2016-2017 Annual Assessment Report
Department of Physics
MS Physics
September 21, 2017

1. **What learning outcome(s) did you assess this year?** List all program outcomes you assessed (if you assessed an outcome not listed on your department SOAP please indicate explain). Do not describe the measures or benchmarks in this section Also please only describe major assessment activities in this report. No GE assessment was required for the 2016-2017 academic year.

SLO:

In this cycle the SLO assessed was the collection of all published papers with student co-authors, all Theses (Phys 299), and all student presentations given (departmental colloquia, regional, national, and/or international conferences). There were no project (Phys 298) submissions during AY 2016-17. The assessment report therefore concentrates on Measure A2 of the MS program's SOAP (attached as Appendix A):

"Every other year the department assessment coordinator will collect all published papers with student co-authors, all projects (Phys 298) and Theses (Phys 299), and all student presentations given (departmental colloquia, regional, national, and/or international conferences). The department assessment coordinator will summarize the content of the student works (papers, projects, theses, talks) and will collect these together with the student works for the review committee."

Measure A2 covers Outcomes 1.1, 1.2, 2.2, 2.3, 2.4, 3.2, and 3.3 of the SOAP.

2. **What assignment or survey did you use to assess the outcomes and what method (criteria or rubric) did you use to evaluate the assignment?** If the assignment (activity, survey, etc.) does not correspond to the activities indicated in the timeline on the SOAP, please indicate why. Please clearly indicate how the assignment/survey is able to measure a specific outcome. If after evaluating the assessment you concluded that the measure was not clearly aligned or did not adequately measure the outcome please discuss this in your report. Please include the benchmark or standard for student performance in your assessment report (if it is stated in your SOAP then this information can just be copied into the report). An example of an expectation or standard would be "On outcome 2.3 we expected at least 80% of students to achieve a score of 3 or above on the rubric."

We collected together all published papers by students (student authors underlined):

1. Preston Jones, Patrick McDougall, and Douglas Singleton, "Particle Production in a Gravitational Wave Background", *(Phys. Rev. D **95**, 065010 (2017)*). **(rank: 4)**

2. Michael Ragsdale and Douglas Singleton, "Schwinger Effect for Non-Abelian Gauge Bosons", (*IOP Conf. Series: Journal of Physics: Conf. Series **883**, 012014 (2017)*) **(rank: 4)**
3. Ryan Andosca and Douglas Singleton, "Time Dependent Electromagnetic Fields and 4d Stokes' Theorem", (*Am. J. Phys. **84**, 848 (2016)*). **(rank: 4)**
4. Vladimir Dzhunushaliev, Vladimir Folomeev, Arislan Makhmudov, Ainur Urazalina, Douglas Singleton, and John Scott, "Compact and extended objects from self-interacting phantom fields", *(Phys. Rev. D **94**, 024004 (2016)*). **(rank: 4)**
5. Douglas Singleton and Jaryd Ulbricht, "Time-dependent Aharonov-Casher effect", (*Phys. Lett. B **753**, 91 (2016)*). **(rank: 4)**
6. James Macdougall, Douglas Singleton, and Elias C. Vagenas, "Revisiting the Marton, Simpson, and Suddeth experimental confirmation of the Aharonov-Bohm effect", (*Phys. Lett. A **379**, 1689 (2015)*) **(rank: 4)**

We collected together all MS thesis:

1. Ryan Andosca "Time Dependent Electromagnetic Fields and 4d Stokes' Theorem" **(rank: 4)**
2. Patrick McDougall, "The Gravitational Schwinger Effect and Attenuation of Gravitational Waves" **[This thesis was awarded "best graduate thesis" in the CSM] (rank: 4)**
3. John Scott, "U(1)xU(1) Gauge Theory Applied to Magnetic Monopoles". **(rank: 4)**
4. James Macdougall, "The Time Dependent Aharonov-Bohm effect". **(rank: 4)**
5. Michael Ragsdale, "Schwinger Effect for Non-Abelian Gauge Bosons" **(rank:4)**
6. Melissa Blacketer**, "**VARIABILITY OF HOT SUBDWARF STARS FROM THE PALOMAR-GREEN CATALOG OF ULTRAVIOLET EXCESS STELLAR OBJECTS**" (rank:4)**
7. Lawrence Lechuga, "SIMPLE XRT: A SELF-SHIELDED IMAGE GUIDED RADIATION THERAPY DEVICE" **(rank 4)**
8. James Rubio, "QUANTUM COSMOLOGY: SOLUTIONS TO THE MODIFIED FRIEDMANN EQUATION" (**rank 4)**
9. Raua Menkabo, "The Experimental Investigation On Zinc Oxide Nanowires Grown By Chemical Vapor Deposition Technique" **(rank 2)**
10. Alaric Doria, "Acceleration and Observer Dependence of Vacuum States in Quantum Field Theory" **(rank 4)**

