SJSU MSAE 2018 Annual Program Assessment Report

Department:	**Aerospace Engineering**
Programs:	**MSAE**
College:	**Engineering**
Program Website:	**MSAE: http://www.sjsu.edu/ae/programs/msae/index.html**
Link to Program Learning Outcomes (PLOs) on program website: **MSAE: http://www.sjsu.edu/ae/programs/msae/msae_program_outcomes/**	
Program Accreditation (if any):	**N / A**
Contact Person and Email:	**Dr. Nikos J. Mourtos nikos.mourtos@sjsu.edu**
Date of Report:	**15 March 2019**

Part A

1. – MSAE Program Learning Outcomes

No changes in PLOs but expanded the Outcome Performance Indicators for Outcome D from two to three to allow for a better resolution in assessing the skills embedded in this outcome.

PLO-A: Use graduate level mathematics to model and solve complex aerospace engineering problems.

PLO-B: Apply aerospace engineering science (aerodynamics, propulsion, flight mechanics, stability & control, aerospace structures & materials, etc.) to perform an in-depth analysis and / or design of an aerospace engineering system taking into consideration economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints.

Outcome Elements
B1: Ability to apply aerospace engineering science.
B2: Ability to perform an in-depth analysis and / or design of an aerospace engineering system.
B3: Ability to consider economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints in the design of an aerospace engineering system.

PLO-C: Use modern tools (computational or experimental).

Outcome Performance Indicator:
Use modern software to analyze aerospace systems and conduct computer simulations, parametric studies, and 'what if' explorations.

PLO-D: Perform a literature search related to a given problem, demonstrate an understanding of this literature, and cite references in appropriate ways.

Outcome Performance Indicators:
D1: Identify a sufficient number of relevant, appropriate references for a given problem.
D2: Demonstrate an understanding of these references in a thorough literature review.
D3: Cite references in appropriate ways throughout a technical report using standard rules (AIAA, APA, etc.)

PLO-E: Graduate level technical writing ability, including correct language and terminology, appropriate visuals, and summarizing key ideas.

Outcome Performance Indicators:
E1: Use correct language, spelling, and terminology; summarize key ideas.
E2: Use appropriate graphs and tables to present results.

MSAE Thesis / Project Evaluation Form

Title							
Name					Semester –		
Advisor							
MSAE PLOs / Outcome Elements		**Max Possible**	***Ave score***	**Min Passing**	Project Advisor	Faculty Member 2	Faculty Member 3
B.1	Application of AE science (aerodynamics, propulsion, flight mechanics, stability & control, aerospace structures & materials, etc.)	20		14			
B.2	In-depth analysis and/or design of an aerospace system or vehicle.	20		14			
C	Application of modern tools (computational or experimental)	10		7			
D.1	Appropriate literature search (# and appropriateness of references cited)	10		7			
D.2	References listed & cited following APA or AIAA format.	10		7			
D.3	Understanding of the cited literature (summary of previous work)	10		7			
E.1	Correct language and terminology	10		7			
E.2	Appropriate use of graphs and tables	10		7			
	Total Score	100		70			

Overall Score: 90 – 100 = Excellent, 80 – 89 = Good, 70 – 79 = Acceptable, 50 – 69 = Weak, 00 – 49 = Lacking

Comments:

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

No changes.

UNIVERSITY LEARNING GOALS	MSAE PROGRAM OUTCOMES
Specialized Knowledge	Use graduate level mathematics to model and solve complex aerospace engineering problems.
Broad Integrative Knowledge	Apply aerospace engineering science to perform in-depth analysis and / or design of aerospace engineering systems taking into consideration economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints.
Intellectual Skills	Use modern tools (computational or experimental).
Applied Knowledge	Perform a literature search related to a given problem, demonstrate an understanding of this literature, and cite references using accepted formats (AIAA, APA, etc.).
Social and Global Responsibilities	Demonstrate graduate level technical writing ability, including correct language and terminology, appropriate visuals, and an ability to summarize key ideas.
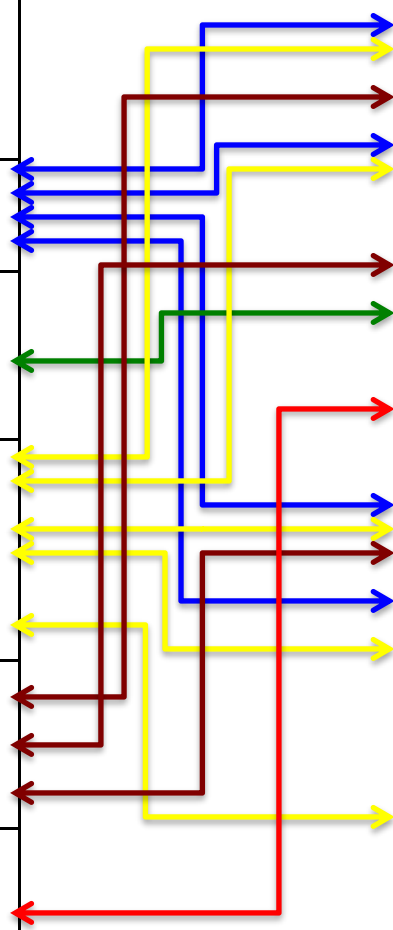
3. Alignment – Matrix of PLOs to Courses

