CWU Physics Department Policy Manual

Last updated: April 2022

Faculty Performance and Review Standards

See the College of the Science Website at https://www.cwu.edu/sciences/faculty-resources-departments for the most up to date document.

Physics Funding Request Policy

Last updated: May 2019

1. CBA Funds Request: $1,200

Form is located on the Provost page. Under Faculty Resources, you will find the Faculty Development Fund Request Form.

E-mail completed forms to: Your department Secretary or Fiscal person and copy CBA_Faculty_Development@cwu.edu. Department Secretaries or Fiscal People, this form and expense backup must be retained for reconciliation and audit. Allowable expense questions can be directed to CBA_Faculty_Development@cwu.edu. Forms must be submitted and approved prior to any purchases.

- If you plan to use the funds to travel, please be sure to complete the Travel Authorization and add that number to the CBA funds request form prior to submitting. Once you have completed your expense report after your trip, email the department secretary so she/he can check the account details to ensure the fund accounts are correct. She/he will email you back with details of any corrections she/he made. Submit the expense report after the department secretary approves.
- If you plan to use the funds for equipment, please work with the lead instructional technician. Please send all invoices to the department secretary. If your equipment/travel needs exceed the funding allocation be sure to have approval for the other funding requests prior to initiating the purchasing process.

Check with the department secretary for the appropriate speedkey for your purchases. Do not exceed $1,200.

2. COTS Faculty Enhancement Fund Request: $450-$650

Funding information is on the COTS page. Under Faculty and Staff Resources. Form is at the bottom of the page.

Untenured tenure-track faculty may request up to $650 and tenured and FTNTT faculty may request up to $450. A short application must be submitted and approved by the department chair and the Associate Dean, Inter-Science Support. Funds can be used any time during the fiscal year they are awarded and are available on a first come-first, served basis until the designated pots of money are spent.

Deadline: First come, first served until College Faculty Career Enhancement Funds are depleted.

Check with the department secretary for the appropriate speedkey for your purchases. Do not exceed $300-$500 Funds will not be accessible unless the request has been approved and the email from Martha has been received.

- If you plan to use the funds to travel, please email the department secretary with the estimated travel dates and the funds you plan to utilize. Once you have completed your expense report after your trip, email the department secretary so she/he can check the account details to ensure the fund accounts are correct. She/he will email you back with details of any corrections she/he made. Submit the expense report after the department secretary approves.
- If you plan to use the funds for equipment, please work with the lead instructional technician. Please send all invoices to the department secretary. This documentation is required at the end of the year audit.

3. Department Fund Request from COTS Enhancement funds: amount varies

Each year, the department gets funds from the COTS dean's office from sources such as summer school profits, grant indirect funds, and College in the High School programs. These will be divided up as follows.

- Undergraduate projects (25-40%)
    - Requests of less than $100 are made directly to the lead instructional technician.
    - Requests of over $100 are made using the Funds Request webform: http://www.cwu.edu/physics/funds-request
- Student employment (0-20%)
    - These funds are controlled by the department chair, in consultation with department faculty
- Faculty professional development (30-50%)
    - Once these funds are released to the department, faculty can make requests using the Funds Request webform: http://www.cwu.edu/physics/funds-request
    - These funds will be distributed on a first come, first served basis. Requests for more than 25% of this funding may be brought to the department for discussion.

Safety Policies and Procedure

Last updated: April 2022

Background: The CWU-Physics Safety Committee (PSC) was formed in the Fall of 2016 in order to address safety concerns associated with moving into Science II as well as establishing a general set of safety and security protocols for classrooms, teaching laboratories, research laboratories, and club and outreach activities. Current committee members are Dr. Nathan Kuwada (chair), Dr. Benjamin White, and Dr. Cassandra Fallscheer.

Safety at CWU: CWU has recently been tasked with developing a university-wide safety policy developed and administered by the Health and Safety Council. A proposal is currently in the process of being approved by the Board of Trustees. This policy "will likely form the foundation for new university wide safety and health initiatives, new department and college level committees, and new university safety policies." Part of the proposal is to develop department-level safety committees. Rather than reinvent the wheel, the PSC proposes that we as a department address our urgent safety and security concerns as soon as possible, but wait until the CWU Health and Safety Council proposal is implemented to move forward with our general policy on safety and security. This will hopefully ensure that we are in-line with the university policy from day one.

Section I: Laboratory Safety

All students enrolled in any physics lab course (Phys 331, 333, 334, 323, etc.) be required to complete an general lab safety contract prior to any laboratory work (included as an appendix). In addition, the PSC also recommends the Lab Safety Workspace (http://labsafetyworkspace.org/) as a suitable online general lab safety course repository for additional training. Signed contracts and certificates must be stored in the space where the majority of lab activities are performed and easily accessible.

Section II: Research Lab Protocols

Research labs should follow the protocols and suggestions of EH&S, including but not limited to: developing a laboratory specific safety training protocol, maintaining a collection of Standard Operating Procedures (SOPs), maintaining a current list of chemicals stored in the lab, and following University procedures for hazardous waste storage and disposal.

