Program Summary

Physics is a small program and most likely historically under-resourced. We are an undergraduate only program, though we would like to change that. We have a fairly large service mission. We provide service courses to Engineering, Engineering Technology, Computer Science, Music Technology, Health Sciences, Biology, Chemistry and Geology. These service course requirements have grown over the past 6 years and these take resources to staff the classes and provide a quality experience. Our introductory classes with laboratories only grow in increments of laboratory sections, and each lab section requires additional staff time. This growth in service classes and the number of physics majors has stressed our program. What we have lost in this process is the ability to offer general education courses. Four years ago we had a very diverse and unique selection of general education courses (Physics of Sports, Physics of War, Introduction to Lasers, etc.). These offerings have been slashed simply because we do not have sufficient staff.

Over the past six years, the Department of Physics has undergone numerous changes that have had a profound impact on our students and student education. Recognition of these changes has come from the American Physical Society’s award for Improving Undergraduate Education and from the growth of the number of majors from the long term average of 20 (six years ago) to the present day 53. We attribute our success to a number of factors:

A) Required advising – all physics majors must come to the department for advising.

B) Top to bottom departmental examination of class goals.

C) A departmental educational philosophy that uses (research based pedagogy) interactive engagement to help students really learn, retain, and understand the fundamental concepts of physics.

D) Building a department community that supports student success.

E) Create new multidisciplinary concentrations

The USAP committee needs to recognize that these changes have been very difficult and time consuming. They include changing faculty and student attitudes. They require creating communities. They require continuous tending. The growth of our program has also stressed the department. Faculty are on continuous unrecompensed overload of 1-2 hours per semester. The chair has had continuous overloads of 3 - 6 hours per semester. And yet in spite of this we have been successful.

The USAP committee also needs to know that we have ambitious plans. We listed 10 Goals. Goals that were not in these 10 are: Creating a community of Physicists bringing physicists from industry, high school, local universities together; updating our advanced laboratories (which need more, new equipment); and creating a graduate program (applied or medical physics).

Lastly, when looking at the goals - priorities are more related to time than importance. Longer term goals are lower priority.

Task Force:
Thank you for the time and effort you put forth in your report. Through the USAP process, we are working to create a culture of continuous improvement; setting specific and measurable goals is an important step in the process of moving IPFW toward this culture of improvement. Part of this effort is getting individuals and units at IPFW to think differently about planning and the future. The work of Physics is critical to IPFW and we greatly appreciate the time you spent on this significant endeavor.

This report seemed to show the clearest need for additional resources in terms of faculty and support. While many of the goals and their measures depend upon external support, there are also goals included that can be accomplished given the current context. The question of overloads and their systemic use requires immediate attention.

Thank you again for being part of this important initiative.

**Criterion:** #1: Mission - How does your unit support the mission of the university? This may include your mission and vision statements. (no more than 200 words)

**Question:** Mission - How does your unit support the mission of the university? This may include your mission and vision statements. (no more than 200 words)

The IPFW Department of Physics provides high quality physics education, producing well prepared graduates who are confident in their abilities and understanding of physics. We promote physics research and creative activities of faculty, students and staff. The Department of Physics engages with the University community and the larger community providing greater understanding of the nature of physical science, an appreciation of physics in everyday life, and technical expertise.

**Criterion:** #2: Accomplishments - Please list significant accomplishments from the last three years as they align with Plan 2020 goals

**Question:** I. Foster Student Success - Please list significant accomplishments from the last three years as they align with Plan 2020 goal area I: Foster student success.

2014

- 16 students involved in research
- Complete revision of curriculum
- Add concentrations in Biomedical Physics, Optoelectronics, Engineering Physics, and Computational Physics
• Added Senior Thesis (research requirement) to degree programs

• Replace all 500 level courses with 400 level courses.

• Adopted Python as a departmental programming language integrated in every intermediate and advanced class.

• Add requirement of a computational project and experimental project to every class.

• Require Computational Physics for most concentrations.

• Formation of Physics Honor Society – Sigma Pi Sigma

• 10 entries and 13 majors participated in the Undergraduate Research Symposium.

