Analysis of Curriculum

1. Basic Philosophy

The Computer Engineering Curriculum is designed to best achieve the PEO while satisfying all curricular requirements of EAC/ABET (both general and specific to ECE programs) and the curricular requirements of the Institution (core curriculum). Within these constrains the curriculum is designed to accomplish the following:

- Provide all graduates with a strong general education focused on areas relevant to engineering and its impact on society and the environment such as ethics, economics and social and economic systems.

- Provide all the graduates with a solid background in Mathematics and Physics, which is essential for life-long learning and the ability to pursue graduate studies.

- Provide all the graduates with a strong background in all major Computer Engineering areas (through a large core of required ECE courses) which is essential for life-long learning and the ability to work across the whole spectrum of Computer Engineering employment.

- Give to all the graduates the opportunity to better understand and absorb the materials taught in the classroom by offering laboratory training in all the areas where this is feasible.

- Provide to all the graduates experiences with simulation and CAD software, which are integrated in all courses where it is applicable.

- Provide all the graduates with multiple design experiences, culminating with a major design experience through a five-credit-hour Senior Design course sequence.

The implementation of the above in the Computer Engineering Curriculum will be discussed in the following subsections.

2. Structure of the Curriculum

The curriculum consists of four components with a total of 128 semester credit hours as shown in Figure 1. The "ECE Topics" plus the "ECE Foundation" constitute the Engineering Topics Component (as defined by EAC/ABET).

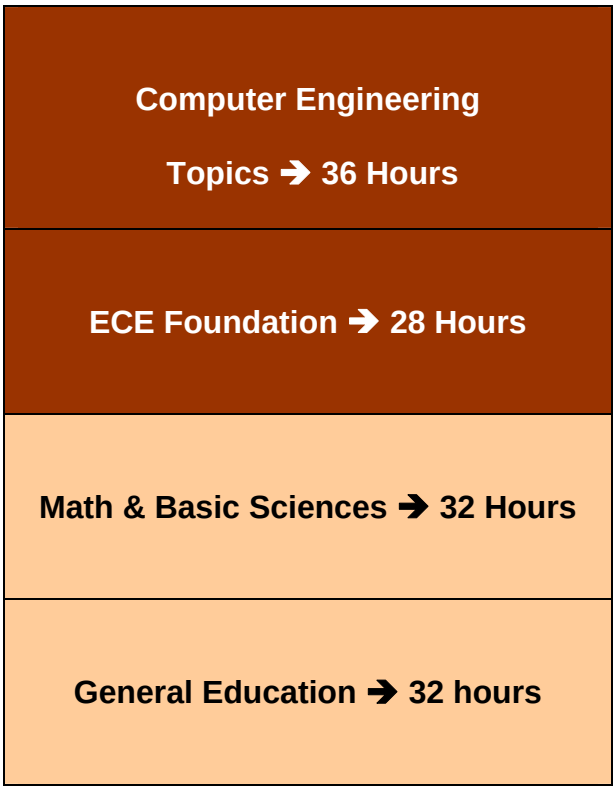

Figure 1 Structure of the Curriculum

The description of each of these components will be presented in the following subsections, along with its contribution:

- Toward achieving the curricular requirements of the Institution
- Toward achieving the EAC/ABET curricular requirements
- Toward accomplishing the PEO
- To the Program Desired Outcomes

3. General Education Component

With reference to Figure 2, the General Education Component consists of eleven courses (six required courses and five restricted electives) with a minimum of thirty-two semester credit hours (maximum thirty-three semester credit hours).

General Education					
Department & Course Number	Title	Credit Hours	Lecture	Laboratory	Suggested Semester
English 101	English Composition I	3	3		1
English 102	English Composition II	3	3		2
Speech Com. 101	Oral Communication	3	3		2
Philosophy 104	Ethics	3	3		1
Philosophy 105	Elementary Logic	3	3		2
Economics 302I	Economic Systems, History & Philosophy	3	3		4
Select one of the following					
Economics 240	Introduction to Microeconomics	3	3		3
Economics 241	Introduction to Macroeconomics	3	3		3
Select one of the following					
Biology 202	Human Genetics	2	2		3
Physiology 201	Human Physiology	3	3		3
Select one from the approved list of Fine Arts					
Fine Arts	Elective	3	3		1
Select one from the approved list of Multicultural					
Multicultural	Elective	3	3		4
Select one from the approved list of Social Sciences					
Social Science	Elective	3	3		7
Minimum General Education Credit Hours		32			
University Requirements (Core Curriculum)		32			
EAC/ABET Minimum Requirements					
General Education as Percentage of the Curriculum		25			

Figure 2 General Education Component of the Curriculum

- **Consistency with the Objectives and Mission of the Institution**

These thirty-two semester credit hours satisfy all the requirements of the University Core Curriculum (except the requirements of the Core Curriculum in the areas of Mathematics and Sciences, which are of course satisfied by the Math and Science courses required by the major). The Core Curriculum is designed to accomplish the General Education goals of the University as defined by its mission statement.

The General Education Component of the curriculum is, therefore, consistent with the mission and the objectives of the University.

- **Consistency with EAC/ABET General Criterion 5**

The University Core Curriculum, described in detail in the Undergraduate Catalog (submitted by the University), offers a wide variety of courses in each of the areas that must be covered. The Computer Engineering Curriculum has eliminated or has significantly restricted the choice in most of the Core areas to ensure that all our students take those General Education courses that best complement the technical content of the curriculum.

The General Education Component of the Computer Engineering Curriculum, therefore, although designed to satisfy the University Core Curriculum is at the same time consistent with the EAC/ABET General Criterion 5, regarding the General Education component.