We collected together all 290 reports and 298 projects:

1. Patrick McDougall, "Particle Production in a Gravitational Wave Background". **(rank: 4)**
2. Michael Ragsdale, "Schwinger Effect for Non-Abelian Gauge Bosons". **(rank: 4)**
3. Ryan Andosca, "Time Dependent Electromagnetic Fields and 4d Stokes' Theorem". **(rank: 4)**
4. John Scott, "Compact and extended objects from self-interacting phantom fields". **(rank: 4)**
5. Jaryd Ulbricht, "Time-dependent Aharonov-Casher effect. **(rank: 4)**

6. James Macdougall, "Revisiting the Marton, Simpson, and Suddeth experimental confirmation of the Aharonov-Bohm effect". **(rank: 4)**
7. Jimmy Gonzalez, "Modeling Line Profiles in Accretion Disk of CVs by an Acoustically Heated Corona". (**rank: 4**)
8. Larry Scott, "Notes From 290 Fall 2016" **(rank 4)**
9. Lawrence Lechuga, "Magnetic Resonance Imaging Fundamentals" **(rank 4)**
10. Patrick Talbot, "Gadolinium Nano-particle Synthesis update" **(rank 4)**
11. Megan McGranaghan, "Context Dependence in Introductory Mechanics Courses" **(rank 4)**

We collected student presentations:

1. Ryan Andosca presented the talk "Time-dependent Electromagnetic Fields and the Four Dimensional Stokes Theorem" at the 2016 Central California Research Symposium for which he won best graduate talk (see the link http://www.fresnostate.edu/academics/grants/programs/students/symposium.html) **(rank: 4)**
2. Patrick McDougall presented the talk, "Particle Production in a Gravitational Wave Background", 2016 American Physical Society, Far West Section Meeting, Davis CA, October 2016. This talk won 2nd place for best graduate student talk (see the link https://www.aps.org/units/cal/awards/index.cfm) **(rank: 4)**
3. Patrick McDougall presented the talk "Particle Production in a Gravitational Wave Background", 33rd Pacific Coast Gravity Meeting, Santa Barbara CA, March 2017. **(rank: 4)**
4. Jimmy Gonzalez presented the talk, "My research work on dark matter searches at the LHC during summer 2016" at CSU Fresno **(rank 4)**
5. Marijus Brazickas, "W* analysis updates" at ATLAS dijet working group meeting **(rank 4)**
6. John Scott presented the talk, "Compact and extended objects from self-interacting phantom fields", 2016 American Physical Society, Far West Section Meeting, Davis CA, October 2016. **(rank: 4)**

We reviewed all of these papers, theses, 290 reports, and talks and found that 97% achieved a mark of 4 (on a scale of 1=lowest to 4=highest) in terms of excellence of physics and writing. Many of these written projects were published in top tier, peer reviewed journals. Since they underwent rigorous peer review we take that as the best outside indicator of the top performance of our students and of the success of the MS program in regard to this SLO. The oral presentations also were largely given at outside physics meetings and two of the talks were awarded prizes.

3. **What did you discover from the data?** Discuss the student performance in relation to your standards or expectations. Be sure to clearly indicate how many students did (or did not) meet the standard for each outcome measured. Where possible, indicate the relative strengths and weaknesses in student performance on the outcome(s).

We discovered that our students are preforming at an outstanding level for the most part in terms of their writing and also in giving research talks at local and national meetings. 90% of the students were achieving the highest possible score in this SLO assessment.