• Very active Society of Physics Students

• Very high proportion of graduates get jobs that are related to their degree (usually named engineers). 40% of majors get jobs in industry as engineers. 40% go to graduate school (Physics, Biology, Engineering, and Medical School). 20% have a variety of other careers that are often but not always technical (Computer related, pilot, minister, etc.)

• Departmental Pedagogy is student centric. In general we use interactive engagement techniques for high long term success of students.

• Adding two new interdisciplinary concentrations: Interdisciplinary Physics and Entrepreneurial Physics

• Revising Assessment Plan

• Strong advising (this was implemented 6 years ago really). Every major is required to come for advising every semester to register for classes.

• IPFW Physics won a national award from the American Physical Society for Improving Undergraduate Education.
2013

- 23 students involved in research.

- Completion of individual course goals for every physics course.

- Created concentrations in physics. Most concentrations are interdisciplinary in nature – Biomedical Physics, Computational/Mathematical Physics, Engineering Physics.

2012

- 17 students involved in research

**Question:** II. Creation of Knowledge - Please list significant accomplishments from the last three years as they align with Plan 2020 goal area II: Promote the Creation, Integration, and Application of Knowledge.

**Summary:** 1 book, 8 publications, 57 presentations in past 3 years

2014

**Book**

1. 

David Maloney *TIPERs: Sensemaking Tasks for Introductory Physics* book which Pearson Published in January, 2014.

**Presentations and workshops**


5. David Maloney “I Teach Problem Solving: What do We Mean?” Texas Community College Teachers Association meeting in San Antonio


7. David Maloney, three day workshop on Instructional Strategies for Introductory Physics at Green River Community College in Seattle, WA March 27-29

8. David Maloney, three day workshop on Instructional Strategies for Introductory Physics June 26-28 at Manchester Community College in Manchester, CT.

9. David Maloney workshop on “Research-based Alternative Approaches to Problem Solving” at the national meeting of the American Association of Physics Teachers July 27th in Minneapolis, MN.


11. David Maloney, Poster on “Reverse Game Play as an Introduction to Scientific Reasoning”.

12. David Maloney, two day workshop for Mass Insight Education on Instructional Materials and Approaches for the New AP Physics Course Oct 17 and 18 in Marlborough, MA


Publications


2. Desiderio A. Vasquez and P.M. Vilela, "Rayleigh-Taylor instability of steady fronts described by the Kuramoto-Sivashinsky equation", CHAOS 24, 023135 (2014)

Other Support

1. Stephen Gillam secured, with Dr. Catherine Pilachowski’s (IU Bloomington) support, four nights of dark-of-moon observing time January 2014, at the Wisconsin-Indiana-Yale-NOAO 0.9-meter telescope. This was used to observe the surroundings of NGC 2419 in support of his on-going research.

2. Stephen Gillam secured, with Dr. Catherine Pilachowski’s (IU Bloomington) support, four nights of dark-of-moon observing time February 2014, at the Wisconsin-Indiana-Yale-NOAO 0.9-meter telescope. This was used in a study of the feasibility of detecting multiple stellar populations in external galaxies using broad-band U and B photometry.

3. Stephen Gillam secured, with Dr. Catherine Pilachowski’s (IU Bloomington) support, two nights of observing time November 2014, at the Wisconsin-Indiana-Yale-NOAO 3.5-meter telescope. This was used to observe star clusters in the Andromeda galaxy and observe the surroundings of NGC 2419 in support of his growing collaboration with astronomers at IUB and my on-going research.

4. Stephen Gillam secured, with Dr. Catherine Pilachowski’s (IU Bloomington) support, six nights observing time January 2015, at the Wisconsin-Indiana-Yale-NOAO 0.9-meter telescope. This will be used in a study of the feasibility of detecting multiple stellar populations in external galaxies using narrow blue CN-band photometry.

2013

Presentations and workshops
1. Timothy Grove was an author for a poster presentation ("Using Plumbdads-Quarkles to examine student understanding of scientific practice") at the 2013 Winter Meeting of AAPT in New Orleans, LA.

2. Timothy Grove was an author for a poster presentation ("Using Plumbdads-Quarkles to examine student understanding of scientific practice") at the 2013 Summer Meeting of AAPT in Portland OR.