- **Consistency with the PEO**

The General Education Component includes nine hours of English composition and oral communication. These along with the technical communication seminar offered in the framework of ECE 495a, the proposal and the final report assignments are designed to meet the requirements of PEO-2, regarding communication skills. The other courses which include six hours of economics, ethics, logic, social sciences and culture are contributing to the accomplishment of Program Educational Objective -3, regarding the broad education necessary to understand the impact of engineering solutions in a global and societal context.

- **Contribution to the Program Outcomes**

With reference to Figure 3, the General Education courses primarily contribute to Outcomes DO-10 and DO-12. The Life Sciences courses (Biology 202 and Physiology 201) (which are contributing to Outcome DO-2) are included in the General Education Component, rather than the Mathematics and Basic Sciences Component of the curriculum, because they are introductory in nature, they are not calculus-based and they are not prerequisites to any other required course.

General Education	1	2	3	4	5	6	7	8	9	10	11	12
ENGL 101										x		
ENGL 102										x		
SPCM 101										x		
BIOL 202 or PHSL 201		x										
ECON 240 or ECON 241												x
ECON 302I												x
PHIL 104												x
PHIL 105												x
Social Studies												x
Multicultural Studies												x
Fine Arts												x

Figure 3 General Education Component – Contribution to Outcomes

The background and skills acquired through the General Education Component, along with the technical skills and the design tools acquired through the Engineering Component of the curriculum, are integrated in the Senior Design course sequence which provides the students with the major design experience that culminates the program.

4. Basic Sciences and Mathematics

With reference to Figure 4, this component consists of thirty-two credit hours of which twelve are in basic Sciences and twenty are in Mathematics.

Eight hours of Physics (two courses and two laboratories respectively) covering the areas of Mechanics, Heat, Thermodynamics, Electricity, Magnetism and Optics are required. Four hours of Science (course and laboratory) can be selected from an approved list of university-level science courses. Our students are encouraged to select PHYS 205c and PHYS 255c which cover concepts of modern atomic, molecular and quantum physics and relativity. Other students select university-level Chemistry or Physiology.

The Mathematics sequence includes six courses, all required. The Department of Mathematics offers a sequence of three courses in Calculus (MATH 150, MATH 250 and MATH 251) with a total of eleven hours and one three-credit-hour course in Differential Equations (MATH 305). The ECE Department offers a four-credit-hour course ECE 315 entitled Mathematical Methods in Engineering, covering the areas of Probability and Statistics, Complex Variables, Linear Algebra and Matrix Methods, all with applications in electrical and computer engineering problems. Finally, two of the four credit hours of ECE 225 (Introduction to Discrete Logic and Digital System) are devoted to the introduction to Discrete Mathematics.

Basic Sciences and Mathematics					
Department & Course Number	Title	Credit Hours	Lecture	Laboratory	Suggested Semester
Mathematics Courses: All Required					
MATH 150	Calculus I	4	4	1*	1
MATH 250	Calculus II	4	4		2
MATH 251	Calculus III	3	3		3
MATH 305	Ordinary Differential Equations I	3	3		4
ECE 225**	Introduction to Discrete Mathematics	2	2		3
ECE 315	Mathematical Methods for Engineers	4	4		4
Total Hours		20			
Basic Sciences: Required Courses					
PHYS 205a	University Physics (a)	3	3		3
PHYS 255a	University Physics (a) Laboratory	1		1	3
PHYS 205b	University Physics (b)	3	3		4
PHYS 255b	University Physics (b) Laboratory	1		1	4
Basic Sciences: Select from Approved List					
Science Course	Elective	3	3		6
Laboratory	Elective	1		1	6
Basic Sciences Total Hours		12			
Minimum Math and Basic Sciences Credit Hours Required		32			
EAC/ABET Minimum Requirements		32			
Math and Basic Sciences as Percentage of the Curriculum		25			
EAC/ABET Minimum Requirements		25			
University Requirements (Core Curriculum)		9			

* One hour of recitation

** ECE 225 is a four-credit-hour course. The other two hours are devoted to applications of discrete math and Boolean algebra to digital circuit design

Figure 4 Basic Sciences and Mathematics Component of the Curriculum

- **Consistency with the Objectives and Mission of the Institution**

The University Core Curriculum, which is designed to provide the students with a well-rounded education, requires forty-one semester credit hours. Thirty-two of these hours have already been discussed in the previous subsection (General Education Component). The other nine hours (six hours of Basic Sciences and three hours of Mathematics) are obviously satisfied by the Basic Sciences and Math Component. Thus, the Institutional requirements are satisfied.

- **Consistency with EAC/ABET General Criterion 5**

This component consists of thirty-two semester credit hours and accounts for twenty-five percent of the curriculum.

This component, therefore, satisfies Criterion 5 of EAC/ABET, which requires "one year of a combination of college level mathematics and basic sciences (with some experimental experience) appropriate to the discipline."

- **Consistency with the PEO**

The strong background in Mathematics and Physics (provided by the appropriate combination of required courses) is necessary to prepare the students to acquire the ability for life-long learning and the ability to successfully pursue graduate studies. These are two important objectives of the program.

- **Contribution to the Program Outcomes**

General Education	1	2	3	4	5	6	7	8	9	10	11	12
Math 150	x		x									
Math 250	x		x									
Math 251	x		x									
Math 305	x		x									
ECE 315	x		x									
ECE 225	x		x			x		x				
Physics 205a and 255a		x	x	x								
Physics 205b and 255b		x	x	x								
Science Elective		x	x	x								

Figure 5 Math and Basic Sciences – Contribution to Program Outcomes

The Mathematics courses contribute directly to Outcome DO-1 and indirectly to Outcome DO-3. The Assessment of Outcome DO-1 is done through the ECE courses that primarily contribute to the Outcome DO-3. The Basic Sciences courses contribute directly to Outcomes DO-2 and DO-4 and indirectly to the Outcome DO-3.

