Outcome (a) Rubrics

An ability to apply knowledge of mathematics, science, and engineering

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
| XXX | XXX | 112 | XXX |  |  |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **ability to apply mathematics, science, and engineering** | XXX | **Always** uses the proper mathematical, and scientific formulation to solve problems | Uses the proper mathematical, and scientific formulation to solve problems **most** of the times | Uses the proper mathematical, and scientific formulation to solve problems **some** of the times | **Rarely** uses the proper mathematical, and scientific formulation to solve problems |

Outcome (b) Rubrics

An ability to design and conduct experiments, as well as to analyze and interpret data

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
| xxx | xxx | xxx | xxx |  |  |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Identifying clear goals for the experiment** | xxx | Clearly identify the objectives of the experiment, the expected results, and possible pitfalls to watch for | Clearly identify the objectives of the experiment and some of the expected results but does not think of the possible pitfalls | Identify some of the objectives of the experiment but omits the expected results and possible pitfalls | Does not identify any objectives for the experiment and/or expected results |
| **Choosing the appropriate experimental test bed (Hardware, Software, Emulation, Simulation, or hybrid) to achieve the identified objectives of the experiment** | xxx | Chooses the best test bed suitable for achieving the objectives with proper justification | Chooses the best test bed suitable for achieving the objectives with no justification | Chooses a test bed that is not optimum but somehow achieves the identified objectives | Chooses a test bed that does not achieve the objectives at all |
| **Designing and conducting the experiment** | xxx | Student groups design and conduct the experiment with no errors at all | Student groups design and conduct the experiment with some minor errors that do not adversely affect the objectives | Student groups design and conduct the experiment with some errors that affect the results and the objectives | Student groups design and conduct the experiment with major conceptual or procedural errors that render the results useless and leave the objectives unachieved |
| **Ability to analyze and interpret the data** | xxx | Analysis and interpretation of results exceed requirements of experiment and demonstrate significant higher-order thinking ability | Analysis and interpretation of results meet requirements of experiment and demonstrate some higher-order thinking ability | Results are analyzed but not interpreted; very limited evidence of higher-order thinking ability | No evidence of significant analysis and interpretation of results; fail to meet requirements of the experiment; demonstrate only lower-level thinking ability |