4. **What changes did you make as a result of the data?** Describe how the information from the assessment activity was reviewed and what action was taken based on the analysis of the assessment data.

We made no changes. The data indicate that the program is in excellent shape and no need for any changes at this point in time.

5. **What assessment activities will you be conducting in the 2017-2018 AY?** List the outcomes and measures or assessment activities you will use to evaluate them. These activities should be the same as those indicated on your current SOAP timeline; if they are not please explain.

In accordance with our timeline in the SOAP, we plan to assess outcomes 1.1, 1.2, and 3.3 using Measure A1:

Physics MS students will take the physics subject GRE and/or the MFT in physics. The MFT will be administered by the department assessment coordinator. The GRE scores and MFT scores will be collected by the department assessment coordinator for analysis. Advancement to candidacy requires GRE scores at or above the 25th percentile, or MFT scores at or above the median (currently a score of 148 or better).

We will collect students' GRE and MFT scores for the 2015-2017 period to examine the degree to which our students are able to demonstrate proficiency in major fundamental areas of physics, and to find out whether they have acquired the expected additional experience in important special topics in the field.

6. **What progress have you made on items from your last program review action plan?** Please provide a brief description of progress made on each item listed in the action plan. If no progress has been made on an action item, simply state "no progress."

Action plan items pertaining specifically to the MS program from our last program review (2016) are listed below.

- *Continue work by Dr. Huda to conduct a major website overhaul to better present the research done in the department and to assist our students.*

This item is now complete. The new department web site may be viewed at http://www.fresnostate.edu/csm/physics/

- *Meet with the dean to exchange information and set calendar-based plan and process to inform college and campus regarding events, recognitions and accomplishments about faculty, staff and students in physics.*

Communication with the dean's office regarding events, recognitions and accomplishments about faculty, staff and students in physics is ongoing and happens through multiple channels. However, a calendar-based plan has not been established.

- *Develop a justification for additional funding for faculty/student research engagement, develop a proposed calendar for the use of additional support and add a cost-based estimate for additional support. Schedule and present to the dean or associate dean.*

There has been no progress on this item due to the recent transition in the CSM's dean's office. We hope that with the arrival of Dean Christopher Meyer the department can move this item back to the top of our list of priorities.

- *Investigate current college and campus plans for fee waivers for TA's. Add your support to any existing proposals and/or develop and submit a separate request for review by the dean or associate dean keeping in mind that such a proposal should be considered for funding for the 2016-17 academic year.*

The department was anticipated here by Interim Dean Dundas: we now have tuition "waivers" for our TAs. More precisely, these are tuition incentives, since they have so far contributed only about $1500 to a few eligible TAs. While this constitutes undeniable progress, it is far from the original goal of a full tuition waiver for all our TAs. Since our budget under the new budget model leaves no room for departmental support for this initiative, we are left at the mercy of the university on the item that has perhaps the most profound impact on our graduate enrollment.

- *Request that the VP for Faculty Affairs attend a faculty meeting to review current policy on workload.*

This action plan item was intended to address the need for clarification (and a more appropriate accounting) by the office of the Provost of workload assignments across research, teaching and service, faculty salary issues, and transparency in budget allocations. All these topics have direct implications for our MS program, student enrollment and research, course availability, faculty teaching and research, and faculty and staff morale and well-being. Despite its importance, there has been no progress. As a matter of fact, despite literally years of waiting and multiple emails, the administration has not even responded to the faculty's requests.

- *Establish a written plan for recruitment of students at the undergraduate and graduate level. Continue support and expand (as appropriate) current physics and STEM outreach and recruitment programs.*

While we still don't have a written plan (which in retrospect seems unnecessary), we continue to support and expand outreach and recruitment programs. These programs are largely based on faculty talks at undergraduate institutions, with funding from the department's budget as well as from targeted funds from the Division of Graduate Studies.

- *Complete request from the Office of the Provost and Dean of CSM to provide summary of needs for new and replacement faculty position for the next five years.*

This item is now complete. We have secured permission to search for a new tenure-track faculty member in computational physics. The search is currently in progress.

Additional Guidelines: If you have not fully described the assignment then please attach a copy of the questions or assignment guidelines. If you are using a rubric and did not fully describe this rubric (or the criteria being used) than please attach a copy of the rubric. If you administered a survey please consider attaching a copy of the survey so that the Learning Assessment Team (LAT) can review the questions.

