SJSU Annual Program Assessment Form
Academic Year 2016-2017

Department: Meteorology and Climate Science
Program: MS in Meteorology
College: Science
Program Website: www.sjsu.edu/meteorology
Link to Program Learning Outcomes (PLOs) on program website:PLO BS Climate
Program Accreditation (if any):
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Date of Report: March 10, 2017

Part A

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

   The PLOs for the Meteorology and Climate Science program follow the standards accepted by the American Meteorological Society (AMS: BS in Meteorology recommendations). The roadmap for the MS in Meteorology is consistent with most universities that grant graduate degrees. Beginning graduate students are strongly encouraged to take METR 202 (Research Methods in Meteorology). The students take three required courses: METR 205 (Advanced Atmospheric Dynamics), METR 215 (Advanced Physical Meteorology), and METR 240 (Numerical Modeling). The department periodically offers a wide range of elective courses, which include topics such as turbulence, fire weather, parameterization in numerical models, and advanced synoptic meteorology. The program requires each student to complete a thesis based on research.

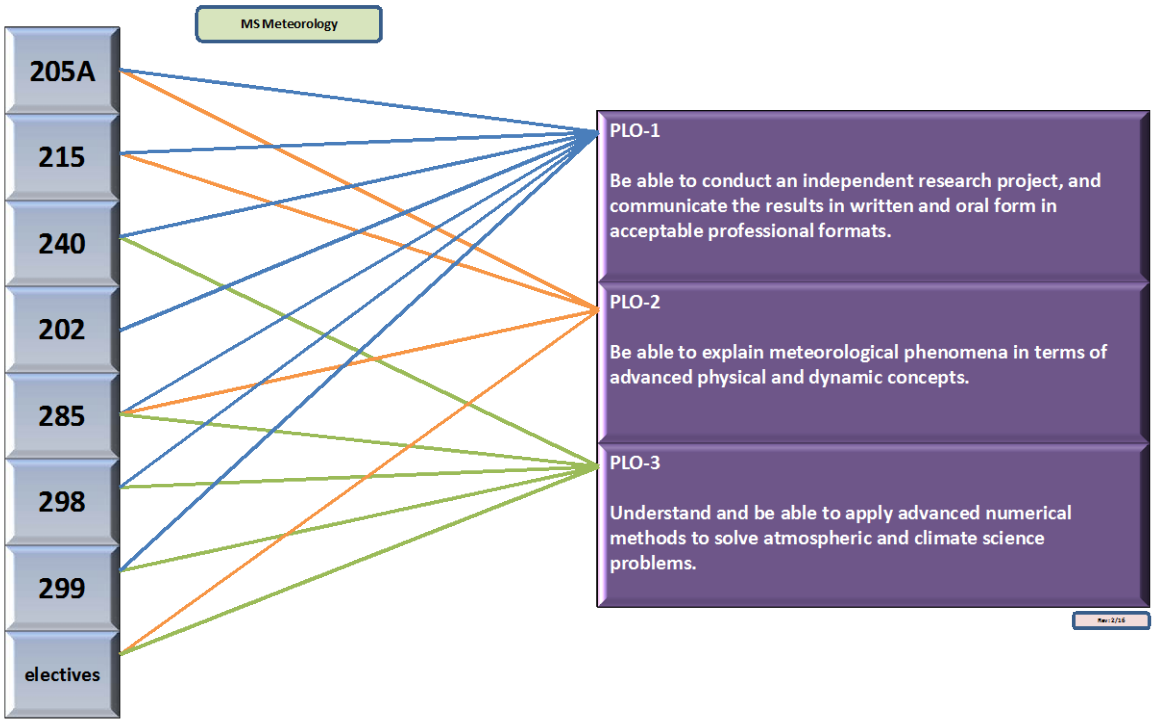
   The PLOs for the MS Meteorology are:

   1. Be able to conduct an independent research project, and communicate the results in written and oral form in acceptable professional formats.
   2. Be able to explain meteorological phenomena in terms of advanced physical and dynamic concepts.
   3. Understand and be able to apply advanced numerical methods to solve atmospheric and climate science problems

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

		MS METEOROLOGY			
university		program	PLO-1	PLO-2	PLO-3
			independent research project	explain met phenomena	numerical methods
ULG-1	1.1		X	X	X
ULG-2	2.1		X	X	X
	2.2			X	
	2.3			X	
ULG-3	3.1		X	X	X
	3.2		X	X	X
ULG-4	4.1		X	X	X
	4.2		X	X	X
	4.3		X	X	X
ULG-5	5.1			X	
	5.2				
courses			thesis!!	205,215	240

3. Alignment – Matrix of PLOs to Courses



4. Planning

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

5. **Student Experience**
   a. All PLOs are posted online (currently 2 clicks away, but this will be upgraded to 1 click away).
   b. **New this year**: PLO language has been added to the department landing page.
   c. Faculty have been encouraged by the chair to include language in our greensheets that: (a) mentions the existence of department PLOs; and (b) includes the URL.
   d. Almost all faculty use the CANVAS system, in which PLOs, rubrics etc. can be easily and readily shared with students.
   e. It has not ever occurred to us to seek feedback from students on PLOs! We wrote them to be clear, and we assume they are clear! Likewise, it has never occurred to us to ask for student feedback on the whole assessment experience! Our students seem happy ☺. **New this year**: We are developing a mini-survey on this. At first, we will target undergrads, but may extend to grad students later.

