CRITERION 5. CURRICULUM

A. Program Curriculum

The Program Curriculum of the EESP is designed to meet the program educational objectives. The EESP requires that all educational programs must have a freshman year that consists of mathematics and basic science, a set of general education, and engineering topics. With these constraints, the implementation of the EESP curriculum consists of three elements and with a total minimum of 145 credits hours as shown in the Figure 5-1.

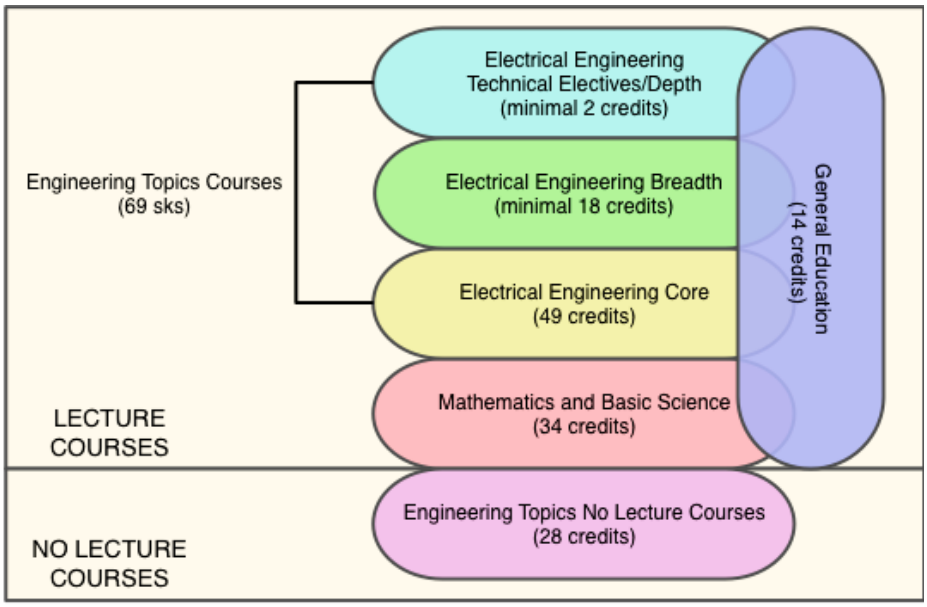

Figure 5.1 Overview of EESP curriculum.

Table 5-1 describes the plan of study for students in this program including information on course offerings in the form of a recommended schedule by year and term along with maximum section enrollments for all courses in the program.

The flowchart or worksheet that illustrates the prerequisite structure of the program's required courses is shown in Figure 5-2.

