SIE 498B- Systems Engineering Senior Design
Fall 2023, University of Arizona

Advisor:	Dr. Mike Kwinn Office: ENGR 103, Phone: 845.401.8361 Email: kwinnm@arizona.edu Office hours by appointment
Teaching Assistants:	NA
Class meetings:	No regularly scheduled meeting time. Teams will meet to complete the project according to their coordinated schedule. Team can coordinate with the advisor to meet, when necessary.
Catalog description:	Teams of students will use material taught in the SIE curriculum to address a customer's needs and help a real-world client design or improve a system. Students will use a system design process, discover system requirements, identify project and technical risks, and develop a project plan and schedule. Students will communicate orally and in writing. A series of design reviews will monitor project goals, schedule, risk and progress. 498A should be taken in the student's second to last semester.
Prerequisite(s):	Senior status
Textbook:	No specific textbook required

Outcome Related Course Learning Objectives:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

| **Instructional Objectives:** | The objective of the Senior Design Project is to utilize the knowledge and skills gained from the Systems Engineering, Industrial Engineering or the Engineering Management curriculum to address and solve a problem(s) of interest to industry. |

D2L Website:

You will access this site by going to http://d2l.arizona.edu and logging in with your UA Net ID. If you need assistance with D2L you should contact D2L Help (http://help.d2l.arizona.edu); you may also try the 24/7 IT Support center on campus (http://the247.arizona.edu), which is available 24 hours a day, 7 days a week. When you log on to D2L, this course will be listed on the welcome page under "My Courses".

Announcements, class notes, PowerPoint files, spreadsheets used in class, homework assignments and solutions, exams from previous semesters, discussion questions, and links to news items of interest will posted to this website. You must be registered for the class to be permitted entry to the site.

Assignments

Each team will maintain a logbook (electronic folder is sufficient) for all of their documents and activities and ensure that logbook is available for review. All documents and notes, including notes from every meeting, will be maintained in this logbook.

Each team will meet for weekly to ensure that the team is making progress towards project completion. Notes from each meeting should be maintained in the team logbook.

Additionally, each team will complete the following project requirements:

Project Requirement	Timeline
Project team logbook	Continuous
Preliminary Technical Documentation Package (TDP1)	2 October 2023
Intermediate Technical Documentation Package (TDP2)	1 November 2023
Final Report and Poster Presentation	4 December 2023

Grading:

The final grades will be given based on completion and submission of the following requirements. Grading rubrics are at the end of this document. Teams are encouraged to submit their reports when they are completed and are not required to wait until the due date.

Project team logbook	10%
TDP1	15%
TDP2	15%
Poster Presentation	15%
Final Report	25%
Instructor/Team Assessment	20%
Total	**100%**

Attendance policy:

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: http://catalog.arizona.edu/2015-16/policies/classatten.htm

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02

Participating in the course and attending course events are vital to the learning process. As such, attendance is required at all scheduled meetings. In person attendance for this course is imperative to the development of the course project. The in person discussions will not be recorded for viewing online after the lessons. If you cannot make a scheduled class meeting, please let the instructor know ahead of time, if possible.

Students with Special Needs:

Students with disabilities or special needs who require accommodations to fully participate in course activities or meet course requirements must register with the S.A.L.T. Center or Disability Resource Center. Students needing special accommodations should contact SALT, 1010 N Highland Ave., or the Center for Disability Related Resources, 1224 E. Lowell Street, for documentation of special needs. If you qualify for special accommodations, bring your letter of request to the instructor as soon as possible. An exam taken in the DRC testing center is to be taken at exactly the same time the exam is given in class.

Academic behavior:

If any form of academic dishonesty occurs in this course, procedures as given by the Dean of Students will be followed. The reduction in credit in the following bulleted list is the minimum action to be taken – other actions (e.g., notes on transcripts, reduction in final grade in course) may be taken as deemed appropriate.

- Plagiarism is a serious offense! Students are advised to review the library site (http://www.library.arizona.edu/help/tutorials/plagiarism/index.html) on plagiarism. Plagiarized material will receive a zero score and the incident will be reported to the dean.