3. Timothy Grove organized and ran a workshop (with Mark Masters, Jacob Millspaw, Steve Lindaas, Greg Adams (student), and Sri Dasari (student)) at the AAPT 2013 winter meeting in New Orleans.

4. David Maloney - Invited talk at Texas Community College Teachers Association


8. Mark Masters, Panelist on “Fighting about Lab Goals”, organized by Richard Dietz, Summer 2013 American Association of Physics Teachers, Portland


Parallel Plate Capacitor. Winter meeting 2013 American Association of Physics Teachers, New Orleans.


16. Jacob Millspaw; (presentation) iLabs: Hands on Investigations with iPads in Introductory Physics Labs, 2013 AAPT Winter Meeting, New Orleans, LA

17. Jacob Millspaw, Workshop, Low-Budget Instructional Labs, 2013 AAPT Winter Meeting, New Orleans, LA

18. Jacob Millspaw, (Poster Session), Jacob Millspaw, Sally Mikhail, Joe Wilhelm; iLabs: Hands on Investigations with iPads in Introductory Physics Labs, 2013 AAPT Winter Meeting, New Orleans, LA

Publications


2012

Presentations and workshops

1. Timothy Grove was an author for a poster presentation (“Optical concept assessment”) at the 2012 Winter Meeting of AAPT in Ontario CA.

2. Timothy Grove was an author for a poster presentation (“Optical concept assessment”) at the 2012 Summer Meeting of AAPT in Philadelphia PA.


7. Mark Masters, Invited Panelist on Laboratories, Winter Meeting 2012, AAPT, Ontario CA

8. Mark Masters, Invited speaker, Ball State


10. Mark Masters, Invited Panelist on Laboratory Assessment, Beyond First Year Laboratory Conference.

11. Mark Masters, Invited Moderator on Writing, Beyond First Year Laboratory Conference (involved speaking too).


13. Mark Masters, Writing to Learn Physics in the Laboratory -Winter Meeting 2012, AAPT, Ontario CA


16. Mark Masters, The Zen of Learning Laboratory Physics through Writing and the Art of Peer
17. Mark Masters, A Mechanical Analog of Nuclear Magnetic Resonance - Summer Meeting 2012, AAPT, Philadelphia

18. Mark Masters, Writing to Learn in the Introductory, Intermediate and Advanced Laboratory - Winter Meeting 2012, AAPT, Ontario CA


20. Jacob Millspaw; Tabletop Kits Help Students Grasp Concepts in Light, 2012 AAPT Winter Meeting, Ontario, CA,

21. Jacob Millspaw, Mark Masters and Jhonny Young; Fan Carts Blow – an exploration into the troubles with fan carts. 2012 AAPT Winter Meeting, Ontario, CA,

22. Jacob Millspaw; (Poster) Tabletop Kits Help Students Grasp Concepts in Light, 2012 AAPT Winter Meeting, Ontario, CA

23. Desiderio Vasquez, "Oscillations and dynamic instabilities in chemical systems", "Convection in stable and unstable fronts", A poster presentation in the Gordon Research Conference, Waterville, ME, USA


Paper


2. P. M. Vilela, and D. A. Vasquez, Phys. Rev. E 86, 066102 (2012), "Stability of fronts in the Kuramoto-Sivashinsky equation advected by a Poiseuille flow"

Jacob Millspaw, Decco Grant for development of an on-line PHYS 220.

2. Desiderio Vasquez, Fulbright Scholar

**Question:** III. Regional Hub - Please list significant accomplishments from the last three years as they align with Plan 2020 goal area III: Serve as a Regional Intellectual, Cultural, and Economic Hub for Global Competitiveness.

We have the only physics program with research opportunities in Northeast Indiana.

**Question:** IV. - Create a Stronger Univ - Please list significant accomplishments from the last three years as they align with Plan 2020 goal area IV: Create a Stronger University through Improving the Support of Stakeholders and the Quality and Efficiency of the Organization.

Stakeholders defined as students and service departments as well as the university as a whole. The Physics department has worked on improving efficiency for the past six years which is how we were able to grow without increased resources. However, we have maximized the efficiency of the department and without greater resources – such as additional faculty and more space, we are in stasis.