**COE 351, COE 400, and COE 485 Rubrics Forms**

Outcome (c) Rubrics

**An ability to design a system, component, or process to meet desired needs**

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Requirements are translated accurately and with great precision into system behavior and features clearly described without ambiguity and without entering into any design details** |  | Requirements are translated accurately and with great precision into system behavior and features clearly described without ambiguity and without entering into any design details. | Requirements are translated accurately into system behavior and features clearly described with some ambiguity. The description of behavior and features enters into some details and proposes design solutions thinking it is just translating the requirements. | Requirements are not translated accurately into system behavior and features. Some features not clearly described. Some consistency errors. | Specification does not follow the requirements consistently. Several consistency errors. No clear difference between system behavior description and features and design solutions. |
| **Potential conceptual problems are addressed and properly formulated. Some system behavior is translated into some mathematical formulas describing necessary conditions for the system to function properly or alike** |  | Potential conceptual problems are addressed and properly formulated. Some system behavior is translated into some mathematical formulas describing necessary conditions for the system to function properly or alike | Potential conceptual problems are addressed but not properly formulated. Some system behavior is translated into some mathematical formulas describing necessary conditions for the system to function properly with some errors on the assumptions. | Potential conceptual problems are recognized but not properly formulated. No system behavior is translated into some mathematical formulas describing necessary conditions for the system to function properly. | Potential conceptual problems are not identified in any way. |
| **Different design alternatives are proposed and clearly discussed and compared. The comparison is rigorous and accurate.** |  | Different design alternatives are proposed and clearly discussed and compared. The comparison is rigorous and accurate. | Different design alternatives are proposed and clearly discussed and compared. Some rigor missing in the comparison although accurate statements are made. | A small subset of the possible design alternatives is considered. No thorough comparison is performed and statements are not accurate. | No design alternatives are proposed. |
| **The analysis of the technical and economic constraints leads to the optimal design solution. The justification and argumentation is thorough, accurate and consistent.** |  | The analysis of the technical and economic constraints leads to the optimal design solution. The justification and argumentation is thorough, accurate and consistent. | The analysis of the technical and economic constraints leads to the optimal design solution. The justification and argumentation is accurate and consistent but not thorough. Missing justifications for some aspects. | The analysis of the technical and economic constraints does not lead to the optimal design solution. The justification and argumentation are a little accurate and superficial. | The design solution is presented without any analysis. Some inappropriate justification and argumentation is present with a lot of inconsistencies. |
| **A structured design methodology is followed that breaks the overall solution into sub-components adequately using trade-offs. Relations and interactions between sub-components are well defined. No redundancy or overlapping in the sub-components roles.** |  | A structured design methodology is followed that breaks the overall solution into sub-components adequately using trade-offs. Relations and interactions between sub-components are well defined. No redundancy or overlapping in the sub-components roles. | A structured design methodology is followed that breaks the overall solution into sub-components adequately using trade-offs. Relations and interactions between sub-components are not well defined. A little redundancy or overlapping in the sub-components roles. | No structured design methodology is followed. Breaking the overall solution into sub-components follows an ad-hoc methodology with no clear rules. Trade-offs are not identified. Relations and interactions between sub-components are not well defined. A lot of redundancy or overlapping in the sub-components roles. | No structured design methodology is followed. Breaking the overall solution into sub-components follows is purely arbitrary. Trade-offs are confused with solution parameters. Relations and interactions between sub-components are anarchically defined. Sub-components are not really sub-components and suffer from a lack of clear identity. |

Outcome (d-I) Rubrics

**An ability to function on multi-disciplinary teams**

(*Our interpretation of multidisciplinary teams includes teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds*).

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Contributions** |  | Routinely provides useful ideas when participating in the group and in classroom discussion. A leader who contributes a lot of effort. | Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard! | Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required. | Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate. |
| **Problem-solving** |  | Actively looks for and suggests solutions to problems. | Refines solutions suggested by others. | Does not suggest or refine solutions, but is willing to try out solutions suggested by others. | Does not try to solve problems or help others solve problems. |
| **Attitude** |  | Is never publicly critical of the project or the work of others. Always has a positive attitude about the task(s). | Is rarely publicly critical of the project or the work of others. Often has a positive attitude about the task(s). | Is occasionally publicly critical of the project or the work of other members of the group. Usually has a positive attitude about the task(s). | Is often publicly critical of the project or the work of other members of the group. Is often negative about the task(s). |
| **Focus on the task** |  | Consistently stays focused on the task and what needs to be done. Very self-directed. | Focuses on the task and what needs to be done most of the time. Other group members can count on this person. | Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on task. | Rarely focuses on the task and what needs to be done. Lets others do the work. |
| **Working with others** |  | Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together. | Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group. | Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member. | Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player. |

Outcome (d-II) Rubrics

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Teamwork** |  | 1. The project was carried out by more than TWO members 2. The work load and variety on each member seems fair 3. Leadership role being assumed by each member for different tasks is evident 4. Scheduled meetings minutes are Always recorded and the contribution of each team members are identified | 1. The project was carried out by more than TWO members 2. The work load and variety on each member seem fair 3. Leadership role being assumed by each member for different tasks is NOT apparent 4. Scheduled meetings minutes are Usually recorded and the contribution of each team members are identified | 1. The project was carried out by more than TWO members 2. The work load and variety on each member does not seem to be fair or at least one member has been assigned trivial non-technical tasks (e.g. writing the report) 3. Scheduled meetings minutes are Often recorded and the contribution of each team members are NOT identified | 1. The project was carried out by more than TWO members 2. The work load and variety on each member does not seem to be fair or at least one member has been assigned trivial non-technical tasks (e.g. writing the report) 3. Scheduled meetings minutes are Rarely recorded and the efforts are scattered. |