Part B

6. Assessment Data and Results

- **Our process**

As a small program, our assessment process has differed from the norm. Large programs which offer every course every semester, have the opportunity to match a PLO from their planning matrix (per #4 above) with one or more classes every semester, and thus can readily gather data and close the loop. Life is different in small programs. There are three core science classes we require of our MS students (205, 215, 240), together with a "research methods course (202)" which was designed to satisfy GWAR. The three science courses are offered on a 3-semester rotation, and 202 is taught when/if we have a large enough cohort. Thus in some semesters, we offer a single 200-level course (suitable for measuring PLOs @ graduate level), while in others we offer two such classes.

In a given year when we conduct program assessment, with the grad program we look *first* to see which class we're offering from the menu above, and *second* to see which PLO we could therefore assess. The campus paradigm is to do the opposite. As we've explained above, that's often not possible in a small program. We try our best to cover all PLOs in a 5-year cycle, as required.

It can also be quite difficult to "close the loop" in these circumstances. For example, the class MET 205 has been taught every 3rd semester for the last few years. It's currently being taught by the 3rd different instructor in the same time period. Each instructor will bring his/her own experience, interest, and teaching style to the class. Some will highlight very mathematical approaches to the problem, while others may emphasize computational approaches, which still covering the same basic curriculum. As a result, shortcomings identified in class X taught by instructor Y in year N may not be addressable for quite some time. This point is returned to below.

- **Our report**

In the 15-16 cycle, we assessed PLO 2: ***Be able to explain*** *meteorological phenomena in terms of advanced physical and dynamic concepts*. Since the assessment cycle was mysteriously moved up by 3 months, we will report here on your feedback on our report on this from last year.

> **In the present 16-17 cycle**, we plan to assess PLO 1: *Be able to conduct an independent research project, and communicate the results in written and oral form in acceptable professional formats*. We have plenty of data for this, although the data will be in binary format (yes *vs* no).

Going back to PLO 2 from last year, we chose to assess this PLO via two required grad classes, METR 205 (Fall 15) and 240 (Spring 16). Both courses require students to understand the fundamental concepts of atmospheric circulation and demonstrate that understanding through exams, homework assignments, and projects that require papers and presentations. The assignments and projects also require computer programming.

In Spring 16 in a faculty meeting we identified the classes (205 & 240) we would use to assess PLO 2. The assessment coordinator and faculty worked out the details of which exact data to use, gathered the data and wrote the report. At this point there was a fracture in the system, viz the chair did not notice that faculty were using class grades as an indicator of meetage of PLO 2. When this arrangement was

discussed @ faculty meeting, the chair should have popped up and reminded faculty that that's a no-no, so we will all be on the lookout for this in future. The chair will remind (has reminded) faculty that course grades, exam grades etc. can NEVER be used as a basis for assessing a PLO. Even if the PLO stated "be able to pass a midterm exam".

This appears to have been the main issue with our assessment of PLO 2 in AY 15-16, and there's no reasonable way we can go back and fix the problem. We will have discussions in a near-term faculty meeting on how to properly gather and analyze data.

In the meantime, and based on admittedly casual analysis, we remain confident that our grad students are meeting our PLOs through our rigorous classes and expectations. For one thing, they are all getting jobs! Quite a few are leaving for jobs before they complete the thesis – this will be the topic of this year's analysis of PLO 1.

7. Analysis

This was covered directly above.

8. Proposed changes and goals

First, we will work to address assessment of PLOs via preferred metrics. As far as these two grad classes are concerned, one thing that emerged clearly in AY 15-16 is that students coming into the SJSU program from elsewhere (i.e., out-of-state), generally have markedly poorer computing skills than graduating SJSU majors. This became a significant deterrent to learning, since it slowed the class (MET 240) and also required to instructor to spend epic amounts of time with weaker students. We will implement certain changes based on this, as outlined below, and test their effectiveness in a future cycle.

Part C
Overall, we are happy with our graduate program. We have high standards (as recognized by colleagues at other institutions), and high expectations, and we generally have very positive outcomes.

Proposed Changes and Goals	**Status Update**
Assess programming skills	Since the course (MET 240) was not taught this year, we have not checked this box yet.
Complete programming training for those who don't pass assessment.	Since the course (MET 240) was not taught this year, we have not checked this box yet.
Ensure MS students are aware of the PLOs for the program	Pending