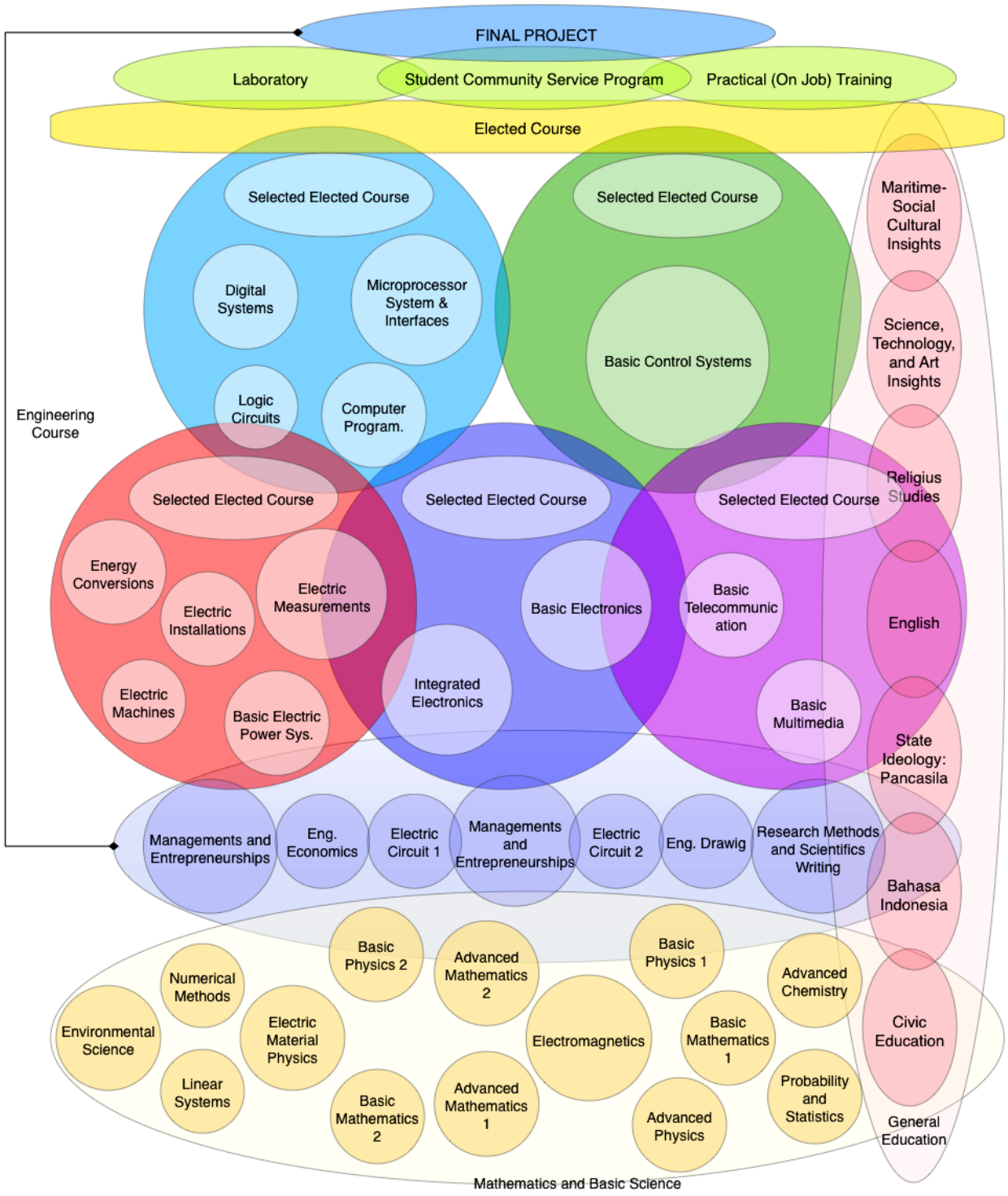

Figure 5-2 Flowchart or worksheet that illustrates the prerequisite structure of the program.

B. Course Syllabi

The Course Syllabi can be found in Appendix A of this Readiness Review Report.

Table 5-1 Curriculum

Electrical Engineering Study Program

Course *Electrical Engineering*	*Required, Elective, or a Selected Elective*	*Subject Area (Credit Hours)*				*Last Two Terms the Course was Offered: Year and Semester or Quarter*	*Maximum Section Enrollment for The Last Two Terms the Course was Offered*
		Math & Basic Sciences	*Engineering Topics Check If Contains Significant Design ()*	*General Education*	*Other*		
Lecture Courses							
011U0032 Civic Education	R			2		I; 1	84
009U0032 Bahasa Indonesia	R			2		I; 1	84
016U0033 Basic Mathematics 1	R	3				I; 1	100
020U0033 Basic Physics 1	R	3				I; 1	100
101D4113 Electrical Circuits 1	R		3			I; 1	100
102D4112 Logic Circuits	R		2			I; 1	100
103D4112 Engineering Drawing	R		2			I; 1	100
104D4112 Advanced Chemistry	R	2				I; 1	100
001U0032 Religious Studies (Islam, Catholic, etc)	R			2		I; 2	84
012U0032 State Ideology: Pancasila	R			2		I; 2	84
010U0032 English	R			2		I; 2	84
017U0033 Basic Mathematics 2	R	3				I; 2	100
022U0033 Basic Physics 2	R	3				I; 2	90
105D4123 Electric Circuits 2	R		3			I; 2	90
106D4122 Digital Systems	R		2			I; 2	100
107D4122 Computer Programming	R		2			I; 2	95

