**Annual Assessment Report for 2020-2021 AY**

Reports completed on assessment activities carried out during the 2020-2021 AY will be due September 30th 2021 and must be e-mailed to the Director of Assessment, Dr. Douglas Fraleigh (douglasf@csufresno.edu).

Provide detailed responses for each of the following questions within this word document. Please do NOT insert an index or add formatting. For purposes of this report, you should only report on two or three student learning outcomes (department’s choice) even if your external accreditor requires you to evaluate four or more outcomes each year. Also be sure to explain or omit specialized or discipline-specific terms.

Department/Program: \_\_Physics\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Degree \_MS\_\_\_\_

Assessment Coordinator: \_\_G. Munoz\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Please list the learning outcomes you assessed this year.

This assessment report concentrates on Measure A1 of the MS program’s SOAP:

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 148 as per ETS web site data).

Measure A1 covers Outcomes 1.1, 1.2, and 3.3 of the SOAP.

1. What assignment or survey did you use to assess the outcomes and what method (criteria or rubric) did you use to evaluate the assignment? **Please describe the assignment and the criteria or rubric used to evaluate the assignment in detail and, if possible, include copies of the assignment and criteria/rubric at the end of this report.**

13 MS Physics students took the Major Field Test (MFT) in Physics during the period ranging from Fall 2019 to October 15, 2021. The MFT is designed specifically for the assessment purposes relevant to this report. As the ETS web site states,

*“The ETS® Major Field Tests were designed to assist higher education institutions and academic programs in assessing student knowledge within the academic major. Each Major Field Test:*

* *is a comprehensive outcomes assessment designed to measure the critical knowledge and skills commonly obtained by college students in their major program of study*
* *evaluates students’ ability to analyze and solve problems, understand relationships and interpret material*

*Test results provide information on how students perform in relation to other students in their program and at comparable programs nationwide.”*

1. What did you learn from your analysis of the data? Please include sample size (how many students were evaluated) and indicate how many students (number or percentage instead of a median or mean) were designated as proficient. Also indicate your benchmark (e.g. 80% of students will be designated as proficient or higher) and indicate the number of students who met that benchmark.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Score | Percentile | Date | GPA |
| Student 1 | 152 | 58 | 10/18/19 | 3.55 |
| Student 2 | 162 | 78 | 11/25/20 | 3.67 |
| Student 3 | 146 | 42 | 11/25/20 | 3.42 |
| Student 4 | 162 | 78 | 11/25/20 | 4.00 |
| Student 5 | 128 | 4 | 11/25/20 | 3.20 |
| Student 6 | 159 | 73 | 11/25/20 | 3.67 |
| Student 7 | 134 | 14 | 11/25/20 | 3.00 |
| Student 8 | 157 | 69 | 3/26/21 | 3.36 |
| Student 9 | 120 | 1 | 3/26/21 | 3.17 |
| Student 10 | 161 | 75 | 3/26/21 | 3.52 |
| Student 11 | 133 | 11 | 3/26/21 | 2.86 |
| Student 12 | 154 | 62 | 3/30/21 | 3.23 |
| Student 13 | 156 | 65 | 5/13/21 | 3.69 |
| Student 14 | 169 | 87 | 5/14/21 | 2.86 |
| Student 15 | 166 | 84 | 10/15/21 | 4.00 |
| Student 16 | 139 | 28 | 10/15/21 | 3.61 |
| Student 17 | 152 | 61 | 10/15/21 | 3.50 |
| Student 18 | 128 | 6 | 10/15/21 | 3.17 |

Consistent with a previous report on MFT scores, it is remarkable that all the students that failed their first attempt to achieve a passing score (and were therefore forced to retake the exam) in this cohort came from undergraduate programs other than our own. This indicates that a majority of the students who score below the median come from undergraduate programs that do not provide an adequate background for a physics major. Unfortunately, the weaknesses in their backgrounds are not captured by the admissions process, as all of these students satisfied the typical admissions requirements including a 2.5 GPA and scores above 150 in the general GRE. As pointed out in our previous report, we must conclude that the MFT, although intended to test undergraduate knowledge within the academic major, is a very valuable tool to help identify students at risk.

Of the 13 students that have attempted the MFT during this period, there is only one that still has to demonstrate proficiency. In other words, upwards of 92% of these students are designated as proficient or higher.

The chart below shows that there is a strong correlation between students’ MFT scores and their overall GPA.



We believe this correlation confirms the conclusion above. Since graduate courses will obviously present a greater challenge to students with weak UG backgrounds, these students are also naturally expected to have lower GPAs. Thus, if low MFT scores are indeed a reflection of weak UG backgrounds, MFT scores should exhibit precisely the strong correlation with students’ GPAs seen in the chart below. On the other hand, the GPA-MFT score correlation indicates that our grading and assessment practices in the graduate courses are validated by an instrument used at the national level. This is undoubtedly of greater significance than assessment tools developed locally, since the latter would typically be conceived, applied, graded, and analyzed by the same faculty that teach the graduate courses. Unlike our MFT/GRE based assessment, in-house assessment methods such as these fail the basic scientific requirement of a control group to validate the conclusions drawn from the study.