5. Engineering Topics Component

With reference to Figure 1, the Engineering Topics Component consists of two modules, the ECE Foundation (twenty-eight semester credit hours) and the Computer Engineering Topics (thirty-six semester credit hours). All sixty-four hours must be taken from ECE or Computer Science courses.

The students, therefore, take a minimum of sixty-four hours of Engineering Topics (which is 50% Curriculum). This satisfies the relevant requirement EAC/ABET Criterion 5, which requires a minimum of forty-eight hours (or 37.5% of the Curriculum) of Engineering Topics. In the following subsections the two modules of Engineering Topics will be discussed in more detail.

6. ECE Foundation

The ECE Foundation is one of the centerpieces of the academic philosophy of the program. All students are required to take introductory courses in all major areas of Electrical and Computer Engineering. This provides the solid foundation necessary for life-long learning and the ability to find employment in all sectors of Computer engineering spectrum of activity.

With reference to Figure 6, the ECE Foundation Module consists of eight required courses of which three (at the 200-level) offer fundamental introductory knowledge and five (at the 300-level) which provide the solid background in all the major Computer Engineering areas. The students after successfully completing these five courses (normally by the end of their junior year) have the ability to either focus on one or more areas, or to select their Technical Electives from different areas according to their plans or interests.

The structure of the required part of the curriculum, which includes the Math courses, the required Physics courses, the basic ECE courses (200-level) and the five ECE Foundation courses (300-level) is shown in the block diagram of Figure 7. The diagram starts from the first calculus course and through the prerequisite structure ends with the six ECE Foundation courses. The integration of Math, Physics and ECE Science in the required part of the curriculum is one of the strengths of the program designed to best achieve the PEO.

• Contribution to Program Outcomes

The contribution of the ECE Foundation Module to the Program Outcomes is shown in Figure 8.

ECE Foundation Module						
Department & Course Number	Title	Credit Hours	Lecture	Laboratory	Design Hours	Suggested Semester
All Courses are Required						
ECE 222*	Introduction to Digital Computation	3	3			2
ECE 225**	Discrete Logic and Digital Systems	2	2	1	1	3
ECE 235	Electric Circuits	4	3	1		4
ECE 321***	Intro to Software Engineering	3	3		1	4
ECE 327	Digital Circuit Design	4	3	1	2	5
ECE 329	Computer Organization and Design	4	4	1	2	6
ECE 345	Electronics	4	3	1	1	6
ECE 355	Signals and Systems	4	3	1	1	5
Total Hours (All Engineering Topics)		28				

* Can be substituted by CS 202

** ECE 225 is a four-credit-hour course. The other two hours are devoted to Discrete Math and have already counted in the Math and Basic Sciences Component.

