



2015-16 Academic Program Assessment Report

Reports must be uploaded into the Assessment Portal (<https://uoeee.asu.edu/assessment-portal>) and approved by the college no later than September 30, 2016.

College: ES_GR

Academic Unit:

Program: ESSEECPSM

Program Background

Please provide your program mission statement.

List the names and titles of those participating in the assessment planning, analysis and reporting activities for this program.

Harvey Bryan, PhD, Program Director

Karen Dada, Program Manager

Please describe your program's assessment process and specific assessment activities during the 2015-16 academic year. Please include [who](#) was involved and [how](#) they were engaged in assessment activities.

The assessment process involves:

- developing and distributing surveys
- meeting with an Industrial Advisory Board
- evaluating student progress

Two surveys were developed and distributed by the Program Manager during the 2015-16 academic year. One survey involved collecting student feedback on the courses they have taken. This information was used to help future students with their course selection, and to evaluate the compatibility of the courses with the mission of the PSM SEEC program.

The second survey was distributed to PSM SEEC alumni to determine average starting salaries after graduation, current salaries, the length of time students/graduates spent looking for jobs, and the type of industry worked in after graduation.

Meetings with the PSM SEEC Industrial Advisory Board were coordinated by the Program Director and Program Manager. Attendees at the meetings involved Board members and faculty. The Board provides feedback regarding prominent developments and/or issues facing the solar energy industry, and that information is used to enhance the program's curriculum.

Finally, student progress in meeting the program requirements is monitored by the Program Director and Program Manager through the use of grades and adherence to PSM SEEC, FSE and ASU policies and guidelines.

Of important note is the small size and recent establishment (spring 2011) of our program, both of which allow us to keep relatively close tabs on our alumni. We are pleased to have several lines of communication open with most of our alumni, including a private Linked In group, weekly news announcements, and networking mixers. Our alumni are frequently the source of job and internship announcements.

If [no data](#) were collected for this program during 2015-16, please use the space below to note the reason and describe the strategies in place to ensure that data collection will occur during 2016-17, and then continue to the last page of this report and provide any changes to your current assessment plan.

n/a

During the 2015-16 academic year, what changes have been made to the program, curriculum, and/or instruction? Why were these changes made? Please discuss how those changes were implemented and their intended impact on student learning.

Based on feedback received from our Industrial Advisory Board, a Photovoltaic Systems Engineering course was added to the program in fall 2015. This new class is used as the required photovoltaic engineering course for the program. Recognizing that PSM SEEC students come from a variety of STEM undergraduate backgrounds, this course covers the basic principles of planning, design, installation and operation of photovoltaic systems. Following with the mission of the PSM SEEC program, the course includes discussion of engineering, policy and economic considerations for a wide variety of solar energy systems, ranging from residential to utility-scale.

Program Assessment Results

Outcome 1: Demonstrate understanding of solar energy engineering technologies and how they apply to various applications (utility, residential, operation and maintenance, etc).

What do these results indicate about the extent to which students from this program possess the knowledge or skill reflected in Outcome 1? How do your results support this conclusion? Please use the space below to indicate whether or not each performance criterion was met and to describe components of the program you believe contributed to this result.

True to the PSM SEEC program objectives, students are working in a variety of solar-related companies, ranging from commercial and utility scale solar design firms such as Ameresco, to residential solar installers like SunRun, to photovoltaic testing labs such as TUV Rheinland, to solar start-ups to solar policy advocacy groups (Solar Electric Power Association). Our students have secured jobs across the country, from California to Massachusetts, Georgia to Arizona.

Of particular interest is the fact that several companies have hired multiple PSM SEEC graduates over the past several years. These companies include First Solar (hired five PSM graduates), Ameresco (hired two PSM graduates, and made an offer to a third who accepted employment elsewhere), Sun Run (hired three PSM graduates), Natural Power and Energy (hired two PSM graduates), and TUV Rheinland (hired three PSM graduates).

