SAINT LOUIS UNIVERSITY.

Program-Level Assessment: Annual Report

Program Name (no acronyms): Physics BS/BA	Department: Physics
Degree or Certificate Level: BS&BA	College/School: CAS
Date (Month/Year): July 29, 2020	Primary Assessment Contact: Irma Kuljanishvili
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In what year was the data upon which this report is based collected? 2020/2021

In what year was the program's assessment plan most recently reviewed/updated? 2020

1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment cycle? (Please list the full, complete learning outcome statements and not just numbers, e.g., Outcomes 1 and 2.)

In accordance with the schedule set by the assessment plan the following three outcomes were assessed:
In 2020/2021, items 1, 2, & 3 were assessed (see Appendix 2 for more detailed description of Outcomes 1-6).

1. *Outcome 1. Students will apply the principles of physics to problems of fundamental and practical interest.*
2. *Outcome 2. Students will design and conduct experiments and analyze and interpret data.*
3. *Outcome 3. Students will collaborate effectively on teams.*

2. Assessment Methods: Artifacts of Student Learning

Which artifacts of student learning were used to determine if students achieved the outcome(s)? Please describe and identify the course(s) in which these artifacts were collected. Clarify if any such courses were offered a) online, b) at the Madrid campus, or c) at any other off-campus location.

Student assignments, laboratory reports, written term paper, and students' oral presentation were used to determine if students achieved these specific outcomes. The following courses were used to collect data for the assessment process:
Modern Physics I, Optics, Optics Lab, Modern Physics Lab, Analog and Digital Electronics & Lab, Experimental Physics Classical Mechanics, Quantum Mechanics , Thermodynamics and Statistical Physics,
Electricity and Magnetism I&2, and Research 1, Research 2, and Research 3. (Three semester sequence of undergraduate research course). Most courses were offered face-to-face. Some courses which are underlines above were offered in the 'online' modality.

Students complete a research project encompassing at least three semesters of research at the conclusion of which they give an oral presentation in a department seminar. At the end of the seminar the physics faculty meets to discuss and assess students' oral presentations.

3. Assessment Methods: Evaluation Process

What process was used to evaluate the artifacts of student learning, and by whom? Please identify the tools(s) (e.g., a rubric) used in the process and **include them in/with this report document** (do not just refer to the assessment plan).

Faculty evaluated artifacts collected in courses they taught using the rubrics in Appendix 1 Physics Faculty met on June 10, 2021 for Annual Assessment meeting. Each Faculty provided feedback based on each faculty observations and their evaluations of students artifacts such as tests, term papers, oral presentations. Evaluations were ranked per specific Learning Outcome and approved rubric.
Rubric is provided in Appendix 1.
Summary of the data is provided in Appendix 2.

4. Data/Results

What were the results of the assessment of the learning outcome(s)? Please be specific. Does achievement differ by teaching modality (e.g., online vs. face-to-face) or on-ground location (e.g., STL campus, Madrid campus, other off-campus site)?

Results in general indicate that individually students in the program/s meet expectation.
In this year's assessment report the achieved results were not significantly different, (averaged scores were very comparable) from previous years 2019/2020.
Additionally, in spite of different modalities that individual courses used, all laboratory and project experimental courses were still offered 100% in-person, assessments results were steady and positive. This is, in part, due to the specific outcomes that were assessed in 2020/2021.
Senior Capstone courses for example, all final presentations took place via Zoom, and presentations by students in Zoom Class meeting. Specifically in oral presentations students did as well as it would be expected in face- to- face class presentation. In assessment of communications in writing, the same was noted. There was no statistically viable difference noted in written test and assignments.

(See Appendix 2:
Outcome 1, Average = 3.426
Outcome 2, Average = 3.019
Outcome 3, Average = 3.375).
One individual scores fall below 3 which indicates "Progressing towards expectation".

5. Findings: Interpretations & Conclusions

What have you learned from these results? What does the data tell you?

