SJSU Annual Program Assessment Form
2018 Report

Instructions

1. Complete the attached form and submit it as an email attachment to *Graduate and Undergraduate Programs* (academicassessment@sjsu.edu) on or before **March 15, 2018**.

2. Please copy your college's Associate Dean and Assessment Facilitator on the email submission. Assessment Facilitators are also available to provide support - please feel free to contact them with any questions or concerns.

3. Completed forms will be posted on your Program Records webpage.

This report is organized into three sections designed to organize your annual assessment efforts and to inform your department's Program Planning. Here is the rationale behind each section.

Part A – The Big Picture

- This section will likely only need to be prepared once at the beginning of your assessment cycle, although it should be reviewed each year and updated as necessary. This information should be included in each annual report, even if it has not changed.
- This section lists your Program Learning Outcomes (PLOs) and, more importantly, how they connect with your curriculum within the program and the University Learning Goals (ULGs).
- Finally, this section presents your assessment plan for the current planning cycle in the form of a multi-year schedule (usually 5 years, updated as part of Program Planning). This schedule should indicate which PLO(s) will be assessed each year, as well as your plans for implementing changes based on assessment results, and re-assessment after changes have been given time to take effect.

Part B – What We Did This Year

- This section details your assessment efforts over the last year (Spring and Fall 2017).
- Which PLO(s) were assessed, how was the data collected, and what do the data tell you with regard to student achievement on this PLO? What do you plan to do, if anything, to improve future achievement levels (i.e., "close the loop")?

Part C – Keeping Track of the Changes ("Closing the loop")

- This section is meant to keep a running record of your efforts to improve your students' outcomes. This table should grow throughout your assessment cycle and will be an important part of your next Program Plan.
- Create a new row in the table each time you propose a change as a result of your assessment efforts. Then be sure to keep track of your change efforts in subsequent years.

SJSU Annual Program Assessment Form
Academic Year 2017-2018 Report

Department: Meteorology & Climate Science
Program: BS Meteorology
College: Science
Program Website: www.sjsu.edu/meteorology
Link to Program Learning Outcomes (PLOs) on program website: yes of course we have!
Program Accreditation (if any): N/A
Contact Person and Email: Alison Bridger (Chair), alison.bridger@sjsu.edu
Date of Report: 3/28/18

Part A

1. **List of Program Learning Outcomes (PLOs)**

The PLOs for the Meteorology and Climate Science program follow closely the standards accepted by the American Meteorological Society (AMS: BS in Meteorology recommendations). The roadmap for the BS in Meteorology, following the guidelines from the AMS, includes courses in Mathematics, Physics, and Chemistry in addition to courses in the department that teach computer programming and statistics. The students take required meteorology courses covering atmospheric dynamics, atmospheric physics, and synoptic meteorology.

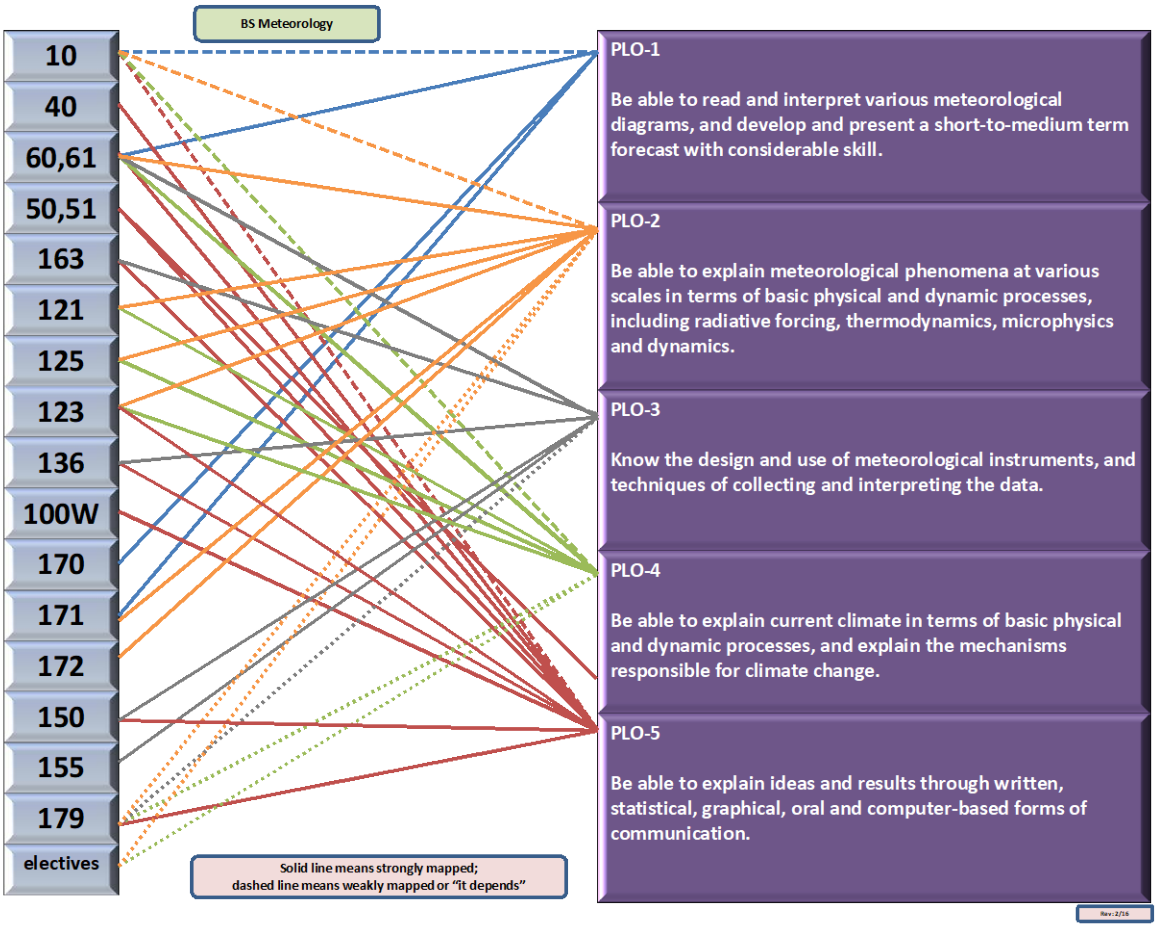
The five PLOs for the BS Meteorology are:

