CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

ACADEMIC SENATE

ACADEMIC PROGRAMS COMMITTEE

REPORT TO

THE ACADEMIC SENATE

AP-091-167

Electromechanical Systems Engineering Technology
BS FOR SEMESTERS

Academic Programs Committee	Date: 05/26/2017
Executive Committee Received and Forwarded	Date: 07/06/2017
Academic Senate	Date: 07/12/2017 First Reading

BACKGROUND: The Department of Electromechanical Engineering Technology has put forward a referral converting the existing BS degree in Electromechanical Systems Engineering Technology (EMET) in the quarter system to the semester system program.

The Electromechanical Systems Engineering Technology (EMET) Program at Cal Poly Pomona is designed to prepare a diverse student population for application-oriented technical careers as professional members of the Engineering Team. Our graduates are expected to not only gain an excellent technical background in their education, but also to develop personal skills in the areas of written and oral communication, respect for diversity, and an understanding of the significance of lifelong learning.

RESOURCES CONSULTED:
Deans
Associate Deans
Department Chairs
All Faculty

DISCUSSION:
Before reaching the Academic Programs Committee, this program was reviewed by the College Curriculum Committee in the College of Engineering as well as the Dean of Engineering and the Office of Academic Programs. All concerns raised at those levels were addressed. The Academic Programs Committee then conducted campus-wide consultation, as well as its own review of the program. No concerns were raised.

RECOMMENDATION:

The Academic Programs Committee recommends approval of the semester program Bachelor of Science in Electromechanical Systems Engineering Technology (EMET) (See attached program proposal).

Program Proposal

BS in Electromechanical Systems Engineering Technology

This proposal consists of a revised version of the existing BS degree curriculum for the Engineering Technology-General (ET-G) Program.
In addition, it is proposed that the name of the existing Engineering Technology – General Program be changed to Electromechanical Systems Engineering Technology (EMSET) Program and was approved by senate in the May 2015.

CURRICULUM SHEETS

CURRICULUM SHEET FOR SEMESTER CONVERSION

Program Name: BS Electromechanical Systems Engineering Technology				
Total Units: 124				
Major Courses – Core – Units: 88				
Course Number	**Title**	**Units (lec/lab)**	**Revisioned/ Converted**	**GE Double Count (Y/N)**
EGR 1000/L	Engineering, Society, and You/Laboratory	2/1	N/A	Y (E)
MAT 1300	Technical Calculus I	4	N/A	Y (B4)
MAT 1310	Technical Calculus II	4	N/A	N
PHY 1510/L	Introduction to Newtonian Mechanics/Laboratory	3/1	N/A	Y (B1,B3)
PHY 1520/L	Introduction to Electromagnetism and Circuits/Laboratory	3/1	N/A	N
CHM 1210/L	General Chemistry I/Laboratory	3/1	N/A	N
ETE 1151/L	C/C++ Programming/Laboratory	3/1	Rev.	N
ETM 2101	Applied Statics	3	Rev.	N
ETM 2111	Applied Dynamics	3	Rev.	N
ETM 2171	Material Science for Engineering Technology	3	Rev.	N
ETM 2201/L	Strength of Materials/Laboratory	3/1	Rev.	N
ETM 3061	Applied Thermodynamics I	3		
ETM 3081	Applied Heat Transfer	3	Rev.	N
ETM 3101	Applied Fluid Mechanics I	3	Rev.	N
ETM 3121	Applied Fluid Mechanics II	3	Rev.	N
ETM 3141L	Thermal Fluids Laboratory	1	Rev.	N
ETM 3301/L	Instrumentation and Control/ Laboratory	3/1	Rev.	N
ETM 3341	Heating Ventilation and Air Conditioning I	3	Rev.	N
ETE 4751/L	Introduction to Robotics Control and Application/Laboratory	3/1	Rev.	N
ETE 2011/L	Electrical Networks/Laboratory	3/1	Rev.	N
ETE 3211/L	Electronic Systems/Laboratory	3/1	Rev.	N
ETM 3151/L	Machine Elements/Laboratory	3/1	Rev.	N
MFE 1260/L	Engineering Graphics/Laboratory	1/1	Rev.	N
MFE 2211/L	Manufacturing Processes-Casting, Forming, Joining, Metal Removal/Laboratory	3/1	Rev.	N
EGR 4810	Project Design Principles and Applications	1	Rev.	Y (B5)
EGR 4820	Project Design Principles and Applications	1	Rev.	Y (B5)
EGR 4830	Project Design Principles and Applications	1	Rev.	Y (B5)