1. What changes, if any, do you recommend based on the assessment data?

Our recommendations are to:

1. Continue to use the MFT as a tool to identify students at risk due to inadequate backgrounds.
2. Offer our GRE/MFT preparatory course in a more consistent manner. We offered this course again last spring, after a long hiatus imposed by staffing and budget issues. The positive impact was immediately apparent: some of the students with the weakest backgrounds were finally able to achieve passing scores after taking the course. Several of these students had unsuccessfully taken the MFT at least twice before, and showed no signs of improvement in their scores.
3. Assign tutoring activities for undergraduate courses to students who do not pass the MFT on their first trial. This is a long-standing recommendation which we are certain produces verifiable improvements in MFT/GRE performance, but the department has been denied permission to implement it. The reason appears to be budgetary in nature, which seems curious given the CSU’s interest in student recruitment, retention, and success.
4. As per recommendations put forward in our previous report, we considered the possibility of adding problem solving sessions to our graduate courses. This requires some care, since to make the proposal effective we would need to increase the units of a typical graduate course from 3 to 4, which would have numerous implications for the number of units of the graduate program as well as for faculty workload. After multiple discussions within the department, we recently submitted a Catalog change request that will make this idea a reality for some of our graduate courses.
5. Also in line with previous recommendations, we instituted a policy limiting the number of times the department will pay for the cost of the MFT. Although we do not believe this to be a widespread issue, there is a possibility that some students may not be preparing for the test as conscientiously as they should.
6. If you recommended any changes in your response to Question 4 in your 2018-19 assessment report, what progress have you made in implementing these changes? If you did not recommend making any changes in last year’s report please write N/A as your answer to this question.

Please see B – E above.

1. What assessment activities will you be conducting during AY 2021-22?

In accordance with our timeline in the SOAP, we plan to assess outcomes 1.1, 1.2, 2.2, 2.3, 2.4, 3.2, and 3.3 using Measure A2:

*“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.”*

We will collect and analyze Phys 298 reports, Phys 299 theses, and published papers. These works will be scored following a department rubric developed a few years ago and modified recently. Student presentations will not be evaluated, because our past experience has revealed that while valuable in principle, student presentations at conferences are in practice very difficult to evaluate consistently by a committee.

1. Identify and discuss any major issues identified during your last Program Review and in what ways these issues have or have not been addressed.

Issues identified during our last Program Review are reproduced below. Comments on our progress are included under each item.

*A. Recommended Changes to Mission and Goals of the Program*

*There are no recommended changes to the mission and goals of the program at this point.*

*B. Effectiveness of Instructional Program*

*1. Curriculum: The department would very much like to add numerical physics to its list of courses offered for the physics major as well as for the M.S. degree. This depends on securing a new hire position and being able to successfully do a search (see hiring plan in Appendix I1 and I2).*

Our search for a computational physicist resulted in the addition of Dr. Ettore Vitali to our faculty. He has already developed a number of courses in computational physics and statistical mechanics. Dr. Vitali has closed a major gap in our curriculum that had persisted for too long.

*2. Recruitment, Retention, and Student Services: We anticipate continuing on with our successful outreach program and adding more student services such as increased tutoring hours, providing more recitation sections, more facilities for students to assemble and get to know each other. However, the operating budget of the department is stretched thin because of expenses such as additional student assistants, tutors, demo/lab assistant, etc., all expenses that should either come from the Dean’s office or allow for an increase in the budget to pay for such expenses.*

Almost all action plan items listed under #2 had to be postponed and, as anticipated in our previous report, had to be abandoned almost in its entirety. Our budget has been reduced (as a percentage of the CSM’s budget), our colloquium funding has been cut substantially, and Covid-19 has made recruitment trips by our faculty impossible for the moment. Requests to continue our program of free tutoring by TAs for introductory courses have been denied, and we have neither funding nor space to hold recitation sections. The only item under #2 that survives is Don Williams’ outreach program, which thrives only because Don’s indefatigable efforts have secured a grant from Chevron.

3. *Community Interactions (Professional, Disciplinary, and Industry/Regional): We plan to continue with our presence in the Valley as the source of expertise involving our specialties and hope to maintain an interactive and personal relationship through the Downing Planetarium and the outreach program with the residents, parents, and children in the area.*

The Downing Planetarium and Museum are the pride of the Department of Physics. Probably close to a million visitors have attended shows at the facilities near Science II since the opening of the Planetarium. Its impact on Central Valley residents is vast, and inextricably linked to the tireless dedication of Steve and Kathy White.

*C. Resources*

*1. Financial/Budgetary: As explained above, the department is in dire need of getting the former half-time DAA position restored. There are several occasions during the week when there is no coverage if the student assistant is unable to come and the office has to be closed. This situation is not quite helpful for public relations*.

We have one DAA and one student assistant. Not much has changed unfortunately, but this is completely out of our hands.

*2. Faculty/Staff: As explained in detail above, a hiring plan for new faculty along with a five- year strategic hiring plan has been turned into the CSM (see Appendices I1 and I2). In addition, as part of an internal reflection process, the faculty also came up with a funding priority document to assist the development director in securing possible endowments for the department so that it is not as vulnerable to changes at the administrative level as evidenced in the last few years (see Appendix I5).*

In the last few years we have lost three faculty members to retirement. We have been allowed to hire one new tenure-track faculty member, Dr. Ettore Vitali. We have also recently seen the departure of some of our most hard-working lecturers

*3. Other: It has been commented upon in previous program reviews that our department is in different buildings around the campus. The main office and most of the classrooms along with a few faculty offices are in the main McLane building whereas some faculty offices are in the J Wing of McLane Hall and the biomedical physics faculty offices and classrooms are in Science II Building. While there is no immediate solution to bringing all the department faculty offices under one roof, this is perhaps, something to keep on the radar for future construction projects. Also of major importance to our graduate program is the need for additional space where faculty can meet and work with their project/thesis students.*

Given the current level of support from the university and the college, we see no hope that any of these goals will be realized any time soon.