AC 2010-225: ASSESSING CURRICULUM IMPROVEMENT THROUGH SENIOR PROJECTS

Jianbiao Pan, California Polytechnic State University

Dr. Jianbiao (John) Pan is an associate professor in the Department of Industrial and Manufacturing Engineering at Cal Poly, San Luis Obispo, CA. After completing a PhD at Lehigh University in Industrial Engineering in 2000, he joined the optoelectronics center at Lucent Technologies/Agere Systems as a member of technical staff. He received a M.E degree in Manufacturing Engineering from Tsinghua University, Beijing, China, and a B.E. degree in Mechatronics from Xidian University, Xian, China. Dr. Pan's research interest lies in environmentally benign microelectronics packaging and reliability including lead-free soldering and LED packaging. His teaching interests include electronics manufacturing, microelectronics and electronic packaging, statistical data analysis, design and analysis of experiment, and CAD/CAM. He is a Fellow of the IMAPS, a Senior Member of the IEEE and of the SME, and a Member of the ASEE. Dr. Pan is a recipient of the 2004 M. Eugene Merchant Outstanding Young Manufacturing Engineer Award from the SME. He is a Highly Commended Winner of the Emerald Literati Network Awards for Excellence 2007, and an invitee of the National Academy of Engineering's Frontiers in Engineering Symposium in 2007. He is also the First Place winner of the IPC's Worldwide Academic Poster Competition in 2009.

Albert Liddicoat, California Polytechnic State University

Albert A. Liddicoat received his M.S. and Ph.D. degrees in Electrical Engineering and his M.S. degree in Engineering Management from Stanford University in 1996, 2002 and 1999, respectively. He earned a B.S. degree in Electronic Engineering from California Polytechnic State University in San Luis Obispo in 1989. Dr. Liddicoat worked for IBM's Storage Technology Division from 1990 until 2002 where he held many positions in disk drive development including: servo system test and integration, ASIC development, system electronics and architecture, program management, and senior hardware development manager.

Currently, Dr. Liddicoat is the Assistant Vice President for Academic Personnel and the Forbes Professor of Computer and Electrical Engineering at Cal Poly State University in San Luis Obispo. He teaches digital design and embedded systems courses. His research interests include computer architecture, computer arithmetic, networks, re-configurable computing and engineering education. Dr. Liddicoat received the Professional Achievement Award from the College of Engineering at California Polytechnic State University in 2003, and he is a Senior Member of the Institute of Electrical and Electronic Engineers.

James Harris, California Polytechnic State University

James G. Harris received his BS and MS in EE from UCB and the PhD in EE from Syracuse University. He was an Assistant Professor at Howard University, and an Associate Professor at the University of the District of Columbia, both in Washington, D.C. He is a Professor (emeritus) with the Department of Electrical Engineering, and the Computer Engineering Program at Cal Poly in San Luis Obispo, CA. He served as the Department Head of the EE Department from 1982-89 and the Director of the Computer Engineering Program from 1993-97 and 2008-09. From 1990-92, he was a Program Director in the Division of Undergraduate Education at the National Science Foundation in Washington, D.C. He worked for TRW in Redondo Beach, CA for 11 years, primarily on signal processing projects. He is a member of IEEE, ASEE, ACM, AAAS, ASES and SHOT.

Linda Shepherd, California Polytechnic State University

Linda Shepherd is Professor of Political Science and Public Policy at Cal Poly, San Luis Obispo, California, where she has also served as founding director of the Master of Public Policy program, founder of the Institute for Policy Research, and past Chair of the Department of

