

CALIFORNIA STATE UNIVERSITY, CHICO

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING (ECE)

The Master of Science in Electrical and Computer Engineering Program (MSECE)

Assessment Plan

The educational program objectives for the Master of Science in Electrical and Computer Engineering (MSECE) program have been developed in conjunction with the department's Industrial Advisory Board, faculty, and students. The program objectives consist of a fundamental component of graduate education for students seeking the MS degree in this ECE department and possibly the Ph.D. degree at other institutions. The program objectives also include the important component of providing effective opportunities for practicing professional engineers seeking to expand their engineering education at the postgraduate level.

Based on these program objectives, the ECE department faculty developed a set of measurable educational outcomes to be assessed at different program junctures. Each of the educational outcomes is designed to support one or more program objectives. Assessment of each program outcome includes defining specific performance criteria related to the outcome as well as a set of methods to evaluate such criteria. Those methods include evaluation of student performance in course(s) that are relevant to the outcome being assessed as well as overall feedback information obtained by surveys from current graduates, alumni, and employers. For the course components of the evaluation, a set of rubrics for each outcome have been developed as described in the rubrics section of this plan. Those rubrics also assist instructors in preparing students to meet program educational outcomes, and students in understanding what is expected of them in various courses.

The following sections describe this assessment plan using the outline below:

- I. Statement of Program Objectives
- II. Definition of Program Outcomes
- III. Description of the Outcome Assessment process
- IV. Outcome Assessment rubrics
- V. Assessment Surveys

0. Mission

The MSECE Program Mission is to provide the preparation to maintain currency and conduct research and development in the fields of electrical and/or computer engineering.

I. Objectives

- (A) Expand students' knowledge and analytical skills in electrical and computer engineering so that they may apply such knowledge and skills to the analysis and design of advanced systems
- (B) Provide the preparation that allows graduates to maintain currency and conduct research in the fields of electrical and/or computer engineering
- (C) Ensure that graduates have the ability to communicate their thoughts effectively so that others can comprehend and build on their work
- (D) Upgrade technical knowledge for practicing engineers
- (E) Prepare students to succeed in a doctoral program in electrical and computer engineering or a related field

II. Outcomes

1. An ability to identify and formulate requirements for advanced systems (B,C, d)
2. An ability to analyze and prioritize requirements and constraints in order to determine the features that must be included in advanced systems (B,D, c,e)
3. An ability to design advanced digital or analog systems that meet all requirements (A, b,d,e)
4. An ability to implement designs for digital or analog systems and evaluate how well the designs meet the requirements (D, a,b,e)
5. An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues (B,C,E, a,d)
6. An ability to apply current technologies and use modern tools to solve engineering problems (A,B,E, d)

III. Outcome Assessment

(i) Mapping of Educational Outcomes to Program Educational Objectives

Each of the educational outcomes is designed to support one or more program objectives. The table below shows the relation between educational objectives and outcomes.

| Educational Outcomes | Educational Objectives | | | | |
|---|------------------------|-----|-----|-----|-----|
| | (A) | (B) | (C) | (D) | (E) |
| 1. An ability to identify and formulate requirements for advanced systems | | ** | ** | * | |
| 2. An ability to analyze and prioritize requirements and constraints in order to determine the features that must be included in advanced systems | | ** | * | ** | * |
| 3. An ability to design advanced digital or analog systems that meet all requirements | ** | * | | * | * |
| 4. An ability to implement designs for digital or analog systems and evaluate how well the designs meet the requirements | * | * | | ** | * |
| 5. An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues | * | ** | ** | * | ** |
| 6. An ability to apply current technologies and use modern tools to solve engineering problems | ** | ** | | * | ** |

** indicates the outcome is strongly supportive of the objective

* indicates that student gets experience related to the outcome in this course

(ii) Course to Outcomes Assessment Map

The following table maps those Educational Outcomes to MSECE courses.

| EECE Course No. | 425 | 455 | 615 | 617 | 631 | 643 | 655 | 669 | 675 | 698 |
|---------------------|-----|------------|------------|-----|-----|------------|-----|-----|-----|-----|
| Educational Outcome | | | | | | | | | | |
| 1. | | | | | ** | * | | * | * | |
| 2. | | | | | ** | | * | | | * |
| 3. | | | | * | | ** | | * | | |
| 4. | | | | * | | | | | | ** |
| 5. | ** | | ** | | | | | | ** | |
| 6. | | ** | | | | | * | * | | * |

** outcome is assessed in this course (appropriate rubric used)

Bold Core courses

* indicates that student gets experience related to the outcome in this course

(iii) Outcomes Assessment Criteria and Assessment Methods

Outcome 1 An ability to identify and formulate requirements for advanced systems

Performance Criteria

Each graduating student should be able to demonstrate his/her ability to

- a) Identify user needs for a product or process
- b) Translate user needs into unambiguous product or process requirements.