Section III: Keys and Building Access

All students who request building keys and after hour access must read and sign a key contract (included as an appendix) that is to be stored in the Physics main office. Contracts are valid for the entire time a student is enrolled unless the contract is modified. Main points are included below for reference:

After-hours Building Access:

- Make sure there is another person in the building with you at all times
- The Courtesy Assistance Team (CAT) is available to walk students across campus between the hours of dark and midnight. The CAT can be reached at 509-963-2950
- Keep your cell phone with you at all times
- Do NOT let others into the building who do not have building access
- Be courteous, respectful, and leave the space neat and tidy before leaving

Roof Access:

- Keep your cell phone with you at all times
- Wear closed toe shoes
- Pay attention to your surroundings; watch for tripping hazards such as concrete piers, telescopes, step stools, and Geology equipment
- No sitting on or climbing over the border wall
- No food or beverages
- No horseplay
- All instances of being on the roof should be specifically related to class duties, assignments, or approved club activities.
- Check that no one is in the restroom before leaving the roof

Section IV: Demo Shows and Outreach Activities

All students who are performing physics demos must complete safety training administered by a Laboratory Technician. Demos have been classified by their risk (Level 1 and Level 2), and appropriate trainings must be completed prior to using any apparatus.

Safety Appendix A: Student Key and Access Policy

CWU Physics Keys and Access Policy

This document outlines the terms to which students who need to acquire 4th floor, roof, or after-hours building access to any portion of Discovery Hall must agree to and abide by.

Building Access:

- Let someone know when you are in the building outside of open building hours.
- Keep your cell phone with you at all times. We recommend enabling wi-fi.
- Do NOT let others who aren't in your group into the building who do not have building access
- Be courteous, respectful, and leave the space neat and tidy before leaving.
- Your building access is only for purposes as discussed with the faculty or staff member who requested the building access on your behalf.
- The University Police and Public Safety Department oversees building safety, and all members of campus are expected to comply with safety instructions issued by officers from this department.

Roof Access:

- Keep your cell phone with you at all times
- Wear closed toe shoes
- Pay attention to your surroundings. Watch for tripping hazards such as concrete piers, telescopes, step stools, and Geology equipment.
- No sitting on or climbing over the border wall
- No food or beverages
- No horseplay
- All instances of being on the roof should be specifically related to class duties, assignments, or approved club activities.
- Check that no one is in the restroom before leaving the roof

If you get locked out, Campus Security can assist: 509-963-2959 (business-hours, non-emergency) or 509-963-8534 (after-hours, non-emergency). The Courtesy Assistance Team (CAT) is available to walk students across campus between the hours of dark and midnight. The CAT can be reached at 509-963-2950

I understand that key card access to the 4th floor, roof, and any portion of Discovery Hall after hours is a privilege that can be revoked at any time. I understand that the FIRST instance of behavior not aligned with the policies above will constitute grounds for having my access privileges revoked.

Name: _____

Signature: _____

Date: _____

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Safety Appendix 2: General Safety Rules and Equipment

- Familiarize yourself with location of alarms and fire extinguishers and the types of fires for which the extinguishers are rated. The fire extinguishers in this building (SCCN) are dry chemical ABC; they may be used on trash-wood-paper-liquids-electrical equipment.
- Familiarize yourself with location of eye wash and safety shower.
- Learn location of emergency exits and procedure to follow when alarm sounds.
- Closed shoes (e.g., not sandals or flip-flops) must be worn at all times in the laboratories.
- Eating and drinking are absolutely prohibited in laboratories.
- Horseplay and pranks are absolutely prohibited in laboratories.
- Safety glasses must be worn at the direction of the lab instructor.
- Contact lenses are not recommended.
- Do not work in a laboratory wearing loose hair, loose clothing, or jewelry (reflection hazard for lasers, electrical and mechanical hazard for equipment)
- Do not put backpacks, coats, books, etc. on the floor (this poses a trip hazard).
- Do not run electrical cords or tubing across the floor.
- Use the ladders to access outlets and equipment that cannot be easily reached. Do not stand on stools or chairs or try to reach by stretching awkwardly.
- When in doubt, ask to find out; don't guess.

Glassware:

- Use only pyrex or shatterproof glassware.
- Keep glassware away from edges of lab bench.
- Do not place "rollable" glassware on its side.

Equipment:

- Before using an instrument or machine, be sure to know how to turn it off in case of emergency.
- Mount equipment securely and properly.
- Perform electrical connections for an apparatus with equipment turned off and skeptically ***triple***-check connections before powering up. Any high-voltage equipment (> 150 V) must be both turned off and unplugged while connections are made and checked by the laboratory instructor before the equipment is plugged in and turned on.
- Check all electrical connections and mounting bolts before each use (changes could have been made while you were not working with the equipment)
- Check that all rotating parts are free to turn, and that there is no mechanical obstruction before starting.
- Never "force" a mechanical component or electrical connection – ask for instructor assistance before proceeding with a procedure or operation with a piece of equipment that doesn't "feel" right (to prevent damage to equipment and potential injury to equipment users).

Safety Appendix 3: First aid

There are certain serious injuries in which time is so important that treatment must be started immediately.