- Anyone found cheating is in violation of the Student Code of Academic Integrity and will receive a zero on that assignment and will be reported to the Dean of Students or appropriate designee.

- The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See: http://policy.web.arizona.edu/~policy/threaten.shtml.

Academic integrity policy:

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work, exercises, homework, and exams must be the product of independent effort unless otherwise instructed. Students are expected to know and to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See:

- http://catalog.arizona.edu/2011-12/policies/aaindex.htm
- http://deanofstudents.arizona.edu/codeofacademicintegrity

Any violation of the academic integrity code will be dealt with using the procedures detailed in the code.

Confidentiality of Student Records:

The UA policy on confidentiality is at: http://www.registrar.arizona.edu/ferpa/default.htm.

Classroom Behavior Policy:

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (i.e. texting, chatting, reading a newspaper, making phone calls, web surfing, etc.). Students are asked to refrain from disruptive conversations with

people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See: http://policy.web.arizona.edu/~policy/threaten.shtml.

Restricted communication devices:

Cell phones and other communication devices are to be turned off during class and during examinations. Lap top computers are prohibited during exams.

University absence policies:

- All holidays of special events observed by organized religions will be honored for those students who have affiliation with that particular religion.
- Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

Revisions:

Modifications may occur in this syllabus. The grading policy, regarding tests, exams, and homework is rigidly fixed. Students will receive timely updates on any modifications.

Student feedback:

Students may be asked to provide written feedback on the course and its contents.

Specific Grading Rubrics Second Semester

Preliminary Technical Documentation Package (TDP1) Grading Rubric - Rev 2 (10%)

Overall Criteria	Excellent (A) 100%	Good (B) 80%	Fair (C) 60%	Poor (D) 40%	Fail (E) 0%
Introduction and Project Description	5 Description of the overall project and the MVPs included with rationale and scope of delivery defined in alignment with requirements, critical technology, and/or use cases. Includes a description of the report content and the relationship between the sections.	4 Gives general description of the project and MVPs, but some missing link to requirements, use case and/or overall project.	3 Project as a whole is defined, but content of this delivery not defined in context to whole project.	2 Poorly written description. Scope of project or MVP discussion is missing.	0 Project Description is missing.
System Description and System Block Diagram (02c and 04c)	10 Clearly describes the system including the system block diagram with proper partitioning of subassemblies and interfaces completely defined and labeled. MVP sub portions and relationships to full design are identified. Project and design solution specifically considers impacts in a global, cultural, social, environmental, and economic context.	8 Most information is described but lacks some detail. Impacts are not clearly stated.	6 Poor System block diagram. Not all subassemblies are included, and/or the interfaces are not fully defined. Impacts are poorly assessed.	4 System Block Diagram not discussed at all. Impacts are not assessed.	0 Section is missing.
System Verification Plan/SRVM	15 The System Verification Plan (SVP) shall include an overview how requirement verification will be performed. Plan shall include expected verification dates, date completed, and procedure to be used. SRVM complete with references to current verification procedures (test, inspection, or demonstration), data sheets, inspection reports, etc. Evidence – analysis reports, data sheets, inspection reports are captured referencing document by number and version, hardware/software configuration, result, expected result (numerical) and pass/fail.	12 SVP/SRVM is partially complete but missing either reference documentation (procedures, evidence, margin)	9 SVP/SRVM contains only System Requirements with no flowdown.	6 SVP/SRVM does not contain full complement of current system requirements.	0 SVP/SRVM is missing
Design Documentation	60 Note: TDP1 does not require assembly drawings to be complete. The assembly drawings should be identified and have numbers assigned in the IDL. All drawings and software should be complete for the MVPs.	48	36	24	0
IDL	All Drawings/Document listed with current revision Status	Some Drawings/Document listed with current revision Status	Few Drawings/Documents listed with current revision Status	Very incomplete	Missing