Assessment Methods

- a) Students in EECE 631 will be given an assignment to identify the user needs related to a particular product or process.
- b) Graduate Exit Surveys
- c) Alumni Surveys
- d) Employer Surveys

Evaluation

- a) Student written requirements statements will be evaluated using a rubric that is given to students prior to the assignment. The minimum acceptable score for the assignment is given in the rubric.
- b) Graduate exit surveys will reveal student perceptions about their ability to write requirements. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.
- c) Alumni surveys will show how well they are able to write requirements on the job. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.

Outcome 2 An ability to analyze and prioritize requirements and constraints in order to determine the features that must be included in advanced systems

Performance Criteria

Each graduating student should be able to demonstrate his/her ability to

- a) Analyze requirements for clarity, completeness and consistency for a product or process
- b) Prioritize requirements so that the user receives the optimum product or process that fit the constraints imposed.

Assessment Methods

- a) Students in EECE 631 will be given an assignment to analyze and prioritize the requirements for a product or process.
- b) Graduate Exit Surveys
- c) Alumni Surveys
- d) Employer Surveys

Evaluation

- a) A complete technical requirements document will be evaluated using a rubric that is given to the students prior to the assignment. The minimum acceptable score for the assignment is given in the rubric.
- b) Graduate exit surveys will reveal student perceptions about their ability to analyze and prioritize requirements. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.
- c) Alumni surveys will show how well they are able to analyze and prioritize requirements on the job. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.

Outcome 3 An ability to design advanced digital or analog systems that meet all requirements

Performance Criteria

Each graduating student should be able to demonstrate his/her ability to produce a complete design document for a product based on a technical requirements document.

Assessment Method

- a) Students in EECE 643 will be given a complete requirements document for a product and required to produce a design from that document.
- b) Graduate Exit Surveys.
- c) Alumni Surveys
- d) Employer Surveys

Evaluation

- a) A complete set of design documents will be evaluated using a rubric that is given to them prior to the assignment. The minimum acceptable score for the assignment is given in the rubric.
- b) Graduate exit surveys will reveal student perceptions about their ability to design complex digital or analog products. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.
- c) Alumni surveys will show how well those who are in design positions are able to design products on the job. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.

Outcome 4 An ability to implement designs for digital or analog systems and evaluate how well the designs meet the requirements

Performance Criteria

Each graduating student should be able to demonstrate his/her ability to implement a design in either hardware or software, or both.

Assessment Method

- a) Students in EECE 643 and EECE 698 (Advanced Embedded Systems) will be required to implement a complete design. The instructor may choose to have the students simulate a design rather than build hardware or software.
- b) Graduate Exit Surveys
- c) Alumni Surveys
- d) Employer Surveys

Evaluation

- a) The performance of a student-built product or simulation will be measured to determine that it meets all of the design specifications. The minimum acceptable score for the assignment is given in the rubric.
- b) Graduate exit surveys will reveal student perceptions about their ability to implement a complex digital or analog product. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.
- c) Alumni surveys will show how well graduates are able to design products on the job. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.

Outcome 5 An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues

Performance Criteria

Each graduating student should be able to make effective use of tools, including the internet, to find appropriate research references. They should also be able to analyze the impact of material they find on their research and projects.

Assessment Method

- a) Students in EECE 425 and EECE 615 and EECE 675 will be given an assignment that requires a literature search.
- b) Graduate Exit Surveys.
- c) Alumni Surveys
- d) Employer Surveys

Evaluation

- a) Research papers will be evaluated using a rubric that is given to the students. The minimum acceptable score for the assignment is given in the rubric.
- b) Graduate exit surveys will reveal student perceptions about their ability to conduct a literature search. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.
- c) Alumni surveys will show how well graduates are able make effective use of published materials to do product research. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.

Outcome 6 An ability to apply current technologies and use modern tools to solve engineering problems

Performance Criteria

Each graduating student should be able to use current and evolving technology to design and implement new products and services using standard engineering tools.

Assessment Method

- a) Students in EECE 455 will be given an assignment that requires that they implement a service using a variety of networking devices.
- b) Students in EECE 615 will be tested on their ability to use tools to implement and verify their designs
- c) Graduate Exit Surveys.
- d) Alumni Surveys
- e) Employer Surveys

Evaluation

- a) Student projects will be evaluated to see how effectively they made use of the tools available to them using a rubric that is given to the students. The minimum acceptable score for the assignment is given in the rubric.
- b) Graduate exit surveys will reveal student perceptions about their ability to conduct a literature search. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.
- c) Alumni surveys will show how well graduates are able make effective use of published materials to do product research. Mean survey results of at least 4 out of 5 on a scale of “very unprepared” to “very well prepared” are considered acceptable.