1. Be able to read and interpret various meteorological diagrams, and develop and present a short-to-medium-term forecast with considerable skill.
2. Be able to explain meteorological phenomena at various scales in terms of basic physical and dynamic processes, including radiative forcing, thermodynamics, microphysics, and dynamics.
3. Know the design and use of meteorological instruments, and techniques for collecting and interpreting the data.
4. Be able to explain current climate in terms of basic physical and dynamical processes, and explain the mechanisms responsible for climate change.
5. Be able to explain ideas and results through written, statistical, graphical, oral and computer-based forms of communication.

2. **Map of PLOs to University Learning Goals (ULGs)**

	BS METEOROLOGY					
university	program	PLO-1	PLO-2	PLO-3	PLO-4	PLO-5
		charts & forecasting	explain met phenomena	met instruments & data	climate	communication
ULG-1 1.1		X	X	X	X	X
ULG-2 2.1		X	X	X	X	X
2.2		X	X	X	X	
2.3			X		X	
ULG-3 3.1		X	X	X	X	X
3.2		X	X	X	X	X
ULG-4 4.1		X	X	X	X	
4.2		X	X	X	X	X
4.3		X	X	X	X	X
ULG-5 5.1			X	X	X	
5.2					GE only	
courses		170,171	60,61,121,125,171	163	112	100W,179,170,171
				60,61,71,123,173,174		

3. **Alignment – Matrix of PLOs to Courses**



4. **Planning –** [**Assessment Schedule**] (per posted schedule)

	AY 13-14	AY 14-15	AY 15-16	AY 15-16	AY 17-18
PLO 1					
PLO 2					
PLO 3					
PLO 4					
PLO 5					

5. **Student Experience**

a. All PLOs are posted online (**NEW THIS YEAR**: they are now 1 click away. This is a major assessment improvement.) Please find them at http://www.sjsu.edu/meteorology/
b. Faculty continue to be encouraged by the chair to include language in our syllabuses that: (a) mentions the existence of department PLOs; and (b) includes the URL.
c. Almost all faculty use the CANVAS system, in which PLOs, rubrics etc. can be easily and readily shared with students.
d. **NEW THIS YEAR**: we conducted a survey to see whether students have found this information. Survey results are discussed in the MS-Meteorology report.

Part B

6. **Assessment Data and Results**

In the 16-17 cycle, we assessed PLO 4: *Be able to explain current climate in terms of basic physical and dynamical processes, and explain the mechanisms responsible for climate change*. Data was gathered during the Spring 17 offering of METR 61, our sophomore-level "Intro" class for both BS-Meteorology and our BS-Climate Science students. {As a result, this report will be identical in the BS-Climate Science assessment report}.

On the final exam for MET 61, we wrote a number of questions designed to assess students' abilities to both (i) explain current climate in terms of basic physical and dynamical processes, and (ii) explain the mechanisms responsible for climate change. The data gathered was as follows:

- Questions 32-35 each required a 1-2 word answer
- Questions 36-37 each required a short essay answer
- Question 38 presented a graphic on net radiative forcing of climate change due to anthroprogenic causes, and required students to study the graphic and extract data etc.