We have fully described the assignment.

MS Assessment Report Addendum:

The overall conclusion from the report is that the MS program is doing spectacularly well. 97% of the 290s/298s are getting a 4 out of 4 ranking. A large percentage of the MS students are publishing their work in top tier peer reviewed journals. Many MS students are also giving talks based on their research at local and national conferences/meetings.

However there appears to be a disconnect between some department policies and the level of support for research the department gives and the outstanding outcomes of our MS students and their faculty mentors. We will list these issues below and request that action be taken on each item to ensure the continued outstanding success of our MS program.

(i) There appears to be some confusion as to the requirements for the 290s. One of the authors of this report (Dr. Munoz) was under the impression that a written report was required only after the student had completed the work specified in the original agreement (i.e., when the final letter grade is entered in the my.fresnostate roster). This might take more than one semester since students often receive RP grades in 290s. The other author of this report (Dr. Singleton) was under the impression that a

report needed to come with each 290 every semester. Both of us agree that the latter is not a good policy and as well is not reflective of what actually happens. The department DAA only had recorded eight 290 reports turned in out of approximately 70 different 290s and some of these reports where actually PPT presentations. Further our own accounting of 290/298 reports gave 11 reports not counting the PPT presentations. Thus in practice there is clearly not "one report per 290 every semester" and in fact we find that such a policy (if it is the policy) is not reflective of good, productive research and in any case is not reflective of what actually goes on. Furthermore, such a policy would be impossible to enforce and in direct contradiction to the notion of an RP grade. Our suggestion in this regard is that a departmental research committee be formed to, among other things, come up with a good and workable policy for 290s that reflects the reality of how research is done and helps support rather than suppress the research excellence that is in evidence in our students' work – especially the published work in peer reviewed journals.

(ii) Faculty doing the MS assessment work should receive some release time. This condition was noted in the response to the program review team to the MS program. To quote: "A very simple solution in the case of assessment would be to permanently increase the department's budget so as to fund 3 WTU per semester of assigned time to be allocated to a departmental assessment coordinator … Until the 3 WTU per semester for the assessment coordinator becomes a reality, we recommend that assessment coordinator duties be given to the chair, since the chair does already receive release time for this kind of duty and has expressed support for assessment activities." Thus for the next cycle of MS assessment there should be some WTUs of release time assigned or as suggested this duty should fall to the chair.

(iii) The department should find ways to continue to support the students and the faculty who do such an outstanding job with getting students involved in real, publishable research. In the MS program review response several proposals where put forward or the department to pursue. In brief these suggestions were

(a) More credit for teaching graduate classes (along the lines, for example, of the 1.5 financial aid multiplier that students get when registering for graduate courses).

(b) Adoption as department policy the signing up of Phys 290 as single units rather than in blocks (or at least leave this to the individual faculty member and student)

(c) Allow the carry-over without expiration of overload WTUs from spring to fall just as from fall to spring.

(d) Form a department research committee which would set realistic and workable policies for Phys 290 and Phys 190, investigate ways to start up a research course, and in general to study how to support research-active faculty. The research committee will also propose the criteria by which a faculty would be considered research active. The creation and implementation of a research course would take into account the actual amount of time spent by faculty members when carrying out research with students. Phys 290 was created as an independent study course, and its 0.5 WTU are a badly inaccurate reflection of the amount of time research-active faculty devote to their thesis or project students.

(e) The research committee (see (d) above) will also make recommendations as to how Appendix B of APM 337 can be used to give release time to research active faculty (research active faculty being defined by the criteria proposed by the research committee in (d) above).

We strongly suggest that to continue the research excellence shown by our MS students and faculty that the department implement the formation of a department research committee to make policy in regard to research and research support. This is to ensure that the students who do the research and faculty who provide the research experience and mentorship are appropriately supported and compensated so that the MS program can continue to excel.