Assignment of Course Rubrics for MSECE Program Outcomes

| Course No. | (1) | (2) | (3) | (4) | (5) | (6) |
|-------------------|------------|------------|------------|------------|------------|------------|
| EECE 425 | | | | | X | |
| EECE 455 | | | | | | X |
| EECE 615 | | | | | X | |
| EECE 631 | X | X | | | | |
| EECE 643 | | | X | | | |
| EECE 675 | | | | | X | |
| EECE 698 | | | | X | | |

IV. Outcome Assessment Rubrics

| Outcome Assessment Summary | | | | | | |
|--|---|--|--|------------------------------------|-------------|--|
| Program Outcome: | 1) An ability to identify and formulate requirements for advanced systems | | | | Instructor: | |
| Course: | EECE 631 - Engineering Processes and Management Techniques | | | | Semester: | |
| Description: | This course examines engineering processes and management techniques. Engineering process topics include requirements generation and analysis, design techniques and views, software development processes, and hardware development processes. Management techniques topics include task estimation and scheduling. The course also compares different development methodologies including structured analysis/design and agile methods. | | | | | |
| Metric: | Assessment will be based on a series of requirements-based assignments, given throughout the semester. | | | | | |
| Rubric: | A student will demonstrate successful completion of this outcome by achieving a score of 7 of 10 (based on the assessment rubric shown in the attached table). | | | | | |
| Standard 1: | | Standard 2: | | Standard 3: | | |
| | | Must all standards be satisfied (Y,N)? | | "N" means only one must be passed. | | |
| Instructor Evaluation Summary | | | | | | |
| Number of students achieving standard: | | | | | | |
| Number of students failing standard: | | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | | |
| Comments related to the suitability of this outcome measurement. | | | | | | |
| Suggestions for possible changes to this outcome measurement. | | | | | | |

Rubric for Program Outcome

1) An ability to identify and formulate requirements for advanced systems

Assessment will be based on a series of requirements-based assignments, given throughout the semester. A student will demonstrate successful completion of this outcome by achieving a score of 7 of 10 (based on the assessment rubric shown in the following table). This assessment will be conducted as part of the grading in EECE 631 - Engineering Processes and Management Techniques. The evaluation measures are as follows:

| | | | |
|--|----------------------------------|---|--|
| | Requirements Completeness | The requirements set addresses all aspects of the system, including all functional behavior, system performance, error handling, inputs/outputs, user interaction, etc. | |
| | Requirements Singularity | Each requirement addresses one and only one specific aspect of the system, and does not overlap with other requirements. | |
| | Requirements Language | The language used in the requirements is concise, clear, and unambiguous. | |
| | Testability | The requirements are written so that a test can clearly be derived that verifies that the system satisfies each requirement. | |
| | Precision | Each requirement, where applicable, expresses system behavior and performance in precise, measurable terms. | |

| Student: | | | | |
|----------------------------|--|--|--|--------------|
| Evaluation Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Requirements Completeness | Major functional areas not covered by requirements | Majority of functional areas covered, with small omissions | Complete requirements coverage for all functional aspects | |
| Requirements Singularity | Significant number of overlapping requirements or requirements specifying multiple functions | Small number of multiple-function or overlapping requirements | Complete set of non-overlapping, single function requirements | |
| Requirements Language | Vague, non-specific requirements language used throughout | Majority of requirements concisely written, with some ambiguities or imprecision | Concise, clearly specified language used in all requirements. | |
| Testability | Many non-testable requirements | Small number of non-testable requirements | All requirements fully testable | |
| Precision | Limited or no requirements with measurable values specified | Some measurable values used, with minimal omissions or ambiguities | Specific, measurable values specified in all applicable requirements | |
| | | | Total | |

| Outcome Assessment Summary | | | | | |
|--|---|--|--|------------------------------------|--|
| Program Outcome: | 2) An ability to analyze and prioritize requirements and constraints in order to determine the features that must be included in advanced systems | | | Instructor: | |
| Course: | EECE 631 - Engineering Processes and Management Techniques | | | Semester: | |
| Description: | This course examines engineering processes and management techniques. Engineering process topics include requirements generation and analysis, design techniques and views, software development processes, and hardware development processes. Management techniques topics include task estimation and scheduling. The course also compares different development methodologies including structured analysis/design and agile methods. | | | | |
| Metric: | Assessment will be based on a series of requirements-based assignments, given throughout the semester. | | | | |
| Rubric: | A student will demonstrate successful completion of this outcome by achieving a score of 8 of 12 (based on the assessment rubric shown in the attached table). | | | | |
| Standard 1: | | Standard 2: | | Standard 3: | |
| | | Must all standards be satisfied (Y,N)? | | "N" means only one must be passed. | |
| | | | | | |
| Instructor Evaluation Summary | | | | | |
| Number of students achieving standard: | | | | | |
| Number of students failing standard: | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | |

Rubric for Program Outcome

2) An ability to analyze and prioritize requirements and constraints in order to determine the features that must be included in advanced systems

Assessment will be based on a series of requirements-based assignments, given throughout the semester. A student will demonstrate successful completion of this outcome by achieving a score of 8 of 12 (based on the assessment rubric shown in the following table). This assessment will be conducted as part of the grading in EECE 631 - Engineering Processes and Management Techniques. The evaluation measures are as follows:

| | | | |
|--|---|--|--|
| | Requirements Structure | The requirements set is structured logically, with requirements divided into groups by functional area. | |
| | Prioritization | Each of the requirements is clearly assigned a priority, based on a clear, objective standard in terms of evaluating its relative importance. | |
| | Identification of Constraints | All applicable constraints, or aspects of the system that are not directly tied to a specific behavior or operation, are clearly identified and included. Examples of these include: reliability, security, maintainability, performance, etc. | |
| | Non-Functional vs. Functional Requirements | There is a clear separation between those requirements that describe the system's functional behavior (response to inputs, behavior sequences, etc.) and the non-functional characteristics of the system (performance, environmental characteristics, development approach, etc.) | |
| | Traceability: Between requirements sets | There is clear mapping between higher level or more abstract requirements and the derived lower level requirements that follow from them. | |
| | Traceability: To originating elements | There is clear mapping between each of the higher level requirements and the system engineering products that express the need for that requirement. | |

| Student: | | | | |
|--|--|--|--|--------------|
| Evaluation Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Requirements Structure | Requirements set lacking any structure or organization | Requirements organized, but not in clearly defined groups | Requirements fully organized into coherent structural groups | |
| Prioritization | Complete lack of prioritization expressed in requirements documents | Limited amount of prioritization of requirements defined, or requirements prioritized inconsistently | Requirements clearly prioritized throughout requirements documents, based on consistent policies | |
| Identification of Constraints | No clear system constraints identified | Limited set of system constraints identified | Complete set of system constraints clearly identified | |
| Non-Functional vs. Functional Requirements | No separation of functional and non-functional requirements | Some separation of functional and non-functional requirements | Complete separation of functional and non-functional requirements | |
| Traceability: Between requirements sets | Limited or incorrect traceability between high level and lower level requirements sets | Partial traceability between high level and lower level requirements sets | Complete and correct traceability between high level and lower level requirements sets | |
| Traceability: To originating elements | Limited or incorrect traceability between requirements and prior specifications | Partial traceability between requirements and prior specifications | Complete and correct traceability between requirements and prior specifications | |
| | | | Total | |

| Outcome Assessment Summary | | | | | | |
|--|---|--|---|------------------------------------|-------------|--|
| Program Outcome: | 3: An ability to design advanced digital or analog systems that meet all requirements. | | | | Instructor: | |
| Course: | EECE 643 Computer-Aided Circuit Engineering | | | | Semester: | |
| Description: | The use of computer-aided design tools to analyze, design and test both analog and digital circuits and devices. | | | | | |
| Metric: | Assessment will be based on an evaluation of two assignments to design digital and analog systems. | | | | | |
| Rubric: | A student will demonstrate successful completion of these outcomes by achieving a score of 15 of 22 (based on the assessment rubric shown in the attached table). | | | | | |
| Standard 1: | 15 | Standard 2: | | Standard 3: | | |
| | | Must all standards be satisfied (Y,N)? | N | "N" means only one must be passed. | | |
| Instructor Evaluation Summary | | | | | | |
| | | | | | | |
| | | Number of students achieving standard: | | | | |
| | | Number of students failing standard: | | | | |
| | | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | | |
| Comments related to the suitability of this outcome measurement. | | | | | | |
| Suggestions for possible changes to this outcome measurement. | | | | | | |

Rubric for Program Outcome

3: An ability to design advanced digital or analog systems that meet all requirements.