Outcomes are addressed throughout the MSAE curriculum, each typically addressed and assessed at their highest levels (5 or 6) in the Bloom / Anderson Taxonomy, as shown in the table below.

	Student Outcomes				
MSAE	A	B	C	D	E
Required Courses					
AE 200	+++				
AE 242 / AE 243 / AE 245 / AE 246		+++			
AE 250		+++			
AE 262 / AE 264 / AE 280		+++			
AE 267		+++			
AE 269			+++		
AE 271					+++
AE 295A&B / AE299		+++		+++	+++

+++: Skill level 5 or 6 in Bloom/Anderson Taxonomy

4. Planning – Assessment Schedule

MSAE Assessment Schedule

MSAE Student Outcomes					
	A	B	C	D	E
AY 17-18			X		
AY 18-19				X	
AY 19-20					X
AY 20-21	X				
AY 21-22		X			
AY 22-23			X		

5. Student Experience

MSAE PLOs can be found here:
http://www.sjsu.edu/ae/programs/msae/msae_program_outcomes/

a.   How are your PLOs and the ULGs communicated to students, e.g. websites, syllabi, promotional material, etc.?

- MSAE website (link above)
- Syllabi include a table, which shows how CLOs are linked to PLOs.
- The skills included in PLOs and their importance to engineering practice are discussed in every graduate level (for MSAE) course on the first day of class and revisited throughout the semester, as various course activities and assignments are linked to CLOs and SOs.

b.   Do students have an opportunity to provide feedback regarding your PLOs and/or the assessment process? If so, please briefly elaborate.

Students are given opportunities in *each course* during the semester to provide feedback in regards to:
- How effective is the teaching in terms of helping them acquire the skills outlined in the CLOs / PLOs.
- How well the various assessment methods in each course measure their level of competence in these skills.

Graduating seniors are surveyed with the following questions:

Question 1: What do you think are the most important skills for an AE to compete successfully for a position in industry?

Question 2: Do you feel that our MSAE program prepared you adequately in the skills you consider important? Write "yes" OR "no" next to each skill you identified in questions 1 above.

Questions 3: Which courses prepared you for these skills? Write next to each skill you identified in questions 1 the course(s) you think helped you develop these skills.

Responses from question 1 are summarized and compared to the skills listed in the MSAE PLOs. If students identify any new skills not listed in the MSAE PLOs, AE faculty discuss and recommend whether to modify PLOs and include these newly identified skill(s).

Responses from questions 3 and 4 help determine whether – always according to students – the MSAE Program prepares them adequately in the skills they consider important and which courses are most effective in this regard.

Part B

6,7,8 Assessment Data, Results, Analysis, and Proposed Changes

(Please briefly describe the data collected for this report (e.g., student papers, posters, presentations, portfolios, assignments, exams). The instruments used to evaluate student achievement (e.g., rubrics or other criteria) and actual data (e.g., assignment description or instructions) should be attached as appendices. PLOs should be evaluated based on direct assessments of learning, not grades earned by students.)

As shown in our assessment schedule in Section 4, MSAE assessment is performed on an academic year basis, while SJSU annual assessment follows a calendar year. As a result of this misalignment in the two timelines, the data and analysis presented in our Annual Assessment Report comes from two different academic years and covers more outcomes, as shown in the table below.

		MSAE
	Outcome:	*C – Modern Tools*
AY F17 – S18	Course:	AE269
	Who:	Prof. Papadopoulos
	Semester:	Fall 2017 *(2018 AE Annual Assessment Report)*
AY F18 – S19	Outcome:	*D – Literature Search*
	Course:	AE295B
	Who:	Prof. Mourtos
	Semesters:	Spring 2018, Summer 2018 & Fall 2018

Outcome D – *Perform a literature search related to a given problem, demonstrate an understanding of this literature, and cite references in appropriate ways.*

Assessment Summary: Overall, Outcome D is satisfied in the MSAE Program.