Outcome (e) Rubrics

**An ability to identify, formulate, and solve engineering problems**

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Applying concepts, governing math or physics equations and algorithms to solve a problem** |  | Applies correct concepts, chooses correct governing equations and optimum algorithms (or methods) to solve a problem. | Applies correct concepts, chooses correct governing equations but use sub-optimum algorithms (or methods) to solve a problem. | Applies some correct concepts and chooses some correct governing equations but makes mistakes | Applies incorrect concepts and/or chooses incorrect governing equations  can not solve problems |
| **Demonstrating effective open-ended problem solving techniques (including the debugging of a faulty design; hardware, software or both)** |  | Always solves problems using step-by-step logical procedure and obtain correct solution | Mostly solves problems using step-by-step logical procedure. Sometimes he solves problems in an ad-hoc manner, but still he obtains correct solutions | Mostly solves problems using step-by-step logical procedure but some times makes minor procedural errors that lead to incorrect solution of the problem | Solves problems without logical step-by-step logical procedure and makes procedural errors resulting in incorrect solution |

Outcome (g-O) Rubrics

**An ability to communicate effectively**

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Audience awareness:** interacts with audience (e.g. stepping towards audience and speaking to them, not at them), looking at them, making eye contact |  | Interacts with audience throughout presentation | Some interaction with audience | Little interaction with audience | Does not interact with audience at all … Does not look at the audience … Look at PC, screen, or elsewhere |
| **Focus:** goal, evidence, conclusion (gives audience a roadmap and follows it) |  | Gives audience very clear road map of goal, evidence and conclusion | Gives audience an adequate road map of goal, evidence and conclusion | Gives audience some road map of goal, evidence and conclusion | Does not give audience an adequate road map of goal, evidence and conclusion |
| **Transitions:** phrases smoothly link one part to next |  | Very smooth Transitions | Transitions are generally smooth | Some transition is provided though not smooth | Abruptly transitions from one phase to the next … No linking |
| **Use of visual aids** (any non-plain text methods such as graphs, charts, flow diagrams …etc.) **to tell the story and enhance the quality of the presentation** |  | Uses visual aids very effectively to tell the story; visual aids enhance presentation | Overall, uses visual aids effectively to tell the story; visual aids add to presentation | There is some use visual aids effectively to tell the story | Either does not use visual aids at all; or too much dependency on visual aids |
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| **Mechanics** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Body position** (e.g., facing audience or screen) |  | Always facing audience | Faces audience most of the time | Faces audience some of the time | Faces screen or board all the time |
| **Eye contact** (e.g., scanning entire audience) |  | Eye contact (excellent scanning of audience, looking at people) | Eye contact (some scanning of audience, looking at people) | Some eye contact (not enough, looking down a lot) | No eye contact |
| **Visual aids** (e.g., clear, not too busy, readable size font) |  | Clear, right amount on each slide | Can read clearly, usually not too much material | A little bit busy, sometimes not clear | Too busy, blurry |
| **Delivery** (e.g., fluency, pace, voice projection, um’s, uh’s) |  | Excellent pace, projects voice, great enthusiasm | Good pace, usually projects voice, some enthusiasm | A little bit fast, sometimes um’s, little projecting voice, little enthusiasm | Too fast, too many um’s, not projecting voice, lack of enthusiasm |
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| **Questions** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Asks audience for questions** |  | Effectively opens (“I’d be happy to answer questions”) | Asks for questions | rarely asks for questions | Does not ask for questions |
| **Answers questions effectively and smoothly** |  | Answers questions effectively and smoothly | Answers questions adequately | rarely answers questions adequately | Does not answer questions adequately |