A student will demonstrate successful completion of these outcomes by achieving a score of 15 of 22 (based on the assessment rubric shown in the attached table)

| Student: | | | | |
|---|--|---|---|--------------|
| Evaluation Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Digital System Design | | | | |
| System Requirements of Digital System to be designed | Unable to list system requirements | System requirement list is incomplete for a digital system | System requirement list is complete | |
| Block Diagram | Block diagram is incorrect | Block diagram is incomplete for some of functions | Block diagram represents system to be designed functionally complete and correct. | |
| User Inputs and Outputs | Some of inputs and outputs are wrong | Incomplete user inputs and outputs | Complete user inputs and outputs are listed for the system. | |
| State Assignments and Algorithmic State Machine Diagram | Algorithmic State Machine Diagram is illogical | Algorithmic State Machine Diagram doesn't represent the system functions completely | Algorithmic State Machine Diagram represents the system functions completely | |
| State Table of Digital System | State Table of Digital System is incorrect | State Table of Digital System is incomplete | State Table of Digital System is functionally complete and correct | |
| Simulation of Digital System with VHDL (Quartus II 5.0) - program | Needed VHDL program missing or VHDL program is present but incorrect | VHDL program is present but simulation is not complete | All modules present and the system proved working correctly by simulation | |

| | | | | |
|--|--|---|---|--|
| Analog System Design | | | | |
| System Requirements of Analog System to be designed | Unable to list system requirements | System requirement list is incomplete for an analog system | System requirement list is complete | |
| Block Diagram | Block diagram is incorrect | Block diagram is incomplete for some of functions | Block diagram represents system to be designed functionally complete and correct. | |
| User Inputs and Outputs | Some of inputs and outputs are wrong | Incomplete user inputs and outputs | Complete user inputs and outputs are listed for the system. | |
| Design of Analog System using schematic capture or netlist | unable to create a schematic or netlist with correct parts and connections | schematic or netlist has parts oriented poorly; parts not labeled correctly | schematic or netlist is correct and easy to read | |
| Simulation of Analog System with PSPICE | unable to run simulation successfully | results are hard to read or interpret | simulation accurately describes circuit operation | |
| | | | Total | |

| Outcome Assessment Summary | | | | | | |
|--|---|--|---|------------------------------------|-------------|--|
| Program Outcome: | 4. An ability to implement designs for digital or analog systems that meet all requirements. | | | | Instructor: | |
| Course: | EECE698 Advanced Embedded Systems | | | | Semester: | |
| Description: | The course deals with embedded systems design centered around Complex PLDs and FPGAs leading to System On a Chip designs. The course also deals with designing embedded systems where the embedded processor is a stand-alone commercial processor such as the PIC Microcontroller , the ARM microcontroller or the 68HC12 Microcontroller. | | | | | |
| Metric: | Assessment will be based on a semester-long embedded system development project requiring used of CAD VHDL tools and both stand-alone and soft-core embedded processors. | | | | | |
| Rubric: | A student will demonstrate successful completion of this outcome by achieving a score of 8 of 12 (based on the assessment rubric shown in the attached table). | | | | | |
| Standard 1: | 8 | Standard 2: | | Standard 3: | | |
| | | Must all standards be satisfied (Y,N)? | N | "N" means only one must be passed. | | |
| | | | | | | |
| Instructor Evaluation Summary | | | | | | |
| | | | | | | |
| | Number of students achieving standard: | | | | | |
| | Number of students failing standard: | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | | |
| Comments related to the suitability of this outcome measurement. | | | | | | |
| Suggestions for possible changes to this outcome measurement. | | | | | | |

| Rubric for Program Outcome | | | | |
|---|--|--|---|--------------|
| | 4. An ability to implement designs for digital or analog systems that meet all requirements | | | |
| Assessment will be based on a semester long embedded system development project requiring use of CAD VHDL tools and both stand alone and soft-core embedded processors. | | | | |
| Student: | | | | |
| Eval. Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Generating Memory Maps for an Embedded System | All Starting and Ending Map Addresses Missing or Have incorrect values | Starting and Ending map Addresses Labeled , but some are incorrect | All starting and Ending Map Addresses labeled With Correct values | |
| System Design with FPGAs and CPLDs Using VHDL. | Inability to design systems with FPGAs and CPLDs Using VHDL | Ability to design with FPGAs and CPLDs but marginal knowledge of VHDL | Ability to design with FPGAs and CPLDs using VHDL | |
| Design with Embedded processors | Inability to design complex systems using embedded processors | Ability to design withstand alone embedded processors but not with 'soft-core' embedded processors via FPGAs | Ability to design with both stand alone commercial embedded processors as well as with 'soft-core' embedded processors with VHDL and CAD environments | |
| Simulation of Embedded Systems Using VHDL | Inability to generate simulations of Embedded Systems Using VHDL | Able to generate some, but not all, VHDL simulation results of Embedded Systems . | Able to generate complete simulation results Using VHDL for Embedded Systems | |
| Writing C or C++ programs for systems with stand-alone embedded processors | Unable to write C or C++ programs for systems with stand-alone embedded processors. | C or C++ software produced correct results for two thirds of the system. | All C or C++ software routines produced Correct outputs. | |
| System Functionality. | Nothing works! | System barely works | All system functions operated correctly. | |
| | | | Total | |