System Requirements Document	Full System Requirements Document with all System Requirements, System Block Diagram (SBD), verification methods, and full flow down of system requirements to sub-system and sub-assembly requirements and verification. Requirement flowdown is consistent with the delivered project at current maturation state.	System Requirement Document, with SBD and verification methods (at all levels), or but missing some requirement decomposition for current state of maturation.	System Requirement Document is partially complete. Missing SBD, verification methods for all levels and/or requirements for current state of maturation.	SRD is missing the verification methods, SBD, and/or requirements flowdown for current state of maturation.	Document is missing or not consistent to the state of the project.
Verification Documentation (Verification Procedure, Data Sheets, Inspection Report)	The Verification Procedure(s) is/are complete for project including verification procedures for all items, inspection processes etc.	All information is presented, but not clear and/or complete in all areas.	At least one area is missing. Methods and / or data sheet poorly discussed.	Very incomplete and poorly presented. The test procedure is adequate.	VP missing.
Hardware Drawing Package	IDL current. All "Piece Part" drawings are complete. All drawings for Minimum Viable Product 1 (MVP 1) are complete. Top Level assembly and lower level – sub-assembly component, interface, electrical drawings are complete and fully describe the project. All drawings appear on IDL, have numbers and revisions. Top Level Assembly and Sub Level Assembly drawings are not required for TDP1	All drawing numbers identified in IDL and drawings representative of the project. MVP1 is well defined. Some lower level drawings (Interface, component, electrical) are incomplete.	All drawing numbers identified in IDL and drawings representative of the project. MVP1 is poorly defined. Some lower level drawings (Interface, component, electrical) are missing.	Some drawing not identified in IDL. MVP1 not fully defined and some lower level drawings not present (as applicable) and/or incomplete.	Not presented.
Software Documentation (SDD)	SDD is professionally formatted and well written. This includes a Title page, a Revision History page, and a Table of Contents. All relevant sections for the corresponding MVPs are complete and provide a comprehensive description of the software specific requirements, design, test plans and procedures.	All information is presented, but not clear and /or complete in all areas.	SDD is not sufficiently described for the corresponding MVPs or is poorly formatted/written and difficult to follow.	SDD is missing more the 60% of the key information appropriate for the MVPs being delivered.	Not present
Models	Models of expected performance captured. System Level models (as applicable) present and include as verified results. Models reference the delivered project configuration.	Models of expected performance reference system requirements only, no implementation of as verified performance. No discussion of margin.	Models insufficient to run/describe project	Models missing and lacking detail to represent performance.	Not present

Ability to structure a technical document in a logical manner. Ability to produce professionally formatted documents.	5 Ability to present relevant technical information in a structured narrative. Presents with a format of the highest quality, the objectives, the hypotheses, the methods, results, and conclusions. Document includes cover sheet, document revision history, table of contents, and applicable document section. Engineering standards used are listed in the referenced documents section and directly linked to the design. Engineering Constraints are considered and included in system requirements.	4 Ability to present relevant technical information in an organized way. Presents in a proper format, the objectives, the hypotheses, the methods, results, and conclusions. Cover sheet, revision history, table of contents or applicable documents section is missing. Engineering Standards are listed in the report reference section but are poorly linked to the design. Engineering Constraints are not well considered.	3 Lacks ability to present relevant technical information in an organized way. Presents in a proper format, the objectives, the hypotheses, the methods, results, and conclusions Applicable Engineering standards are missing. Design Constraints are not included.	2 Provides a disorganized and/or poorly formatted document	0 TDP1 is not handed in.
Ability to communicate through design iterations in response to client feedback.	5 Clear understanding of the feedback and concise expression of the required design changes along with adequate justification.	4 Clear understanding of the feedback and expression of the required design changes.	3 Unclear understanding of the feedback and expression of the required design changes.	2 Misunderstanding of the feedback and/or poor expression of the required design changes.	0 TDP1 not handed in.