Outcome 1 met?

Yes

Measure 1.1	Satisfactory performance in required Photovoltaic Engineering Course based on rubric covering understanding of overall system functionality, application, design and installation.		
Performance Criterion 1.1	Satisfactory performance is indicated when 90% or more successfully complete the course requirements. Successful completion is based on a grading rubric covering the student	Was the Performance Criterion Met?	Yes
Results	<p>18 Students were enrolled in 2015/16. Of those students, 16 graduated from the degree program. Two progressed at a part-time pace and both are scheduled to graduate in either fall 2016 or summer 2017. All students successfully completed coursework necessary to achieve passing grades, thus demonstrating the ability to:</p> <ul style="list-style-type: none"> a) apply knowledge of mathematics, science and engineering; b) design a system, component, or process to meet desired needs; c) function on multidisciplinary teams; d) understand the impact of PV engineering solutions in a global and societal context; e) demonstrate knowledge of contemporary solar energy engineering and commercialization issues; f) use techniques, skills, and modern engineering skills for engineering practice. <p>Therefore, 89% have successfully completed the course requirements necessary to complete the degree program; and 100% successfully completed course requirements to progress through to the next semester.</p>		
Number of Observations Included in Assessment (e.g., number of students, papers, projects)	18	Proportion of <u>Target Population</u> Assessed	100%
Data Collection Challenges or Issues [if applicable]	N/A		

Measure 1.2	Students demonstrate sufficient knowledge of PV solar energy engineering technologies to secure employment or further graduate study after graduation.		
Performance Criterion 1.2	Satisfactory performance is indicated when 80% or more of reporting graduates are appropriately employed in the solar or a related industry, or go on to further graduate study, within one year of degree completion.	Was the Performance Criterion Met? Yes	
Results	<p>Because this performance measure tracks student employment rates within one year of degree completion, the graduating cohort from the 2014/15 year are evaluated. Of the 15 students who graduated from that cohort, all 15 are full-time employees within the solar industry. True to the PSM SEEC program objectives, students are working in a variety of solar-related companies, ranging from commercial and utility scale solar design firms such as Ameresco, to residential solar installers like SunRun, to photovoltaic testing labs such as TUV Rheinland, to solar start-ups to solar policy advocacy groups (Solar Electric Power Association). Our students have secured jobs across the country, from California to Massachusetts, Georgia to Arizona.</p> <p>Of particular interest is the fact that several companies have hired multiple PSM SEEC graduates over the past several years. These companies include First Solar (hired five PSM graduates), Ameresco (hired two PSM graduates, and made an offer to a third who accepted employment elsewhere), Sun Run (hired three PSM graduates), Natural Power and Energy (hired two PSM graduates), and TUV Rheinland (hired three PSM graduates).</p> <p>In regards to the 2015/16 cohort, most graduate in the summer, and have only completed the degree requirements within the last month (August 2016). Of the 16 students who graduated during fall and spring semesters of the 2015/16 academic year, we are aware that six are employed full-time within the solar industry and two have moved on to pursue doctoral degrees here at ASU. Therefore, 50% of our 2015/16 graduates received jobs or pursued further academic study within the solar industry within only one month of degree completion.</p> <p>In spring 2016, the PSM SEEC Program Manager sent a Qualtrics survey to our alumni to collect information on employment after graduation. The survey was sent to 52 alumni, of which 31 responded. The survey sought to collect information regarding the length of a student's job search, when they started their job search in relation to their graduation date, their initial starting salary after graduation, and their current salary. Information was collected as to the length of time an alumnus had been graduated from the program (<1 year, 1-2 years, 2-3 years, 4-5 years; the program is five years old).</p> <p>Based upon the responses received, the average starting salary is \$69,150, with a current average salary of \$87,910 (a 21% increase within 1-5 years after graduation). Of the four respondents who graduated 4-5 years ago, all are earning \$100,000 or more a year. Seventy-five percent of respondents secured employment in the solar industry as their first job after graduation.</p> <p>Most respondents started their job search before graduation (42% more than three months before graduation; 32% 0-3 months before graduation). This information will be helpful so we can direct the students to ASU resources, such as Sun Devil Career Link and the Engineering Career Center, during this time. We also will consider instituting some resume writing and/or interview skill workshops to help the students transition into their professional careers.</p>		
Number of Observations Included in Assessment (e.g., number of students, papers, projects)	16	Proportion of Target Population Assessed	100%
Data Collection Challenges or Issues [if applicable]	<p>As the applied project is the required culminating experience of the program, this measure does not present data collection challenges or issues.</p> <p>True to the PSM SEEC program objectives, students are working in a variety of solar-related companies, ranging from commercial and utility scale solar design firms such as Ameresco, to</p>		