Scoring Level	Style and Format	Mechanics	Content and Organization
4 – Exemplary	- In addition to meeting the requirement for a "3," the paper is consistent with the APS/AIP Style Manual throughout. - Models the language and conventions used in related scholarly/professional literature. - Would meet the guidelines for a professional publication.	- In addition to meeting the requirements for a "3," the paper is essentially error free in terms of mechanics. - Writing flows smoothly from one idea to another. - Transitions help establish a sound scholarly argument and aid the reader in following the writer's logic.	- In addition to meeting the requirements for a "3," the paper excels in organization and presentation of ideas related to the topic. - Raises important issues or ideas that may not have been represented in the literature cited. - Would serve as a good basis for further research on the topic.
3 – Accomplished -	- While there may be a few minor errors, APS/AIP Style Manual conventions for style and format are used consistently throughout the paper. - Demonstrates thoroughness and competence in documenting sources; the reader would have little difficulty referring back to cited sources. - Style and format contribute to the comprehensibility of the paper.	- While there may be a few minor errors, the paper follows normal conventions of spelling and grammar throughout. - Errors do not interfere significantly with comprehensibility. - Transitions and organizational structures such as subheadings are used that help the reader move from one point to another.	- Follows all requirements for the paper. - Topic is timely and carefully focused. - Clearly outlines the major points related to the topic; ideas are logically arranged to present a sound scholarly argument. - Paper is interesting and holds the reader's attention. - Does a credible job summarizing related literature.
2 – Developing -	- While some of the APS/AIP Style Manual conventions are followed, others are not. Paper lacks consistency of style and/or format. - It may be unclear which references are direct quotes and which are paraphrased. Based on the information provided, the reader would have some difficulty referring back to cited sources. - Significant revisions would contribute to the comprehensibility of the paper.	- Frequent errors in spelling, grammar (such as subject/verb agreements and tense), sentence structure and/or other writing conventions make reading difficult and interfere with comprehensibility. - Writing does not flow smoothly from point to point; lacks appropriate transitions.	- While the paper represents the major requirement, it is lacking in substantial ways. - The content may be poorly focused or the scholarly argument weak or poorly conceived. - Major ideas related to the content may be ignored or inadequately explored. - Overall, the content and organization needs significant revision to represent a critical analysis of the topic.

1 - Beginning	- APS/AIP Style Manual conventions are not followed. - Fails to demonstrate thoroughness and competence in documentation. - Lack of appropriate style and format make reading and comprehensibility problematic.	- Paper contains numerous errors in spelling, grammar, and/or sentence structure that make following the logic of the paper extremely difficult.	- Analysis of existing professional literature on the topic is inadequate. - Content is poorly focused and lacks organization. - The reader is left with little information about or understanding of the paper's topic.

APPENDIX A

Department of Physics/MS Program

Student Outcomes Assessment Plan (SOAP)

I. Mission Statement

The primary mission of the Graduate Physics Program at California State University, Fresno, is to provide graduate students with a solid education in physics that is intended to form the basis for several career options. Our graduates are able to proceed on to Ph.D. studies, work in industry or teach at the secondary or junior college level. We achieve our mission by offering a flexible, broad-based academic program with the opportunity for specialization in theoretical physics, experimental physics or physics pedagogy. Our graduate students acquire a firm grounding in the major areas of classical mechanics, electrodynamics, quantum mechanics and mathematical physics. Optional courses are offered in particle physics, general relativity, relativistic quantum mechanics/field theory, and condensed matter. Further specialization is possible – and encouraged – by taking Phys 290 (Independent Study) courses in advanced topics. As part of our efforts to provide a more comprehensive education, students serving as Teaching Associates (TAs) in introductory laboratories gain valuable hands-on teaching experience.

II. Goals and Student Learning Outcomes

GOAL 1. To provide students with a solid background in the principal areas of physics.

Outcome 1. Students will pass courses and demonstrate proficiency in most of the major fundamental areas listed above.

Outcome 2. Students will broaden their knowledge and acquire additional experience in important special topics by successfully completing elective courses in physics and related areas.

GOAL 2. To provide adequate opportunity for students to apply their knowledge to practical experimental and theoretical research problems.

Outcome 1. The required culminating experience is to complete either a project (Phys 298) and a competency examination, or a thesis (Phys 299) in one of the three research avenues offered by the Department of Physics: experiment, theory, or physics education. Either alternative (Phys 298/299) provides practical experience.