Intermediate Technical Documentation Package (TDP2) Grading Rubric - Rev 2 (10%)

Overall Criteria	Excellent (A) 100%	Good (B) 80%	Fair (C) 60%	Poor (D) 40%	Fail (E) 0%
Introduction and Project Description	5 Description of the overall project and the MVPs included with rationale and scope of delivery defined in alignment with requirements, critical technology, and/or use cases. Includes a description of the report content and the relationship between the sections.	4 Gives general description of the project and MVPs, but some missing link to requirements, use case and/or overall project.	3 Project as a whole is defined, but content of this delivery not defined in context to whole project.	2 Poorly written description. Scope of project or MVP discussion is missing.	0 Project Description is missing.
System Description and System Block Diagram (02c) (04c)	10 Clearly describes the system including the system block diagram with proper partitioning of subassemblies and interfaces completely defined and labeled. MVP sub portions and relationships to full design are identified. Project and design solution specifically considers impacts in a global, cultural, social, environmental, and economic context.	8 Most information is described but lacks some detail. Impacts are not clearly stated.	6 Poor System block diagram. Not all subassemblies are included, and/or the interfaces are not fully defined. Impacts are poorly assessed.	4 System Block Diagram not discussed at all. Impacts are not assessed.	0 Section is missing.

System Verification Plan/SRVM	15 — The System Verification Plan (SVP) shall include an overview how requirement verification will be performed. The verification plan shall detail verifications (by requirement number) complete with expected dates, date completed, and procedure to be used. SRVM complete with references to current test [verification] procedures, data sheets, inspection reports, etc. Evidence – data sheets, inspection reports are captured referencing document by number and version, hardware/software configuration, result, expected result (numerical) and pass/fail.	12 — SVP/SRVM is partially complete but missing either reference documentation (procedures, evidence, margin)	9 — SVP/SRVM contains only System Requirements with no flowdown.	6 — SVP/SRVM does not contain full complement of current system requirements.	0 — SVP/SRVM is missing
Design Documentation	60 — Note: TDP2 requires a complete drawing package. Top assembly drawing, subassembly drawings, piece part drawings, wiring lists, schematics, harnesses, specifications for Commercial Off The Shelf (COTS). Drawings for standard hardware – bolts, nut, washer, etc – are not required.	48	36	24	0
IDL	All Drawings/Document listed **with current revision Status**	Some Drawings/Document listed with current revision Status	Few Drawings/Document listed with current revision Status	Very incomplete	Missing
System Requirements Document	Full System Requirements Document with all System Requirements, System Block Diagram (SBD), verification methods, and full flow down of system requirements to sub-system and sub-assembly requirements and verification. Requirement flowdown is consistent with the delivered project at current maturation state.	System Requirement Document, with SBD and verification methods (at all levels), or but missing some requirement decomposition for current state of maturation.	System Requirement Document is partially complete. Missing SBD, verification methods for all levels and/or requirements for current state of maturation.	SRD is missing the verification methods, SBD, and/or requirements flowdown for current state of maturation.	Document is missing or not consistent to the state of the project.
Verification Documentation (Verification Procedure, Data Sheets, Inspection Report)	The Verification Procedure(s) is/are complete for project including verification procedures for all items, inspection processes etc.	All information is presented, but not clear and/or complete in all areas.	At least one area is missing. Methods and / or data sheet poorly discussed.	Very incomplete and poorly presented. The test procedure is adequate.	VP missing.
Hardware Drawing Package	IDL is current. TDP2 requires a complete drawing package. Top assembly drawing, subassembly drawings, piece part drawings, wiring lists, schematics, harnesses, specifications for Commercial Of The Shelf (COTS). Drawings for standard hardware – bolts, nut, washer, etc – are not required	All drawing numbers identified in IDL and drawings representative of the project. Some lower level drawings (Interface, component, electrical) are incomplete.	All drawing numbers identified in IDL and drawings representative of the project. Some lower level drawings (Interface, component, electrical) are missing.	Some drawing not identified in IDL. Some lower level drawings not present (as applicable) and/or incomplete.	Not presented.
Software Documentation (SDD)	SDD is professionally formatted and well written. This includes a Title page, a Revision History page, and a Table of Contents. All relevant are complete and provide a comprehensive	All information is presented, but not clear and /or complete in all areas.	SDD is not sufficiently described for the corresponding design or is poorly formatted/written and difficult to follow.	SDD is missing more the 60% of the key information appropriate	Not present