Political Science. She specializes in teaching interdisciplinary courses in research methodology, quantitative analysis, qualitative analysis, and assessment design. Dr. Shepherd received her B.A. in Political Science from UCLA, and her M.A. in Political Psychology and her Ph.D. in Public Policy from the University of California, Davis. She has authored and co-authored several journal articles and book chapters on the subjects of public policy, research methods, political psychology, and political behavior. She co-edited Profiling Political Leaders (Praeger, 2002) and Political Leadership for the New Century (Praeger, 2003), and edited Political Psychology: The Development of the Discipline Book Series (Leske/Budrich, 2006). In addition, Dr. Shepherd currently serves as President and member of the Executive Board of the Psycho-Politics Research Committee of the International Political Science Association. Dr. Shepherd is the recipient of multiple research grants, and has presented research at numerous national and international scholarly meetings including the NATO Advanced Research Workshops on the Social and Psychological Factors in the Genesis of Terrorism. She serves as a reviewer for the Journal of Political Psychology, the American Political Science Review, Sage Publications, Houghton Mifflin, and Prentice Hall Publications.

Assessing Curriculum Improvement through Senior Projects

Abstract

Senior project and/or capstone design courses are intended to provide a culminating design experience for students and to demonstrate their understanding of engineering knowledge and their ability to apply that knowledge to practical problems. It is expected that the quality and attributes of students' senior design projects can be used as a good measure of determining how well the curriculum prepares students to engage in engineering design as well as a measure of faculty teaching and student learning. This paper reports the results of a study designed to assess whether the new computer engineering curriculum implemented at Cal Poly over the previous five years has had a positive impact in preparing students for engineering design through measuring the quality and complexity of senior design projects. A randomized complete block design was used in the study. Ten senior projects each were randomly selected from the population of three groups: computer engineering senior projects completed in the 2002-2003 academic year, computer engineering senior projects completed in the 2007-2008 academic year, and electrical engineering senor projects completed in the 2007-2008 academic year. A senior project evaluation rubric was developed to assess the quality and complexity of the senior projects. Members from the Computer Engineering Industrial Advisory Board used the rubric to score the randomly selected senior projects. The scores assigned by the advisory board members were compared to the letter grades assigned by faculty advisors for these senior projects. The results of the analysis show that the overall quality of computer engineering senior projects improved from academic year 2002-2003 to academic year 2007-2008. However, there is a statistically significant difference in the overall senior project grades assigned between faculty advisors as compared to senior project scores assigned by the advisory board members. The results also indicate that the rubric developed from this study is robust since different evaluators did not have a statistically significant effect on the grading of senior projects.

Introduction

The Computer Engineering curriculum at Cal Poly San Luis Obispo has been modified significantly in the previous five years to prepare students for a "system" level engineering experience and project-based learning. Three new courses include: CPE329 *Introduction to Systems Design*, IME458 *Microelectronics and Electronic Packaging*, and CPE350/450 *Capstone* course sequence. In the *Introduction to Systems Design* course, students design a custom computing platform using programmable logic with reusable intellectual property core Technology, instead of using a standard hardware development board in a traditional embedded systems course.[1,2] In addition, students interface this computer system to external hardware devices that include digital and analog I/O, and develop firmware to best meet the system design requirements. In the *Microelectronics and Electronic Packaging* course, students gain a hands-on experience in designing and manufacturing a complex system through layout, assembly and testing an electronic device involving a multilayer Printed Circuit Board (PCB). The Capstone course sequence prepares students to work in teams of 4 to 6 people to design and implement a complex system that meets the needs of a real customer such as an industrial company or a nonprofit organization. The Capstone experience is a two-quarter course sequence where student gain team building, design skills, project management, engineering ethics and other related skills.[1, 2] This paper focuses on the assessment of the curriculum improvement from these three new courses.

Various methods have been reported in the engineering education literature to assess the effectiveness of the curriculum improvement. Dempsey et al. [3] presented using senior mini-projects instead of traditional senior capstone projects in electrical and computer engineering curriculum assessment. Ricks et al. [4] used student perceptions of their abilities and quantitative measures of student performance using both written assignments and laboratory assignments to evaluate the effective of a new embedded systems curriculum. Gannod et al. [5] described the gap analysis and its impact on the curriculum program. A comprehensive curriculum assessment has been reported by Clancey et al. [6] including eight tools such as skills test, analysis of design projects, senior exit interview, alumni survey, writing portfolio, oral presentation skills, safety program, and performance on the Fundamentals of Engineering (FE) exam. However, each of the reported methods has its limitations.