For **STOPPAGE OF BREATHING** from electrical shock, or asphyxiation, the mouth to mouth method of resuscitation is far superior to any other known. **RESCUE BREATHING MUST BE STARTED AT ONCE!!!**

SEVERE BLEEDING can almost always be controlled by direct pressure on the wound with a pad of cloth. The cleaner the cloth the better, but in an emergency part of the clothing may be used.

To treat severe bleeding:

- Stop the bleeding.
- Wrap the injured to avoid shock, and call immediately for medical attention.
- Raise the bleeding part higher than the rest of the body.
- Keep victim lying down.
- Never use a tourniquet. **Thermal Burns**

Minor:
Apply ice or cold water.

Major:
In case of a clothing fire, the victim should drop to the floor and roll; do not run to a safety shower; do not use a fire extinguisher on a person with burning clothing - he/she may suffocate.

1. After flames are extinguished, deluge the injured under a safety shower, removing any clothing contaminated with chemicals.
2. Keep the water running on the injured part for 15 minutes to remove heat and to wash off chemicals.
3. Place clean, soaking wet, ice-packed cloths on burned areas, and wrap to avoid shock and exposure.

Chemical burns or splashes

Learn the location of safety showers and eye wash fountains in your area.

1. Immediately flush with water.
2. Apply a stream of water while removing any clothing that may have been saturated with the chemical.
3. If the splash is in the eye, flush it gently for at least ten minutes with clear water.
4. If the splash is on the body, flood it with running water.
5. A shower, hose or faucet should be used in an emergency.
6. For chemicals spilled over a large area, quickly remove contaminated clothing while using the safety shower; treat as directed under **MAJOR THERMAL BURNS**. Seconds count, therefore no time should be wasted simply for modesty.

Traumatic Shock

In cases of traumatic shock or where the nature of the injury is not clear, keep the victim warm, lying down and quiet. Wait until medical assistance or transportation arrives before moving the victim.

Safety Appendix 4: Radioactive Sources

The radioactive sources used in this course are, unless otherwise noted by the instructor, sealed in a small amount of epoxy at the center of a one inch diameter plastic disk, and low level. Because of this they pose no special hazard if handled appropriately.

- The instructor will show you where to find the sources (the storage location) that you will use in the course. Use only those sources to which you are directed by the instructor.
- Set up apparatus before you get the source from its storage location.
- Handle the source only in moving it from its storage location to its location in the apparatus. Handle a source for the shortest reasonable amount of time.
- ***Never*** put a source in your pocket, not even for "just a moment".
- ***Never*** put a source in some location other than its storage location or the apparatus, not even for "just a moment".
- Use shielding (i.e., lead blocks) between sources and locations at which people (you or others) are likely to spend more than a few minutes. (Distance from the source – even relatively small distances, e.g., just a meter or two - is another very effective means to reduce exposure. Consider this in setting up apparatus.)
- Only handle unprotected lead absorbers and shielding while wearing gloves and wash hands with soap and water immediately after handling any lead material. (Lead is toxic and can be absorbed through the skin.)
- Move the source back to the storage location as soon as it is no longer being used in the apparatus.
- If you are working with radioactive sources you may NOT leave the lab at the end of the class until the instructor has verified that all the radioactive sources are accounted for.
- Carefully follow all instructions given by the instructor for any special handling considerations.

Safety Appendix 5: Rules for Working with Electrical Equipment

Precautionary Procedures:

- Upon indication of any unusual performance of the electrical equipment or the experimental circuit (examples:
  smell, smoke, sparks, popping noise) turn off all power and unplug power supply. "If it smells 'hot', turn off and pull the plug."
- Avoid contact of wet materials with circuit. Do not work with wet hands or clothes.
- When checking an operating circuit keep one hand either in your pocket or behind your back (this simple but important strategy prevents your heart from being in a series circuit that extends from a contact at one arm to a contact at the other, and thus can significantly reduce the risk of electrocution!). Also, remove all jewelry.
- Maintain a work space clear of extraneous material such as books, papers and clothes, clean for at least one foot beyond the periphery of the operating circuit. Never put papers on top of electrical equipment or over the vents of electrical equipment where heat or a spark can cause a fire.
- Never change wiring with circuit plugged into power supply.
- Never plug leads into power source unless they are connected to an established circuit.
- Check circuits for proper grounding with respect to the power.

Fire:

- Turn off power source and unplug if these can be reached without causing injury. Notify the instructor immediately.
- If the fire is small and, in your best judgement can be easily extinguished, use an extinguisher. Never use water.
- Otherwise, if there is any question at all about whether you are able to extinguish the fire, immediately initiate an alarm and evacuate all persons from the area or building. Your first responsibility in case of fire is to save lives, and only after that to protect equipment.

Shock or Explosion:

- Turn off power source and unplug if these can be reached without causing injury. Notify the instructor immediately.
- Apply artificial resuscitation if necessary.
- Have someone call Emergency number.
- Stay with the victim until relief arrives.

Safety Appendix 6: Handling of Optical Components

The delicate nature of optical components requires that special procedures be followed in order to maximize their performance and lifetime. Through everyday use, optics can come in contact with contaminants such as dust, water, and skin oils. These contaminants increase scatter off the optical surface and absorb incident radiation, which can create hot spots on the optical surface, resulting in permanent damage. Optical components with coatings are particularly susceptible to this sort of damage.