*** Can be substituted by CS 220 “Programming with Data Structures”

Figure 6 ECE Foundation Module

COMPUTER ENGINEERING PROGRAM

Required Technical Courses

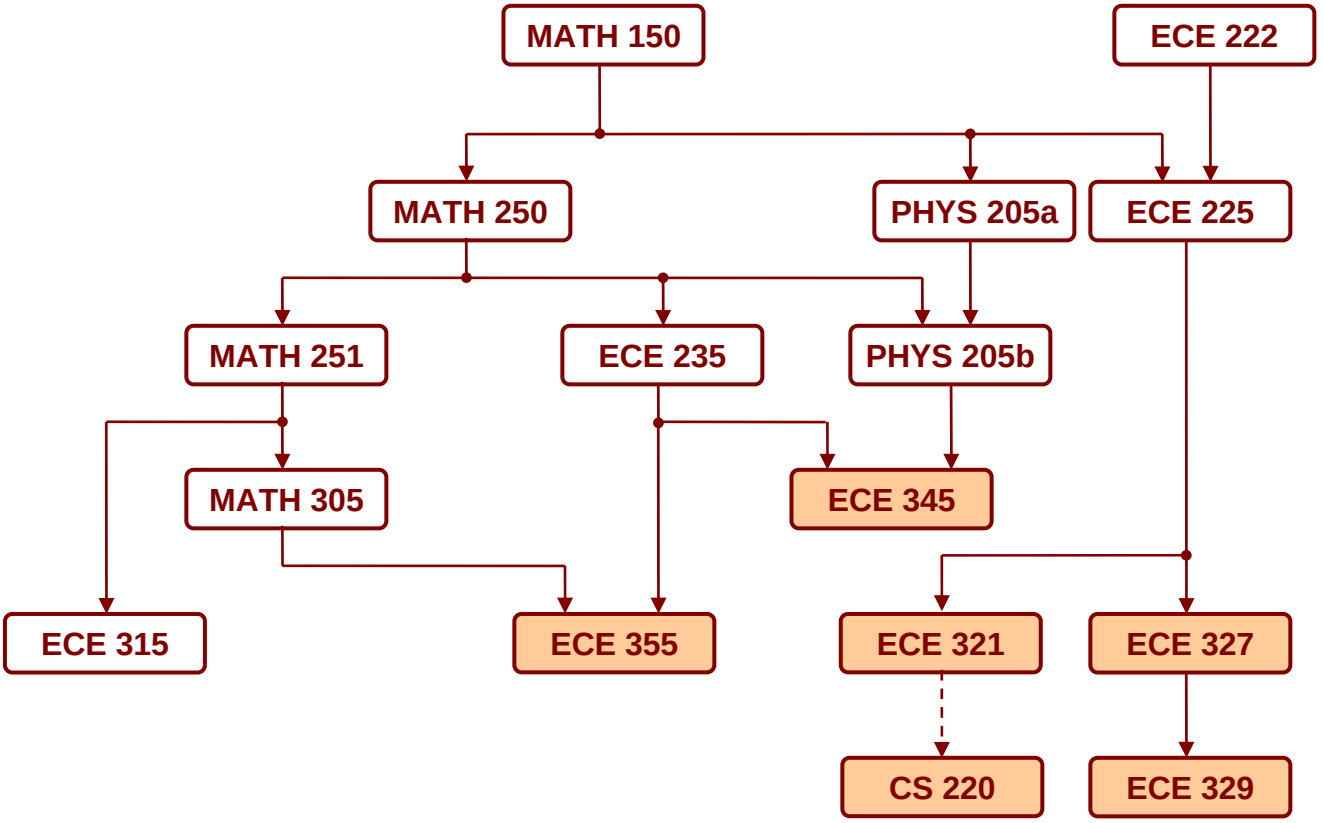

Figure 7 The Flowchart (above) shows the sequence of the technical courses {Mathematics, Physics, Programming and ECE Science}, that are required by all Computer Engineering majors. The sequence leads to the six courses (marked with colored background) which are the foundation for all Computer Engineering technical disciplines (ECE 321 and CS 220 are equivalent. The students may select one of the two).

ECE Foundation Module												
	Desired Outcomes DO											
Courses ↓	1	2	3	4	5	6	7	8	9	10	11	12
ECE 222	x		x		x	x	x			x		
ECE 225	x		x			x		x				
ECE 235			x	x		x	x			x		
ECE 321 or CS 220			x		x	x	x	x				
ECE 327			x	x	x	x	x	x			x	
ECE 329			x		x	x	x	x		x		
ECE 345			x	x	x	x		x	x	x	x	
ECE 355			x		x	x	x				x	

Figure 8 ECE Foundation Component – Contribution to Outcomes

7. Computer Engineering Topics

This module consists of the following:

- The Freshman Course "Introduction to ECE" 3 hours
- Two-Semester Senior Design course sequence 5 hours
- Twenty-eight hours of Technical Electives 28 hours

In the following subsections the Computer Engineering Topics Module will be analyzed in terms of contribution to the PEO and Desired Outcomes of the Program.

• Freshman Engineering Course

The Freshman Engineering course ECE 101 (crosslisted with ENGR 101) is designed to demonstrate concepts of engineering such as design in order to attract the interest of the students and to help them persevere through the first part of the curriculum which is not engineering oriented. This objective is achieved through well thought out laboratory assignments involving design of systems to achieve certain tasks, although the student has no knowledge of the inner workings and the mathematical model of the components used.

• Senior Design Course Sequence

The Senior Engineering Design course is a two-semester, five-credit-hour course sequence ECE 495a (two credit hours) and ECE 495b (three credit hours) taken over

two successive semesters. Prerequisite of this course is that the student must have senior status. This course, normally, is taken during the last two semesters before graduation. The purpose of the course is to provide the students with a major design experience with realistic constraints and to build a bridge between academe and the work place. Within the constraints of the academic environment, we try to create an environment that resembles the conditions of real engineering practice as follows: the course instructors operate as the management of an engineering company; the students operate as employees of the company; the Faculty advisors, assigned to the project, operate as consultants; and the project sponsor is the client.

- **ECE 495a**

This is the first course in the sequence and accounts for two semester credit hours. In the framework of this course the students have to:

- Study the projects available to find the ones closer to their interests
- Form teams of four to six (according to the size and the anticipated areas of expertise needed for the project they plan to select)
- The team, with the guidance of the course instructors, selects the year-long project
- The course instructors scale (if necessary) the size of the project to match the size of the team.

The team studies the request for proposals that outlines generally what is wanted, but usually does not specify how to do the work. The teams take these general requirements, reformulate them into a problem that they can solve, and write a proposal to do the design and to implement the work the following semester. The proposal contains a literature review that indicates that they understand what has been done in the area previously, a description of what their system will do, the subsystems that they now anticipate incorporating, a list of the applicable codes and standards, an estimated budget, a schedule to get the work done, and a list of deliverables – items that they now anticipate putting into the design report at the end of the next semester.

The projects are kept small enough so that the team can reasonably finish the design work and implementation (during the second semester) in twelve weeks working ten hours per week. Although team-work is the essence of this course, each team member must have a clearly identifiable assignment to permit the assessment of the contribution of each team member to the project. The teams are to structure their proposals to meet the requirements of the client regarding constraints such as cost, manufacturability, performance, user friendliness, as specified in the proposal and as (possibly) added later by the client after viewing preliminary design plans.

The projects are primarily drawn from members of the ECE Industrial Advisory Council, from local industries and from national or regional design competitions. Some projects come from local non-profit groups (with a problem wanting a technical solution), Faculty research, other interests of the Faculty, and occasionally from the students themselves. A variety of types of projects are often available so that some will be suitable for students with the various sub-specialties in the Electrical and Computer Engineering programs. The students bring the knowledge and skills learned in their previous classes to the problem at hand. We try to see that the teams have a mix of the interests and skills from previous classes to have a successful project. On the other hand, most projects have some aspect that has not been covered in any class taught in the Department. This enables the students to recognize and demonstrate that they can acquire new skills and knowledge without having to have a class in that particular topic.