Senior project and/or capstone design courses are intended to provide a culminating design experience for students and to demonstrate their understanding of engineering knowledge and their ability to apply that knowledge to practical problems. It is expected that the quality and attributes of students' senior design projects can be used as a good measure of determining how well the curriculum prepares students to engage in engineering design as well as a measure of faculty teaching and student learning. Senior projects have been widely used in curriculum assessment though Dempsey et al. [3] argued that it is difficult and time-consuming in curriculum assessment due to the diversity and the length of the senior projects.

This paper reports the results of a study designed to assess whether the new computer engineering curriculum implemented at Cal Poly over the previous five years has had a positive impact in preparing students for engineering design through measuring the quality and complexity of senior design projects.

Experimental Procedures

A randomized complete block design [7] was used in the study. Ten senior projects were randomly selected from the population of three groups: computer engineering senior projects completed in the 2002-2003 academic year (CPE02/03), computer engineering senior projects completed in the 2007-2008 academic year (CPE07/08), and electrical engineering senor projects completed in the 2007-2008 academic year (EE07/08). The motivation to include EE07/08 senior projects in this study is that there is significant overlap in the EE and CPE curriculum at Cal Poly which includes CPE 329 and the option of taking IME 458 as a technical elective. The response variable is the quality of the senior project as assessed using a rubric-based instrument created by the authors. The senior project reports were scored by the Computer Engineering Industrial Advisory Board members. Since different board members may assign different scores to the same senior project even though the rubric-based instrument is used, the board member is considered as a block in the experimental design. The effect of the individual evaluators will also be analyzed to determine the scoring consistency using the rubric. One senior project from each of the three groups is randomly selected and these three senior projects with a grading rubric were assigned to an advisory board member. Thus, each advisory board member received one CPE02/03 senior project, one CPE07/08 senior project, and one EE07/08 senior project to evaluate. Information indicating the student's name, major, and year was removed from the senior project report in order to facilitate a blind review and to reduce any possible bias.

A senior project evaluation rubric was developed to assess the quality and complexity of the senior projects. Members from the Computer Engineering Industrial Advisory Board used the rubric to score the senior projects. The rubric developed for this study is included in the Appendix.

Results and Discussions

Seven advisory board members completed their evaluations for a total of 21 senior projects. An Analysis of Variance (ANOVA) is used to analyze the resulting data. The P-value in the ANOVA analysis is a measure of how likely the sample results are, assuming the null hypothesis is true. The null hypothesis, in this study, is that there is no difference in average score among CPE02/03, CPE07/08, and EE07/08. If a p-value is less than α-level (a specified significant level, 0.05 in this study, or 95% confidence level), the null hypothesis is rejected.

Table 1 summarizes the ANOVA results for all 13 questions in the senior project rubric. It shows that the P-value for only three questions is less than 0.05: Q3 ability to use techniques, skills and modern engineering tools, Q11 the quality of the diagram, graphics, figures, and tables, and Q13 the overall score of the senior project. The "P-value of Reviewer No." column is a measure of whether different reviewers have an effect on the results.

Figure 1 shows the main effect plot for Question 3, ability to use techniques, skills and modern engineering tools. No statistically significant improvement is found in the ability to use techniques, skills and modern engineering tools between CPE02/03 and CPE07/08 though the EE07/08 group is higher than each of the CPE groups. After discussing this data with the CPE faculty and advisory board members, it was determined that the examples of skills listed in question 3 are better aligned with electrical engineering majors. The authors are in the process of revising the rubric to include more examples of skills that are commonly used in computer engineering.

Figure 2 shows the main effect plot for Question 11, the quality of the diagram, graphics, figures, and tables. The results show that one aspect of the computer engineering senior project, the diagram, graphics, figures and tables quality has improved from 2002/2003 to 2007/2008. This significant improvement is attributed to the newly introduced capstone courses, CPE350/450. In both capstone courses, presentation and writing skills have been specifically targeted. It should be pointed out that no comparison should be made between the computer engineering senior project and the electrical engineering senior project because of the different senior project preparation courses between CPE and EE curricula.