| Outcome Assessment Summary | | | | | | | |
|--|---|--|---|------------------------------------|--|-------------|--|
| Program Outcome: | 5. An ability to conduct literature search and assess its impact on electrical and/or computer engineering issues. | | | | | Instructor: | |
| Course: | EECE 425 Advanced Computer Architecture | | | | | Semester: | |
| Description: | Design and performance aspects of computer systems: caching, parallel processor structures, arithmetic pipelining and vector processing units, architectural classifications, memory structures, multiprocessor systems, interconnection networks, multiprocessing control and scheduling, and parallel algorithms. | | | | | | |
| Metric: | Assessment will be based on report and presentation on a literature survey of an important topic of the course. | | | | | | |
| Rubric: | A student will demonstrate successful completion of this outcome by achieving a score of 7 of 10 (based on the assessment rubric shown in the attached table). | | | | | | |
| Standard 1: | 7 | Standard 2: | | Standard 3: | | | |
| | | Must all standards be satisfied (Y,N)? | N | "N" means only one must be passed. | | | |
| Instructor Evaluation Summary | | | | | | | |
| Number of students achieving standard: | | | | | | | |
| Number of students failing standard: | | | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | | | |
| Comments related to the suitability of this outcome measurement. | | | | | | | |
| Suggestions for possible changes to this outcome measurement. | | | | | | | |

Rubric for Program Outcome

| 5. An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues | | | | |
|--|--|---|---|--------------|
| Assessment will be based on a report on literature survey of a topic relevant to the class . | | | | |
| Student: | | | | |
| Evaluation Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Understanding | Misunderstanding of reading assignment of technical paper | Understanding 70% of the technical content of the papers surveyed | Understanding of 95% of the contents in the papers surveyed | |
| Presentation | Fail to present the concepts and impact of the paper correctly | Present 70% of the concepts and impact of the research papers correctly | Present 95% of the concepts and impact of the research papers successfully. | |
| Discussion | Fail to discuss any impact of the papers | Discusses most of the impact of the papers | Discusses most of the impact of the papers with a look into cutting edge technology | |
| Number of Reference papers surveyed | Conduct literature research for one reference paper. | Conduct literature research for two reference papers | Conduct literature research for more than two reference papers. | |
| Report | Fail to develop a report and/or paper for reading assignment of the technical paper. | Develop a report and/or paper for the reading assignment of the paper | Develop a report and/or paper for the student's own idea related to the topic. | |
| | | | Total | |

| Outcome Assessment Summary | | | | | | |
|--|--|--|---|------------------------------------|-------------|--|
| Program Outcome: | 5: An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues | | | | Instructor: | |
| Course: | EECE 615 High Frequency Design Techniques | | | | Semester: | |
| Description: | Study of the problems associated with passive components at high frequencies, high-frequency measurement techniques, transmission lines, line reflections, matching and terminations, scattering parameters, ground and power planes, and printed circuit board design considerations. | | | | | |
| Metric: | Assessment will be based on an evaluation of selected assignments for each student in EECE 615. A minimum of two assignments will be evaluated throughout the semester. | | | | | |
| Rubric: | A student will demonstrate successful completion of this outcome by achieving a score of 7 of 10 (based on the assessment rubric shown in the attached table). | | | | | |
| Standard 1: | 7 | Standard 2: | | Standard 3: | | |
| | | Must all standards be satisfied (Y,N)? | N | "N" means only one must be passed. | | |
| Instructor Evaluation Summary | | | | | | |
| Number of students achieving standard: | | | | | | |
| Number of students failing standard: | | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | | |
| Comments related to the suitability of this outcome measurement. | | | | | | |
| Suggestions for possible changes to this outcome measurement. | | | | | | |

Rubric for Program Outcome

5: An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues

A student will demonstrate successful completion of this outcome by achieving a score of 7 of 10 (based on the assessment rubric shown in the following table).