- **Technical Communication**

One of the two semester credit hours of ECE 495a is devoted to technical communication. The students must attend the technical communications (writing and oral communication). The students receive detailed instruction regarding the types of documents and presentations that engineers are expected to produce such as memos, resumes, proposals, progress reports, design reports – the last three both written and oral. The student's knowledge and skills in this area are assessed through their performance in the relevant activities of the project, which are concluded with the final report and the final presentation.

- **ECE 495b**

ECE 495b is the second course in the Senior Design sequence and accounts for three semester credit hours. Normally, the students take this course in their last semester. In the framework of this course the team is implementing their proposal by doing the design work. The design process requires that each team:

- Submits a weekly action item list
- Normally conducts one to three design reviews
- Produces both written and oral progress reports
- Produces a final written report
- Presents a final oral and poster presentation of their design results

The design report includes the following:

- A discussion regarding the extent to which the design meets the needs and specifications of the client
- A discussion regarding the potential benefits of the product to society
- A section with all technical details of the system including engineering drawings

- A section regarding the applicable codes and standards
- A section regarding the estimated cost
- A section regarding the schedule of implementation
- A section with conclusions and recommendations

This latter section should include recommendation for improvement of the design, a discussion of the limitations of the design, a fault analysis, a discussion of health and safety issues, a discussion of possible impact on the environment and society.

- **Assessment of Senior Design Sequence**

The Senior Design course by its nature offers itself to multiple assessment tools for all Desired Outcomes DO-3 to DO-12 by many individuals both within and outside the Department. The course instructors in addition to their own assessment solicit input from the Faculty Advisor(s), other faculty that participated in or observed the project, the members of the Industrial Advisory Council, the project sponsor(s), the students themselves and any outside input for projects that competed in national or regional design competitions.

This is by far the most sophisticated course assessment process given the importance of the Senior Design course and the unique opportunity to observe integrated in one course all the concepts related to all Desired Outcomes of the program. All the materials related to the Senior Design course including the course assessment folders will be available for review by the EAC/ABET team during the visit.

- **Technical Electives**

Finally, the "Computer Engineering Topics" module includes twenty-eight hours of Technical Electives. At least twenty hours must be taken from the following:

ECE 421, ECE 422, ECE 423, ECE 424, ECE 425, ECE 428, ECE 429

CS 306, CS 414, CS, 416, CS 435, CS 484, CS 485

The Computer Engineering Technical Electives are shown in Figure 9. The ECE Technical Electives in the other areas are shown in Figures 9 and 10. For each course the following information is listed:

- Credit hours
- Lecture credit
- Laboratory credit
- Engineering Design hours
- Suggested Semester

ECE Technical Electives						
Department & Course Number	Title	Credit Hours	Lecture	Laboratory	Design Hours	Suggested Semester
Digital Systems and Computer Engineering						
ECE 421	Synthesis with HDL	4	3	1	2	7
ECE 422	Intro to Data Communications Networks	4	3	1	2	8
ECE 423	Digital VLSI Design	4	3	1	2	7
ECE 424	Microprocessor-Based Systems	4	3	1	3	7
ECE 425	VLSI Design and Test Automation	4	3	1	2	8
ECE 428	Programmable ASICs Design	4	3	1	2	8
ECE 429	Computer Systems Architecture	4	3	1	2	8
Electromagnetics, Electronics and Optics						
ECE 440	CMOS Radio-Frequency IC Design I	4	3	1	2	7
ECE 441	Photonics I	4	3	1	2	7
ECE 446	Electronic Circuit Design	4	3	1	3	8
ECE 447	Electronic Devices	4	3	1	1	8
ECE 448	Photonics II	4	3	1	2	8
ECE 472	Antennas I	4	3	1	2	8
ECE 477	Fields and Waves I	3	3		1	7
ECE 479	Microwave Engineering I	4	3	1	2	8

Figure 9 Technical Electives: Digital Systems and Computer Engineering
Electromagnetics, Electronics and Optics

ECE Technical Electives						
Department & Course Number	Title	Credit Hours	Lecture	Laboratory	Design Hours	Suggested Semester
Communications and Signal Processing						
ECE 467	Introduction to Biomedical Imaging	4	3	1	2	7
ECE 468	Digital Signal Processing	4	3	1	2	8
ECE 471	Wireless and Personal Communications	3	3		1	7
ECE 472	Antennas I	4	3	1	2	8
ECE 476	Intro to Broadband Communications	4	3	1	1	8
ECE 478	Analog and Digital Communications	4	3	1	2	8
ECE 422	Intro to Data Communications Networks	4	3	1	2	8
ECE 441	Photonics I	4	3	1	2	7
Control and Power Systems						
ECE 456	Embedded Control and Mechatronics	4	3	1	2	7
ECE 459	MEMS and Micro-Engineering	4	3	1	2	8
ECE 483	Power Electronics	4	3	1	2	8
ECE 484	Computer-Aided Circuit Analysis	4	3	1	2	7
ECE 486	Electric Energy Sources	3	3		1	8
ECE 487	Power System Analysis	4	3	1	2	7
ECE 488	Power System Engineering	4	3	1	2	8
ECE 489	Electric Power Distribution	4	3	1	3	7

Figure 10 Technical Electives: Communications and Signal Processing
Control and Power Systems

- **Prerequisite Flowchart**

The prerequisite Flowchart for the required part of the curriculum was shown in Figure 7. The chart showed the path from the first calculus course through the Math, Science and 200-level ECE courses to the five ECE Foundation courses (300-level). The path from the five ECE Foundation courses to the Technical Electives in Computer Engineering is shown in Figure 11.