Table 1. Summary of the ANOVA Results for all 13 Questions

Question No.	**P-value of Major_Year_Index**	**P_value of Reviewer No.**
Q1	0.203	0.147
Q2	0.09	0.307
Q3	**0.046**	**0.013**
Q4	0.748	0.103
Q5	0.191	0.467
Q6	0.181	0.171
Q7	0.094	0.110
Q8	0.373	0.354
Q9	0.303	0.302
Q10	0.440	0.551
Q11	**0.000**	0.111
Q12	0.123	0.346
Q13	**0.034**	0.467

Figure 3 shows the main effect plot for Question 13, overall quality of senior projects. It is evident that the overall quality of computer engineering senior projects improved from academic year 2002-2003 to academic year 2007-2008. However, the study cannot conclude that the slight overall improvement in senior project scores is only due to the proposed curriculum improvement, because it is an observatory study, not a controlled experiment. Other factors such as the difference in quality of faculty and students in the last five years may also contribute to the difference in senior project quality.

It should be noted that not all of the students that completed senior projects during the 2007-2008 academic year experience all three curriculum changes. Only limited computer engineering and electrical engineering students have taken IME458, *Microelectronics and Electrical Packaging* class. There are several reasons IME458 has not been taken by many CPE or EE students: 1) many students do not know the class is an approved technical elective because it is a new course and there were schedule conflicts since it was listed in another department (Industrial & Manufacturing Engineering); 2) the course has been offered only a few times over the last five years due to budget constraints.

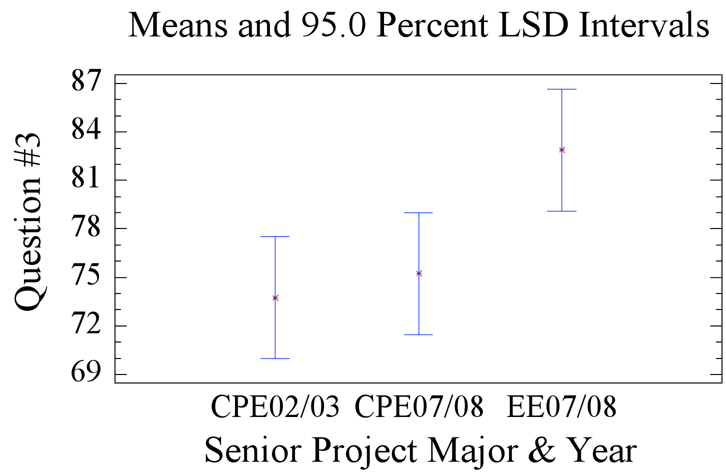

Figure 1. Main effects plot for Question 3: ability to use techniques, skills and modern engineering tools

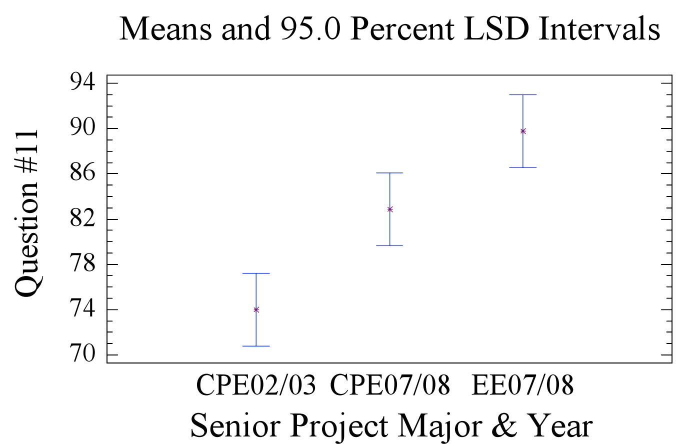

Figure 2. Main effect plot for Question 11: the quality of the diagram, graphics, figures, and tables