Outcome 2. Provide computational experience using packages such as Mathematica, Excel and other relevant software, along with numerical techniques.

Outcome 3. Students performing experimental research will learn to design and set up experiments, and will become familiar with the operation of research instruments as well as with computer interfacing and digital data handling. Students performing theoretical research will learn advanced problem-solving methods to identify and address relevant questions probing or extending fundamental theories of physics. Research in physics education generally involves the development of

visual and diagrammatic teaching aids and demonstration equipment, identification of physics learning difficulties, and uncovering the role that misconceptions play in hindering physics learning.

Outcome 4 Students will demonstrate competency in searching and reading relevant physics literature. They will learn to find online and peer-reviewed journal articles, critically read and evaluate work by professionals in their field, and summarize these papers in written or oral form.

GOAL 3. To prepare students to pursue advanced degrees or to assume positions in education or science or industry, and to provide scientific speaking and writing experience.

Outcome 1. Students will demonstrate competency in speaking and presentation skills by delivering talks in courses, departmental colloquia, and in regional, national, and/or international conferences.

Outcome 2. Students will gain experience using word-processing, graphics and presentation software in preparing written reports, transparencies, posters, seminars, etc. They will write papers that meet the style and format of an appropriate peer-reviewed journal. Students will be encouraged to learn widely used software such as LaTex in the preparation of papers for publication in peer-reviewed journals.

Outcome 3. Students will acquire the requisite educational/technical background.

III. Curriculum Map (Matrix of Courses X Learning Outcomes)

Table 1: Alignment of Courses and Objectives for the Master of Science Degree in Physics.

	OUTCOMES								
COURSE	**1.1**	**1.2**	**2.1**	**2.2**	**2.3**	**2.4**	**3.1**	**3.2**	**3.3**
Phys 203	I								I
Phys 220A	I			I	I	I	I	I	I
Phys 220B	R, A			I	I	I	I	I	R, A
Phys 222A	I			I	I	I	I	I	I
Phys 222B	R, A				I	I			R, A
Phys 270	A			R	R	I			A
Phys 272	R, A			R	R, A	I			I, R
Phys 290	A	I, R, A		R, A	R, A	R, A	R	R	A
Phys 298	A	A	A	A	A	A	A	A	A
Phys 299	A	A	A	A	A	A	A	A	A

Phys 203: Classical Mechanics (4)

Phys 220A-B: Advanced Electricity and Magnetism (3-3)

Phys 222A: Quantum Mechanics I (3)

Phys 222B: Quantum Mechanics II (3)

Phys 270: Advanced Mathematical Physics (3)

Phys 272: General Relativity (3)

Phys 290: Independent Study (1-3)

Phys 298: Project (2-6)

Phys 299: Thesis (2-6)

I = Introduced; R = Reinforced; A = Advanced/Mastered

IV. Assessment Methods

A. Direct Measures

1. Physics MS students will take the physics subject GRE and/or the MFT in physics. The MFT will be administered by the department assessment coordinator. The GRE scores and MFT scores will be collected by the department assessment coordinator for analysis. Advancement to candidacy requires GRE scores at or above the 25th percentile, or MFT scores at or above the median (148).

2. Every other year the department assessment coordinator will collect all published papers with student co-authors, all projects (Phys 298) and Theses (Phys 299), and all student presentations given (departmental colloquia, regional, national, and/or international conferences). The department assessment coordinator will summarize the content of the student works (papers, projects, theses, talks) and will collect these together with the student works for the review committee.

B. Indirect Measures

1. An online, running alumni survey will be set up on the departmental webpage. The department assessment coordinator will collect this data every three years and summarize the results.

V. Student Learning Outcomes X Assessment Methods Matrix

Table 2: Learning Outcomes and Assessment Methods for the Master of Science Degree in Physics.

	OUTCOMES								
MEASURE	**1.1**	**1.2**	**2.1**	**2.2**	**2.3**	**2.4**	**3.1**	**3.2**	**3.3**
A1	X	X							X
A2	X	X		X	X	X		X	X
B1	X	X	X	X	X	X	X	X	X

VI. Timeline for Implementation of Assessment Methods and Summary Evaluations

Every Year

Measure A1. Outcomes 1.1, 1.2, 3.3.

