SJSU Annual Program Assessment Form
Academic Year 2014-2015

Department & College: **Aerospace Engineering**
Website: ae.sjsu.edu
University Learning Goals addressed at:
http://ae.sjsu.edu/academics/bsae/bsae-program-educational-objectives
http://ae.sjsu.edu/academics/bsae/bsae-program-outcomes
http://ae.sjsu.edu/academics/msae/msae-program-educational-objectives
https://ae.sjsu.edu/msae-program-outcomes
Program Accreditation (if any): ABET (BSAE)
Contact Person and Email: Dr. Nikos J. Mourtos nikos.mourtos@sjsu.edu
Date of Report: 01 June 2015

Part A

1. List of Program Learning Outcomes (PLOs): No changes
2. Map of PLOs to University Learning Goals (ULGs): No changes
3. Alignment – Matrix of PLOs to Courses: No changes
4. Planning – Assessment Schedule: No changes
5. Student Experience: No changes

Part B

6. **Graduation Rates for Total, Non URM and URM students (per program and degree)**

Academic Programs		First-Time Freshmen: 6 Year Graduation Rates		New UG Transfers: 3 Year Graduation Rates		Grads: 3 Year Graduation Rates	
		Fall 2008 Cohort		Fall 2011 Cohort		Fall 2011 Cohort	
		Entering	% Grad	Entering	% Grad	Entering	% Grad
Aerospace Engineering	Total	59	**42.4%**	19	**57.9%**	16	**62.5%**
	URM	10	30.0%	02	50.0%	03	100%
	Non-URM	45	46.7%	15	60%	10	40%
	Other	04	25.0%	02	50.0%	03	100%

The graduation rates shown above are significantly higher than those in last year's (AY 2013–2014) report. Specifically:

- The *Total* First-Time Freshmen 6-Year Graduation Rate increased from 33.3% to **42.4%**, the New UG Transfer 3-Year Graduation Rate increased from 37.5% to **57.9%** and for MSAE graduates the 3-Year Graduation Rate increased from 41.7% to **62.5%.**

- The *URM* First-Time Freshmen 6-Year Graduation Rate increased from 21.4% to **30.0%**, the New UG Transfer 3-Year Graduation Rate increased from 0% to **50.0%** and for MSAE graduates the 3-Year Graduation Rate increased from 50.0% to **100%**, although the cohort numbers in the last two groups are very small to be statistically significant**.**

- The *Non–URM* First-Time Freshmen 6-Year Graduation Rate increased from 36.4% to **46.7%**, the New UG Transfer 3-Year Graduation Rate increased from 50.0% to **60.0%** and

for MSAE graduates the 3-Year Graduation Rate increased from 33.3% to **40%.**

We believe these improvements are primarily due to systematic and consistent advising. We understand that the AE First-Time Freshmen 6-Year Graduation Rates are still lower than the university targets set by the Chancellor's Office for 2015–2016 (51.6%, 47.8%, and 53.2%, respectively for total, URM and Non-URM populations). Possible explanations for the lower-than-the-target graduation rates, as well as the measures taken to further improve these rates, are discussed below.

Typically almost all of our juniors stay on track and graduate within two or two-and-a-half years from the time they enter their fall junior semester. Possible explanations for the lower-than-the-target graduation rates are as follows:

(a) A large percentage of freshmen and/or sophomores change majors out of AE. We are in the process of compiling some data (e.g. grades in critical math and science courses) for students who leave AE, so we can better understand why they leave their major.

(b) A large percentage of our students work and some of them even work full–time. These students need to work to support themselves through college and/or to support their families. The increased tuition and cost of living in the SJSU area places an even higher financial burden on them. In their effort to graduate as soon as possible and despite our best advise, some of them take course loads much higher than they can handle considering their work and family responsibilities and as a result they end up repeating some of their courses. Failing or getting "D"s in required courses sets them back by at least an entire academic year, in some cases even more, as they have to adjust to lower course loads after they learn their lesson.

(c) Regarding MSAE graduation rates: The MSAE Program is structured so that full-time students can graduate in three semesters. However, we do admit conditionally students with non-BSAE degrees. Depending on their background, these students may be required to take up to 18 units of BSAE core courses plus additional prerequisite courses, as needed. This adds another year to their degree.