Course ***Electrical Engineering***	***Required, Elective, or a Selected Elective***	***Subject Area (Credit Hours)***				***Last Two Terms the Course was Offered: Year and Semester or Quarter***	***Maximum Section Enrollment for The Last Two Terms the Course was Offered***
		Math & Basic Sciences	***Engineering Topics Check If Contains Significant Design ()***	***General Education***	***Other***		
108D4121 Electric Circuits Laboratory	R		1			I; 2	100
109D4121 Digital Systems Laboratory	R		1			I; 2	95
008U0032 Principle of Science, Technology, and Art	R			2		II;3	70
201D4113 Advanced Mathematics 1	R	3				II;3	85
202D4112 Basic Electric Power (Systems)	R		2			II;3	70
203D4112 Basic Telecommunication (Systems)	R		2			II;3	85
204D4112 Basic Electronics	R		2			II;3	85
205D4112 Electric Material Physics	R	2				II;3	70
206D4112 Advanced Physics	R	2				II;3	85
207D4111 Basic Electric Power laboratory	R		1			II;3	85
208D4111 Basic Telecommunication Laboratory	R		1			II;3	85
209D4111 Basic Electronics Laboratory	R		1			II;3	85
007U0032 Principle of Maritime Science	R			2		II;4	70
210D4123 Advanced Mathematics 2	R	3				II;4	85
211D4122 Linear Systems	R	2				II;4	85
212D4122 Electric Machines	R		2			II;4	70
213D4122 Basic Multimedia	R		2			II;4	70
214D4122 Integrated Electronics	R		2			II;4	85
215D4122 Microprocessor Systems and Interfaces	R		2			II;4	85
216D4122 Basic Control Systems	R		2			II;4	70

Course ***Electrical Engineering***	***Required, Elective, or a Selected Elective***	***Subject Area (Credit Hours)***				***Last Two Terms the Course was Offered: Year and Semester or Quarter***	***Maximum Section Enrollment for The Last Two Terms the Course was Offered***
		Math & Basic Sciences	***Engineering Topics Check If Contains Significant Design ()***	***General Education***	***Other***		
217D4122 Electric Installation and Laboratory	R		2			II;4	85
218D4121 Integrated Electronics Laboratory	R		1			II;4	85
219D4121 Microprocessor Systems and Interfaces Laboratory	R		1			II;4	85
301D4112 Engineering Economics	R		2			III;5	
302D4112 Probability and Statistics	R	2				III;5	
303D4112 Electric Measurement	R		2			III;5	
304D4112 Electromagnetics	R	2				III;5	
*Selected Elective Course (1 Package)**	SE		9			III;5	
342D4122 Numerical Methods	R	2				III;6	
343D4122 Energy Conversion	R		2			III;6	
344D4122 Environmental Science	R	2				III;6	
345D4122 Management and Entrepreneurship	R		2			III;6	
*Selected Elective Course (1 Package)**	SE		9			III;6	
402D4112 Research Methods and Scientific Writing	R		2			IV;7	
*Elective Course***	E		2			IV;7	
Total Required Minimum Lecture Courses		34	69	14	0		
Total-ABET Basic Level Requirements							
Total Credit Hours for Lecture Courses	117						
Percent of Total		29,1%	59,0%	12,0%	0,0%		

Course ***Electrical Engineering***	***Required, Elective, or a Selected Elective***	***Subject Area (Credit Hours)***				***Last Two Terms the Course was Offered: Year and Semester or Quarter***	***Maximum Section Enrollment for The Last Two Terms the Course was Offered***
		Math & Basic Sciences	***Engineering Topics Check If Contains Significant Design ()***	***General Education***	***Other***		
Total Must Satisfy Either Credit Hours of Percentage	Minimum Semester Credit Hours	32 Hours	48 Hours				
	Minimum Percentage	25,0%	37,5%				
Non-Lecture Courses							
401D4112 Practical (On Job) Training	R		2			IV;7	
403D4112 Final Project Proposal	R		2			IV;7	
Laboratory 1	R		8			IV;7	
491D4124 Student Community Service Programs	R		4			IV;8	
492D4122 Final Project Results	R		2			IV;8	
Laboratory 2	R		8			IV;8	
493D4122 Final Project Report	R		2			IV;8	
Total Credit Hours for Non-Lecture Courses	28						
Overall Minimum Total Credit Hours For Completion of The Program	145						