Every Other Year

Measure A2. Outcomes 1.1, 1.2, 2.2, 2.3, 2.4, 3.2, 3.3.

Every Third Year

Measure B1. Outcomes 1.1, 1.2, 2.1, 2.2, 2.3, 2.4, 3.1, 3.2, 3.3.

VII. Process for Closing the Loop

The Department of Physics will establish a Graduate Assessment Committee which will consist of the department assessment coordinator and at least two other faculty members. The Graduate Assessment Committee will meet at least once a year and will review the scores of the GRE/MFT. Every second year they will review the summary and collected works of the students. Every third year they will also review the alumni survey data. Based on these reviews the Graduate Assessment Committee will suggest changes to the curriculum and/or the MS SOAP.

Assessment data and suggested program and assessment activities changes are presented to the entire faculty during a department faculty meeting near the end of each spring semester, and the entire faculty will decide whether to implement any changes.

Indirect Measure B.1 – Alumni Survey

Fresno State Department of Physics Alumni Survey

Personal information

Name: Last name when a student:

Address (City, State, Zip):

Email: Telephone (home/work):

Education

Fresno State degree(s) earned (check all that apply): ___Physics BS ___ Biomedical Physics BS ___Physics MS

Fresno State Graduation year:

Other academic institutions attended:

Name	**City, State, Country**	**Program Name**	**Dates Attended**	**Full/Part Time?**	**Degree Obtained (if any)**	

Fresno State Physics Program Effectiveness

for career 1. not very important 2. somewhat important 3. important 4. very important 5. extremely important N/A not applicable	Below are some abilities or types of knowledge that a student should possess upon graduation from the Department of Physics. Please use the scales on each side of the table to rate their importance for your career advancement as well as the effectiveness of your education at FRESNO STATE in developing them.	*education was* 1. not very effective 2. somewhat effective 3. effective 4. very effective 5. extremely effective N/A not applicable
1 2 3 4 5 N/A	Physics depth and breadth of knowledge	1 2 3 4 5 N/A
1 2 3 4 5 N/A	scientific problem solving	1 2 3 4 5 N/A
1 2 3 4 5 N/A	mathematical skills	1 2 3 4 5 N/A
1 2 3 4 5 N/A	lab or instrument skills	1 2 3 4 5 N/A
1 2 3 4 5 N/A	computer programming	1 2 3 4 5 N/A
1 2 3 4 5 N/A	communicating scientific information (speaking, writing)	1 2 3 4 5 N/A
1 2 3 4 5 N/A	research experience	1 2 3 4 5 N/A
1 2 3 4 5 N/A	word-processing, graphics and presentation software	1 2 3 4 5 N/A

Educational Experience

Please list up to three attributes of a professional in your discipline that you believe will either continue to be or will become important in the future.

a)_____

b)_____

c)_____

How would you rate your overall preparation to:	Not applicable	Extremely satisfied	Very satisfied	Satisfied	Somewhat satisfied	Not satisfied	
a) practice professionally within your discipline?							
b) interview and obtain your first job after graduation?							
c) succeed in subsequent graduate or professional education?							

If employed in physical sciences, how do you rate the overall quality of your educational preparation, relative to recent graduates from other schools? ____ much higher than average ___ higher than average ____ average ____ lower than average ___ much lower than average

What three things would you recommend to the Fresno State Department of Physics that would improve its education program?

a)_____

b)_____

c)_____

What three things about the Fresno State Department of Physics did you find most valuable for your career preparation?

a)_____

b)_____

c)_____

Would you recommend a Fresno State physics education to a friend or relative? ____ yes ____ no___ maybe

Would you recommend another Fresno State program to a friend or relative? ____ yes ____ no___ maybe

Professional Development

Membership in professional organizations:

Advanced professional certification:

Employment

Company (City, State, Country)	**Product/service**	**Yrs. employed**	**Job titles**	**Salary Code***
Current employer:		_____ to _____	start: finish:	start: finish:
First employer:		_____ to _____	start: finish:	start: finish:

*Salary codes in thousands per annum: A < 30; B = 30-39; C = 40-49, D = 50-75, E = 75-100, F > 100

Comments

Please use the space below for comments you may have about your education at Fresno State or about this survey.