The content of this guide covers common handling procedures that are applicable to many optical components. Due to variation in materials, size, delicacy, etc. of optical components, it is important that the correct handling methods are used. What is okay for one type of optical component will destroy another type of optical component. Because of this, we recommend that the guide be read in its entirety. If the type or category of optic is not specifically mentioned in the guide, please contact the optical component manufacturer for handling instructions.

Handling (In this class, you will only be allowed to handle optics if there is no other option and you have consulted with the instructor *FIRST*.)

By practicing proper handling techniques, you will decrease the necessity to clean your optics and thus maximize their lifetime. Always unpack or open optics in a clean, temperature-controlled environment. ***Never*** handle or touch optics with bare hands, as skin oils can permanently damage the optical surface quality. Instead, wear gloves; alternatively, for smaller optical components, it may be helpful to use optical or vacuum tweezers. Independent of the method used to hold the optic, if at all possible, only hold the optic along non-optical surfaces, such as the ground edges of the optic.

Important: The optical surface of holographic gratings, ruled gratings, first surface unprotected metallic mirrors, and pellicle beamsplitters (this is not an exhaustive list) should never be touched by hands (even if gloved) or optical handling instruments. They are extremely sensitive, and ***any*** physical contact will cause damage.

Caution: Most crystals (e.g., calcite polarizers, beam displacers, lithium niobate wafers, and EO modulators) are temperature sensitive and can crack if exposed to thermal shock. Therefore, it is important to always allow the package and contents to come to thermal equilibrium prior to opening. These crystals are also much softer than conventional optics, and thus, need to be handled more carefully when cleaning.

Safety Appendix 7: Laser and Other Light Sources Safety Guidelines

1. Some of the lasers or other light sources used in this class are powerful enough that they may quickly

INJURE AND CAUSE PERMANENT VISION IMPAIRMENT. (Note that if the laser or light source is not in the visible portion of the spectrum, e.g. infrared or ultraviolet, it can be even more dangerous because your eye/brain is insensitive at these wavelengths and does not even recognize that it is being exposed to injuriously powerful levels of light – specifically, you lose the blink reflex.)

2. Manage the space so that ***OTHERS*** are either restricted from entry or are aware that lasers or other light sources are in use and will take appropriate protective measures before entry, e.g., close and lock doors to the space, turn on "laser in use" signs, provide immediate verbal warnings upon entry of the space by others, etc.

3. For some of the lasers and light sources and as directed by the instructor, whenever the source is on, you and all others in the space ***must*** wear the safety goggles that are appropriate for the wavelength of the lasers. ***BUT*** always remember the goggles are ***ONLY*** the ***LAST*** line of defense – to protect your eyes and others only in the event that you have incorrectly applied the precautions identified below. You must still follow all appropriate safety procedures and failure to do so, even while wearing the goggles, can result in ***INJURIES AND PERMANENT VISION IMPAIRMENT***. Always remember that the safety goggles decrease your vision by blocking some wavelengths and also that they may give you a sense of safety that is not appropriate. Continue to carefully apply all other safety practices.

1. You ***MUST*** remove all jewelry, watches, or other objects that could reflect or scatter light before beginning work with lasers or other light sources.

2. ALWAYS avoid working with your eye level at the level of a laser beam. The beam should always be well above or well below eye level. Optical tables are designed to be at a height so this is the case ***when you are standing***. ***THUS*** you defeat this safety practice by sitting in a chair or on a stool at an optical table that has a laser or other light source. You must remain standing when working with lasers and other light sources at an optical table.

3. Perform alignment of the apparatus and other non-measurement tasks with the laser set to the lowest possible power that still allows you to perform these tasks.

4. Think about and plan any adjustments you are making to the apparatus.
    A. Turn off the laser or block the beam before inserting or removing optical components, tools, or any other objects that could potentially reflect or scatter laser beams.
    B. Qualitatively visualize the paths the laser beam will take as you perform the adjustments. Consider all paths and don't forget reflections can occur from all kinds of surfaces especially including "transparent" surfaces.
    C. Plan your adjustments based on these paths.
    D. Before you begin adjustments make certain everyone in the room not engaged in the adjustment is located "behind the beam" (in a part of the room opposite the primary direction of propagation of the beam.)
    E. Insure that you and anyone in the area is wearing the safety goggles.
    F. Double-check your plan and only then perform your adjustments.

5. Use beam blocks, light absorbing material appropriate to the beam energy, light enclosures, etc., at appropriate positions in the optical path.

6. ***NEVER*** look directly into the laser beam or at scattered laser light from a reflective surface. ***NEVER*** sight along the beam. Avoid direct exposure of the laser beam to skin or clothing.

Safety Appendix 8: Physics 333/334 Laboratory Conditions Agreement

The laboratory exercises you will be performing in Physics 333/334 will use specialized equipment that possesses a potentially disastrous mix of delicacy, cost, and personal danger.