**Question:** Other Accomplishments - Please list any other significant accomplishments from the last three years that do not align with Plan 2020.

**Criterion:** #3: Accreditations - Program specific accreditation and status

**Question:** Accreditations - What program-specific accreditations and status do you have, if any?

None

**Question:** Constraints/Benefits - How do these accreditations constrain or benefit the work of your unit, if applicable?

N/A
#4: Laws and Mandates - Federal and state laws or mandates that your unit addresses

**Question:** Federal and State Laws - What federal and/or state laws or mandates do you address, if any?

None

**Question:** Constraints/Benefits - How do these federal and state laws or mandates constrain or benefit the work of your unit?

#5: Inefficiencies - Activities that you spend resources on inefficiently or in ways that do not support the mission.

**Criterion:** #5: Inefficient use of resources - On what activities, if any, do you spend resources (money, time, people, etc.) inefficiently or in ways that do not support the mission of your unit or the university? List as many as apply.

Paperwork for the purpose of paperwork. Often the paperwork seems to be an activity of little value to those completing the paperwork. Additionally, it is unclear if anyone reads the paperwork so that it take vast amount of times which might be better spent helping students and in scholarship.

Advanced labs are too limited by space and by equipment so that we have to offer sections more frequently. This take faculty time which diminishes overall productivity and exhausts the experimental physicists.

There is no support from the University for marketing. Therefore we must expend effort to do it ourselves. One serious example is that when the Physics Department won a National Award, the University communication office has been unwilling to issue a news brief to the outside world or even have this up on the IPFW Web page. Maybe one is forthcoming but that is not apparent. So the feeling is that there is no administrative support for success or marketing.

**Criterion:** #6: IR and Budget Review - Review of your department profile and budget

**Question:** Contextualize IR data - Upon review of your IR Department Profile (for academic units) and FY 14-15 Budget information, are there any data you want to correct or contextualize? To view your profile or budget visit the Office of Institutional Effectiveness website: http://www.ipfw.edu/offices/ir/profiles/
We have several comments. 1) The number of majors (secondary and primary) has increased from a long term average of approximately 20 six years ago to 53 now. That significant increase has strained the department in several ways. A) We have to offer advanced labs more frequently because we don't have the appropriate space nor the equipment. B) Supporting Student Research, a high impact activity and one of the goals in the plan is difficult given the number of students, the overloads, and lack of acknowledgment of this activity.

2) The data shows our credit hours generated have diminished. In the aggregate, that would seem to imply our enrollments have decreased (from 2011) with the rest of the university. However, drilling into the data shows that our enrollments in introductory and major courses has increased from 2011. What has changed is that we are short staffed and we no longer offer most of our General Education Courses. This decreases our credit hour generation. We are suffering from death by labs.

3) The data does not show that we have all of our introductory labs taught by LTL’s and that this constitutes the equivalent of 2 FTE. If one of those LTL’s left, we would be unable to staff those labs.

4) The data does not show that all of the department faculty are overloaded in general at least by 1 hour per semester if not 2. That these overloads are not compensated and the department does not have a way to provide release time to make up for the overloads. This negatively impacts scholarship and the pursuit of external funding.

Criterion: #7: Goal One - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

Task Force:
1. Comment on the specificity of the goal:

Perhaps specificity could be improved by stating the goal: “Maintain and review assessment and use of assessment for student learning”

2. Comment on the goal's measures:

Measures would be improved through the inclusion of all objective quantifiable goals.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

4. Comment on the goal's relevance:

Very Relevant

5. Comment on the timeline of the goal:

Ongoing

Possible opportunities for collaboration or suggestions for addressing a gap:

Assessment Director and COAS Assessment Committee

**Question:** Unit Goal - What is your unit goal?

Assessment and use of assessment data

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

1.A. Improve Measurement of Student Learning

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

High

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?

- Continue to update the assessment plan

- Collect data and analyze the data

- Make programmatic changes as data indicate.
**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

- We have a new assessment plan that we feel is appropriate and functional
- We come to a departmental agreement on how to accomplish departmental goals

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

Yes, sort of. Right now, because every faculty member has a continuous overload, it is difficult to do this effectively. However, next semester (Fall 15) when we will tentatively have two new faculty, this should become a more reasonable task.