Notes:

Percentages of	**Lecturer Course Only (117 credits)**	**Total Courses (145 credits)**
Math & Basic Science	34 (29%)	34 (23.4%)
Engineering Topics	69 (59%)	93 (64.2%)
General Education	14 (12%)	18 (12.4%)

The proportion of Mathematics and Basic Sciences is only 23.4% of the total 145 credit hours minimum requirement for graduation. However, 28 credit hours out of those 145 credit hours are non-lecturer courses, such as Final Undergraduate Projects (Final Project, Seminars, and Laboratories) and Student Community Services, which may have Mathematics and Basic Sciences contents and are not comparable ("apple to apple") to the regular lecture courses. Based on argument above, the non-lecture courses may be excluded so that the proportion of Mathematics and Basic Science is now 29.0% of the total of 117 credit hours of regular lecturer courses.

1. **Required** courses are required of all students in the program, **elective** courses (often referred to as open or free electives) are optional for students, and **selected elective** courses are those for which students must take one or more courses from a specified group.
2. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the maximum enrollment in each element. For selected elective courses, indicate the maximum enrollment for each option.

Instructional materials and student work verifying compliance with ABET criteria for the categories indicated above will be required during the campus visit.

The following information provides the components of the EESP curriculum.

General Education

The general education consists of 7 courses (total 14 credit hours). The general educations are listed in Table 5.2 General Education Component below. These fourteen credit hours satisfy all the requirements of the Hasanuddin University general education curriculum, which is design to accomplish the goals of Hasanuddin University as defined by its mission statements.

Table 5-2 General Education Component

Code	General Education	Credit	Course (%)	Lab (%)	Other (%)
011U0032	Citizenship Education	2	100		
009U0032	Indonesian Language	2	100		
001U0032	Religion	2	100		
012U0032	State Ideology: Pancasila	2	100		
010U0032	English	2	100		
008U0032	Concept of Science and Technology	2	100		
007U0032	Social Science of Maritime Culture	2	100		

Mathematics and Basic Science

The mathematics and basic science consist of 34 (thirty-four) credit hours. It divides to 18 (eighteen) credit hours of mathematics as shown in the Table 5.3 and 16 (sixteen) credit hours of basic science as shown in The Table 5-4.

Table 5-3 Mathematics Component

Code	General Education	Credit	Course (%)	Lab (%)	Other (%)
016U0033	Basic Mathematics 1	3	100		
017U0033	Basic Mathematics 2	3	100		
201D4113	Advanced Mathematics 1	3	100		
210D4123	Advanced Mathematics 1	3	100		
211D4122	Linear Systems	2	100		
302D4112	Probability and Statistics	2	100		
342D4122	Numerical Methods	2	100		

Table 5-4 Basic Science Component

Code	General Education	Credit	Course (%)	Lab (%)	Other (%)
020U0033	Basic Physics 1	3	75	25	
022U0033	Basic Physics 2	3	75	25	
206D4112	Advanced Physics	2	100		
104D4112	Advanced Chemistry	2	100		
205D4112	Electric Material Physics	2	100		
304D4112	Electromagnetics	2	100		
344D4122	Environmental Science	2	100		

Engineering Topics

The engineering topics component divides to 69 (minimum) credit hours of lecture course as shown in the Table 5-5 and 28 credit hours of no lecture course as shown in the Table 5-6.