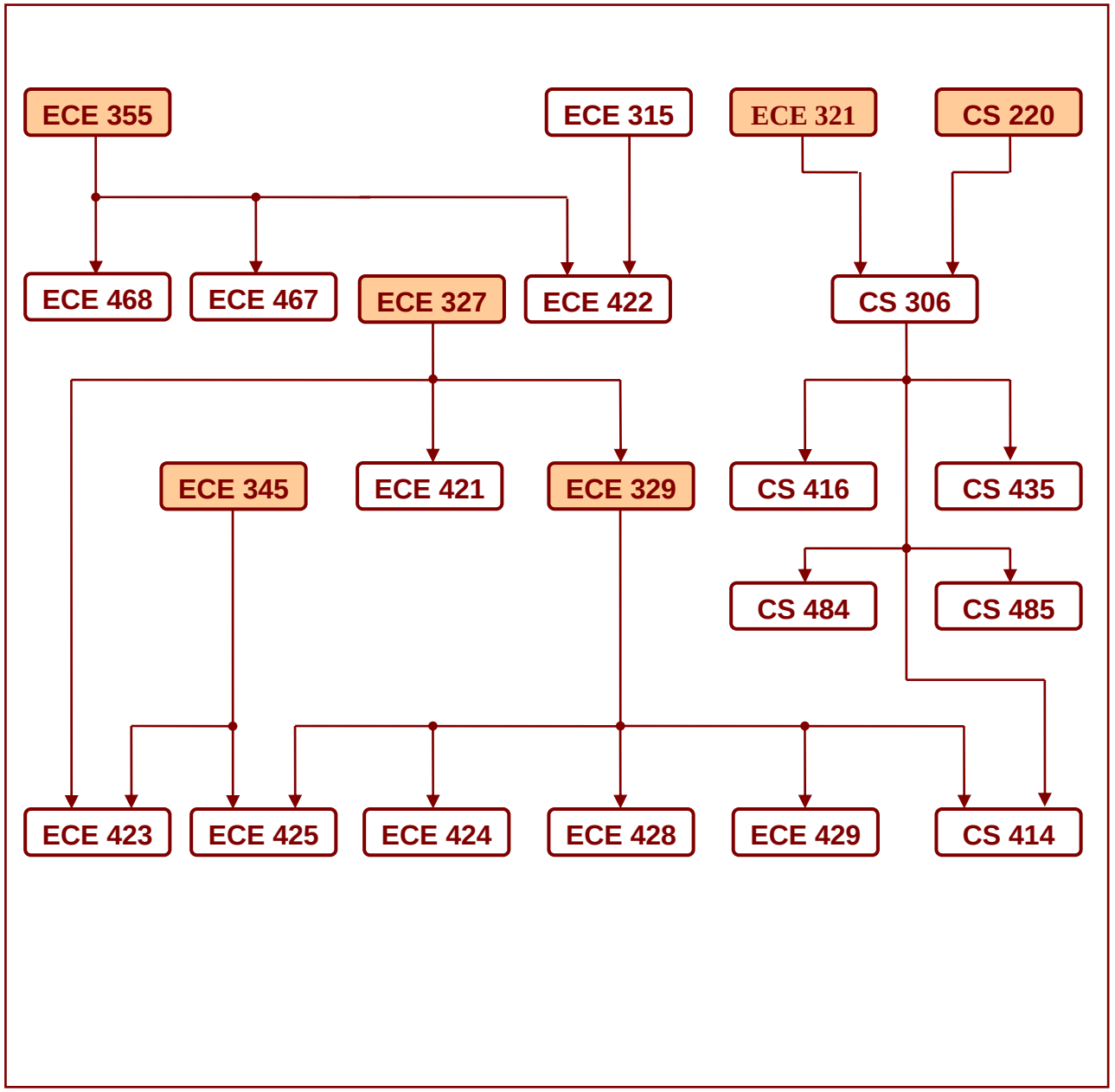

Figure 11 Technical Electives in Digital Electronics and Computer Engineering

8. Conclusions

The Computer Engineering Curriculum consists of 128 semester credit hours and is designed to be completed in four years (eight semesters). The composition of the curriculum in terms Engineering Topics, Math & Sciences, General Education and other, along with the EAC/ABET minimum requirements regarding these components is depicted in Table 1.

Table 1 Distribution of Curricular Components

Curriculum Component	Maximum	Minimum	EAC/ABET
General Education Component (hours)	32	32	
General Education Component (in percent)	25	25	
Math and Basic Sciences (hours)	35	32	32
Math and Basic Sciences (in percent)	25	25	25
Engineering Topics (hours)	64	64	48
Engineering Topics (in percent)	50	50	37.5
Other (hours)		0	
Other (in percent)		0	

- **Consistency with EAC/ABET General Criterion 5**

From the summary of Table 1, it is evident that the curriculum meets all the requirements of EAC/ABET, regarding the distribution of credit hours and the minimum number of credit hours required for each curricular component. From the discussion presented in the previous subsections it is also evident that adequate time and attention is given to each curricular component, consistent with the general Criterion 5.

- **Consistency with the Objectives and Mission of the Institution**

The curriculum satisfies the requirements of the Institution defined by the "Core Curriculum," designed to provide all the students with high quality well-rounded education. The curriculum also provides a strong engineering education, consistent with the status of the Institution as a "Doctoral Research University – Extensive."

- **Consistency with the PEO**

From the discussion in the previous subsections, it is evident that the basic characteristics of the curriculum are:

- A focused General Education Component
- A strong Math and Physics Component
- A maximum Engineering Topics Component (50% of the curriculum)
- A required ECE Foundation Component (25% of the curriculum)
- A strong Laboratory Component
- Emphasis on Engineering Design

All the above characteristics of the curriculum are consistent with and necessary to achieve the Program Educational Objectives. The large "Engineering Topics" component permits both a large required "ECE Foundation Module" and a sufficient number of hours for Technical Electives. The integration of laboratory or simulation and CAD tools in almost all courses is also consistent with and necessary to achieve the PEO.