The physics program provides outlets for students to learn, apply their knowledge. Better mathematical preparation could be beneficial for some students. Research projects and written papers and oral presentations related to Senior Capstone research courses have greatly benefited from close Instructor-Student interaction and team work in cases where students are engaged in complex projects with multiple team members. Students demonstrated resilience and adapted easily to remote learning. During the recent difficult times, students demonstrated remarkable patience and tenacity working in the laboratories under COVID-19 safety restriction.
Faculty demonstrated dedication to students' learning in difficult situation, dictated by COVID-19, while discovering new ways to implement the use of online recourses (library/e-journals, e-books and webinars) as pedagogical tool.
Some faculty members continued to experience challenges due to new technology and insufficient technological infrastructure at home such as bandwidth, etc., regardless of faculty equipment which was adequately updated.
Faculty, in those, rare cases, resorted to other forms of communications such as e-mail, and other messaging applications.

6. Closing the Loop: Dissemination and Use of Current Assessment Findings

A. When and how did your program faculty share and discuss these results and findings from this cycle of assessment?

Faculty met in July 11, 2021, discussed minor chances that were proposed in assessment plan (from December

2020), and provided data on proposed outcomes to assess. This resulted in assessing three outcomes, rather than two outcomes per year, as it was done prior to 2020.

This report will be sent to the Associate Dean/s and will eventually be posted on the website http://www.slu.edu/the-office-of-the-provost/assessment-of-student-learning/program-level-assessment/college-of-arts-and-sciences
where it can be viewed by faculty, staff, students, and alumni.

B. How specifically have you decided to use these findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies	• Course content • Teaching techniques • Improvements in technology • Prerequisites	• Course sequence • New courses • Deletion of courses • Changes in frequency or scheduling of course offerings
Changes to the Assessment Plan	• Student learning outcomes • Artifacts of student learning • Evaluation process	• Evaluation tools (e.g., rubrics) • Data collection methods • Frequency of data collection

Please describe the actions you are taking as a result of these findings.

Changes to the Assessment Plan;
Last year certain changes were implemented. One course was added to assessment plan.
We have also adjusted the data collection, specifically from assessing two outcomes per year to three outcomes per year out of total six outcomes. This way complete set of data can be collected and analyzed after each 2 year cycle. This also ensures timely implementation of changes if such chances are needed. It also will help with and additionally eliminating spikes and fluctuations.

Changes to Curriculum;
While not directly related to these data, program will be revised specifically in relation to the launch of University wide new core in 2022. These chances in frequency of some course offering, or introduction of new Courses related to reorganization of program course requirements will be discussed in Fall 2021.

If no changes are being made, please explain why.

No identifiable issues were discovered.
Average scores were at the scale 3 which "Meets Exception". For outcome 1 and 3, average scores were above 3. One individual student score fell below 3, which specific faculty attributed to "student stopped coming to class". No supporting information was provided in this case. In COVID-19 situation such fluctuation are expected.

1.Below Expectations
2.Progressing to Expectations
3.Meets Expectations
4.Exceeds Expectations

7. Closing the Loop: Review of Previous Assessment Findings and Changes

A. What is at least one change your program has implemented in recent years as a result of assessment data?

We have started offering upper division courses with less frequency.
We have added one additional course to assessment which was added to list of courses which are being assessed under Outcome 1.

B. How has this change/have these changes been assessed?

Same assessment rubric was applied.

C. What were the findings of the assessment?

It is early to say with certainty; this cycle was the first year of these minor changes. It will be more evident after completing a full cycle after next year.

D. How do you plan to (continue to) use this information moving forward?

After new "full cycle" of all 6 outcomes assessment completion, faculty will meet and discuss results.

IMPORTANT: Please submit any assessment tools (e.g., rubrics) with this report as separate attachments or copied and pasted into this Word document. Please do not just refer to the assessment plan; the report should serve as a stand-alone document.

Appendix 1

Physics Assessment Rubrics

Outcome\Level of Attainment	1.Below Expectations	2. Progressing to Expectations	3. Meets Expectations	4. Exceeds Expectations
1**. Students will apply the principles of physics to problems of fundamental and practical interest.**	Not able to apply physics principles.	Can apply physics principles to simple problems with guidance.	Can apply physics principles to problems of increasing complexity	Can apply physics principles to problems beyond the classroom
2. **Students will design and conduct experiments and analyze and interpret data.**	Not able to conduct experiments or analyze data	Can conduct experiments and analyze data with direction	Can design and conduct experiments and analyze data with minimal direction	Can design and conduct experiments and analyze data independently. Demonstrates innovative thinking.
3. Students will collaborate effectively on teams.	Does not work well in groups	Contributes minimally to the efforts of a group	Participates actively in various aspects of group work	Works productively in groups, and inspires others
4. Students will communicate effectively and professionally in oral and written formats	Unable cogently to express ideas orally and in writing	Able to express simple ideas with some clarity	Able to express complex ideas with clarity	Able to express complex ideas with clarity and make connections among related ideas
5.Students will be able to discuss contemporary issues	Not able to discuss contemporary scientific and	Able to discuss such issues with guidance.	Able to discuss such issues on his/ her own	Has a broad knowledge of current issues

in science and technology	technological issues in context.		clearly and concisely	and conveys ideas clearly and concisely.
6.Students will be able to formulate numerically and solve scientific problems utilizing at least one programing language or environment	Not able to formulate a scientific problem as a set of numerical steps; and not able to produce code to solve it	Able to convert a scientific problem into numerically accessible steps with some assistance, code it and obtain results	Able to convert a scientific problem into numerically accessible steps, code it and obtain results. Investigate results and analyze errors.	Able to convert a scientific problem into numerically accessible steps, providing multiple alternative routes, code them and obtain results. Investigate results and analyze errors and optimize approaches.

Appendix 2

Physics Assessment Data (Assessed Outcomes 1, 2, and 3 based on rubric described above)

Outcome\Level of Attainment	Results
1. Students will apply the principles of physics to problems of fundamental and practical interest.	Modern Physics I (2610) Based on written solutions to test problems. CD 4, NG 4, GO 3, AS 3, HS 3 Classical Mechanics I (3110) Based on written solutions to test problems. CD3, GO3, AS3 Optics (3310) Based on homework and written solutions of test problems TM 3.5, DM 3.0, CM 3.5, GN 4.0, FS 2.5, NT 3.5, PV 3.5 PHYS(3410) Thermodynamics and Statistical Mechanics Students will do “research” homework assignments, where they are asked to investigate some fundamental problem in all possible aspects instead of answering specific questions. NG-3, SK-3, CML-3, NT-3 Modern Physics II, PHYS (3610) Students gave presentations, and wrote essays on topics of their interests, related to Modern Physics. SK 4, JL 4, YM 3, CM 4, AS 2.5 (AS: Physics Minor), (JL: BA) E&M I, PHYS (4210) Based on written solutions of homework and test problems CD 4, NG 4, SK 4, CML 4, NT 4

	E&M II, PHYS (4220) Based on written solutions of homework and test problems JL 4, AI 1, TM 4, DM 4, FS 4 Quantum Mechanics, PHYS (4610) Based on written solutions to test problems. AI1, SK4, JL4, YM4, CML4, GN4 PHYS(4870) Research II SK4, CML4, TM 4, DM 4, FS3, PV3 PHYS(4880) Senior Inquiry (Research Project—Research III) TM 4, DM 4, FS3, KMc4 Average = 3.426
2. Students will design and conduct experiments and analyze and interpret data.	Modern Physics I Laboratory (2620) CD 4, GO 3, AS 3 Optics Laboratory (3320) MB 3.2, EGR 3.0, TM 3.0, DMc 3.0, CML 3.0, FS 3.0 NT 3.1, FV 3.2 Analog & Digital Electronics (PHYS3510/PHYS3511(Lab) In A&D Electronics students do final projects of designing and building a functioning electronic device of their choice. The device must be functioning and of practical utility. To that end they apply knowledge of physics principles to design their device. AI-2 (stopped attending), TM-3, MY-3, DM-3, FS-3 Experimental Physics PHYS(4020) TM 3, DM 2, FS 4, PV 3, NT 2 PHYS(4880) Senior Inquiry (Research Project—Research III) Students designed and conducted experiments, collected and analyzed data. KMc 4.0 Average = 3.019
3. Students will collaborate effectively on teams.	PHYS(2620) Modern Physics Laboratory CD 4, GO 4, AS 4 Optics Laboratory (3320) Students worked in teams, conducted experiments and discussed experimental data. MB 3.0, EGR 3.0, TM 3.0, DM 3.0, CML 3.0, FS 3.0 NT 3.0, PV 3.0 Experimental Physics (4020) TM3, DM 3, FS 4, PV4, NT 3 PHYS(4870) Research II TM 4, DM 4 PHYS(4880) Senior Inquiry (Research Project—Research III)

	TM 4, DM 4, KMc 4.0 Average = 3.375