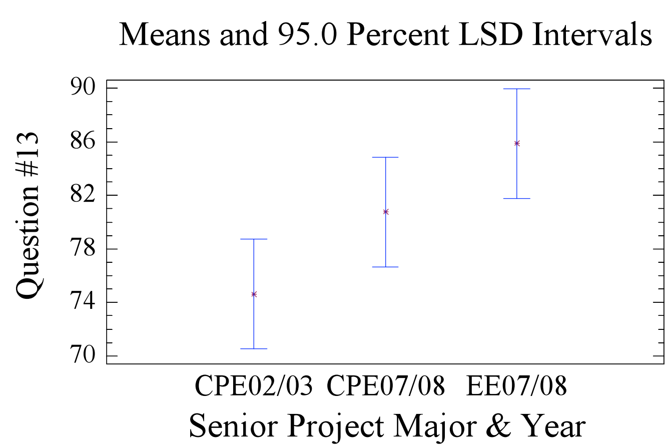

Figure 3. Main effect plot for Question 13, overall score of the senior project

Table 2 shows that the average score assigned by the advisory board members and the average letter grade assigned by faculty advisors for these senior projects. It is clearly shown that the average score of CPE senior projects given by faculty advisors is much higher than that of the score assigned by advisory board members, while the average score of EE senior projects given by faculty advisors is similar to that of the score assigned by advisory board members. Although the differences in assessment of senior project quality as evaluated between faculty advisors and industry evaluators is still unknown, inconsistent grading in senior projects by faculty advisors has also been presented by Dempsey et al. [3] Recall that the senior project grade assigned by the faculty member includes many aspects not accounted for in the senior project rubric. The senior project rubric used by industry evaluators only evaluates the senior project as described in the report while the faculty advisor has knowledge of the project proposal, interim reports, meetings, demonstrations, and a better understanding of the technical difficulty and project complexity. Since the objective of this study is to assess how well the curriculum prepares students for professional practice, the authors feel that the score of the industry evaluators is a better measure than that of faculty. After reviewing the results of this study, the computer engineering faculty felt that the rubric with the previously discussed modifications would help them in evaluating and grading senior projects.

Table 2. Average Score Comparison Given between Faculty Members and Advisory Board Members

	Average score given by faculty advisors	Average score assigned by advisory board members
CPE 02/03	3.83/4.0 (**A-**)	74.6/100 (**C**)
CPE 07/08	3.90/4.0 (**A**)	80.8/100 (**B-**)
EE 07/08	3.35/4.0 (**B+**)	85.9/100 (**B+**)

Summary and Recommendations

A study has been done to assess whether the new computer engineering curriculum implemented at Cal Poly over the previous five years has had a positive impact in preparing students for engineering design through measuring the quality and complexity of senior design projects. The results of the analysis show that the overall quality of computer engineering senior projects improved from academic year 2002-2003 to academic year 2007-2008 though no direct cause and effect conclusion can be drawn from the study.

There is a significant difference in senior project grades assigned between faculty advisors as compared to scores assigned by the advisory board members. The computer engineering faculty and advisory board recommended that the grading rubric should be given to students so that they will have a better understanding of the expectations for their senior project reports. Faculty members feel that by using the senior project rubric, their evaluation and grading of senior projects would be more consistent and they see this as a positive program improvement.

The results of this study also indicate that the rubric developed from this study is robust because different evaluators do not have a significant effect on the grading of senior projects except for Question #3. Some advisory board members and faculty members feel that the rubric is slightly biased toward electrical engineering majors. Currently the computer engineering faculty has agreed to provide inputs to revise the rubric to have a better balance between the computer science and the electrical engineering aspects of computer engineering.

Acknowledgements

This work was sponsored by National Science Foundation, under Award # DUE-0633363. The authors want to thank the advisory board members for their time in reviewing and scoring the senior projects for this study.