Just a few examples:

- Invisible laser radiation can instantaneously and permanently damage vision
- High voltages and currents can kill – 100 mA across the heart is a fatal current
- Insignificant-appearing but expensive and irreplaceable equipment can be destroyed in a moments negligence

In order to reduce the potential for disaster you will need to obey the following guidelines in this laboratory:

- When beginning a new exercise or significantly changing a setup for an exercise you are working on, always ***check in with the instructor*** for the most important procedures and considerations to insure personal safety and safety of the equipment, and review the relevant safety guidelines in this document.
- For electrical systems, and optical systems that include lasers or other dangerous light sources (e.g., UV), for expensive equipment that could be damaged by incorrect electrical connections, and for any high voltage sources (> 150 V) always ***seek instructor approval before plugging in and turning on, or energizing equipment.***
- ***Never "force" a mechanical piece of equipment or an electrical connection***, for instance by turning a knob or dial or coaxial connector that feels stuck– if you think a piece of equipment is not doing what it is supposed to, do seek instructor assistance.
- ***Never touch an optical surface or place an optical surface in contact with a table or other object***: mirrors, prisms, lenses, waveplates, polarizers, etc. Oils and acids from your skin or grit from another surface can instantly destroy it. In most cases you shouldn't need to directly handle an optical component, but if you think you must, obtain instructor approval first and then use gloves and/or special optical tissue to handle it.
- When setting up or changing an experimental apparatus, familiarize yourself with the equipment first, carefully think through how to do the setup/changes ***in advance,*** specifically considering equipment and personal safety issues, and ***always seek group consensus and value skeptical feedback from all group members*** about methods and procedures. Use common sense AND uncommon sense. Conflicts can be resolved by consultation with the instructor.
- Treat ***every piece of equipment*** you work with as if ***it is expensive and irreplaceable. The appearance that a piece of equipment is old, obsolete, insignificant, or inconsequential is extremely deceptive.***
- ***If you do not understand something or notice something that seems even mildly important about equipment you are working with, turn off equipment, stop work, and ASK***.
- Power cords and electronic cables can be a special problem, both as a trip hazard and as a potential means for a delicate and/or expensive piece of equipment to be yanked from a setup and dropped. ***Position power cords and electronic cables thoughtfully and neatly.*** This also make troubleshooting easier and makes it less likely that equipment will be damaged or electrical hazards will be encountered.
- ***BE PATIENT!!!! THINK!!!! ASK!!!!***

I have read, understand, and will follow the safety and laboratory practices in this document.

Name_____

Signature_____
Date_____

Undergraduate Research Policy and Procedures

Last updated: May 2019

All physics majors (including B.S., B.A., and Dual Degree) must complete a research project.

The experience of conducting research gives students a boost in the skills needed to succeed in graduate school and the workplace. It also builds confidence and enables students to display excellence beyond the classroom.

Specific Research Requirements for Each Degree:

- Students completing a B.S. Degree must complete the first component of the following research tracks (either two credits of PHYS 495, a summer research opportunity, or a research-intensive class) and an additional two credits of PHYS 495.
- Students completing a B.A., Dual Degree, or minor are encouraged to complete the full track but are only required to complete the first step (either two credits of PHYS 495, a summer research opportunity, or a research-intensive class).

Research projects take at least two quarters to complete; therefore, *students must have their research plan approved by their Physics advisor prior to their junior year (or two academic years before their anticipated graduation date). A research plan form can be found on page 4.*

As described below, students at CWU can fulfill the research requirement through several tracks that culminate in a final two credits of PHYS 495. The different tracks are designed to offer flexibility. When choosing a track, students should consider their career goals, science interests, academic schedules, and the technical skills they would like to learn or strengthen. Students are encouraged to discuss their options with their Physics advisor.

Tracks:

Independent Research Project Track:

Students will take at least four credits of PHYS 495 during the academic year and complete an independent research project or independent study of a physics subject not covered in the CWU physics curriculum. Research projects will be supervised by a CWU faculty member. Learning outcomes for PHYS 495 courses are detailed on page 3.

Student Requirements:

- Research project must be arranged in advance with a faculty member from the CWU physics department.

- Research projects can begin as early as sophomore year with advisor and mentor approval, and research projects must be started no less than two quarters before the intended graduation quarter.
- During the final two credits of PHYS 495, students are required to complete a presentation and technical report or project proposal detailing their project.

Research-Intensive Class Track:
Students taking a research-intensive class (see your advisor or the department office for the latest list) may have the option of registering for an additional two credits of PHYS 495 in a subsequent quarter to continue/expand on a project based on the course content.

Student Requirements:

- The research-intensive class instructor must be informed that you have selected this track during the first week of the course.
- Students must have approval from the instructor of the research-intensive class before signing up for an additional two credits of PHYS 495.
- The continuation of a research-intensive class project is neither required or assured. Approval depends on the student performance in the course and the instructor's schedule.
- During the final two credits of PHYS 495, students are required to complete a presentation and a technical report or project proposal detailing their project.

Summer Research/Internship Track:
Students will complete a research experience or technical internship over the summer at CWU or offsite. In the following academic year, students must register for an additional two credits of PHYS 495 with a Physics faculty member. During this time, students can wrap up the project and complete a final presentation and technical document describing their summer experience.