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

Currently short staffed

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

Assessment is a continuous process. We have spent 6 years revising our assessment plan. So while we will improve it over the forthcoming year, it will still be a work in progress. The assessment plan will likely change for at least the next 3 years as we refine our process.

**Criterion:** #8: Goal Two - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:**
1. Comment on the specificity of the goal:

Too broad. The action steps seem more like specific goals.

2. Comment on the goal's measures:

The measures would be improved by object of a quantifiable outcomes.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

The challenges, aside from the overload question, are not clearly articulated. For example, how does LCD Wall Display connect to this goal?

4. Comment on the goal's relevance:

Relevant

5. Comment on the timeline of the goal:

Ongoing

Possible opportunities for collaboration or suggestions for addressing a gap:

Marketing

**Question:** Unit Goal - What is your unit goal?

Marketing of our programs and physics in general

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

It is not clear how this fits into the 2020 goals. However, it is of vital importance, especially for Physics in which the students do not even have an opportunity in high school.

I.E.4 – Promote majors and programs with strong job placement opportunities.

I.E.3 – Build and strengthen relationships with regional partners.

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

High

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?
• Bring Collegiate Connection/School Based Programs students to campus

• Develop a newsletter

• Outreach to local high schools and middle schools.

• Webpage and improve usage of social media

• Distribution of materials to high school teachers and high school counselors.

• Communication with local industry

Question: Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

• Increase in number of physics majors

• Community Awareness of the quality of the IPFW Physics Program

Question: Resources - Are you able to accomplish this unit goal with your current resources?

Maybe. With the two new hires for Fall, we may be able to make progress if we can reduce overloads.

Question: Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

Time is our biggest resource shortage. Did we mention that the faculty in the department typically have a 1 to 2 hour overload each semester (chair often has 3-6 hour overload)? This makes it difficult to make progress on these difficult topics and the university has been less than helpful in marketing.

Also, University policies make things cost prohibitive. For example, the expense of a LCD Wall display is very expensive if we follow the university policy which requires significant infrastructure. This cost is placed on the department even though there is a desired university outcome being achieved. So in essence the department is taxed to create a video display that promotes the department.

Question: Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?
**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

This is an ongoing task. While we hope to make progress with brochures and posters this year, and then continuing to update marketing materials to be distributed to the counselors in high schools.

**Criterion:** #9: Goal Three - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:**

1. **Comment on the specificity of the goal:**
   
   Consider changing “feeling” to “recognize”, otherwise specific.

2. **Comment on the goal's measures:**
   
   One possible way to improve the goal’s measures would be to include pre and post-class student survey.

3. **Comment on the unit’s ability to achieve the goal (include a consideration of the departmental profile and budget data):**
   
   Faculty time

4. **Comment on the goal's relevance:**
   
   Very Relevant

5. **Comment on the timeline of the goal:**
   
   Long term

Possible opportunities for collaboration or suggestions for addressing a gap:

Biology, Chemistry, Health Sciences Consortium

**Question:** Unit Goal - What is your unit goal?

Update the PHYS 22000/22100 course sequence to increase the feeling of relevance for life science students.

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

1.B.4, Expand use of high impact instructional interventions

1.B.5, Transform the concept of college classroom and delivery
Indiana University-Purdue University Fort Wayne (IPFW)
Program Write-up with Task Force Comments
PHYS Physics

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

High

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?

- Talk with Biology (stake holder) about class content.
- Redesign the curriculum so that the course is more focused on the life sciences.
- Redesign the laboratories for biomechanics and medical instrumentation/measurement.

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

- Product – the labs
  - Improved student attitude
  - Biology students taking physics before their senior year over the long term.

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

No/maybe. The problem is time. Curriculum development is labor intensive.

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

- We will need money for apparatus. However, lab fees might cover this.
- We still need faculty time for development.

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?

The biggest is time. This is a significant undertaking and we will need to get all faculty that teach this class on board. That means the faculty have to change what they do. Likewise, we will have to change the students' attitude about physics.

**Question:**
Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

This too is long term goal. First revision in the first year.

**Criterion:** #10: Goal Four - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:** 1. Comment on the specificity of the goal:

As stated the goal is unclear. Consider including: “Explore how to increase..." At the beginning of the goal.

2. Comment on the goal's measures:

Vague action steps. What, specifically, will be involved in actively recruiting under-represented groups?

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

Will need help from outside departments

4. Comment on the goal's relevance:

Very relevant

5. Comment on the timeline of the goal:

Reasonable

Possible opportunities for collaboration or suggestions for addressing a gap:

Multicultural and Diversity Affairs, Women and Returning Adults, Dual-Credit/School-Based Program

**Question:** Unit Goal - What is your unit goal?

Diversity of students studying physics.

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

I.D Increase the diversity of the IPFW Community

I.D.3. – Build and strengthen relationships, proactive programs and services to encourage enrollment of students from historically under-represented groups.

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.
High

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?

- Actively recruiting students from under-represented groups (in physics), minorities and women.
- This may require tailoring our message appropriately.
- Scholarship?

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

More students from these under-represented groups

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

No.

**Question:** Needed Resources - If you don't have enough resources, what additional resources do you need to accomplish this unit goal?

Not without more faculty time. That may be forthcoming.

We need help on how to seek these students.

Help finding money for scholarships.

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?

See above. We do not have as diverse a faculty as we might.

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

This is a year 2 goal.

**Criterion:** #11: Goal Five - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.
**Task Force:** 1. Comment on the specificity of the goal:

As stated the goal is unclear. The action steps seem to be specific goals.

2. Comment on the goal's measures:

Would be improved through the inclusion of quantifiable objectives.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

Similar theme—Lack of time

4. Comment on the goal's relevance:

Very Relevant

5. Comment on the timeline of the goal:

Ongoing

Possible opportunities for collaboration or suggestions for addressing a gap:

**Question:** Unit Goal - What is your unit goal?

Increase Scholarly Productivity and external funding

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

II.B. Promote mentoring relationships between faculty and students engaged in creation, integration, and application of knowledge.

**Why is this the only area that deals with scholarship? Why does it not value scholarship for its own sake? II.B. is really part of I.B.**

I.E.3 – Build and strengthen relationships with regional partners.

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

Medium High

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?
PHYS Physics

• Re-engage faculty with research.

• Faculty submission of proposals

• Faculty publications

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

• Increase in number of publications

• Increase in number of proposals submitted for external funding.

• Increased/more even distribution of students in research amongst faculty.

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

No.

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

Not unless we end the required overloads. Hopefully this will be partially fixed starting Fall 2015.

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?

The need for more faculty time.

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

This is an ongoing process.

**Criterion:** #12: Goal Six - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:**
1. Comment on the specificity of the goal:

As currently written, the goal is unclear. Are physics majors currently getting internships? If so, then the goal should be to increase internships. If not, it should be to start an internship program.

2. Comment on the goal's measures:

The measures would be improved by the inclusion of quantifiable objectives.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

Similar—need faculty time.

4. Comment on the goal's relevance:

Very Relevant

5. Comment on the timeline of the goal:

Reasonable

Possible opportunities for collaboration or suggestions for addressing a gap:

All offices that handle internships across campus (google IPFW internships—too many to list succinctly)

**Question:** Unit Goal - What is your unit goal?

Internships for physics majors.

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

I.E.2 – Develop activities and experiences that promote success in student achievement

I.E.4 – Promote majors and programs with strong job placement opportunities.

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

Medium

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?
• Actively seeking meaningful internships for students by contacting local employers and informing them of what a physics student can do, finding out their needs and seeing how physics students can fit those needs.

• Organize more seminars on relating to student

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

• More students in internships

• More seminars relating to getting internships and jobs.

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

Not without faculty time which will be coming with new hires. We also need times for seminars.

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

Another free hour during the week.

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?

We need to identify local companies and meet with them. This will take time.

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

This is a year 2-3 goal.

**Criterion:** #13: Goal Seven - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:**
1. Comment on the specificity of the goal:

   Clear

2. Comment on the goal's measures:

   Using a timeline would provide clearer metrics.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

   Time as a resource is needed.