Bibliography

1. Liddicoat, A., Pan, J., Harris, J., and Slivovsky, L., "Curriculum Enhancement to Support Project-based Learning in Computer and Electrical Engineering," *Proceedings of the American Society for Engineering Education Annual Conference & Exposition*, 2008.
2. Liddicoat, A., Pan, J., Harris, J., Del Bello, D.J., and Slivovsky, L., "Work in Progress – Enhancing Student-Learning through State-of-the-art Systems Level Design and Implementation," *Proceedings of the 38th ASEE/IEEE Frontiers in Education Conference*, 2008.
3. Dempsey, G.L., Anakwa, W.K.N., Huggins, B.D., Irwin, J.H., Jr., "Electrical and Computer Engineering Curriculum Assessment via Senior Miniproject," *IEEE Transactions on Education*, Vol. 46, No. 3, 2003, pp. 350-358.
4. Ricks, K.G., Jackson, D.J., and Stapleton, W.A., "An Embedded Systems Curriculum Based on the IEEE/ACM Model Curriculum," *IEEE Transactions on Education*, Vol. 51, No. 2, 2008, pp. 262-270.
5. Gannod, B.D., Gannod, G.C., and Henderson, M.R, "Course, Program, and Curriculum Gaps: Assessing Curriculum for Targeted Change," *Proceedings of the 35th ASEE/IEEE Frontiers in Education Conference*, 2005.
6. Clancey, S., Keith, J.M., and Pintar, A.J., "Improving the Chemical Engineering Curriculum through Assessment: Student, Faculty, Staff, Alumni, and Industry Input," *Proceedings of the American Society for Engineering Education Annual Conference & Exposition*, 2002.
7. Montgomery, D.C., *Design and Analysis of Experiments*, 6th Ed., John Wiley & Sons, 2005, pp. 119-133.

Appendix

Student Number: ______________ **Reviewer Number:_____________**

Senior Project Title: ____

After reviewing each senior project, please assign a *numeric score* (e.g. 85 or 93) for each question that best reflects the evidence provided in the senior project report. Please consider the following grading criteria when assigning a numeric score.

A – (90-100) Superior Attainment of Course Objectives
B – (80-89) Good Attainment of Course Objectives
C – (70-79) Acceptable Attainment of Course Objectives
D – (60-69) Poor Attainment of Course Objectives
F – (0-59) Non-Attainment of Course Objectives

1. Overall system level design **SCORE ____________**

Requirements vague, poor design, no verification or testing	Some requirements identified, design addresses some requirements limited verification or testing	Several requirements identified, design concept meets most design constraints, some verification and testing	Most requirements identified, design concept meets most design constraints, some verification and testing	All requirements identified, design concept meets all design constraints, thorough verification and testing
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

2. Ability to formulate and solve engineering problems **SCORE ____________**

Did not demonstrate ability to formulate or solve engineering problems	Few examples of formulating and solving engineering problems	Used quantitative skills to formulate and solve some engineering problems	Used quantitative skills to formulate and solve most engineering problems	Demonstrated skills to formulate relevant engineering problems and solve them independently
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

3. Ability to use techniques, skills and modern engineering tools necessary for engineering practice such as pSpice, Matlab, VHDL, ModelSim, Embedded Developers Kit, Cadence Allegro, or Mentor Graphics Expedition

SCORE ____________

Did not use software, simulation and computer aided design tools	Used at least one modern engineering tool for senior project	Used some modern engineering tools in senior project	Demonstrated ability to use several modern engineering tools in senior project	Demonstrated ability to use software, simulation and computer aided design tools necessary for engineering practice
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

4. Range of engineering design skills needed

- **Microcontroller/processor**
- **Analog Design**
- **Digital Design**
- **Simulation**
- **Software**
- **Printed Circuit Board Design**

SCORE ____________

Project covered 1 item from list	Project covered 2 items from list	Project covered 3 items from list	Project covered 4 items from list	Project covered 5 or more items from list
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

5. Hardware Design Complexity (Number of subsystems, number of IC components, and number of signal wires in system)

SCORE ____________

Student did not design custom hardware (i.e. used PC or commercial development board)	1 to 2 subsystems, 1-3 integrated circuit components, less than signal interconnections	2 to 3 subsystems, 2-4 integrated circuit components, 50-200 signal interconnections	3 to 4 subsystems, 3-5 integrated circuit components, 100-300 signal interconnections	Hardware design was very complex, 5 or more subsystems, five or more integrated circuits, sophisticated circuit schematic diagram
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

