AL - QUDS UNIVERSITY

- Deanship of Dual Studies -

Faculty of Engineering

PROGRAM OF STUDY FOR THE B.Sc. DEGREE

IN

ELECTRICAL ENGINEERING

February, 2018

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AL - QUDS UNIVERSITY

FACULTY OF DUAL STUDIES

ELECTRICAL ENGINEERING PROGRAM
PROGRAM OF STUDY FOR THE B.Sc. DEGREE IN
ELECTRICAL ENGINEERING / ELECTRIC POWER ENGINEERING

February 2018

1. Admission Requirements

The newly established Dual studies faculty at Al-Quds University offers an Electrical Engineering Dual Study program leading to the degree of Bachelor of Science (B.Sc.) in Electrical Engineering. New students can apply for admission to this program upon obtaining a minimum 80% average grade in the Tawjihi-Scientific Stream Certificate or equivalent. Final admission is, however, granted upon satisfying the Tawjihi grade standards and other general requirements set by the Faculty in conjunction with the University Admission Office in the beginning of each academic year. The general and program requirements are described in the following subsections:

Grade-Point Average (GPA): An admitted student must maintain GPA higher that 60% on all work as specified in the "Degree Program of the Electrical Engineering". Failure to do so will result in dismissal from the Electrical Engineering program. Collateral and transferred credits are not included in calculating the GPA. Repeated work, grades and credits for all courses attempted are to be included in the calculation.

DSEE Program Requirements: Students must complete a minimum of 120 credit hours of the Electrical Engineering courses that are concentrated in the specialization of Electric Power Engineering, in addition to 18 credits for the practical periods. Students must work in a graduation projects in order to show their ability in applying their accumulated knowledge in practical project.

Graduation project and study project regulations

1. At the end of his electrical engineering study, the student is required to carry out Projects (1810402, 1810490, 1810491) at the company where he is trained.
2. The graduation project is a specific, well-described task out of the company. The students have to apply their acquired complex theoretical knowledge and practical experiences to solve this task by a scientific and systematic approach.
3. The study project extends over one semester and must be carried out at Al-Quds University. It can be a design project, an analytical paper or an experimental work in Hard- or Software. The student is responsible of finding a study project advisor who chairs the student's study project review committee and becomes the student's academic advisor.
4. At the end of the project, the result of the student's findings must be provided in form of a report, and an additional system demo and/or an oral examination.
5. The student, in consultation with her/his advisor and training officer in the company he/she trains in, suggests an idea to work on for the aim of producing a graduation project. The supervisor and the company-training officer are responsible to monitor the student while he is carrying out the graduation project. After a while, the student submits a report containing his findings and the proposed solution. After that, he must work closely with his/her supervisor and the training officer in implementing the proposed solution.

6. The student is expected to present his/her graduation project at the end of the fourth year to a joint committee composed of Dual Studies faculty and partner companies.

2. Program Objectives

The educational objectives of the DSEE program are centered on the graduation of qualified engineers with solid foundations in the areas of electrical engineering, who are characterized by the following characteristics:

- The ability and creativity in solving problems, and dealing and coping with the pace of modern technologies in the different areas of electrical engineering.
- Demonstrate proficiency in the design, analysis, improvement and implementation of modern electrical systems.
- Compete effectively in a world of rapid technological changes, and to become leaders, businesspersons and managers innovators or teachers in a broad context of electrical engineering.
- Work effectively in a professional environment, and show the necessary communication skills, leadership, and commitment to professional ethics.
- Pursue post-graduate studies and research in the disciplines of advanced topics and electrical engineering, as well as to become consultants in their respective fields.
- Work professionally bolstered by a technical background and solid scientific and adequate skills in the field of electrical engineering, and the ability not only to design electrical power systems, but also to deal with all types of electrical systems and problems.
- Adapt to different roles and responsibilities in a multicultural work environment through respect for diversity and professional within the organization and society at the national and international levels.

3. General Objectives of Practice Periods in Dual Study Electrical Engineering

In the practical phases, students link their acquired knowledge from the theory phase with the practical activity in their company. According to a planning drawn up by the company, a “practice plan” is set up. It has to be regarded that not for each theory module will be an equivalent activity in the company, i.e. courses and work in a company has not to fit 1:1. This is obvious for example in mathematics but also in other subjects. The practice schedule should be adapted in time and content to the specificities of the company and take into account the individual level of knowledge of students. Adjustments of the plan according to the priorities and needs of the company are possible.