IME 4020	Ethical Concepts in Technology and Applied Science	3	Rev.	Y (B5 or C4)
Major Courses - Core Electives – Units: 7 (one course from each group)				
Course Number	**Title**	**Units (lec/lab)**	**Revisioned/ Converted**	**GE Double Count (Y/N)**
Group 1				
ETM 3001	Total Quality Management	3	Rev.	N
ETM 3021	Industrial Safety	3	Rev.	N
ETM 4871	Human Factors	3	Rev.	N
ETM 3051	Engineering Economics	3	Rev.	N
Group 2				
ETM 4101/L	Internal Combustion Engines/Laboratory	3/1	Rev.	N
ETM 3351	Heating Ventilation and Air Conditioning II	3	Rev.	N
ETM 4151	Renewable Energy Systems	3	Rev.	N
Group 3				
ETM 4191	Applied Thermodynamics II	3	Rev.	N
ETM 4801	Hydraulics	3	Rev.	N
ETM 4851	Mechanical Building Systems	3	Rev.	N
ETE 3501/L	Feedback Control Systems/Laboratory	3/1	Rev.	N
ETM 4990	Special Topics for Upper Division students	1-3	Rev.	N
General Education Requirements (48 units)				
Course Number	**Title**	**Units (lec/lab)**	**Revisioned/ Converted**	**GE Double Count**
Area A1	N/A	3	N/A	
Area A2	N/A	3	N/A	Y
Area A3	N/A	3	N/A	Y
Area B1	Introduction to Newtonian Mechanics	3	N/A	Y
Area B2	Life Science	2	N/A	
Area B3	Introduction to Newtonian Mechanics Lab	1	N/A	Y
Area B4	Technical Calculus I	4	N/A	Y
Area B5	Project Design Principals & Applications	3	N/A	Y
Area C1	N/A	3	N/A	
Area C2	N/A	3	N/A	
Area C3	N/A	3	N/A	
Area C4	Ethical Concepts in Technology & Applied Science	3	N/A	Y
Area D1	N/A	3	N/A	
Area D2	N/A	3	N/A	
Area D3	N/A	3	N/A	

Area D4	N/A	3	N/A	
Area E	Engineering, Society, and You & Lab	2/1	N/A	Y

4-YEAR ROADMAP

Department: Engineering Technology
BS Electromechanical Systems Engineering Technology
Curriculum Year: 2018-2019

Your department has developed this road plan, taking into account prerequisites and schedule restrictions. Students should pay attention to these concerns when deviating from this plan.

	Fall	Units	Spring	Units	Comment
Year 1	**ETE 1151/L** Major Core	3/1	**ETM 2101** Major Core	3	*Students in this major are expected to maintain a GPA of at least 2.00 in all core courses.* *EGR 1000/L, MAT 1300, and PHY 1510/L satisfy both major and general education requirements.*
	EGR 1000/L GE Area E	2/1	**MAT 1310** Major Core	4	
	MAT 1300 GE Area B4	4	**PHY 1520/l** Major Core	3/1	
	PHY 1510/L GE Area B1, B3	4	GE Area A1	3	
			GE Area A3 (Double Count)		
	Total Units	**15**	**Total Units**	**14**	
			Total Units for Year	**32**	

	Fall	Units	Spring	Units	Comment
Year 2	**ETM 2111** Major Core	3	**ETM 2201/L** Major Core	3/1	*Upper division EMSET courses must be approved in advance by your advisor.* *One course must be completed in each of the GE areas A2-3, B1-3, C1-3, D3, and E.*
	ETM 2171 Major Core	3	**ETE 2011/L** Major Core	3/1	
	CHEM 1210/L Major Core	4	**MFE 2111/L** Major Core	3/1	
	MFE 1261/L	1/1	**GE Area D1**	3	
	GE Area C2	3	**GE Area A2**	3	
	GE Area B2	2			
	Total Units	**17**	**Total Units**	**18**	
			Total Units for Year	**35**	

Year 3	**Fall**	**Units**	**Spring**	**Units**	**Comment**
	ETE 3211/L Major Core	3/1	**ETM 3121** Major Core	3	
	ETM 3151/L Major Core	3/1	**ETM 3141L** Major Core	1	
	ETM 3101 Major Core	3	**ETM 3081** Major Core	3	
	ETM 3061 Major Core	3	**ETM 3301/L** Major Core	3/1	
	GE Area D2	3	**GE Area D3**	3	
			GE Area C3	3	
	Take the Graduation Writing Test				
	Total Units	**17**	**Total Units**	**17**	
			Total Units for Year	**34**	
Year 4	**Fall**	**Units**	**Spring**	**Units**	**Comment**
	EGR 4810 Major Core GE Area B5	1	**EGR 4820** Major Core GE Area B5	1	*All GE Area A courses and all lower division GE courses in a GE area must be completed before taking the GE Synthesis course in that area.*
	ETE 4751/L Major Core	3/1	**EGR 4830** Major Core GE Area B5	1	
	ETM 3341 Major Core	3	**Technical Elective** Major Core	4	
	Technical Elective Major Core	3			
	GE Area C1	3	**IME 4020** GE area C4	3	
			GE Area D4	3	

			Request a graduation check		
	Total Units	**14**	**Total Units**	**12**	
			Total Units for Year	**26**	
Total Units on Plan				**124**	**Double count units: 16**
Major Core Units				**86**	
Major Support Units				**0**	
General Education Units				**48**	
Unrestricted Elective Units				**0**	

TWO-YEAR COURSE SCHEDULE

EMSET Projected Two-Year Course Schedule

Please refer to BroncoDirect for the current academic quarter course schedule

Course	Academic Year 2018-19			Academic Year 2019-2020		
	Fall	Spring	Summer	Fall	Spring	Summer
EGR 1000 L	X	X	X	X	X	X
ETM 2101		X	X		X	X
ETM 2111	X		X	X		X
ETM 2171	X		X	X		X
ETM 2201 L		X	X		X	X
ETM 3051	X		X	X		X
ETM 3061	X		X	X		X
ETM 3081		X			X	
ETM 3101	X		X	X		X
ETM 3121		X			X	
ETM 3141		X	X		X	X
ETM 3301		X			X	
ETM 3341	X			X		
ETM 4101 L	X			X		
ETE 1151 L	X		X	X		X
ETE 2011 L		X	X		X	X
ETE 3211 L	X			X		
EGR 4810	X			X		
EGR 4820	X			X		
EGR 4830		X			X	
ETM 3001		X	X		X	X
ETM 3021	X			X		
ETM 3151 L		X	X		X	X
ETM 3351	X			X		
ETM 4151		X			X	
ETM 4191	X			X		
ETM 4801		X			X	
ETM 4851	X			X		
ETM 4871		X			X	
ETM 4991	X			X		
ETE 350 L		X	X		X	X
ETE 4751 L	X		X	X		X

ASSESSMENT PLAN

MISSION AND VISION STATEMENTS FOR THE COLLEGE OF ENGINEERING

Mission Statement

The mission of the Cal Poly Pomona College of Engineering is to produce well-qualified engineering graduates who are ready for immediate and productive entry into the workforce or for graduate studies. The college does so by providing practice-oriented education based on sound engineering principles and applications, while also emphasizing the teamwork, communication and creative skills needed to be leaders in a global society.

Vision Statement

The Cal Poly Pomona College of Engineering strives to be a leader in providing relevant and rigorous engineering education in a learning-centered environment. As such, the college endeavors to offer programs and curricula that are up-to-date, globally competitive, and supported by strong ties to educational and industrial partners, while maintaining a community of students, staff, and faculty who are talented, successful, and reflect the diversity of California.

MISSION AND VISION STATEMENTS FOR THE ENGINEERING TECHNOLOGY DEPARTMENT AND ELECTROMECHANICAL SYSTEMS ENGINEERING TECHNOLOGY PROGRAM

Program Mission
The Electromechanical Systems Engineering Technology (EMSET) Program at Cal Poly Pomona is designed to prepare a diverse student population for application-oriented technical careers as professional members of the Engineering Team. Our graduates are expected to not only gain an excellent technical background in their education, but also to develop personal skills in the areas of written and oral communication, respect for diversity, and an understanding of the significance of lifelong learning.
Program Vision
Provide the best Electromechanical Systems Engineering Technology learning experience

PROGRAM OBJECTIVES AND STUDENT LEARNING OUTCOMESFOR THE BACHELOR OF SCIENCE IN ELECTROMECHANICAL ENGINEERING TECHNOLOGY (EMSET) PROGRAM

EMSET graduates are expected to accomplish the following program educational objectives (PEO's) within a period of 3-5 years after graduation. Our graduates will be professionals who:

PEO 1 - Prepare graduates with education experience that will provide them with a competitive edge that will prepare them for a successful career in industries involving electromechanical applications.

PEO 2 - Prepare graduates to be members of the "engineering team" where they use their engineering knowledge, methods and established design procedures to solve applied engineering problems related to testing and/or manufacturing in industries involving electromechanical technologies.

PEO 3 - Prepare graduates to accomplish their work responsibilities in a professional and ethical manner, with an awareness of the greater social responsibilities associated with engineering.

PEO 4 - Prepare graduates to have a solid understanding of established math, science and engineering methods for analyzing and solving practical engineering problems in industry.

PEO 5 - Prepare graduates to possess breadth in engineering science including engineering mechanics, energy systems, electromechanical systems, materials and processes.

PEO 6 - Prepare graduates to be self-learners (i.e. life-long learners) in order to maintain technical proficiency in their careers.

PEO 7 - Prepare graduates to be effective communicators both in written and oral form.

PEO 8 - Prepare graduates to work effectively in team settings as members and team leaders as appropriate, including the use of project management techniques.

PEO 9 - Prepare graduates will be proficient in performing laboratory experiments and testing, including the use of appropriate hardware, software, and simulation techniques in solving engineering-oriented problems.

Corresponding Student Learning Outcomes (SLOs):

SLO (a) - EMSET graduates will be to apply knowledge of mathematics, science, and engineering.

SLO (b) - EMSET graduates will be able to design and conduct experiments, as well as to analyze and interpret data.

SLO (c) - EMSET graduates will be able to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

SLO (d) - EMSET graduates will be able to function on multidisciplinary teams.

SLO (e) - EMSET graduates will be able to identify, formulate, and solve engineering problems.

SLO (f) - EMSET graduates will be able to understand professional and ethical responsibility.

SLO (g) - EMSET graduates will able to communicate effectively.

SLO (h) - EMSET graduates will have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

SLO (i) - EMSET graduates will able to recognize the need for, and be able to engage in life-long learning.

SLO (j) - EMSET graduates will have knowledge of contemporary issues.

SLO (k) - EMSET graduates will be able to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Mapping of EMSET program educational objectives (PEOs) and student learning outcomes (SLOs).

	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6	PEO 7	PEO 8	PEO 9
(a) an ability to apply knowledge of mathematics, science, and engineering	X	X		X	X				
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	X	X		X	X				X
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	X	X	X						
(d) an ability to function on multi-disciplinary teams	X	X					X	X	
(e) an ability to identify, formulate, and solve engineering problems	X	X		X	X				
(f) an understanding of professional and ethical responsibilities			X						
(g) an ability to communicate effectively							X	X	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	X		X			X	X		
(i) a recognition of the need for, and an ability to engage in life-long learning						X			
(j) a knowledge of contemporary issues	X	X							
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	X	X			X				X

Curriculum Matrix for the BSEMSET Program

Courses / Learning Outcomes			a) an ability to apply knowledge of mathematics, science, and engineering	(b) an ability to design and conduct experiments, as well as to analyze and interpret data	(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	(d) an ability to function on multi-disciplinary teams	(e) an ability to identify, formulate, and solve engineering problems	(f) an understanding of professional and ethical responsibilities	(g) an ability to communicate effectively	(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	(i) a recognition of the need for, and an ability to engage in life-long learning	(j) a knowledge of contemporary issues	(k) an ability to use the Techniques, skills, and modern engineering tools necessary for engineering practice.
EGR	1000	L	I	I	I	R	R	R	R	I	I	I	I
ETM	2101		I				I						
ETM	2111		I				I						
ETM	2171		I				I						
ETM	2201	L	I	I	I	R	R		I				I
ETM	3061		I				R						
ETM	3081		R				R						
ETM	3108		R				R			I			
ETM	3121		R				R						
ETM	3141	L	R	R	R	R	M		R			I	R
ETM	3151	L	M	R	R	R	M	R	R			I	R
ETM	3301	L	R	R	R	R	R		R				R
ETM	3341		M	R	R		R			R			
ETE	4751	L	R	M	M	M	R	R	R	I	I	I	M
ETE	2011	L	I	I	I	I	I		I				I
ETE	3211	L	R	R	R	R	R		R				R
EGR	4810		R			M		M	M	R	M	R	

EGR	4820		M	M	M	M	M	M	M	R	M	R	R
EGR	4830		M	M	M	M	M	M	M	R	M	R	M
ETM	3001					R		M	R	R			
ETM	3021					R		M	R	R			
ETM	3051		I				R	R					
ETM	4101	L	M	M	R	R	R		R			I	R
ETM	4151		M				R			R		R	
ETM	4191		M				M						
ETM	4851		M			R	M						
ETM	4871							R	R		R		
ETE	3501	L	R	R	R	R	R						
ETM	4991	L	M	R	R	R	M		R				R

Level of Achievement	Description of Achievements
Introduce (I)	By completion of these courses, students will able to: define, describe, identify, recognize, analyze, and solve introductory electromechanical concepts and systems and construct, test, and troubleshoot related laboratory experiments. They will also introduce to team building and how to work in a team.
Reinforce (R)	By completion of these courses, students will able to: define, describe, identify, recognize, analyze, and solve the intermediate level electromechanical concepts and systems and construct, test, and troubleshoot related laboratory experiments. They will also learn how to assign task to the team members, having weekly meeting, and writing completing laboratory reports.
Mastery (M)	By completion of these courses, students will able to: define, describe, identify, recognize, analyze, and solve advanced electromechanical concepts and systems and construct, test, and troubleshoot related laboratory experiments. They will also learn the elements of project management, proposal writing, term-paper/ project presentation, and life-long learning.

Assessment Tools	Sampling Frequency
1) Senior Exit Survey at Project Symposium	Annual
2) Professionals and Faculty Survey at Project Symposium	Annual
3) Fundamentals of Engineering (FE) Exam	Every 3 Years
4) Embedded Assessment in Selected Lecture Courses	Annual
5) Graduate Writing Test (GWT)	Annual
6) Alumni and Employer Surveys	Every 3 Years
7) Self-Directed Learning Readiness Scale Test (SDLRS)	Every 3 Years
8) Student Portfolios (progress in courses, laboratory, and senior project)	Every 3 Years
9) i & j Faculty Survey	Every 3 Years

Methods of Assessment for the BSEMSET Program

Student Outcome	Assessment Method
(a) an ability to apply knowledge of mathematics, science, and engineering	Fundamentals of Engineering Exam Embedded Assessment in Selected Courses Senior Exit Survey
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	Embedded Assessment in Selected Courses (ETM 2201/L, ETM 3151/L, and ETM 3141L) Professionals and Faculty Survey at Project Symposium
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	Embedded Assessment in Selected Courses (ETM 3151/L, ETM 3301/L, ETE 4751/L) Professionals and Faculty Survey at Project Symposium Senior Exit Survey
(d) an ability to function on multi-disciplinary teams	Embedded Assessment in Selected Courses (ETM 4101/L, ETE 4751/L, CE4590, EGR4810, and EGR 4820) Professionals and Faculty Survey at Project Symposium
(e) an ability to identify, formulate, and solve engineering problems	Fundamentals of Engineering Exam Embedded Assessment in Selected Courses (EGR4810, EGR 4820, EGR 4830) Senior Exit Survey
(f) an understanding of professional and ethical responsibilities	Alumni and Employer Surveys Senior Exit Survey
(g) an ability to communicate effectively	Embedded Assessment in Selected Courses Student Portfolios
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	Alumni and Employer Survey Senior Exit Survey
(i) a recognition of the need for, and an ability to engage in life-long learning	SDLRS Test Student Portfolios i & j Faculty Survey
(j) a knowledge of contemporary issues	Embedded Assessment in Selected Courses (ETM 3151/L and ETE 4751/L) Student Portfolios Senior Exit Survey i & j Faculty Survey
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	Fundamentals of Engineering Exam Embedded Assessment in Selected Courses Student Portfolios

Five-Year Program Assessment Schedule (2018-2023) for the BSEMSET Program

	2018 – Fall	*2019 Spring*	*2019 – Fall*	*2020 Spring*	*2020 – Fall*	*2021 Spring*	*2021 – Fall*	*2022 Spring*	*2022 – Fall*	*2023 Spring*
Program Objectives/Student Learning Outcomes										
(a) an ability to apply knowledge of mathematics, science, and engineering	C	C	C A	C	C	C	C A	C	C	C
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	C	C	A		C	C	A		C	C
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		C	A	C		C	A	C		C
(d) an ability to function on multi-disciplinary teams	C	C	A		C	C	A		C	C
(e) an ability to identify, formulate, and solve engineering problems	C	C	C A	C	C	C	C A	C	C	C
(f) an understanding of professional and ethical responsibilities	C	C	C A	C	C	C	C A	C	C	C
(g) an ability to communicate effectively		C	A	C		C	A	C		C
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic,	C	C	A		C	C	A		C	C

environmental, and societal context										
(i) a recognition of the need for, and an ability to engage in life-long learning		C	A	C		C	A	C		C
(j) a knowledge of contemporary issues		C	A	C		C	A	C		C
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	C	C	C A	C	C	C	C A	C	C	C

"C" = Collect data
"A" = Action (i.e. Summary, Analysis, Documentation, Recommendations, etc.)