4. Comment on the goal's relevance:

   Relevant

5. Comment on the timeline of the goal:

   Reasonable

Possible opportunities for collaboration or suggestions for addressing a gap

**Question:** Unit Goal - What is your unit goal?

Build more Hall Demonstrations

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

1.B. Increase student engagement.

One part of student engagement is a sense of place. We have been turning our hallways into a science museum and these “wall demonstrations” do capture student interest.

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

Medium

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?

Work with students to design and build these displays.

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

Simply counting the number of new active displays. The current number is 3.
**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

This goal requires both faculty and student time. Hopefully, with the new additions to the department we can achieve this goal.

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

TIME. A return to normal teaching loads (without mandatory overtime) would greatly help.

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?

Mentoring students, who will help create these demos, such that they see this as a valuable use of their time.

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

Ideally, we would like to add one new active display every two years until we have 10 such displays or run out of usable hall space.

**Criterion:** #14: Goal Eight - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:**
1. Comment on the specificity of the goal:

Clear

2. Comment on the goal's measures:

The measures would be improved by the inclusion of quantifiable objectives.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

Not currently able to achieve

4. Comment on the goal's relevance:

Possibly relevant

5. Comment on the timeline of the goal:

Optimistic

Possible opportunities for collaboration or suggestions for addressing a gap:

Geosciences

**Question:** Unit Goal - What is your unit goal?

**Build the Astrophysics subprogram.** This will include the existing Astronomy Minor and a Physics Degree with an Astrophysics concentration. It will provide more opportunities for undergraduate research in astronomy, an undergraduate observatory on campus, student collaborations with astronomers at other institutions, and undergraduates participating in astronomical, astrophysical and space physics internships. This subprogram, like the other Physics degrees, will produce graduates who are critical thinkers and problem-solvers with highly-developed mathematical and computational skills. Graduates of this program will also have practical problem-solving experience through student research at IPFW, and industry, scientific and engineering internships.

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.
I.A2. Use assessment data to improve student learning.

I.B1. Increase opportunities for engaged and experiential learning including service learning and internship programs.

I.B3. Expand the number of courses that have gateway courses.

I.B4. Expand use of high-impact instructional and advising interventions.

I.E2. Develop activities and experiences that promote success in student achievement through programs with strong student learning outcomes, high graduation rates, and strong job placement prospects.

II.B. Promote mentoring relationships between faculty and students engaged in creation, integration and application of knowledge.

II.C. Promote development of opportunities for faculty and student engagement with the community for the application and integration of knowledge.

III.A. Expand meaningful collaborations and research opportunities with regional, national, and global partners.

III.B. Provide access to outstanding intellectual programming.

III.D. Provide non-credit enrichment experiences for the community.

III.F. Serve as exemplar of free and open discourse.

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

Medium

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?
• Propose a new centerpiece “Techniques of Modern Astronomy” course, with similar goals to the Modern Physics laboratory course.

• Propose a Physics Degree with Astrophysics Concentration.

• Develop the course materials for the proposed courses. (A total of eight.)

• Build the undergraduate observatory.

• Propose to NSF for funds for student research scholarships (5-10 in Astronomy per year).

• Build on existing Science and Society at IPFW event to provide enrichment experiences for the public.
• Use SASI to show the public that students learning in a thriving research community are the best prepared for any well-paid job.
• Expand student-lead public outreach activities into Astronomy.

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?
Proposals for new courses accepted.

The number of students enrolling in the Astrophysics subprogram.

The number of students that graduate each year with an Astronomy Minor or a Physics degree with an Astrophysics concentration.

Majors accepted into summer internships per year.

The number of papers, presentations and talks given by undergraduates on their research.

The number of Physics with Astrophysics graduates getting technical and engineering jobs in Indiana and elsewhere, and going to graduate school.

How many members of the public come to events like SASI.

The number of astronomically-inspired outreach events put on each year by Physics majors.

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

No

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

- Time to develop and integrate the courses into a concentration and into the Physics degree.

- Space for an undergrad. Astronomy Laboratory for 5-10 students.

- Equipment (CCD cameras, spectrometers, lasers, optical components) for the “Techniques of Modern Astronomy” Course.

- Funds for the above equipment.

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?
For the Astrophysics subprogram to be viable in the long term, 3-4 students must be recruited per year. The program must serve 6-10 per year.