AE295B – Aerospace Engineering Project II   *Prof. Nikos J. Mourtos*

Outcome Performance Indicators
D1: Appropriate literature search: # of references listed, appropriateness of references listed, list includes books and technical papers.
D2: References listed and cited following a consistent APA or AIAA format.
D3: Understanding of the cited literature, demonstrated through proper discussion and summarizing of previous work.

Assessment Summary: Performance target is met for OPIs D1 and D3; not for D2.

Course Activities
- APA and AIAA styles are discussed on the first day of class in AE295A.
- Students submit their first progress report in AE295A, which includes a thorough literature review of their topic. They receive feedback on CANVAS regarding their performance in D1, D2, and D3 and asked to correct and resubmit, if necessary.
- The literature review and the list of references in every report is checked again at the end-of-the-first-semester report (AE295A).
- The literature review and the list of references in every report is checked again at the final report in the second semester (AE295B).

Assessment Tools:
- Chapter 1 of MSAE project and theses reports, which includes a literature review of the topic.
- The "References" section of MSAE project and theses reports.

Student Performance Results

	Spring 2018	Summer 2018	Fall 2018	*total*
# of students who passed =	*15*	*2*	*10*	*27*
D1 (scored 70% or higher)	15	2	8	25 (93%)
D2 (scored 70% or higher)	11	0	5	16 (59%)
D3 (scored 70% or higher)	15	2	9	26 (96%)

Analysis
OPI-D1: One student in Fall 2018 listed only one reference (!); another had a fairly short list, consisting mostly of web pages. The other 25 students had an adequate number of appropriate references (typically between 15 and 30), which was a combination of books, conference papers, technical reports, and web references.

OPI-D2: This is the area where a large number of students did not perform well. The following is a list of issues identified in those students who scored less than 70% on D2:
- Listed references using APA style but citations in the report followed AIAA style.
- Some references listed using APA style (year right after authors' names), others using AIAA style (year at the end).
- The year in some references was missing altogether.
- References not listed properly (i.e. they followed neither APA nor AIAA format).
- Listed references according to AIAA rules but in the report, the citations were not sequential, as

required.
- There was a long list of references but no citations in the report.
- Not citing any sources for information that clearly came from some of the references.
- List of references is placed at the very end of the report, after appendices.

OPI-D3: With one exception – this was the student who listed only one reference – students demonstrated an adequate understanding of the references they cited.

Recommendation:
The problems described above in relationship to OPI–D2 can be corrected in AE295A. The first check is in the first progress report in AE295A, where students present their literature review. These reports will receive non-passing grades unless they conform strictly to either the APA or the AIAA style. End-of-semester reports in AE295A which still display inconsistencies in the style will be returned to students for fixing and/or receive non-passing grades.

Implementation: Spring 2019

Part C
9.   Program Learning Outcomes
What are your proposed closing-the-loop action items and completion dates?

Proposed Changes	Status Update
MSAE Outcome D (literature search, references and citations) 2018: Spring, Summer & Fall AE295B final project/thesis reports - Check/correct references and citations in literature review (progress report # 1, AE295A) - Re-check/correct as necessary in end-of-semester report (AE295A) - Final check in the final project report (AE295B) - Students in either course will not receive a passing grade before fixing any problems with their references and citations	Currently implemented in Spring 2019.
MSAE Outcome B (Apply AE science to analyze / design…) Spring 2016 & Fall 2016 – AE295B/AE299 - Final project/thesis reports should include a section on "future work", as needed to carry the project to the next level. - Final project/thesis reports involving the design of an aerospace vehicle or system should include a chapter addressing as many of the	Implemented in Fall 2017

constraints listed in Outcome B as applicable. ▪ Outcome performance indicators will be added for Outcome B to address "future work" and "design constraints" and the MSAE Project Evaluation Form will be modified accordingly.	

10. Program Planning Action Items

What is the direct web link to the program's latest action plan? (You can find it by selecting the relevant college in [Program Records](#) to locate your program.)

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

Continue to improve graduation rates for graduate students using implementation plan developed. Graduation rates have been lower in the past compared to the college and university rates. However, improvements have been noticed. Graduation rates should improve and remain steady at college and university rates.	The graduation rates for the MSAE Program have been increasing dramatically since AE became independent in 2013:
	
	• MSAE graduation rate for first-time graduate students:
	  o 14.3% (F'08 cohort)
	  o **62.5%** (F'13 cohort)
		Annually.

Establish a sustainable profile for the program within college limits in consultation with the dean that develops a successful model for growth of faculty, recruitment and course offerings.	*Established.* AE Department currently has four FT tenured/tenure-line faculty members and recruiting two more. Efforts are underway to recruit MSAE students from Amity University Rajasthan.	Fall 2018 Program Planning Report

Last updated: January 7, 2018 by Thalia Anagnos