	<p>residential solar installers like SunRun, to photovoltaic testing labs such as TUV Rheinland, to solar start-ups to solar policy advocacy groups (Solar Electric Power Association). Our students have secured jobs across the country, from California to Massachusetts, Georgia to Arizona.</p> <p>Of particular interest is the fact that several companies have hired multiple PSM SEEC graduates over the past several years. These companies include First Solar (hired five PSM graduates), Ameresco (hired two PSM graduates, and made an offer to a third who accepted employment elsewhere), Sun Run (hired three PSM graduates), Natural Power and Energy (hired two PSM graduates), and TUV Rheinland (hired three PSM graduates).</p>
--	---

*Ideally, the eligible population includes only students enrolled in your program. In cases where vital courses have students from various programs, specify when the population may include non-majors. The measure may be targeting, graduating students, alumni, students in junior level or capstone courses. The measure should be specific and the proportion should be of that group.

Outcome 2: Effectively communicate engineering and policy aspects of the solar industry

What do these results indicate about the extent to which students from this program possess the knowledge or skill reflected in Outcome 2? How do your results support this conclusion? Please use the space below to indicate whether or not each performance criterion was met and to describe components of the program you believe contributed to this result.

<p>HSD 594 is one of the cornerstones of the PSM SEEC program, as it allows students to demonstrate their knowledge of how the solar industry is impacted by both technology and policy. The course is designed to demonstrate that successful deployment of solar energy technology requires training and understanding within both technical and socio-economic/commercial aspects of the industry. The workshop builds from the technical knowledge offered to students throughout the program, and requires that they apply that technical knowledge to real-world policy problems and settings. Throughout the workshop, students must engage with national and international policy experts to apply that knowledge and further develop their policy research on complex solar issues that consider science, technology and society. Students who successfully meet the requirements of this course have demonstrated their ability to effectively evaluate and communicate the engineering and policy aspects of the solar industry.</p> <p>The applied projects provide students a further opportunity to focus on one specific area, or on one specific issue facing the industry. Successful completion of the applied projects demonstrate that students have considered a specific issue relevant to the solar industry and evaluate the problem within the context of available or emerging technologies, financial feasibility and within the context of existing or proposed policies.</p>	<p>Outcome 2 met? Yes</p>
---	--------------------------------------

<p>Measure 2.1</p>	<p>Satisfactory performance in Science Outside the Laboratory course (HSD 594), which coalesces the engineering and policy learning outcomes of the PSM SEEC Program.</p>		
<p>Performance Criterion 2.1</p>	<p>Satisfactory performance is indicated when 90% or more successfully complete the course requirements. Evaluation of success is based on grading rubric of a) identification of issue; b) evaluation of problem; c) consideration of available solutions; professional conduct and leadership; d) written communication; e) oral communication.</p>	<p>Was the Performance Criterion Met? Yes</p>	
<p>Results</p>	<p>13 students were enrolled in HSD 594, and all satisfactorily completed the course requirements, receiving a grade of "Pass" based on the course grading rubric.</p>		
<p>Number of Observations Included in Assessment (e.g., number of students, papers, projects)</p>	<p>13</p>	<p>Proportion of <u>Target Population</u> Assessed</p>	<p>100%</p>
<p>Data Collection Challenges or Issues [if applicable]</p>	<p>None</p>		