Outcome (g-W) Rubrics

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Report Quality & Writing Skills** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Spelling and Grammar** |  | Almost **no** spelling and/or grammatical mistakes (≤ 0.2 mistake/page) | **Rare** spelling and/or grammatical mistakes (≤ 0.5 mistake/page) | Makes **noticeable** spelling and/or grammatical mistakes (≤ 1 mistake/page) | Makes **frequent** spelling and/or grammatical mistakes (≥ 1 mistake/page) |
| **Punctuation** |  | Proper use of punctuation, sentences are not too long, no repetition of words, proper use of paragraphs | Proper use of punctuation, sentences are sometimes too long, some repetition of words, proper use of paragraphs | Some improper use of punctuation, sentences are usually too long, many repetition of words, some improper use of paragraphs | No use of punctuation at all … Sentences seems to go on and on for ever … No apparent usage of paragraphs |
| **Structure and Organization (choice of fonts, titles, sub-titles, chapters, sub-chapters, sections, sub-sections to enhance the readability and understanding of the report), having a table of content, list of Figures and tables** |  | **Superb** structure of the report, everything makes sense (understand templates and can follow them exactly), perfect table of content, list of figures and tables | **Good** Structure and organization with some departure from the ideal template, good table of content, list of figures and tables | The structure and organization are **not good**; noticeable departure from template, poor table of content, list of figures and tables | The structure and organization of the report seem to be **random**; does not follow the template at all, missing table of content, list of figures or tables |
| **Use of visual illustrations, other than plain text, (graphs, charts, flow diagrams, tables …) to enhance the understanding of the report** |  | **All** information that can be represented graphically is presented as such with **proper** choice of the illustration method that suits the information being presented the most | **Most** information that can be represented graphically is presented as such with **good** choice of the illustration method that suits the information being presented the most | Most information that can be graphically illustrated is presented as **plain text**. **Some** information is illustrated graphically with some wrong illustration methods | Information is **rarely** illustrated graphically with improper choice of illustration methods |
| **Formulae and equations** |  | **All** formulae and equations used are properly written, numbered and referenced | **Most** formulae and equations used are properly written, numbered and referenced | Most formulae and equations used are properly written but **many are not** numbered and referenced | Many formulae and equations used are improperly written and **most of them are not** numbered and referenced |
| **Proper use of References** |  | **All** information obtained from others is properly referenced. The list of references is properly documented (source name, publication name, page numbers, …etc.) | **Most** information obtained from others is properly referenced. The list of references is properly documented (source name, publication name, page numbers, …etc.) | **Some** use of references, most information is not referenced. List of references is not properly documented (some information is missing, like page numbers ….etc.) | **No** referencing at all |
| **Proper use of appendices (to reduce the size of the main body of the report)** |  | **All** the information that is not critical to the understanding of the report but might be of some interest to some of the readers is put in the appendices. Appendices are properly organized (multiple appendices are used for different information) | **Most** of the information that is not critical to the understanding of the report but might be of some interest to some of the readers is put in the appendices. Appendices are properly organized (multiple appendices are used for different information) | Most of the information that can be put in appendices are spread through the main body of the report. **Only one (or few) appendices** are included containing many, unrelated, information | **No** use of appendices at all. Everything is in the main body of the report |
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| **Technical Contents** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **The abstract** |  | Precise, completely conveys what has been accomplished, provide performance numbers with a good first punch line | Completely conveys what has been accomplished, provide performance numbers, no punch line, too many words | Somehow conveys what has been accomplished … No performance numbers | No abstract at all or what is provided as an abstract is not an abstract! |
| **Problem description and motivation** |  | The problem being tackled is clearly described with proper usage of statistics, market surveys, news articles …etc. to support the motivation for tackling this problem | Clear problem description but vague (or little support) motivation | Somehow vague problem description, no motivation or justification for tackling this problem at all | Vague problem description (one can not tell exactly what he is trying to do or why) |
| **Objectives & Deliverables** |  | Measurable objectives and deliverables are clearly and precisely stated | Objectives and Deliverables are stated with some vagueness (making them less measurable) | Some objectives and deliverables are provided (many are missing), however they are not clear nor measurable | Objectives 7 deliverables are not stated at all |
| **Project Management Plan** |  | A well written work plan is provided detailing phases or milestones, tasks, task assignment, task duration, critical path analysis and contingency plans, required resources, and discrepancies between planned and achieved tasks. Tasks are clearly and precisely stated (one can tell what is the expected outcome of a task just by reading the task) | A work plan is provided with some details about tasks (no phases or milestones), tasks, task assignment, task duration, required resources, and discrepancies between planned and achieved tasks. No critical path analysis and contingency plans. Some tasks are vaguely stated (one can not tell what is the expected outcome of a task just by reading the task) | A very brief work plan is provided with very little description of tasks. Tasks are very vague. | No work plan is provided at all |
| **Quality of Engineering Documentation** |  | Engineering principles are well developed, possible solutions are well documented, proper description of solution, proper documentation of experimental setup, data acquisition, analysis, results, testing, benchmarking (all that apply), and conclusions. | Generally sufficient documentation of possible solutions, adopted solution, experimental setup, data acquisition, analysis, results, testing, benchmarking (all that apply), and conclusions. Some items might not be sufficiently documented. | Some documentation is provided but some major components are missing | Documentation is generally inadequate |