				for the system design.	
Models	Models of expected performance captured. System Level models (as applicable) present and include as verified results. Models reference the delivered project configuration.	Models of expected performance reference system requirements only, no implementation of as verified performance. No discussion of margin.	Models insufficient to run/describe project	Models missing and lacking detail to represent performance.	Not present
Ability to communicate through design iterations in response to client feedback. (03b)	5 Clear understanding of the feedback and concise expression of the required design changes along with adequate justification.	4 Clear understanding of the feedback and expression of the required design changes.	3 Unclear understanding of the feedback and expression of the required design changes.	2 Misunderstanding of the feedback and/or poor expression of the required design changes.	0 TDP1 not handed in.
Ability to structure a technical document in a logical manner. Ability to produce professionally formatted documents. (03c)	5 Ability to present relevant technical information in a structured narrative. Presents with a format of the highest quality, the objectives, the hypotheses, the methods, results, and conclusions. Document includes cover sheet, document revision history, table of contents, and applicable document section. Engineering standards used are listed in the referenced documents section and directly linked to the design. Engineering Constraints are considered and included in system requirements.	4 Ability to present relevant technical information in an organized way. Presents in a proper format, the objectives, the hypotheses, the methods, results, and conclusions. Cover sheet, revision history, table of contents or applicable documents section is missing. Engineering Standards are listed in the report reference section but are poorly linked to the design. Engineering Constraints are not well considered.	3 Lacks ability to present relevant technical information in an organized way. Presents in a proper format, the objectives, the hypotheses, the methods, results, and conclusions Applicable Engineering standards are missing. Design Constraints are not included.	2 Provides a disorganized and/or poorly formatted document	0 TDP1 is not handed in.

Final Report Rubric (10% of Grade) Rev 3

Overall Criteria	100%	80%	60%	40%	0%
Introduction and Project Description	5 Description of the overall project and overview of the report sections and how they relate.	4 Gives general description of the project does not identify the structure of the report.	3 Project as a whole is defined, but content of this delivery not defined in context to whole project.	2 Poorly written description. Scope of project.	0 Project Description is missing.
System Description and System Block Diagram (02c and 04c)	10 Clearly describes the system including the system block diagram with proper partitioning of subassemblies and interfaces completely defined and labeled. Design solution specifically considers impacts in a global, cultural, social, environmental, and economic context.	8 Most information is described but lacks some detail. Impacts are not clearly stated.	6 Poor System block diagram. Not all subassemblies are included, and/or the interfaces are not fully defined. Impacts are poorly assessed.	4 System Block Diagram not discussed at all. Impacts are not assessed.	0 Section is missing.