Finally, the strong emphasis on engineering design (which has been a long tradition of the Department) is also consistent with and necessary to achieve the PEO. The Department still evaluates the engineering design content of each course and still requires twenty-two hours of engineering design (although this is no longer a requirement of EAC/ABET). The emphasis placed on the Senior Design course sequence has already been discussed in detail.

- **Contribution to the Program Outcomes**

The integration of any set of Technical Electives into the required part of the curriculum results in multiple contributions to each outcome by different courses. Thus, the curriculum contributes in a balanced way to all the Desired Program Outcomes.

9. Related Exhibits

The following display materials will be available to the EAC/ABET visiting team, providing the documentation in support of the discussion regarding Criterion 5.

1. Course Documentation Folders
2. Outcome Documentation Folders
3. Assessment Plan Folders
4. Course Final Report Folders
5. Senior Design Proposals
6. Senior Design Final Reports
7. Program Text Books

8. Current Course Descriptions Folder (with original signatures)
9. Current Course Instructional Objectives Folder

10. Documentation

The Computer Engineering Curriculum in the format used in the University Catalog is shown in Figure 12. The suggested curricular guide of the Computer Engineering Program is shown in Figure 13. Finally, the Graduation Check List given by the ECE Advisor to the students to monitor their progress toward the degree is shown in Figure 14.

11. Dual Degree in Electrical and in Computer Engineering

The students have the option to receive both degrees by completing 150 hours (University requirement) and by satisfying all requirements of both degree programs. The curriculum (in University Catalog Format), the suggested curricular guide, and the Graduation Check List are shown in Figures 15, 16 and 17 respectively.

Curriculum – Computer Engineering Program				
			Hours	
University Core Curriculum Requirements				32
Foundation Skills			9	
	English 101,102	6		
	Speech Communication 101	3		
Disciplinary Studies			17	
	Economics 240 or 241, Social Science Elective	6		
	Fine Arts Elective	3		
	Biology 202 or Physiology 241	2		
	Philosophy 104, 105	6		
Integrative Studies			6	
	Economics 302I	3		
	Multicultural Elective	3		
Requirements for the Major				96
	Basic Sciences		12	
	Physics 205a, 205b, 255a, 255b	8		
	Science Elective (with lab)	4		
	Mathematics		20	
	Mathematics 150, 250, 251, 305, ECE 225, 315	20		
	Restricted Elective		6	
	ECE 222 or CS 202, ECE 327 or CS 220	6		
	Electrical and Computer Engineering		30	
	ECE 101, 225, 235, 327, 329, 345, 355, 495a, 495b	30		
	Technical Electives		28	
Total Credit Hours				128

Notes:

1. Two of the four hours of ECE 225 cover the area of discrete mathematics, while the other two hours cover the area of combinational circuits.

2. The Technical Electives must include at least twenty hours from ECE 421,422, 423, 424, 425, 428, 429 and CS 306, 414, 416, 435, 484 and 485.

Figure 12 Computer Engineering Curriculum

Freshman Year				
First Semester	**Hours**		**Second Semester**	**Hours**
Math 150	4		Math 250	4
English 101	3		English 102	3
Fine Arts Elective	3		SPCM 101	3
PHIL 104	3		Phil 105	3
ECE 101 or ENGR 101	3		ECE 222 or CS 202	3
	16			**16**
Sophomore Year				
First Semester	**Hours**		**Second Semester**	**Hours**
Math 251	3		Math 305	3
Physics 205a & 255a	4		Physics 205b & 255b	4
BIOL 202 or PHSL 201	2		Multicultural Elective	3
ECON 240 or ECON 241	3		ECE 321 or CS 220	3
ECE 225	4		ECE 235	4
	16			**17**
Junior Year				
First Semester	**Hours**		**Second Semester**	**Hours**
ECE 315	4		Science Elective	4
ECE 355	4		ECE 329	4
ECE 327	4		ECE 345	4
ECON 302I	3		Technical Elective	4
	15			**16**
Senior Year				
First Semester	**Hours**		**Second Semester**	**Hours**
ECE 495a	2		ECE 495b	3
Technical Electives	12		Technical Electives	12
Social Science Elective	3			
	17			**15**

Figure 13 Computer Engineering Program – Suggested Curricular Guide

Computer Engineering Program												
Graduation Worksheet												
Name:				**ID Number:**								
Entry Date:				**Advisor:**								
Course	**H**	**Sem**	**G**	**Course**	**S**	**D**	**H**	**Sem**	**G**	**+**	**-**
General Education (32 hours)				**ECE Foundation (41 hours)**							
ENGL 101	3			ECE 101	-	-	3				
ENGL 102	3			ENGR 101	-	-	3				
SPCM 101	3			*Select one of the above*							
PHIL 104	3			ECE 222	3	-	3				
PHIL 105	3			CS 202	3	-	3				
ECON 302I	3			*Select one of the above*							
Select one of the following				CS 220	2	1	3				
ECON 240	3			ECE 321	2	1	3				
ECON 201	3			*Select one of the above*							
Select one of the following				ECE 225	1	1	4				
BIOL 202	2			ECE 235	3	1	4				
PHSL 201	3			ECE 327	2	2	4				
Select one from Fine Arts				ECE 329	2	2	4				
	3			ECE 345	3	1	4				
Select from Social Sciences				ECE 355	3	1	4				
	3			**Senior Design sequence (5 hours)**							
Select one from Multicultural				ECE 495a	-	2	2				
	3			ECE 495b	-	3	3				
Mathematics (18 hours)				**At least 20 hours from the following**							
MATH 150	4			ECE 421	2	2	4				
MATH 250	4			ECE 422	2	2	4				
MATH 251	3			ECE 423	2	2	4				
MATH 305	3			ECE 424	1	3	4				
ECE 315	4			ECE 425	2	2	4				
Basic Sciences (12 hours)				ECE 428	2	2	4				
PHYS 205a	3			ECE 429	2	2	4				
PHYS 255a	1			*Approved Computer Science Electives*							
PHYS 205b	3										
PHYS 205b	1										
Science Elective & lab				**At most 8 hours of other ECE courses**							
	3										
	1										
				Electives: 28 hours at lest 9 hours of design							