In Fall 2014 we began implementing our AE Learning Community Initiative (discussed below), as a way to better engage our freshmen and sophomores and hopefully improve our retention and graduation rates in the BSAE Program.

7. **Headcounts of program majors and new students (per program and degree)**

	Fall 2014				
	New Students		**Continuing Students**		**Total**
	FT Admit	New Transfers	Continuing	Returning	
Total	**77**	**35**	**219**	**1**	**332**
BSAE	54	35	186	1	276
MSAE	23		33		56

The headcount has been steadily rising in the BSAE Program: from **166** in Fall 2010, **192** in Fall 2011, **211** in Fall 2012, **250** in Fall 2013, to **276** in Fall 2014 showing a strong demand. The headcount has been fairly steady in the MSAE Program at ~ 50 + from Fall 2009 to Fall 2014.

8. **SFR and average section size (per program)**

	Fall 2014	
Course Level	**SFR**	**Average Headcount per Section**
Lower Division	24.8	55.5
Upper Division	30.0	37.6
Graduate Division	23.7	19.9

- AE Lower Division:
    - SFR (24.8) is slightly lower than College (26.4) and lower than University (31.0) averages.
    - Average headcount per section (55.5) is much higher than College (48.2) and University (35.6) averages.

There are only two AE lower division courses reflected in these statistics; both are lecture/lab courses, which operate with a max enrollment of 60 in the lecture and 30 in each of two lab sections.

- AE Upper Division:
    - SFR (30.0) is at the same level as in AY 2013–2014. It is higher than College (27.0) and University (25.5) averages.
    - Average headcount (37.6) is slightly higher than AY 2013–2014. It is in par with College (37.2) but much higher than the University (28.0) average.

In AY13–14 our junior level courses averaged a headcount of ~ 60; in AY14–15 this number was increased to ~ 70. All upper division AE courses are offered only once per AY.

- AE Graduate Division:
    - SFR (23.7) is higher than AY 2013–2014 (17.3). It is lower than the College (40.9) but higher than the University (20.8) average.
    - Average headcount (19.9) is higher than AY 2013–2014 (12.0). It is lower than the College (31.6) but higher than the University (15.8) average.

MSAE required courses increased in size from ~ 25 (AY13–14) to ~ 50 (AY14–15).

9. **Percentage of tenured/tenure-track instructional faculty (AE Department)**

	Fall 2014			
	AE Dept. FTEF #	AE Dept. FTEF %	College FTEF %	University FTEF %
Tenured/Tenure-Track	2.5	50%	42.7%	42.8%
Non Tenure-Track	2.5	50%	57.3%	57.2%
Total	5.0	100%	100%	100%

Part C

10. Closing the Loop/Recommended Actions

Recommendations by the external evaluator of the MSAE Program (2013):

- *The program should immediately implement a plan to hire additional T/TT faculty to bring the faculty size to at least 5 to be in compliance with the new CSU requirement for graduate programs.* The AE Program recruited one new tenure-track faculty member starting in AY15-16, which brings the total number of T/TT faculty to seven (4). To meet the new CSU requirement for graduate programs the AE Program needs at least one more tenure-track faculty member.

11. Assessment Data

Following the timelines for BSAE/MSAE Outcome Assessment (see AY2013–2014 report), we assessed in AY14–15:

BSAE Program

Outcome I – Ability to use the techniques, skills, and modern engineering tools – analytical, experimental, and computational – necessary for aerospace engineering practice

Assessed in AE160 (Fall 2014) and AE162 (Spring 2015).

Analytical, experimental, and design skills are addressed and discussed extensively in Outcomes A, B, and C respectively. Hence, the emphasis in this outcome is on the use of modern software and laboratory equipment.

Performance Criteria & Related Course Assignments

I-1: Can access information effectively and efficiently from the internet.
- (AE160) – Find and study at least 5 references that discuss the importance of STEAM Education for the US and the World. Based on the information in your references, as well as your own opinion, explain why STEAM Education is important for the US and the world. List your references using APA rules.
- (AE160) – Find and study at least 5 references for the technical topic of your Service Learning Project (e.g. helicopters, rockets, etc.). Summarize the most important points of your literature review. List your technical references using APA rules.