Grading proceeded as follows:

- Questions 32-35: score on each answer could range from 0 (wrong answer) to 1 (correct answer), with a possible score of ½ (partially correct/incorrect response)
- Questions 36-37: scored out of 10
- Question 38 was in 5 parts, with possible scores of 0, ½, and 1.

Student breakdown:

- There were 13 students enrolled.
- Of whom, 3-4 were in the BS-Clim Sci program
- Of whom, 8-9 were in the BS-Metr program
- And one was Open U (post-BS)
- Only one of the 13 did not show up for the junior year

7. **Analysis**

Student #	Q32	Q33	Q34	Q35	Q36	Q37	Q38
1	0	1	1	1	7		4.5
2	0	1	1	1	10		5
3	0	.5	0	1	6		4.5
4	.5	1	1	1	9		4.5
5	.5	.5	1	1	8		4.5
6	.5	.5	1	1	8		3.5
7	0	0	1	1	7		5
8	.5	1	0	1	6		5
9	0	.5	0	1	9		4
10	.5	.5	1	1	11		4
11	.5	.5	1	1	6		4
12	0	1	1	1	8		5
13	0	0	0	1	4		5
Student #	Q32	Q33	Q34	Q35	Q36	Q37	Q38
Average	23%	61%	69%	100%	76%		90%

We believe that all scores on these questions are satisfactory – except for Q32. For the other questions, we had the usual response of "most students did OK-well at answering the question", with a small number of "students did poorly at answering the question" or "student got the wrong answer". The latter can happen in "fill in the blank" questions (Q32-35).

Why was Q32 answered poorly? The question was: "Our planet's climate is fundamentally driven by the pole-to-equator variation of this (answer is more than one word):". The desired answer was: "***net*** radiative heating", meaning not just "solar heating" or "infrared cooling" but the balance of the two. In general students did not answer this well.

Why did students not answer this well? There are two possible reasons: (a) the question was not well-posed by the instructor (Bridger). This could potentially be addressed by putting the same question on the MET 61 final again, but written more carefully. The class is being taught in Spring 18 by another instructor, and will probably not be taught again by Bridger. Thus it is difficult to fix this ("close the loop") under statistically appropriate conditions (same class, same instructor, same curriculum). Also, this instructor has efforted to **not** ask the same questions again in case students keep a bank of old test questions, so…

A second possible reason is that the concept is difficult, viz that it's not just solar heating, and it's not just longwave cooling, but the net effect of the two that matters. Many concepts in our science are fuzzy when students first learn them, and then become more clear in subsequent classes (junior, senior year).

Either way, this should be an area to add emphasis to in future classes on climate changes and physical causes.

8. **Proposed changes and goals (if any)**

The caveat above is important and will be re-stated (*in italics*): Low scores on Q32 of this assessment instrument could potentially be addressed by putting the same question on the MET 61 final again, but written more carefully. *The class is being taught in Spring 18 by another instructor, and will probably not be taught again by Bridger. Thus it is difficult to fix this ("close the loop") under statistically appropriate conditions (same class, same instructor, same curriculum). Also, this instructor has efforted to* ***not*** *ask the same questions again in case students keep a bank of old test questions*, so…

The concept of **net radiative heating/forcing** is an area that needs more emphasis in future classes on climate changes and physical causes.

Closing the loop: to do this properly, we should put the same question on the MET 61 final again, but written more carefully. This would provide good data provided the instructor is the same and the curriculum is the same. However, we cannot guarantee this (especially since the instructor is going FERP). If we gather data in this class taught in a different way by a different instructor, we will be comparing apples with oranges. None of us can believe this is even remotely statistically meaningful, and thus is of dubious utility.

Part C

9. **Program Learning Outcomes**

What are your proposed closing-the-loop action items and completion dates?

Describe the progressive changes and the status in the table below.

Proposed Changes and Goals	**Status Update (what's being done and results observed)**	**Date reported**
Ensure customers fully understand the importance of **net** radiative forcing	This is to be looked at next time SLO4 is assessed, right?	Today 3/28/18

10. **Program planning action items**

What is the direct web link to the program's latest action plan?
The last plan (2013) is posted at:
http://www.sjsu.edu/gup/ugs/faculty/programrecords/Science/Meteorology/METR_Docs/METR_Action Plan_2013.pdf

The current plan is working thru the system (external reviewer has visited and commented, report is going up the pipeline).

Describe the action items and the status in the table below.

Action item description	Status Update (what's being done and results observed)	Date reported
#1	Done	Report?
#2	Done	Report?
#3	Thanks!	
#4	Thanks!	
#5	Done!	Fall 17

Last updated: January 7, 2018 by Thalia Anagnos