Student Requirements:

- The summer experience must be arranged and coordinated in advance with a faculty mentor from the CWU Physics Department (even if the research experience is offsite), and approved by the Physics department chair.
- Internships and research experiences must be in a technical field (science, science education, or engineering) and consist of at least 200 hours of work mentored by a professional in that field.
- During the final two credits of PHYS 495, students are required to complete a presentation and technical report or project proposal detailing their project or experience.

PHYS 495 Learner Outcomes:

Student Learning Outcome for PHYS 495	Related Physics B.S. Program Outcome	Assessment (within PHYS 495)
Apply content knowledge from physics and related disciplines to an original project	Graduate demonstrates a comprehensive knowledge base of the areas of physics and related disciplines	Instructor discretion. Possible assessment: Final product from the project that demonstrates appropriate application of physics knowledge. Could include end-of-quarter presentation or a formal written report.
Read and critique journal articles in a subfield of physics	Graduates demonstrate critical thinking skills	Instructor discretion. Possible assessments: Group meeting presentation, or written summary
Develop an original plan for a project to be carried out with available equipment	Graduates demonstrate critical thinking skills	Instructor discretion. Possible assessments: Group meeting presentation, or written summary
Apply research methodology from a subfield of physics	Graduates perform experimental, computational, and analytical techniques in solving physics and physics-related problems	Instructor assessment of student progress toward project-specific goals. (Progress may include trouble shooting, etc.)
Communicate effectively in writing about a technical topic	Graduates demonstrate an ability to communicate effectively	Written proposal or research report.
Demonstrate effective oral communication to an audience that includes non-experts	Graduates demonstrate an ability to communicate effectively	Scientific poster presentation or oral presentation to an audience external to the physics department.
Demonstrate an ability to work and learn independently	Graduates demonstrate an ability to learn new material independently from a variety of resources, to be used throughout their life.	Instructor assessment of student initiative in project design and implementation

Research-Intensive Class Description:

Purpose:

Research-intensive courses provide an opportunity to advertise specific research projects, to instill particular research skills, and evaluate research competence to a group of students in a structured environment. With this in mind, research-intensive courses offer a pathway into completing an independent project during an additional two quarters of PHYS 495. What research skills to focus on and how to teach them is up to the instructor; however, the criteria below must be satisfied for a course to be designated RI. The structure and transition from a RI course to a PHYS 495 project is also up to the instructor. Pages two and three of this document provides some guidance.

Criteria for RI Classes:

- At least a quarter of the class time is dedicated to planning, conducting, and analyzing results from an individual or group research project.
- Student assessment includes at least one 4+ page technical document describing the project objective, background, methods, and results.
- Student assessment includes at least one oral or poster presentation documenting the project.
- Students should receive instructor and peer feedback on their written report and/or presentation and get the opportunity for revision before the final assessment.
- *Should* be 300+ level course in the physics department. 300+ level courses outside the department require advisor approval.

Designating a research-intensive course:

The department will manage the designation of RI courses and RI courses will be advertised to students on the CWU Physics website and department fliers. To avoid confusion, once an RI course is declared, instructors must teach that course in an RI format unless the designation is removed from the website and other informational material.

Mentoring students after an RI class:

At least some of the students who take an RI intensive class should have the opportunity to work with the instructor by signing up for at least two credits of PHYS 495 during a subsequent quarter. During this quarter, students should continue a project started in the course (or start a new related project) and complete the required research presentation and written document described on page 5 of this policy.

This document will be reviewed at least every other year.

CWU Physics Department

Undergraduate Research Plan and Summary Record

Student: _____ CWU ID:_____

Physics Academic Advisor: _____

(Instructions: Obtain Mentor/Instructor initials ***prior to beginning*** the component;

obtain Mentor/Instructor signature/date ***upon completion*** of the component)

Initial Research Component (component and tracks described on back of form):

Selected Track:

☐ Full Independent Research Project (Attach brief summary of the completed PHYS 495 class)	☐ Research-Intensive Class Class:_____	☐ Summer Experience (Attach brief summary of the summer experience)

Academic Term in which the component will be completed: _____

CWU Faculty Mentor or Class Instructor for the component: _____Initials:_____

Dept. Chair signature/date (required ***prior to beginning*** the Summer Experience Track):

_____

Signature/Date of CWU Faculty Mentor or Class Instructor for the component:

_____

Culminating Component (component described on back of form):

Academic Term in which the PHYS 495 class will be completed: _____

CWU Faculty Mentor or Class Instructor for PHYS 495 class: _____Initials:_____

Signature/Date of CWU Faculty Mentor for the component:

_____

Venue/Date of Poster or Presentation:

_____

(Attach poster or presentation abstract)

Title of Written Report or Proposal:

_____

(Attach report or proposal abstract)

Peer Evaluation of Teaching

Last Updated: April 2021

All faculty will participate in peer evaluation of teaching. Peer evaluations should take place every year for non-tenure track, tenure-track, and probationary faculty. Tenured faculty should have an in-depth peer evaluation every two years; with one of those evaluations coming within a year of the due date for when the faculty member is up for promotion or post tenure review. During the other years, faculty members must undergo a basic syllabus or content/pedagogical review of at least one course. A faculty member may request an in-depth peer review these years in place of the basic syllabus or content/pedagogy review. In-depth peer-evaluations may be done by a department colleague or a faculty/staff member from the university with appropriate expertise. At least one evaluation in a faculty member's file for review (contract renewal, tenure, promotion, or post tenure review) must be from the department chair. At least one evaluation from the department chair from the review period will include an overview of the faculty member's mastery of the five teaching parameters described in Appendix C of the COTS Policy Manual (content expertise, instructional design skills, instructional delivery skills, instructional assessment skills, and course management skills).