<p>Measure 2.2</p>	<p>Satisfactory performance in student applied projects, the culminating experience for the PSM SEEC program.</p>		
<p>Performance Criterion 2.2</p>	<p>Satisfactory performance is indicated when 90% or more successfully complete the SEC 594, Applied Project course. Evaluation of success is based on grading rubric of a) identification of issue; b) evaluation of problem; c) consideration of available solutions;</p>	<p>Was the Performance Criterion Met? Yes</p>	

	professional conduct and leadership; d) written communication; e) oral communication.	
Results	Of the 16 students who presented applied projects during the 2015/16 academic year, all 16 demonstrated satisfactory performance, which included identifying an issue facing the solar industry; evaluating the problem, considering available solutions, demonstrating professional conduct and leadership, and demonstrating appropriate written and verbal communication to their applied project committee.	
Number of Observations Included in Assessment (e.g., number of students, papers, projects)	16	Proportion of <u>Target Population Assessed</u> 100%
Data Collection Challenges or Issues [if applicable]		

*Ideally, the eligible population includes only students enrolled in your program. In cases where vital courses have students from various programs, specify when the population may include non-majors. The measure may be targeting, graduating students, alumni, students in junior level or capstone courses. The measure should be specific and the proportion should be of that group.

Program Self-Assessment

Please summarize how the assessment results for the 2015-16 academic year will impact your **academic program** in the coming year. Consider what the assessment data indicate are programmatic strengths or weaknesses and areas of possible development.

The assessment results show that the program is doing well in terms of graduates securing jobs soon after, or in some cases, before graduation. We believe this success is attributable to the applied project and also the extensive industry networking that is offered to the students by the PSM SEEC program. We will continue to focus on providing enhanced industry networking experiences and opportunities for the students and the graduates.

One such activity was the re-establishment of our spring seminar series in which we coordinate a panel of industry experts to discuss industry issues or concerns that will be important to the students as they begin their job search. This panel discussion was not held during the past two years, but we believe that re-establishing the seminar will not only provide additional networking opportunities for our students, but also a recruiting opportunity for the program, because we invite the broader Fulton Schools of Engineering community of students to attend this event.

The results from the employment survey will be helpful in reminding students to utilize ASU resources such as Sun Devil Career Link and the Engineering Career Center at about four months before graduation. This timeframe would also be good for offering resume writing and/or interview skill workshops.

Furthermore, we will continue to help students develop applied project concepts that will serve as a marketing piece for their job search. During the last three years, we have found great success from our "Shark Tank" during which students pitch their applied project concepts to our Industrial Advisory Board, and the Board provides feedback that helps ensure the project ideas are relevant to the industry, and properly scaled for the required six-credits.

Please summarize how the assessment results for the 2015-16 academic year will impact your **assessment process** for the coming year. Please consider revisions to your plan, sampling strategies, data collection, or any other areas.

We would like to continue sending students a formal survey of graduating students to encourage feedback on specific courses, and also get more information on their job search and starting salaries. This information helps with student recruitment, advising, and placement.

Based on student feedback, we would like to offer introductory hands-on training for software platforms frequently used in the solar industry (PV Syst, HelioScope, AutoCAD). Because many of these students do not come from undergraduate disciplines that focus heavily on writing, we also would like to offer more access to resources for formatting and citation, to assist with development of their applied project papers and other reports required throughout the program.

Finally, the Industrial Advisory Board and faculty have recommended developing an photovoltaic system operation and maintenance course. The Program Director and Program Manager are working with faculty to develop this course and plan to offer it in spring 2017.