| Student: | | | | |
|---|--|--|---|-------|
| Evaluation Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Understanding of reading assignment in area of high frequency design techniques | Misunderstanding of the reading assignment of technical paper. | Understanding 70% of the reading assignment of technical paper. | Understanding 95% of the reading assignment of technical paper. | |
| Presentation | Fail to present the concepts of the paper correctly. | Present 70% of the concepts of the research paper successfully. | Present 95% of the concepts of the research paper successfully. | |
| Discussion | Fail to discuss any problems of the paper. | Discuss most of the problems of the paper . | Discuss most of the problems of the paper with a look into cutting-edge technology | |
| Number of Reference papers surveyed | Conduct literature research for one reference papers. | Conduct literature research for two reference papers | Conduct literature research for more than two reference papers | |
| Report of reading assignmet in area of high frequency design techniques | Fail to develop a report and/or a paper for the reading assignment of the technical paper. | Develop a report and/or a paper for the reading assignment of the technical paper. Fail to cite sources of material. | Develop a report and/or a paper to student's own idea related to the topic. Correctly cite sources of material. | |
| | | | Total | |

| Outcome Assessment Summary | | | | | | |
|--|--|--|---|------------------------------------|-------------|--|
| Program Outcome: | 5. An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues | | | | Instructor: | |
| Course: | EECE 675 Electromagnetic Compatibility | | | | Semester: | |
| Description: | Analysis of cabling and ground problems in high-frequency systems. Circuit layout for high frequency applications. Electromagnetic discharge problems. Radio-frequency emissions from electronic devices. Shielding techniques to prevent ESD and EMI. | | | | | |
| Metric: | Assessment will be based on an evaluation of Literature survey of research publications | | | | | |
| Rubric: | A student will demonstrate successful completion of this outcome by achieving a score of 7 out of 10 in all the assigned jobs. | | | | | |
| Standard 1: | | Standard 2: | | Standard 3: | | |
| | | Must all standards be satisfied (Y,N)? | N | "N" means only one must be passed. | | |
| Instructor Evaluation Summary | | | | | | |
| | | | | | | |
| | | Number of students achieving standard: | | | | |
| | | Number of students failing standard: | | | | |
| | | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | | |
| Comments related to the suitability of this outcome measurement. | | | | | | |
| Suggestions for possible changes to this outcome measurement. | | | | | | |

Rubric for Program Outcome

5. An ability to conduct literature research and assess its impact on electrical and/or computer engineering issues

Assessment is based on literature survey on any one of the topics such as Signal integrity, RFI filtering, Grounding, Shielding, EMI measurements.

| Student: | | | | |
|-------------------------------------|--|---|---|-------|
| Evaluation Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Understanding | Misunderstanding of reading assignment of technical paper | Understanding 70% of the technical content of the papers surveyed | Understanding of 95% of the contents in the papers surveyed | |
| Presentation | Fail to present the concepts and impact of the paper correctly | Present 70% of the concepts and impact of the research papers correctly | Present 95% of the concepts and impact of the research papers successfully. | |
| Discussion | Fail to discuss any impact of the papers | Discuss most of the impact of the papers | Discuss most of the impact of the papers with a look into cutting edge technology | |
| Number of Reference papers surveyed | Conduct literature research for one reference paper. | Conduct literature research for two reference papers | Conduct literature research for more than two reference papers. | |
| Report | Fail to develop a report and/or paper for reading assignment of the technical paper. | Develop a report and/or paper for the reading assignment of the paper but citations of source material missing. | Develop a report and/or paper for the reading assignment of the paper including student's own idea related to the topic and including citations of source material. | |
| | | | Total | |

| Outcome Assessment Summary | | | | | | |
|--|---|--|---|------------------------------------|-------------|--|
| Program Outcome: | 6. Use industry standard tools to analyze, design, develop and test computer-based systems containing both hardware and software components | | | | Instructor: | |
| Course: | EECE455 Introduction to Network Engineering | | | | Semester: | |
| Description: | This course Computer reviews network architecture. Network components such as hubs, routers, and bridges are discussed. Transmission media and protocols are discussed. Concepts of data communications are reviewed. | | | | | |
| Metric: | Assessment will be based on a lab test where the student will be required to use laboratory routers and switches to implement, configure, and test an IP network . Individual assignments may be used to verify the use of NAT and WAN configuration. | | | | | |
| Rubric: | A student will demonstrate successful completion of this outcome by achieving a score of 8 of 12 (based on the assessment rubric shown in the attached table). | | | | | |
| Standard 1: | 8 | Standard 2: | | Standard 3: | | |
| | | Must all standards be satisfied (Y,N)? | N | "N" means only one must be passed. | | |
| | | | | | | |
| Instructor Evaluation Summary | | | | | | |
| Number of students achieving standard: | | | | | | |
| Number of students failing standard: | | | | | | |
| | | | | | | |
| Comments related to student achievement of this outcome measurement. | | | | | | |
| Comments related to the suitability of this outcome measurement. | | | | | | |
| Suggestions for possible changes to this outcome measurement. | | | | | | |