In-depth peer evaluations of teaching will be documented using the Department of Physics Peer Course Observation form (Appendix 1), a similarly rigorous instrument from another department, or with a memo addressing the faculty member's mastery of the five teaching parameters described in Appendix C of the COTS Policy Manual. An observation can be a classroom observation, a careful review of curricular materials, or a review of the Canvas course. In-depth peer evaluations, aside from those required for non-tenure track, tenure-track, and probationary faculty, must be requested by the faculty member seeking peer evaluation. If a faculty member does not request a review in a year that one is required, the department chair will select the class and assign a peer reviewer the following academic year. Peer evaluation of course materials and Canvas should use evidence beyond the classroom such as syllabi, supplemental materials, and the use of Canvas or other technology to address some aspects of the faculty member's mastery of the five teaching parameters described in Appendix C of the COTS Policy Manual.

Peer Evaluation Appendix 1: DEPARTMENT OF PHYSICS PEER COURSE OBSERVATION

Instructor_____Course_____

Date_____Evaluator_____

IV. CLASSROOM OBSERVATION

At the instructor's request, the department chair or another faculty member may be invited to visit a class and observe the instructor's teaching. Faculty evaluators should receive a course syllabus and a brief pre-visit description of course goals, lesson objectives, and the teaching method to be observed.

Below is a list of instructor behaviors that may occur within a given class or course. Please use it as guide to making observations, not as a list of required characteristics.

Content Organization

[ ] Clearly stated the purpose/objectives of the lesson

[ ] Related lesson to the "big picture" of the current unit

[ ] Presented topics with a logical sequence

[ ] Paced lesson appropriately

[ ] Summarized major points of lesson

[ ] Responded to problems raised during lesson

Comments:

_____
_____
_____
_____
_____
_____

Student Engagement

[ ] Used appropriate verbal and nonverbal communication strategies to keep students engaged

[ ] Appropriate mix of instructor-led time and student-led time

[ ] Students given opportunities to be actively engaged in the material

[ ] Students asked to provide specific evidence in support of their answers (i.e. “do the results make sense?”)

[ ] Utilized student collaboration strategies (e.g. lab activities, collaborative problem solving, interactive demos, etc.)

Comments:

_____
_____
_____
_____
_____
_____
_____

Classroom Interactions

[ ] Provided opportunities for student discussion

[ ] Used a variety of question levels to formatively assess student understanding

Comments:

_____
_____
_____
_____
_____
_____

Instructional Materials and Environment

[ ] Provided appropriate resources for students to prepare for the lesson

[ ] Supported lesson with useful classroom discussions and problem solving/exercises

[ ] Presented helpful visual materials to support lesson organization & major points

Comments:

_____
_____
_____
_____

_____
_____
_____

Content Knowledge and Relevance

[ ] Presented material aligned with the lesson objectives

[ ] Presented material appropriate to student knowledge & background

[ ] Presented material appropriate to stated purpose of the course

[ ] Demonstrated command of subject matter

[ ] Cited evidence to support statements (e.g. experimental data, derivation, logical reasoning, etc.)

Comments:

_____
_____
_____
_____
_____
_____

Physics Department Student Awards and Honors

Last updated: April 2021

Department Awards

The Physics department acknowledges outstanding accomplishment by a Physics major with annual awards in four areas: academic performance, research, service, and leadership. Faculty members will nominate students and vote on the awardees by the middle of spring quarter. Awardees receive a cash prize or a gift emblematic of their experience as a physics student at CWU, subject to availability of funds. This award or gift will be paid for by CWU Foundation funds. Names of awardees are inscribed on a plaque that is publicly displayed and listed on the department website. Each award might not be given every year.

John Collins Memorial Prize for Service

This award recognizes a student who has made exceptional contributions to the department and/or the broader community.

Sharon Rosell Prize for Leadership

This award recognizes a student who has made exceptional contributions to public outreach efforts, including the recruitment and organization of other students to promote the appreciation and understanding of physics.

Department Award for Outstanding Academic Achievement

This award recognizes a student who has performed at the highest level in physics classes.

Department Award for Excellence in Research

This award recognizes a student who has demonstrated outstanding commitment, originality, and productivity in a research project mentored by Physics faculty.

Sigma Pi Sigma, national physics honor society

The Physics Department joins the national Society of Physics students in electing student members on the basis of outstanding academic achievement. Faculty members will vote on the nominees for induction by the middle of spring quarter. There is an initiation fee collected by the national office. The physics department will pay the initiation fee for all students who are inducted. This fee will be paid for by CWU Foundation funds.Students will be inducted at a ceremony near the end of spring quarter of each year. Students will be nominated based on the following criteria.