Outcome (i) Rubrics

**A recognition of the need for, and an ability to engage in life-long learning**

(*Our interpretation of this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability*)

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Importance of lifelong learning** |  | Demonstrates extensive understanding of the importance of lifelong learning | Demonstrates substantial understanding of the importance of lifelong learning | Demonstrates basic understanding of the importance of lifelong learning | Demonstrates little or no understanding of the importance of lifelong learning. |
| **Independency** |  | Routinely demonstrate the ability to find, evaluate and use resources to learn independently | Usually demonstrate the ability to find, evaluate and use resources to learn independently | sometimes demonstrate the ability to find, evaluate and use resources to learn independently | Rarely demonstrate the ability to find, evaluate and use resources to learn independently |
| **Personal responsibility** |  | Displays exceptional recognition of the need to accept personal responsibility | Displays sufficient recognition of the need to accept personal responsibility | Displays minimal recognition of the need to accept personal responsibility | Does not recognize the need to accept personal responsibility |
| **Critical Thinking** |  | **Demonstrate the ability to:** o Gather new data, use information well, understands concepts within standards. o Know and understand the facts, new thoughts developed on basis of new information. o Use information/knowledge used in multiple “real” contexts. | **Demonstrate the ability to:** o Gather new data, use information well, understands concepts within standards. o Know and understand the facts, new thoughts developed on basis of new information. | **Demonstrate the ability to:** o Gather new data, use information well, understands concepts within standards. | **Demonstrate the ability to gather new data** |
| **Decision making** |  | Demonstrates in-depth level of engagement and decision making skills | Demonstrates appropriate decision making skills | Demonstrates some level of decision making skills | Demonstrates little or no level of decision making skills |
| **Accepting new Challenges** |  | Displays exceptional capability to accept new challenges | Displays substantial capability to accept new challenges | Displays minimal capability to accept new challenges | Displays little or no capability to accept new challenges |

Outcome (j) Rubrics

**Knowledge of contemporary issues**

(*Our interpretation of this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other support jobs as practiced by modern international companies*).