I-2: Use state-of-the-art software to write technical reports and give oral presentations.
- (AE160, AE162) – Use MS suite to prepare and present project reports and lab reports

I-3: Use computer simulations to conduct parametric studies and 'what if' explorations.

- (AE162) – Use Sub2D, Wing Analysis[1], AVL,[2] XFOIL[3], XFLR5[4], QPROP[5] to perform computer simulations and parametric studies of airfoils, wings, and other aerodynamic bodies.

I-4: Use modern equipment and instrumentation in AE laboratories.
- (AE160, AE162) – Use the AeroLab subsonic wind tunnel and instrumentation to perform 7 experiments.
- (AE160) – Use the Rolling Hills Research Corporation model 0710 water tunnel and instrumentation to perform a flow visualization experiment.

Course Statistics

Course	Semester	Faculty Member	Enrollment	# passed	% passed
AE 160	Fall 2014	Dr. Nikos J. Mourtos	76	72	95%
AE 162	Spring 2015	Dr. Nikos J. Mourtos	77	73	95%

Assessment Summary: The performance target is met for all the performance criteria hence the performance target is met for Outcome I.

Assessment Tools: Project reports and lab reports

Student Performance Results

	Performance Criterion	Students who scored 70% or higher
AE160 – Fall 2014	I-1	72 (100%)
	I-2	72 (100%)
	I-4	72 (100%)
AE162 – Spring 2015	I-2	73 (100%)
	I-3	67 (92%)
	I-4	73 (100%)

MSAE Program

Outcome D – Ability to perform a literature search related to a given problem, cite the references in appropriate ways, and demonstrate an understanding of the cited literature

Performance Criteria

D-1: Ability to perform a literature search
D-2: Cite references in appropriate ways
D-3: Demonstrate an understanding of the cited literature

Assessed by evaluating all (18) project/thesis reports of students who gradated in Fall 2014 and Spring 2015.

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[1] < http://www.desktop.aero/appliedaero/potential3d/wingcalc.html>
[2] <http://web.mit.edu/drela/Public/web/avl/>
[3] < http://web.mit.edu/drela/Public/web/xfoil/>
[4] <http://xflr5.sourceforge.net/xflr5.htm>
[5] <http://web.mit.edu/drela/Public/web/qprop/>

Assessment Summary: The performance target is met for all 3 performance criteria and hence for Outcome D.

Assessment Tools: Project and theses reports

Student Performance Results

Student reports are evaluated in regards to each and every Program Outcome by the project/thesis advisor and additional faculty members/ industry mentors, as needed. The table below summarizes student scores for Outcome D for the 18 reports evaluated, on a scale from 0 to 10 for each performance criterion.

Score	5	6	7	8	9	10	
# of students – literature search	2	0	2	1	1	12	
# of students – appropriate citations	0	0	0	0	0	18	
# of students – understanding of literature	1	2	1	2	0	12	

12. Analysis

BSAE Program

Analysis: Students are fairly competent in accessing information effectively and efficiently from the internet, writing technical reports and presenting their projects in class as well as in the community, as required for their Service Learning Project in AE160. They are also very competent in the use of modern software as well as in hands-on laboratory work. It should be noted that students are given opportunities to re-write and re-submit their assignments after corrections are made, which explains their high levels of success.

Recommendation: None

MSAE Program

Analysis: In general, students are performing well in this outcome, with only two students (11%) performing below 70% in performance criterion D-1 and three students performing below 70% in performance criterion D-3.

Recommendation: None

13. Proposed changes and goals (if any)

Following the posted Assessment Timeline in AY15-16 the following outcomes will be assessed:
- BSAE Program:
  - Outcome A (ability to use mathematics, science, and engineering principles to identify, formulate and solve aerospace engineering problems) in AE114, AE140, AE157, AE160, AE162, AE164, AE165, AE167, and AE168.
  - Outcome E (ability to communicate effectively through technical reports, memos, and oral presentations as well as in small group settings) in AE162, AE171A&B,

AE172A&B.
- MSAE Program: Outcome E (Graduate level technical writing ability, including correct language and terminology, appropriate visuals, and summarizing key ideas) by evaluating all project/thesis reports of students who will gradate in Fall 2015 and Spring 2016.