Technical Data Package	Projects will vary. Not all projects will contain drawings and SW design documents. For this reason, the TDP must be graded as "a whole". However, every project should have an Acceptance Test Procedure and some analyses in accordance with the SRVM. Given this, all drawings (Assy drwgs, piece part drwgs, schematics, and wire lists) should be complete. Assy drwgs should contain parts lists or separate BoMs. SW Docs should completely describe the design (logic, flowcharts, header info, inputs/outputs, variables, algorithms, etc.). Each assembly (System & Sub-systems) must have either an assembly drawing or a SW design document. Verification procedures should be complete with verification set-ups, list of equip, procedure, and data sheets. Analyses are fully defined and pertinent data to verify requirements should be clearly shown. The TDP should contain all information required to build (HW & SW) and test the product. The final TDP will incorporate all revisions and is clearly compiled as if a customer deliverable, whether one or not.				
	45 The TDP is complete, clearly written, and inclusive of all design information.	36 The TDP is complete, but not clear in all areas. Some detail is missing.	27 One or more pieces of the TDP is incomplete or unclear.	18 The TDP is poorly done. Many parts are missing	0 Section is missing
Models / Analyses	15 Model/Analysis predictions of performance, margins, and accuracy are described against "A" system requirements (and subsystem levels where appropriate). Analyses and models are clearly described, and data is understood and complete	12 Analyses described, and predictions given, but not clear and/or complete in all areas.	9 Some "A" analyses missing. predictions by analyses not well understood.	6 Analyses poorly discussed with much missing.	0 Models / Analyses are missing
Verification Results	10 Verification results are well written and complete including pass / fail indications, test limits defined, test values given, margins spelled out, and derivations / computations of data clearly shown on data sheets.	8 All information is presented, but not clear and/or complete in all areas.	6 At least one area is missing. Methods and / or data sheet poorly discussed.	4 Very incomplete and poorly presented. The test procedure is adequate.	0 ATP missing.
Final Budget	5 Final Budget clearly presented. Purchased items and fab items detailed out and well understood.	4 Budget lacked some detail in certain areas. Otherwise all elements presented.	3 Budget unclear or not presented well. One of the elements missing.	2 Budget not clear at all. Team does not demonstrate having a handle on costs.	0 Budget not presented.
Lessons Learned & Recommended next steps	5 Lessons learned clearly thought out and presented well. Recommended next steps clear and logical	4 Lessons Learned presented, but "shallow" in some areas. Recommended next steps not clear or logical.	3 Lessons Learned not well thought out. Recommended next steps are not logical.	2 Lessons Learned very sketchy. Just "thrown up" to fill space. Recommended next steps poor.	0 Lessons Learned not presented. Recommended next steps missing.
Ability to identify disciplines, techniques, and tools for solution of the design problem (07b)	5 Clearly identifies specific disciplinary skills, techniques, and tools to obtain a design satisfying all of the requirements. Ability to identify and distribute tasks. Proper use of engineering standards.	4 Broadly identifies disciplinary skills, techniques, and tools needed to obtain a design satisfying some of the requirements. Ability to identify and distribute tasks. Standards broadly applied.	3 Poorly identifies disciplinary skills, techniques, and tools needed to obtain a design satisfying some of the requirements. Lacking ability to identify and distribute tasks. Lack of understanding of the use of standards.	2 Does not know the basic relevant disciplines, techniques, and tools necessary as part of the design process.	0 No presentation given.
Ability to understand and apply knowledge obtained beyond the classroom (07c)	5 Correctly use the newly found data and standards. Thorough understanding and efficient application of the newly found theories and/or tools.	4 Correctly uses the newly found data and standards. Understand and successfully apply at least one of the newly found theories, standards, and/or tools to a given problem with some guidance (e.g, through step by step approach).	3 Newly found data does not fully apply to problem or problem not fully understood and defined.	2 Unable to understand and/or apply any new theories and/or tools.	0 No presentation given.

	5	4	3	2	0
Ability to structure a technical document in a logical manner. Ability to produce professionally formatted documents (03b)	Ability to present relevant technical information in a structured narrative. Presents with a format of the highest quality, the objectives, the hypotheses, the methods, results, and conclusions. Document includes cover sheet, document revision history, table of contents, and applicable document section. Engineering standards used are listed in the referenced documents section and directly linked to the design. Engineering Constraints are considered and included in system requirements.	Ability to present relevant technical information in an organized way. Presents in a proper format, the objectives, the hypotheses, the methods, results, and conclusions. Cover sheet, revision history, table of contents or applicable documents section is missing. Engineering Standards are listed in the report reference section but are poorly linked to the design. Engineering Constraints are not well considered.	Lacks ability to present relevant technical information in an organized way. Presents in a proper format, the objectives, the hypotheses, the methods, results, and conclusions Applicable Engineering standards are missing. Design Constraints are not included.	Provides a disorganized and/or poorly formatted document	FR is not handed in.
Ability to communicate through design iterations in response to client feedback. (03c)	Clear understanding of the feedback and concise expression of the required design changes along with adequate justification.	Clear understanding of the feedback and expression of the required design changes.	Unclear understanding of the feedback and expression of the required design changes.	Misunderstanding of the feedback and/or poor expression of the required design changes.	The FR not handed in.