- Maintaining a program with up to 10 students.

- Providing and supporting a large enough variety of student research topics to appeal to their diverse interests

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

Three to five years. There is recruiting involved. There is curricular design.

**Criterion:** #15: Goal Nine - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:** 1. Comment on the specificity of the goal:

Clear enough

2. Comment on the goal's measures:

The measures would be improved through the use of quantifiable objectives.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):

External resources required

4. Comment on the goal's relevance:

Very relevant

5. Comment on the timeline of the goal:

Reasonable

**Question:** Unit Goal - What is your unit goal?

Fix PHYS 21800/21900 sequence so that students see greater relevance of this course for their majors.

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.
1.B.4, Expand use of high impact instructional interventions
1.B.5, Transform the concept of college classroom and delivery

**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

Medium

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?

- Develop the new curriculum so that the course promote students’ motivation in learning and better fits their carrier goal.
- Develop new laboratories to teach students skills applicable for a modern industrial applications.

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

- Product – the new lab sequences
- Improved student attitude (survey)
- Student achievement

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

No

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

- Faculty release time (a 3 hour (?) load dedicated to this goal.)
- Lab equipment

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?

Faculty time.

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?
This is probably 2-3 years away before we can really focus on this task. So, start in 2 years, finish in three.

**Criterion:** #16: Goal Ten - In this criterion, you will identify your unit goals and tell us how they align to Plan 2020, how they are measured, and what resources you need to meet them.

**Task Force:**

1. Comment on the specificity of the goal:
   
   Clear

2. Comment on the goal's measures:
   
   The metrics seem to be ambitious. They would be improved through the inclusion of quantifiable objectives.

3. Comment on the unit's ability to achieve the goal (include a consideration of the departmental profile and budget data):
   
   Help with recruiting

4. Comment on the goal's relevance:
   
   Relevant

5. Comment on the timeline of the goal:
   
   Ambitious

**Possible opportunities for collaboration or suggestions for addressing a gap:**

School of Education

**Question:** Unit Goal - What is your unit goal?

Fix Physics Teaching Program. The Physics Teaching Program has 133 credit hours of required courses. This is too much. It inhibits students from pursuing a physics teaching degree and the area needs real physics teachers. Therefore this has to be reduced.

**Question:** IPFW Goal - What 2020 goal(s) does this unit goal align with? List as many as apply. If it does not align, you may write “NA” or clarify.

I.B.1 – Increase opportunities for engaged and experiential learning

I.B.4 – Expand use of high-impact instructional and advising interventions.

I.C.1 – Develop and promote interdisciplinary programs. Physics teaching is interdisciplinary with education and physics.

I.D. Increase diversity. If we develop excellent local teachers, they will help us recruit students to IPFW, which should lead to a more diverse student population.
**Question:** Priority Level - Is the unit goal high, medium, or low priority? Limit your high-priority unit goals to 3 to 5.

medium

**Question:** Actions - What action(s) does your unit plan to take to support this unit goal?

- Completely revise the curriculum requiring compromise on the part of both physics and education. This has been enabled by the adoption of physics concentrations that have reduced requirements.

- Join PhysTEC – Physics Teacher Education Coalition

- Recruiting physics teaching majors.

**Question:** Metrics - With what metrics will you assess progress toward accomplishing this unit goal on an annual basis?

- Completion of revised Physics Teaching curriculum

- Membership in PhysTEC and attendance of PhysTEC meetings

- Increase number of physics teaching majors

- Increased regional number of physics teachers in high schools

**Question:** Resources - Are you able to accomplish this unit goal with your current resources?

Some of them, for example, the revision of the curriculum is possible for us to do with help from Education.

Joining PhysTEC.

**Question:** Needed Resources - If you don’t have enough resources, what additional resources do you need to accomplish this unit goal?

We need help recruiting.

**Question:** Challenges - What challenges, other than financial resources, might affect your progress toward accomplishing this unit goal?
Getting high schools to recognize they need physics teachers that are well trained.

Recruiting students to do Physics Teaching.

**Question:** Timeline - If achieving this unit goal will take longer than one year, what is your timeline for implementing and accomplishing it?

This is a 2-4 year plan. We might get the first action completed within a year.