Table 5-5 Lecture Courses

Code	General Education	Credit	Course (%)	Lab (%)	Other (%)
101D4113	Electric Circuits 1	3	100		
102D4112	Logic Circuits	2	100		
103D4112	Engineering Drawing	2	100		
105D4123	Electric Circuits 2	3	100		
106D4122	Digital Systems	2	100		
107D4122	Computer Programming	2	50	50	
108D4121	Electric Circuits Laboratory	2		100	
109D4121	Digital Systems Laboratory	1		100	
202D4112	Basic Electric Power (Systems)	2	100		
203D4112	Basic Telecommunication (Systems)	2	100		
204D4112	Basic Electronics	2	100		
207D4111	Basic Electric Power Laboratory	1		100	
208D4111	Basic Telecommunication Laboratory	1		100	
209D4111	Basic Electronics Laboratory	1		100	
212D4122	Electric Machines	2	100		
213D4122	Basic Multimedia	2	100		
214D4122	Integrated Electronics	2	100		

Code	General Education	Credit	Course (%)	Lab (%)	Other (%)
215D4122	Microprocessor Systems and Interfaces	2	100		
214D4122	Basic Control Systems	2	100		
217D4122	Electric Installation and Laboratory	2	75	25	
218D4121	Integrated Electronics Laboratory	1		100	
219D4121	Microprocessor Systems and Interfaces Lab	1		100	
301D4112	Engineering Economics	2	100		
303D4112	Electric Measurements	2	100		
343D4122	Energy Conversions	2	100		
345D4122	Management and Entrepreneurships	2	100		
402D4112	Research Methods and Scientific Writing	2	100		
	Selected Elective Course (2 package)	18			

Table 5-6 Non-Lecture Courses

Code	General Education	Credit	Course (%)	Lab (%)	Other (%)
401D4112	Practical (On Job) Training	2			100
491D4124	Student Community Service Programs	4			100
	Laboratory 1	2	100		100
	Laboratory 2	3	100		100
403D4112	Final Project Proposal	2			100
492D4122	Final Project Results	2			100
493D4122	Final project Report	2			100

The major design experience that prepares students for engineering practice.

In the EESP curriculum, there are some courses credits allocated to give students experience in project design. In the first semester, students take the Engineering Drawing course (103D4112), in which the students learn how to use CAD (Computer-Aided Design) software to design for example electric and electronic circuits.

In Digital Systems course (106D412) and Digital Systems Lab (109D4121), the students learn to design logic circuits using a CAD Software Tools. In the last lab meeting, the students are divided into several groups and given a design project with any specifications. The students will then solve the problem given in the project, design digital circuit, implement it on a programmable logic device (in this case, we use Field Programmable Gate Array or FPGA device), and then test their functional and performance behaviors.

In Integrated Electronics Course (214D4122) and Integrated Electronics Lab (218D4121), the EESP students will learn how to design integrated circuits using educational CAD tools. The students learn how to design layout topographies of NMOS and PMOS transistors and CMOS logic circuits, simulate the circuit behaviors and analyze their performance.

In the Microprocessor Systems and Interfaces course (215D412) and Microprocessor Systems and Interfaces Lab (219D4121), the students learn design techniques to implement a simple microcontroller-based project. The students learn Assembly and C/C++ Programming language and use them to interface the microcontroller with some I/O units such as sensors and actuators through standard interfaces.

The EESP cooperative education to satisfy curricular requirements

The EESP allows students to gather experience in industries and in society by taking the Practical (On Job) Training course (401D4112) and the Student Community Service course (491D4124) proposed in the last semester.

In the Practical (On Job) Training course, the students will work part-time in industries. Two supervisors are assigned to assess the students work, one from industry and one from the EESP faculty member. The student make a report and presents his/her work in a small meeting with his/her supervisor. Both supervisors give then the grade of the student work according the student performance in industry.

In the Student Community Service course, a groups of students from the EESP and other disciplines will work and learn in a village. A few groups could be sent to rural areas. In the village, the students will analyze any problem in the society and then they will try to find the solution. Student supervisors normally faculty staff from university are assigned to assess the student work and will evaluate the student works and give grades according to student performance.

Scientific Writing

In the 7th semester, the EESP students take the course of Research Methods and Scientific Writing (402D4112). In first course meetings, the students learn research methodology, and then in the final meetings, students learn to write a scientific article. This scientific article is also presented in the Final examination.