Academic Program Assessment Report for AY 2019-2020

Program: M.S. in Mechatronics Engineering

(Due: June 1, 2020)

Date report completed: ___June 5, 2020___

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Brief statement of Program mission and goals: The MSME program prepares students from diverse educational backgrounds to function as engineers in advanced projects in mechatronics engineering and/or to continue their studies and obtain other advanced degrees especially at the doctoral level. Mechatronics combines mechanical, electrical, computer, and controls engineering with computer science to create intelligent machines.

I. Assessment of Student Learning Outcomes (SLOs) in this cycle. Including processes, results, and recommendations for improved student learning. Use Column H to describe improvements planned for 2020-2021 based on the assessment process.

A. Which of the program SLOs were assessed during this cycle? **Please include the outcome(s) verbatim from the assessment plan.**	B. When was this SLO last reported on prior to this cycle? (semester and year)	C. What method was used for assessing the SLO? **Please include a copy of any rubrics used in the assessment process.**	D. Who was assessed? Please fully describe the student group(s) and the number of students or artifacts involved (N).	E. What is the expected proficiency level and how many or what proportion of students should be at that level?	F. What were the results of the assessment? (Include the proportion of students meeting proficiency.)	G. What were the department's conclusions about student performance?	H. What changes/improvements to the program are planned based on this assessment?
Analyze and/or design a mechatronic system	Spring 2019	**Methods**: EN 563 Final Course Exam and/or Project Reports **Rubrics**: Design Strategy,	Five MSME second year graduate students who were enrolled in Spring 2020	At least 80% of the students should meet or exceed expectations	All students (100%) were able to analyze and/or design a mechatronic system. Students' designs demonstrated correct design strategies (Final), solutions (Final),	The students' performance was excellent. However, the sample size (5) was too small for a valid statistical analysis. This will	Changes for remote delivery mode were implemented ad hoc. So, a combination of online methods will be explored. Some technology challenges will have to be

		Solutions, and Tools			and the use of computer tools like MATLAB (Homework Assignments). An exit interview was administered to one student who was graduating	most likely continue.	addressed, e.g. using MATLAB at home.
Apply advanced engineering principles in the design and analysis of a system or process to meet specified needs	Spring 2019	**Methods:** EN 561 Final and/or Homework, EN 513 Homework/ Mini-Projects, and Final Project **Rubrics**: Design Strategy and Constraints	In EN 561 there were three students enrolled in Fall 2019. EN 513 had three MSME student in Spring 2020.	At least 80% of the students should meet or exceed expectations	All students in EN 561 were able to apply correct state-space design strategy under given constraints. They were able to demonstrate their knowledge when solving complicated problems. All students in EN513 were capable of applying appropriate modern AI/ML methods, tools and technologies to solve engineering problems, analyze data, and interpret restults.	All MSME students (100%) in EN 561 and EN 513 performed well. However, no firm conclusions could be reached due to the small sample size.	
Communicate effectively in writing and orally.	Spring 2019	**Methods:** : EN 593: Written and oral presentations	Three MSME first-year graduate students who were enrolled in	At least 80% of the students should meet or exceed expectations	The students in EN 593 wrote literature reviews and did presentations each on a potential topic for his master thesis or research project.	All MSME students met or exceeded expectations for this SLO.	In EN 563, Instead of a project report, a review paper will be required. This is in line with the changes due to the pandemic. No other changes to the

		EN 507: Project report evaluation EN 563: Review paper evaluation **Rubrics:** *Written:* Articulation, organization, neatness, grammar and spelling, writing style, document formatting, and proper referencing of the sources. *Oral:* Delivery, length and detail, mechanics, dialect, visual aides, appearance, and listening and response to questions	EN 593 (Fall 2019) Five MSME graduate students who were enrolled in EN 507 (Fall 2019) Five MSME graduate students who were enrolled in EN 563 (Spring 2020)		All students (100%) exceeded the expectation for this SLO. The students in EN 507 wrote a project report. All students (100%) exceeded the expectation for this SLO. The students in EN 563 wrote a review paper on a robotics topic. All students (100%) met the expectation for this SLO.		program are planned at this time.

Comments on part I:

We steadied the enrollment by offering a 3+2 structure. The 3+2 program has been fully implemented this school year. Recruitment efforts are also increased. We tried to recruit from Iraq, Serbia, India and China. We were able to recruit locally from the existing undergraduate student population as well as from Africa and Asia.

II. Closing the Loop. Describe at least one data-informed change to your curriculum during the 2019-2020 cycle. These are those that were based on, or implemented to address, the results of assessment from previous cycles.

A. What SLO(s) or other issues did you address in this cycle? **Please include the outcome(s) verbatim from the assessment plan.**	B. When was this SLO last assessed to generate the data which informed the change? Please indicate the semester and year.	C. What were the recommendations for change from the previous assessment column H and/or feedback?	D. How were the recommendations for change acted upon?	E. What were the results of the changes? If the changes were not effective, what are the next steps or the new recommendations?
Analyze and/or design a mechatronic system	Spring 2018	Prerequisite course EN 562 was found unnecessary.	EN 562 was removed from the list of prerequisite courses.	All students met or exceeded expectations as before.
Apply advanced engineering principles in the design and analysis of a system or process to meet specified needs	Spring 2018	Prerequisite course EN 562 was found unnecessary.	EN 562 was removed from the list of prerequisite courses.	All students met or exceeded expectations.
Communicate effectively in writing and orally	Spring 2018	No changes were recommended.	No changes were implemented.	All students met or exceeded expectations.

Comments on part II:

The program was reviewed the previous year. Based on the recommendations of the CAP Board the Railroad Engineering emphasis was placed on hold and the 3+2 opportunities were offered to the current undergraduate Mechatronics students.

MSME Assessment Rubrics

Analyze and/or design a mechatronic system

	Exceeds expectations 5%	Meets expectations 75%	Does not meet expectations 20%
Design Strategy	Develops a design strategy, including a plan; decomposes work into subtasks, and develops a timetable.	Uses a design strategy with guidance.	No design strategy is attempted.
Solutions	Develops several potential designs and based on the analysis of those designs finds an optimal design solution using the system view approach.	Can develop and compare multiple solutions to a mechatronic design problem, but does not usually arrive at the best result; conducts optimization but neglects one or two key aspects. Does not use the system view approach.	Cannot design a mechatronic system or individual component without a significant amount of help. Only focuses on one solution to a problem; no optimization attempted.
Tools	Uses computer tools and engineering resources effectively to analyze and/or design mechatronic systems.	There is evidence of mostly correct use of computer tools and engineering resources.	There is no evidence of use of computer tools and engineering resources.

Apply advanced engineering principles in the design and analysis of a system or process to meet specified needs

	Exceeds expectations 5%	Meets expectations 75%	Does not meet expectations 20%
Design Strategy	Develops a design strategy, including a plan; decomposes work into subtasks, and develops a timetable.	Uses a design strategy with guidance.	No design strategy is attempted.
Constraints	Develops a solution that includes all realistic constraints.	Develops a solution that fails to include one or more minor realistic constraints.	There is no consideration of realistic constraints.

Communicate effectively in written form

	Exceeds expectations 5%	Meets expectations 75%	Does not meet expectations 20%
Articulation	Articulates ideas clearly and concisely using visual aids where appropriate.	Articulates ideas, but the idea flow is somewhat disjointed. Does not always use visual aids appropriately (e.g. a table and a graph representing the same information are used; a figure is not addressed in the narrative).	Does not develop/articulate ideas well. Makes points that are hard to understand. Does not use visual aids.
Organization	Organizes the material in a logical sequence (paragraphs, subheading, etc.).	In general, organizes the material well; however, occasionally paragraphs combine multiple thoughts. Does not identify sections and sub-sections clearly.	Imposes little or no structure or organization; does not use subheadings or proper paragraph structure.
Neatness	Presents material neatly and professionally.	Occasionally, does not present material neatly.	Does not present material neatly.
Grammar and Spelling	Uses grammar and spelling correctly.	Makes one or two spelling/grammar errors per page.	Makes spelling/grammar errors throughout more than 1/3 of the paper.
Writing Style	Uses professional writing style.	Sometimes uses jargon, improper voice, improper tense, inappropriate style, etc.	Uses inappropriate writing style for the audience and for the assignment.
Document Formatting	Conforms to the prescribed format.	Conforms to the prescribed format in many portions of the assignment.	Does not follow the prescribed format.

Communicate effectively in oral form

	Exceeds expectations 5%	Meets expectations 75%	Does not meet expectations 20%
Delivery	Plans and delivers an oral presentation effectively; applies the principle of "tell them."	Presents key elements of an oral presentation adequately, but does not apply "tell them" clearly.	Organizes the presentation poorly (e.g. no clear introduction or summary is delivered).
Length and Detail	Presents technical content appropriate for the time allowed and the audience level.	Presents excessive or insufficient detail for time allowed and/or the audience level.	Presents for an inappropriately short or long time period; omits key results during the presentation.
Mechanics	Makes eye contact; can be easily heard; speaks comfortably with minimal prompts; does not block the screen; doesn't show any distracting habits.	Exhibits minor difficulties (e.g. makes sporadic eye contact; occasionally is difficult to hear or understand; overuses prompts or does not use prompts enough; occasionally stumbles or loses place; occasionally blocks the screen; occasionally exhibits some distracting habits (um, ah, clicking pointer, etc.)).	Exhibits major difficulties with the presentation (e.g. makes no eye contact; is difficult to hear or understand; reads from prepared script; blocks the screen; exhibits distracting habits (um, ah, clicking pointer, etc.)).
Dialect	Uses proper American English.	Occasionally uses an inappropriate style of English-too conversational; uses understandable English.	Uses poor English and/or poor pronunciation.
Visual Aides	Uses visual aides effectively.	Presents visual aides that have minor errors or are not always clearly visible.	Presents multiple slides that are unclear or incomprehensible.
Appearance	Exhibits professional appearance.	Appears too casual for a professional presentation.	Appears inappropriately dressed for the occasion (e.g. wears shorts, sandals, etc.)
Listening and Response to Questions	Listens carefully and responds to questions appropriately; is able to explain and interpret results for various audiences and purposes.	Sometimes misunderstands questions; does not respond appropriately to the audience, or has some trouble answering questions.	Does not listen carefully to questions; does not provide appropriate answers, or is unable to answer questions about the presentation material.

Sample MSME Exit Interview

Name: _____ E-mail after graduation_____Date: _____

How did you hear about our MSME program?

What other schools and/or degrees did you consider?

What could be done to make the MSME Program at CSU-Pueblo more attractive to potential students in the same circumstance you were when you began?

How was the experience of being a new (International) MSME student?

What do you think of the degree and education you received at CSU-Pueblo?

What are your future plans?

How do you feel your degree and education have prepared you for your intended career?

How do you feel that your education could have been improved?

What's the worst thing that happened to you since you got here?

What's the best thing that happened to you since you got here?

How confident are you in analyzing and/or designing mechatronic systems using appropriate engineering tools?

How confident are you in applying advanced engineering principles in analyzing and/or designing systems or processes to meet specified needs?

Could you provide any suggestions for changes in the program?