- Physics GPA above 3.5
- Overall GPA above 3.0
- Successful completion of PHYS 351 or the equivalent

Student hiring policies

Last updated: September 2021

The physics department hires student employees on a quarterly basis for the following two ongoing employment pools. Prospective student employees need to apply only once an academic year.

1. Learning Assistant (LA) position (Student LA Physics, Ongoing Pool, Job ID 2286)
2. Teaching Assistant (TA) position (Student TA Physics, Ongoing Pool, Job ID 2287)

The LA Program Coordinator will assign Learning Assistants to a faculty mentor each academic quarter, based on the LA employee's availability and the needs of the department. The LA employee's weekly schedule will be determined in consultation with the faculty mentor. The Teaching Assistant position is intended for situations that fall outside the usual scope of the Learning Assistant program. Teaching Assistants are hired on a case-by-case basis by the department chair in consultation with the relevant classroom instructor.

The physics department requires the following documents from all prospective student employees during the hiring process. (Note that these are in addition to the employment documents required by Human Resources upon hiring):

1. A resume The CWU careers online site requires a resume to be uploaded with the online application. The physics department will keep these on file for all employees.
2. Certificate of completion for the online FERPA training offered through CWU Human Resources. FERPA training is required for all employees who will have access to student records.

Students interested in either of these positions are encouraged to contact the department chair or the LA program coordinator for more information before applying through the CWU Careers website. A detailed description of each position is included below:

I. Learning Assistant position (Student LA Physics, Ongoing Pool, Job ID 2286)

This position is part of the Learning Assistant Program, designed to support classroom instruction in introductory physics while giving upper division students the opportunity to learn teaching methods and gain professional experience.

Roles in the Learning Assistant Program:

- Learning Assistants: Learning Assistants are student employees who support active learning in introductory physics classrooms by working with small groups during lab and problem-solving activities. Learning Assistants may also assist with a small amount of grading in coordination with the classroom instructor.
- Learning Assistant program coordinator: The program coordinator will oversee student hiring, class assignments, payroll, quarterly program meetings, and program assessment. The program coordinator will also facilitate communication among participants in the Learning Assistant Program.
- Hiring manager: The hiring manager will facilitate the student hiring process in coordination with the program coordinator and the office of Human Resources.
- Faculty mentors: Once a Learning Assistant employee is assigned to a specific class for a quarter, the classroom instructor will function as a faculty mentor to the Learning Assistant. The faculty mentor will work with the LA to establish a weekly work schedule and hold regular meetings. The faculty mentor will provide the LA with guidance on how to prepare for their role in the classroom, and constructive feedback to support their ongoing skill development.

The official job description for the Learning Assistant (LA) position:

JOB SUMMARY (purpose)

Facilitating small-group learning in lecture and lab. Assist with classroom instruction in lecture and lab. Develop and teach lessons in partnership with other learning assistants and a faculty member.

REQUIRED QUALIFICATIONS (skills)

- Completion of PHYS 292 or STP 301 or STP 302A with a grade of B or higher
- Minimum G.P.A. of 3.0
- Successful completion of an equivalent course to the one that they will be assisting in.
- Works well with students one-on-one or in groups.
- Good communication skills.
- Must be eligible for student employment in the quarter in which you apply to work.

PREFERRED QUALIFICATIONS

- A- or better in the classes the student will be assisting in or equivalent.
- Demonstrated interest in gaining teaching skills.

JOB DUTIES (Essential Functions)

- Work with small groups of students during lab and lecture activities
- Provide one on one help for students
- Assist with classroom instruction
- Grade

ADDITIONAL INFORMATION FOR APPLICANTS (Educational Benefits)

- Applicant will learn teaching techniques. Applicant will gain experience in facilitating learning.

II. Teaching Assistant (TA) position (Student TA Physics, Ongoing Pool, Job ID 2287)

A student employed as a Teaching Assistant (TA) will provide instructional support that falls outside of the usual scope of the Learning Assistant program. Student employees will be hired as TAs on a case-by-case basis in coordination with the department chair and the relevant classroom instructor.

The official job description for the Teaching Assistant (TA) position:

JOB SUMMARY (Purpose)

Facilitating small-group learning in lecture and lab. Assist instructors in grading student work for lecture and lab. Assist with classroom instruction in lecture and lab.

REQUIRED QUALIFICATIONS (Skills)

- Instructor's permission
- Successful completion of an equivalent course to the one that they will be assisting in.
- Works well with students one-on-one or in groups.
- Good communication skills.
- Must be eligible for student employment in the quarter in which you apply to work.

PREFERRED QUALIFICATIONS

- A- or better in the classes the student will be assisting in.
- Demonstrated interest in gaining teaching skills.

JOB DUTIES (Essential Functions)

- Assist with lab and lecture activities
- Grade
- Provide one on one help for students

ADDITIONAL INFORMATION FOR APPLICANTS (Educational Benefits)

- Applicant will learn teaching techniques. Applicant will gain experience in facilitating learning.
- This is a pooled position that is open year-round. Please contact the department secretary if you have any questions.