Figure 14 Computer Engineering Program – Graduation Check List

Curriculum – Dual Degree				
			Hours	
University Core Curriculum Requirements				32
Foundation Skills			9	
	English 101,102	6		
	Speech Communication 101	3		
Disciplinary Studies			17	
	Economics 240 or 241, Social Science Elective	6		
	Fine Arts Elective	3		
	Biology 202 or Physiology 241	2		
	Philosophy 104, 105	6		
Integrative Studies			6	
	Economics 302I	3		
	Multicultural Elective	3		
Requirements for the Major				118
	Basic Sciences		12	
	Physics 205a, 205b, 255a, 255b	8		
	Science Elective (with lab)	4		
	Mathematics		20	
	Mathematics 150, 250, 251, 305, ECE 225, 315	20		
	Restricted Elective		6	
	ECE 222 or CS 202, ECE 321 or CS 220	6		
	Electrical and Computer Engineering		41	
	ECE 101, 225, 235, 329, 327, 345, 355, 356, 375, 385, 495a, 495b	41		
	Technical Electives		39	
Total Credit Hours				150

Notes:

1. Nine hours required by the major (three hours of math and six hours of basic sciences), apply toward the requirements of the core curriculum for a total of forty-one hours.
2. Two of the four hours of ECE 225 cover the area of discrete mathematics, while the other two hours cover the area of combinational circuits.
3. The Technical Electives must include at least twenty-one hours from ECE 421,422, 423, 424, 425, 428, 429 and CC 306, 414, 416, 435, 484 and 485. A minimum of sixteen hours must be taken from other ECE courses.

Figure 15 Dual Degree Curriculum

Freshman Year				
First Semester	**Hours**		**Second Semester**	**Hours**
Math 150	4		Math 250	4
English 101	3		English 102	3
Fine Arts Elective	3		SPCM 101	3
PHIL 104	3		Phil 105	3
ECE 101 or ENGR 101	3		ECE 222 or CS 202	3
	16			**16**
Sophomore Year				
First Semester	**Hours**		**Second Semester**	**Hours**
Math 251	3		Math 305	3
Physics 205a & 255a	4		Physics 205b & 255b	4
BIOL 202 or PHSL 201	2		Multicultural Elective	3
ECON 240 or ECON 241	3		ECE 321 or CS 220	3
ECE 225	4		ECE 235	4
	16			**17**
Junior Year				
First Semester	**Hours**		**Second Semester**	**Hours**
ECE 315	4		ECE 329	4
ECE 355	4		ECE 345	4
ECE 327	4		ECE 356	4
ECE 375	3		ECE 385	4
	15			**16**
Senior Year				
First Semester	**Hours**		**Second Semester**	**Hours**
ECON 302I	3		ECE 495a	2
Technical Electives	12		Technical Electives	12
Social Science Elective	3		Science Elective	4
	18			**18**

Ninth Semester: ECE 495b (three hours) and fifteen hours of Technical Electives

Figure 16 Dual Degree Program – Suggested Curricular Guide

Dual Degree in Electrical and Computer Engineering												
Graduation Worksheet												
Name:				**ID Number:**								
Entry Date:				**Advisor:**								
Course	**H**	**Sem**	**G**	**Course**	**S**	**D**	**H**	**Sem**	**G**	**+**	**-**	
General Education (32 hours)				**ECE Foundation (44 hours)**								
ENGL 101	3			ECE 101	-	-	3					
ENGL 102	3			ENGR 101	-	-	3					
SPCM 101	3			*Select one of the above*								
PHIL 104	3			ECE 222	3	-	3					
PHIL 105	3			CS 202	3	-	3					
ECON 302I	3			*Select one of the above*								
Select one of the following				CS 220	2	1	3					
ECON 240	3			ECE 321	2	1	3					
ECON 241	3			*Select one of the above*								
Select one of the following				ECE 225	1	1	4					
BIOL 202	2			ECE 235	3	1	4					
PHSL 201	3			ECE 327	2	2	4					
Select one from Fine Arts				ECE 329	2	2	4					
	3			ECE 345	3	1	4					
Select from Social Sciences				ECE 355	3	1	4					
	3			ECE 356	2	2	4					
Select one from Multicultural				ECE 385	3	1	4					
	3			ECE 375	3	-	3					
Mathematics (18 hours)				**Senior Design sequence (5 hours)**								
MATH 150	4			ECE 495a	-	2	2					
MATH 250	4			ECE 495b	-	3	3					
MATH 251	3			**Technical Electives (39 hours)**								
MATH 305	3											
ECE 315	4											
Basic Sciences (12 hours)												
PHYS 205a	3											
PHYS 255a	1											
PHYS 205b	3											
PHYS 205b	1											
Science Elective & lab												
	3											
	1											

Figure 17 Graduation Check List – Dual Degree