6. Design Verification and Testing **SCORE ____________**

Design verification and testing not discussed	Minor testing and design verification included	Tested some of the system requirements but testing plan was not well conceived or results documented	Tested most of the system requirements and reported results for the tests run	Test matrix with boundary conditions considered; test plan included component, integration, and system level testing
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

7. Project implementation and construction **SCORE ____________**

No hardware built	Prototype hardware built with limited functionality using poor quality workmanship	Prototype constructed with some functionality and okay workmanship	Prototype constructed with most functionality and good quality workmanship	Project resulted in a fully functional artifact with high quality workmanship
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

8. Multidisciplinary project (engineering, business, science, mathematics, psychology, art and design)

SCORE ____________

Topic very narrow	Broad within one Engineering discipline (EE, CpE or CS)	Broad within EE, CpE and CS	Incorporated multiple Engineering disciplines	Incorporated disciplines outside of Engineering
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

9. Project management skills (GANTT Chart/schedule, part procurement, or lessons learned)

SCORE ____________

No evidence of project management skills	Vague schedule included, didn't discuss component procurement, limited discussion of issues	Rough schedule, most parts procured for integration, discussion of some obstacles encountered	Detailed schedule, parts obtained or alternatives identified, discussion of how issues were overcome	Well conceived schedule with milestones and/or dependencies, parts obtained in time, identified lessons learned
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

10. Overall quality of written senior project report **SCORE ____________**

• appears to include data and information copied from various sources with little thought or integration. • provides little or no evidence of the ability to understand and analyze the issue • provides little or no evidence of the ability to develop an organized response • has severe problems in language and sentence structure that persistently interfere with meaning • contains pervasive errors in grammar, usage, or mechanics that result in incoherence	• is unclear or seriously limited in presenting or developing a position on the issue • provides few, if any, relevant reasons or examples • is unfocused and/or disorganized • has serious problems in the use of language and sentence structure that frequently interfere with meaning • contains serious errors in grammar, usage, or mechanics that frequently obscure meaning	• is vague or limited in presenting the issue • is weak in the use of relevant reasons or examples • is poorly focused and/or poorly organized • has problems in language and sentence structure that result in a lack of clarity • contains occasional major errors or frequent minor errors in grammar, usage, or mechanics that can interfere with meaning	• presents a clear position on the issue • develops the position on the issue with relevant reasons and/or examples • is adequately focused and organized • expresses ideas with reasonable clarity • generally demonstrates control of the conventions of standard written English but may have some errors	• presents an insightful discussion • develops the position with compelling reasons and/or persuasive examples • sustains a well-focused, well-organized analysis, connecting ideas logically • expresses ideas fluently and precisely, using effective vocabulary and sentence variety • demonstrates facility with the conventions (i.e., grammar, usage, and mechanics) of standard written English
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

11. Rate the quality of the Diagrams, Graphics, Pictures, Figures and Tables **SCORE ____________**

None Included	Poor quality, illegible, not captioned	Some figures included in the report could have been improved, should have added additional items to assist the reader	Good quality in general, could have added additional items to assist the reader	Assists the readers understanding, is accurate, clearly captioned and referenced in text
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

12. Bibliography **SCORE ____________**

Little to none	Only referenced websites and other un-reviewed content	Some variety of references including reviewed or published materials	Used broad range of quality references	Comprehensive, textbooks, journal articles, datasheets, application notes, etc.
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

13. Please assign an overall score to this senior project **OVERALL SCORE ____________**

Not Acceptable Project	Overall Poor Project	Overall Acceptable Project	Overall Good project	Overall Superior project
F < 60	D 60-69	C 70-79	B 80-89	A 90-100

14. Please provide your feedback to improve this rubric to better evaluate senior projects?

____

____

____

____

____

____

____

____