| Rubric for Program Outcome | | | | |
|---|--|---|---|--------------|
| | 6. Use industry standard tools to analyze, design, develop and test computer-based systems containing both hardware and software components | | | |
| Assessment will be based on a lab test where the student will be required to use laboratory routers and switches to implement, configure, and test an IP network . Individual assignments may be used to verify the use of NAT and WAN configuration. | | | | |
| Student: | | | | |
| Eval. Measures | Inadequate | Marginal | Adequate | |
| Scale | 0 | 1 | 2 | Score |
| Physical implementation of the network | Improper cable or equipment selection. | Initial incorrect port selection or incorrect cable type, causing significant delays in implementation. | selection of correct equipment and cable types. Correct network connections. | |
| Configuration of routers and switches | Inability to configure basic interfaces and passwords. | Basic interfaces correctly configured. Routing difficulties in the network. | Network configured correctly. Routing functional. Login, telnet, and console passwords correct. | |
| Use debugging and network monitoring tools to correct problems in a network. | Inability to demonstrate basic functionality of network. | Demonstrated use of only the most basic tools such as ping. | Use of debugging tools to demonstrate functionality of the WAN connection, NAT translation and routing protocols. | |
| Use of NAT translation to provide a local network. | Unable to configure NAT functionality. | NAT configuration of correct form, but private network cannot reach public addresses. | NAT translation fully functional. | |
| Use of routing protocol such as OSPF for single area network. | Unable to provide any OSPF functionality. | Some OSPF functionality, but routing difficulties to some parts of the network. Improper or unnecessary network commands in OSPF configuration. | Full OSPF functionality, proper OSPF configuration. | |
| WAN connections. | WAN connections are not functional. | WAN connection established, but trouble reaching all destinations. | Full network connectivity established. | |
| | | | Total | |

V. Assessment Surveys

Masters In Electrical and Computer Engineering Program Graduate Exit Survey

Your Name:

Company Name *(if applicable):*

Email:

Membership in professional organizations:

Date:

Company Location:

Telephone:

Please Check or Electronically **Red Font** the 1-5 scale : 5= Very Well Prepared - 1= Very Unprepared

Based on your educational experience at Chico State, how well prepared are you to:

| | | 5 | 4 | 3 | 2 | 1 |
|---|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1 | Identify and formulate requirements for advanced systems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 | Analyze and prioritize requirements and constraints in order to determine the features that must be included in advanced systems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 | Design advanced digital or analog systems to meet all requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 | Implement designs for digital or analog systems and evaluate how well the designs meet the requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 | Evaluate how well the designs meet the requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 | Conduct literature research | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | Assess the impact of published literature on electrical and computer engineering issues | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | Apply current engineering technologies | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | Use modern engineering tools to solve problems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Additional Comments:

Masters In Electrical and Computer Engineering Program
California State University, Chico
Alumni Survey

Your Name:

Company Name:

Email:

Membership in professional organizations:

Date:

Company Location:

Telephone:

Please Check or Electronically **Red Font** the 1-5 scale : 5= Very Well Prepared - 1= Very Unprepared

Based on your educational experience at Chico State, how well prepared are you to:

| | | 5 | 4 | 3 | 2 | 1 |
|----|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1 | Identify and formulate requirements for advanced systems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 | Analyze and prioritize requirements and constraints in order to determine the features that must be included in advanced systems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 | Design advanced digital or analog systems that meet all requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 | Implement designs for digital or analog systems and evaluate how well the designs meet the requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 | Keep current in the developments in the field of electrical and computer engineering | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 | Understand the impact of current developments | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | Make effective oral presentations | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | Prepare effective written presentations | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | Recognize the need for, and engage in life-long learning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 | Apply current technologies and use modern tools to solve engineering problems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Additional Comments:

**Masters In Electrical and Computer Engineering Program
California State University, Chico**

Employer Survey

Your Name:

Date:

Company Name:

Company Location:

Email:

Telephone:

Name of Person Evaluated:

Please Check or Electronically **Red Font** the 1-5 scale: 5=Outstanding, 4=Very Good, 3=Acceptable, 2=Below Expectation, 1=Unacceptable, n/a= not applicable

| | | 5 | 4 | 3 | 2 | 1 | n/a |
|---|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1 | How do you rate the graduate analytical problem solving skills? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 | How do you rate the graduate overall knowledge for designing advanced systems? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 | Do they maintain currency in their knowledge of electrical and computer engineering? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 | Are they able to conduct research in the fields of electrical and computer engineering? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 | Are they able to effectively engage in oral communication so that others can comprehend and build on their work? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 | Are they able to generate effective written communication so that others can comprehend and build on their work? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | Do they regularly upgrade their knowledge of practical engineering skills? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | Are they adequately prepared for success in a doctoral program in electrical and computer engineering? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Additional Comments: