics majors, the demand on faculty-led student research

has increased significantly over the last few years, meaning mentoring of research assistant has taken on a more time-demanding role among many faculty in the department. Together with increased teaching demands, both have increased workload among faculty in our department.

**Suggested Solutions:** In order to attract and retain more students from URM, we suggest expanding our existing cohort model for physics majors to first-year (or zeroth-year) students. That would include adding a one-credit option to PHYS 16x for physics majors or interests, expanding PHYS 190 (a seminar currently offered only one quarter a year), and creating a scaffolding course for these students to provide tools to succeed in our major, including study strategies and approaches to research. Furthermore, retention of students from diverse background will markedly improve if these students could be involved in research opportunities from early on. Offering support structures including additional courses and increased research mentoring would require additional faculty TT lines and the creation of a part-time program coordinator position for our department.

In order to support an inclusive environment in first-year labs, we suggest to create a position for a director of first year lab instruction. This person would be able to train UTAs, participate in the development and improvement of lab curriculum which supports inclusive learning, and would be able to teach various lab sections in order to improve the overall experience for students and promote an equitable and inclusive environment. Pilot studies in our department have also shown that if labs have two UTAs in the classroom, especially at “busy” times during the lab period, a better learning environment is created. Therefore, additional TA staffing through additional funding will help improving the lab experiences.

Teaching in the introductory physics sequence is hampered by two factors: classroom layout and class size. The layout of the traditional classrooms is not conducive to, e.g., group activities and enrollment numbers are significantly higher than for instance in comparable SCED courses where student-centered instruction can be seen as a role model. Therefore, as a big-picture request, classrooms conducive to student-centered learning are a main requirement for faculty in our department but also in other departments of the College. Specifically to our department, in order to support student-centered activities in the classroom, we suggest to add a position for instructional staff. This person would be able to assist faculty during the “lecture” periods, providing enhanced interactions with students and therefore create a more inclusive environment. About 5 years ago, our department had a Learning Assistants (LA) program (based on very successful models at the University of Colorado, and other universities). This provided first-year students with a low-barrier opportunity to get help for first year physics courses. It complemented the tutoring center as it provided more specific guidance for students with LAs trained by faculty in content and pedagogy. Budgetary constraints required us to cancel this program, however, a re-start with funding for LAs and faculty would be beneficial for all first year students. In order to prepare these LAs and lab TAs better to serve our students, we suggest adding a pedagogy course about learning styles and approaches in order to improve teaching and interactions of these TAs/LAs with first year students and also improve learning of these TAs/LAs themselves.

### **Anticipated Outcome(s):**

All facets for the first-year experience of CSE majors in Physics & Astronomy course will increase retention and success of URM students and first generation students in Science programs.

Establishing a cohort program for our physics majors and offering support and scaffolding courses will have the positive impact of creating a community of all students from the first year on. That will have a very significant impact on the retention of URM in the major. We are expecting an increase in the number of physics major from URM, an obtainable goal would be about 25%.

We are also very interested in increasing the number of female students in the physics major. Again, a cohort approach creating a sense of belonging will be extremely beneficial to attract new female students and to retain female students who have expressed an interest in Physics. Ideally, parity between male and

female students will be an excellent goal, however, realistically increasing the percentage from currently 22% to over 30% would be considered a success.

**Metrics:** *(How will outcomes be measured? Please include current data points and goals. If this proposal will have any impact on the [Overall Metrics](#) included in the university's strategic plan, please indicate which specific ones here.)*

Many of the important numbers for metrics have been mentioned above: A clear measure will be an increase in the number of URM students and women in the physics major. We will keep tracking these numbers in the subsequent years. However, caution has to be taken since with a cohort size of 20 students, the statistical significance of adding one 1 or 2 students seems larger percentage-wise (5-10%), but could be just normal fluctuations of small numbers.

Also, success rates of all students in the first year will be measured and compared the current rates of drop-out or non-passing in the first-year physics courses.

**How does this proposal align with your departmental/divisional strategic priorities?** *(Please reference specific items from the recently completed departmental/divisional strategic plan and attach a copy.)*

The current proposal addresses all five strategic priorities of the College of Science and Engineering which are also reflected (and in some sense mirror) the Department's Strategic Plan.

1. It provides access to a science program (physics) for URM and female students by creating the scaffolding and cohort model and therefore a sense of belonging. Access in this context is not only getting into the class but actually having the tools and support structure to succeed.
2. Like all science majors, the Physics BS degree meets the needs of the State of increasing the number of graduates in STEM fields.
3. It promotes a supportive and inclusive environment by the above mentioned means of cohort building and scaffolding courses.
4. The requested additional staff support ensure sustainable promotion of research-based teaching practices, in our case, student-centered learning.
5. By creating additional research opportunities for undergraduate students, the proposal will strengthen the scholarly culture and academic excellence.

