Oakland University Assessment Committee/General Education Committee
Assessment Plan Template for Integrated Program and General Education Capstone Course Assessment – 9/15/2020 update

This assessment plan template is for programs that wish to incorporate assessment of their General Education Capstone into their program assessment plan. Members of the University Assessment Committee (UAC) and General Education Committee (GEC) are always willing to work with individuals from any department to develop or revise their assessment plans. In addition, the Office of Institutional Research and Assessment (OIRA) has some very helpful tools for faculty and departments listed on their website. If at any time you have any questions or need any assistance, contact Reuben Ternes (ternes@oakland.edu) for matters related to program assessment or Susanne Condron (dscondron@oakland.edu) for matters related to General Education assessment.

Step 1: Basic Information

Program name: PHYSICS

Name of General Education Capstone Course(s): PHY 4970 – Undergraduate Seminar; PHY 4995 – Independent Research

School or College in which your program resides: College of Arts and Sciences

Program level (check all that apply):

Undergrad	**x**
Master's	☐
Doctoral	☐

Date most recent assessment report submitted: October 15, 2018

Current assessment contact representative (& email): K. C. Castoldi – castoldi@oakland.edu

Current department or program chair (& email): Andrei Slavin – slavin@oakland.edu

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Step 2: Type of Assessment Plan

Option A. Programs that have an external accrediting agency other than the Higher Learning Commission may be eligible to use their accreditor's response in lieu of following the UAC's standard process. These programs use the UAC's 'external accreditation mapping' form instead of this form. Programs without external accreditation should proceed to option B.

Option B. If you are not accredited by an external body (or your accreditor's standards do not meet the standards set by the Higher Learning Commission), then proceed to Steps 3-5 to create your assessment plan.

Step 3: Aligning Program Goals, Student Learning Outcomes, and Assessment Measures

A. Please begin your integrated assessment plan by populating the table below with program-specific information. Use the "Table Tools" in Word to add rows, merge cells, etc. as needed.

- In column 1, record your program goals as they relate your unit's program goals.
- In column 2, record your program's planned Student Learning Outcomes (SLOs) related to each program goal.
- In column 3, record the assessment measure(s) that evaluate each student learning outcome (note: each learning outcome should have an associated assessment measure).

B. Next, incorporate into the table information pertaining to your General Education Capstone course. You have the option of assessing *either* the two General Education Student Learning Outcomes (GESLOs) for Capstone courses *or* the three University Learning Outcomes (ULOs, formerly Cross-Cutting Capacities) that apply to your Capstone course. Please add the following to the table:

- In column 2, record either the two GESLOs or the three ULOs in the rows aligning with their relevant program goals. Also include a brief description of how they reflect your program goals; this might involve including course objectives from the syllabus for example.
- In column 3, record the assessment measures that will be used in the Capstone course to evaluate each of the GESLOs and/or ULOs.

For your reference, the two GESLOs are: (1) Student demonstrates appropriate uses of a variety of methods of inquiry and a recognition of ethical considerations that arise; (2) Student demonstrates the ability to integrate the knowledge learned in general education and its relevance to the student's life and career. The ULOs are: effective communication, critical thinking, social awareness, and information literacy.

The table below is pre-populated to illustrate one possible scenario: A program has two program goals and one SLO for each of those goals and has chosen to assess the three ULOs (two aligning with the first program goal and one with the second). Your situation may differ from this; the key is to have a logical flow of program goal → SLO/GESLO/ULO → assessment measure from left to right across the table.

PHY 4995 – Independent Research

(1) Program Goals	(2) Program SLOs and Gen Ed Capstone GESLOs or ULOs	(3) Assessment Measures
Goal #1 Graduates with Bachelor's degree are prepared with conceptual and technical skills to *pursue master's or doctoral studies in physics*. --- Goal #2 Graduates with Bachelor's degree are prepared with conceptual and technical skills to *pursue careers in industry and government laboratories*.	SLO #1 The students will come to master the fundamentals of scientific investigation and learn how to utilize methods appropriate to the discipline. In the process, they will become aware of ethical considerations associated to research. SLO #2 The students will develop expertise in the main areas of physics needed to enter *graduate programs* and will master the physics needed to understand many technologically important phenomena which prepare them for a *career in physics*. SLO #3 In the capstone experience the students will be called to apply the basic concepts and applications of physics learned in the introductory courses and the theories of classical and modern physics mastered in the advanced courses. SLO #4 The students will communicate the results of their investigations in a written paper, a poster session and/or an oral presentation *[ULO #1 – Effective Communication].* They will apply the critical thinking acquired through previous physics courses to assess the validity of their own research *[ULO #2 – Critical Thinking].* In the process, they will become familiar with the proficient use of physics literature and information location, retrieval and citation *[ULO #3 – Information Literacy].*	Measure #1 Exit Survey Measure #2 Alumni Survey Measure #3 The ETS Major Field Test, a standardized physics exam covering classical and modern physics, is administered before graduation Measure #4 Paper/presentation/poster session

PHY 4970 – Undergraduate Seminar

(1) Program Goals	(2) Program SLOs and Gen Ed Capstone GESLOs or ULOs	(3) Assessment Measures
Goal #1 Graduates with Bachelor's degree are prepared with conceptual and technical skills to *pursue master's or doctoral studies in physics*. --- Goal #2 Graduates with Bachelor's degree are prepared with conceptual and technical skills to *pursue careers in industry and government laboratories*.	SLO #1 The students will come to appreciate a variety of methods in research. For instance, experimental, theoretical, and computational physics research. In the process, they will be exposed to ethical considerations that arise in research. SLO #2 The students will develop expertise in the main areas of physics needed to enter *graduate programs* and will master the physics needed to understand many technologically important phenomena which prepare them for a *career in physics*. SLO #3 In the capstone experience the students will be called to apply the basic concepts and applications of physics learned in the introductory courses and the theories of classical and modern physics mastered in the advanced courses. SLO #4 The students will summarize the content of the seminars in a series of written assignments *[ULO #1 – Effective Communication].* For each seminar, they will describe the underlying physics, discuss any limitations of the methods utilized by the speaker, and provide suggestions for additional research. The students will also describe how the scientists use critical thinking to assess the validity of their research [*ULO #2 – Critical Thinking]*. In the process, they will become familiar with the proficient use of physics literature and information location, retrieval and citation *[ULO #3 – Information Literacy].*	Measure #1 Exit Survey Measure #2 Alumni Survey Measure #3 The ETS Major Field Test, a standardized physics exam covering classical and modern physics, is administered before graduation Measure #4 Writing assignments/participation

Step 4: Participation in Assessment Process

List who will participate in carrying out the assessment	What will be their specific role/s?
All full-time faculty	• Capstone course instructors will evaluate their course resulting papers/programs/posters etc. and pass them along to the Assessment Committee for review • Each capstone course instructor will administer the Exit Survey to their students (the Exit surveys are then passed to the department secretary for storage) • All full-time faculty will meet to discuss the results of the Assessment Report produced by the Assessment Chair to determine if changes to the program are required • All faculty will be involved in implementing changes to the program that result from the assessment report and discussion • All faculty will be involved in the approval of any revised Assessment Plan and/or Report to be submitted to UAC
Assessment Committee: 6 Full-time faculty, each acting as department advisor for one or more branches of physics. Namely: Astrophysics, Medical Physics & Biophysics, Engineering Physics & Geophysics, Materials Physics, and Secondary Teacher Education (STEP)	• Review the evaluation of papers/programs/posters etc. produced by the capstone course instructors • Review the Exit Survey and the Alumni Survey • Review the results of the ETS Major Field Test exams • Discuss possible changes required to the program
Assessment Chair	• Prepare reports on the Exit Survey and the Alumni Survey • Collect material and data from all capstone course instructors • Collect data from the ETS Major Field Test exam • Analyze all collected materials and produce a summary for the department

List who will participate in carrying out the assessment	What will be their specific role/s?
	• Present and discuss the results of the assessment with the Assessment Committee to determine if any changes to the program are required • Produce the Assessment Report for UAC (share draft with all faculty for feedback and produce a revised, final version) • Ensure that any discussed changes to the program are carried out by the department

Step 5: Plan for Analyzing and Using Assessment Results to Improve Program

A. How will you analyze your assessment data?

a. Measure #1 – Exit Survey

A survey of all Exiting Students will be conducted. A copy of the survey is attached.
The survey contains a series of questions designed to determine how the students perceive their overall experience at Oakland University and, more specifically, with the instruction received by Physics Department and with its facilities.

b. Measure #2 – Alumni Survey

A survey of OU Physics Alumni will be conducted every other year. A copy of the survey is attached.
The survey contains a series of questions designed to determine if the students were properly prepared for their graduate studies and/or professional career.

c. Measure #3 – ETS – Major Field Test Examination

A program-wide assessment examination will be administered to each student at the end of the capstone course (PHY 4970 or PHY 4995). This Major Field Test was developed by Educational Testing Services (ETS) to measure student progress and assess the educational outcome of major programs, including Physics.
ETS provides tests that will be proctored by the Assessment Chair. The tests are graded by ETS and scores are reported to the department for the overall student's performance in the test, along with performance in the introductory physics and advanced physics components of the test. Department's means are also produced.
These individual student scores and institutional mean scores can then be utilized to determine the level of achievement of the individual student in our program, but also to compare the overall level of the students in the program compared to a pool of over 5,000 students at about 200 other institutions.

d. Measure #4 – Paper/Presentation/Poster Session from Capstone Course

Each student is required to take at least a capstone course to gain an appreciation of physics research. In particular:

Physics BA/BS	PHY 4995 (Independent Research) or PHY 4970 (Undergraduate Seminar)
Engineering Physics BS	PHY 4995
Medical Physics BS	PHY 4995 or PHY 4970
Physics STEP	PHY 4995 or PHY 4970

In the PHY 4995 course, depending on their choice of type of research experience (e.g. experiments, theoretical, computational), some students will summarize their research experience in an article suitable for publication in a professional journal; others will produce an abstract to be submitted for presentation at a professional meeting; others still will produce a poster and present it at the "Meeting of the Minds" or a similar symposium that provides the opportunity for showcasing undergraduate research. Other students instead will learn some sophisticated program, such as Wolfram Mathematica or Python, that allows them to perform computer simulations of physics phenomena or physics configurations.

The course instructor and at least another faculty member who has expertise in the particular area of research will assess the student's performance. Also, all full-time faculty members meet regularly to discuss the results of their research and, in the process, they discuss the performance of the students involved in the capstone courses.

In the PHY 4970 course, students will be required to write a series of papers, present a Poster session, and actively participate to the Q&A at the end of the seminars. Types of papers are, a 250-words 'Abstract' paper summarizing the research presented in the seminar, a 'Peer Review' paper providing critique to the research performed by the speaker, a 'Research Proposal' on how to extend the research described during the seminar, and a few other short papers aimed at familiarizing the students with the integration of equations in the text and of citations.

Descriptions of the courses and (embedded) grading rubrics are attached.

B. How will you use results to improve your program and/or your capstone course?

The Assessment Committee will meet periodically to review the results of the assessment measurements and discuss whether program changes are required to achieve program goals.
If it is determined that changes are required, the committee will prepare recommendations that will be presented to and discussed by all the full-time physics faculty.
If the entire faculty determines that some of or all recommendations should be implemented, the Assessment Chair will submit a revised Assessment Plan to UAC. At the same time the changes will be implemented and monitored. Their impact on the program will be evaluated, and the entire process will be reiterated on an ongoing basis.

Step 6: Submit Assessment Plan
Send completed form electronically to ternes@oakland.edu.