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Awareness of global effects of engineering solutions (product, practice, event)** |  | Deep understanding of all the relevant contemporary issues related to the creation and/or use of the solution, as well as of issues that may be only tangentially related; good analysis of all these issues and how they might impact the general acceptance of the solution and how this might affect the future development of similar solutions. | Good understanding of all the relevant contemporary issues directly related to the creation and/or use of the solution. | Moderate understanding of the main relevant contemporary issues directly related to the creation and/or use of the solution | Little or no understanding of (or interest in?) contemporary issues directly related to the creation and/or use of the solution |

Outcome (k) Rubrics

**An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice**

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Tool Selection** |  | Selection of tools is based on sound technical criteria. Relevant industry standard class tools (software CAD, simulation, test equipment, emulators, measurement and lab equipment, planning and project management tools) are selected for carrying out specific tasks | Selection of tools is based on prior knowledge of the tools. Relevance of the selected tools is close to the standard practices. | Selection of tools is not based on technical criteria. Tools are selected based on personal preference | Selection of tools is not discussed. Use of the wrong set of tools is commonly noticed. |
| **Tool Usage** |  | Usage of the tools shows a good awareness of the tools capabilities and features. Tools are used correctly and in a consistent way with the stated objectives. Any issue with the tools is resolved using the tools documentation, FAQs or the customer support. Accurate description of credible problems encountered is noticed. | Usage of the tools is shows a fair awareness of the tools capabilities and features. Tools are used correctly and in a consistent way with the stated objectives. Some issues with the tools where the answers are present in the documentation are not properly resolved. Accurate description of credible problems encountered is not always seen. | Usage of the tools is shows a little awareness of the tools capabilities and features. Tools are used correctly and in a consistent way with the stated objectives. Improper use of the tools documentation. Several issues with the tools where the answers are present in the documentation are not properly resolved. Accurate description of credible problems encountered is missing. | Usage of the tools is shows no awareness of the tools capabilities and features. Tools are used incorrectly and in an inconsistent way with the stated objectives. Improper use of the tools documentation. Most issues with the tools where the answers are present in the documentation are not properly resolved. Accurate description of credible problems encountered is missing. |

Outcome (l) Rubrics

**The ability to design a system that involves the integration of hardware and software components**

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| **Representative Student's Name** | **ID #** | **Term (e.g., T112)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Selection of hardware equipment and software** |  | Selection of hardware equipment and software follows a thorough approach where many criterions are used: performance, compatibility, standard compliance, protocol support, interoperability, manufacturer strength. | Selection of hardware equipment and software follows a thorough approach where few criterions are used: performance, compatibility, standard compliance. One or more relevant important criterions are ignored. | Selection of hardware equipment and software is based on the selection of a single manufacturer already integrated solution among several candidates. | Selection of hardware equipment and software is based on the suggestions of the marketing team of one single vendor |
| **Integration Methodology** |  | The integration methodology is well described and followed. Interfaces are well defined and their compatibility discussed. Use of an integration plan featuring integration phases and a test plan for each phase. | The integration methodology is well described and followed. Interfaces are mentioned but their compatibility is not considered. No use of an integration plan. Some mention of a test plan. | The integration methodology is not described properly and not always followed. Interfaces are not mentioned. No use of an integration plan. Tests are carried out without a plan. | An ad-hoc integration (No) methodology is followed but not described. No use of an integration plan. Tests are carried out without a plan. |

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Outcome (f) Rubrics

An understanding of professional and ethical responsibility

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| **Representative Student's Name** | **ID #** | **Term (e.g., T071)** | **Lab or Course #** |  | ***Evaluator's Input*** |
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| **Outcome** | **Score (1 - 4)** | **Exemplary (4)** | **Proficient (3)** | **Apprentice (2)** | **Novice (1)** |
| **Understanding of ethical and professional issues** |  | Deep understanding of the professional issues involved and the ethical implications of the solution; careful, convincing analysis of all relevant factors | Good understanding of all the professional/ethical issues related to the solution; reasonable analysis of the relevant issues | Some consideration of professional, ethical issues raised directly by the solution | Little or no understanding of professional/ethical issues even where there are serious questions involved |