**How does this proposal support the University Mission and Strategic Objectives?** *(Please refer to the [2018-2025 Strategic Plan](#) and indicate which core theme(s) this proposal will help achieve.)*

Most directly, this proposal clearly supports and provides a practical implementation of Goal #3: WWU will foster a caring and supportive environment where all members are respected and treated fairly, and Goal #4: WWU will pursue justice and equity in its policies, practices and impact.

The present proposal is squarely focused on supporting an inclusive environment for all students and providing support for curriculum and programming which engages issues of access and equity.

But our proposal also clearly support Goal #1, specifically point A. By strengthening the science foundation to ensure and expand student access to undergraduate programs.

### **What are the consequences of not funding this proposal?**

By not funding this proposal, the university basically accepts the status quo as an acceptable situation. That means the percentage of URM (11%) in the physics major will not significantly change, undergraduate TAs (a cornerstone of first year lab instruction for 1800 students) will not be able to receive EID and pedagogical training, and the overall push to student-centered learning in all first year courses in the Physics department will be hampered.

Faculty in our department have been trying to implement some of the aforementioned approaches which has led to an increase in workload, but this is not a sustainable solution for the future. Therefore, more resources need to be allocated to address these very real issues of providing inclusive success for physics and other science majors.

### **What alternatives were explored?**

See above, the suggested solutions were run as trial runs, such as Freshman seminar, short TA training, student-centered teaching approach. However, most of these items increased the workload for TT/T faculty substantially which makes it not a sustainable solution, therefore, additional funding for personnel is necessary.

### **Which units (departments, colleges, etc.) will be involved?**

The Physics/Astronomy will be the main department for the proposed activities. However, through the impact on 2500 students taking first year physics and astronomy classes, ALL departments in CSE as well as about 500 students from other colleges will also be impacted. However, the administrative home of the suggested solutions (i.e. additional faculty and staff) will be the Physics/Astronomy department.

### **Equipment needed:**

No specific equipment is needed. \$100,000 in one-time budgeted for start-up for new tenure track faculty positions.

The bigger picture especially for the first year instruction would involve more suitable classroom than the current options of stadium seating for 60-150 students.

*For major (>\$25k) purchases, please provide the following information.*

#### **Item:**

N/A

#### **Purpose:**

N/A

**Cost:**

N/A

**Anticipated Useful Life:**

N/A

**Replacement Cost if any:**

N/A

**Human Resources** *(Complete the table below adding additional rows if necessary):*

<i>Position Title</i>	<i>Total Headcount</i>	<i>Total FTE</i>	<i>Salary and Benefits per FTE</i>	<i>Total Cost</i>
<i>Director of First Year Lab Instruction</i>	<i>1</i>	<i>1.0</i>	<i>\$85,488</i>	<i>\$85,488</i>
<i>Instructional Classroom/Support Tech 2</i>	<i>1</i>	<i>0.75</i>	<i>\$52,729</i>	<i>\$52,729</i>
<i>TT faculty</i>	<i>2</i>	<i>2.0</i>	<i>\$98,459</i>	<i>\$196,918</i>
<i>Learning Assistants (UG)</i>	<i>10</i>	<i>N/A</i>	<i>\$1,241</i>	<i>\$12,419</i>
<i>Program Coordinator</i>	<i>1</i>	<i>0.5</i>	<i>\$38,030</i>	<i>\$38,030</i>

*Table above should match data on budget spreadsheets submitted with this proposal. Complete the spreadsheet to get salary, benefit, and total cost amounts. Contact your division budget officer with questions.*

**Operating & Maintenance Costs (include service contracts, installation costs, etc.):**

\$11,000 recurring in operating and travel.

**Space Requirements:**

**What type of space is needed for this proposal? (e.g., private office, lab space, group work/study space, etc.)**

3 additional office would be required for the staff and faculty positions, a space to re-establish the Learning Assistant program would also be needed.

**What features must this space have? (e.g., fume hoods, plumbing, 3-phase power, etc.)**

Regular office space (175sq.ft.) and Learning Assistant program space (500sq.ft), No special features are necessary

**What needs can be accommodated within your existing space?**

Currently there is no additional office space or a location available for the LA program

**How much new space will be required?**

See above: 3 offices each about 175 sq.ft. and one communal space 500sq.ft.