The students transferred projects and tasks contribute to the personal and professional development and creating value for internal and external customers. The following non-academic qualifications and learning outcomes must be learned and deepened throughout the practical periods in companies:

- Communication and cooperation skills, in addition to teamwork
- Problem-solving ability and creativity
- Reporting and documentation creation
- Learning, working and presentation techniques

The practical period should therefore be designed not only for deepening the professional experience but in addition also for developing the important broad spectrum of non-professional soft qualifications and competences. Industry and the labor market claim that there is a broad gap and lack of competences from regular graduates. Such the Dual Study model aims to improve the

employment conditions for graduates by having them incorporated for almost 4 years already in the EE work environment.

4. Program Intended Learning Outcomes (ILO's)

From the numerous specialization areas of electrical engineering offered by the Dual Study Programs at Al-Quds University, students will be educated and trained in the electric power engineering. This dual study program will enable students to know: How do electric utilities provide power? What equipment is necessary to generate, transmit and distribute electric power? How does the electric power industry improve reliability, security and safety of the electric power grid? The ILO's of the Electrical Engineering dual study program adhere to international accreditations (based on ABET). Thus, upon completion of this program, students will have:

a) An ability to apply knowledge of mathematics, science, and engineering.
b) An ability to design and conduct experiments, to analyze and interpret data.
c) An ability to design a system, component, or process to meet desired needs.
d) An ability to function on multidisciplinary teams.
e) An ability to identify, formulate and solve engineering problems.
f) An understanding of professional and ethical responsibility.
g) An ability to communicate effectively.
h) The broad education necessary to understand the impact of engineering solutions in a global and societal context.
i) Recognition of the need for, and an ability to engage in life-long learning.
j) Knowledge of contemporary issues.
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
l) An ability to transfer theoretical knowledge into practical applications
m) A knowledge of the professional environment
n) Well-developed social competences

5. Dual Studies Electrical Engineering: Numbers, Courses and Credits

Table 1clarifies the numbering system of the DSEE, from which it is obvious that the last two digits, D7 and D6, with the values 1 and 8 are reserved for Dual Studies. If the values of the three digits D3, D4 and D5 are zeros, then these courses are dual study requirements such as "Jerusalem through History" (1800007). D5 and D4 with 1 and 0 are reserved for Electrical Engineering. Electrical Engineering General Courses have numbers determined through D3 that is equal to the study year and D2 and D1 having numbers between [1, 19]

Table 1: Numbering of the DS courses, especially for DSEE

D7	D6	D5	D4	D3	D2	D1	
18		0	0	0	X	X	University or DS Requirement Courses
18		1	0	Y	01… 19		Electrical Engineering (General)
18		1	0	0	X	X	Electrical Engineering (Elective)
18		1	0	Y	20 … 29		Electric Power Engineering
18		1	0	Y	30 … 39		Automation
18		1	0	Y	40 … 49		Car Electronics
18		1	0	Y	50 … 59		…
18		1	0	Y	60 … 69		…
18		1	0	Y	70 … 79		…
18		1	0	Y	80 … 89		…

18	1	0	Y	90, 91	Practices

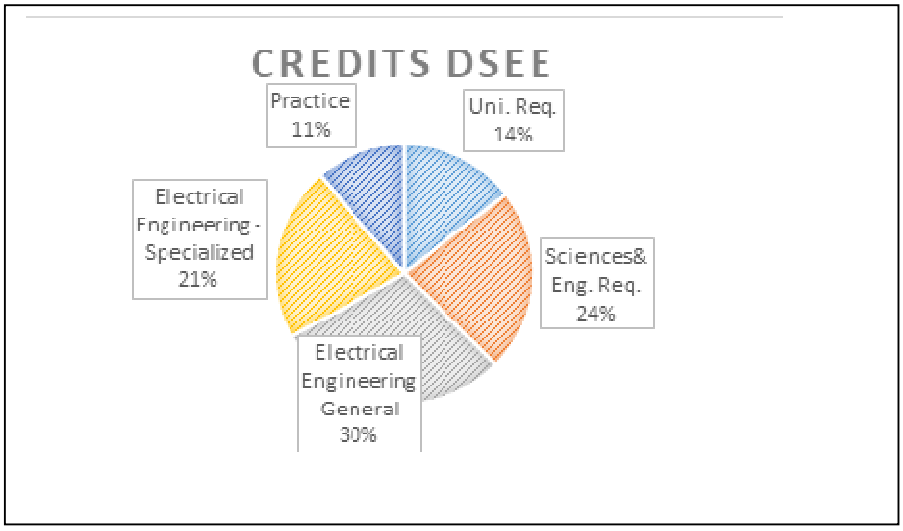
D7, D6 = 18: Dual Studies
D5, D4 = 10: Electrical Engineering
Y ≡ Year ∈ {1, 2, 3, 4}

6. Structure and Contents

The B.Sc. degree in Electrical Engineering / Electric Power Engineering is awarded upon completing a total of 161 credit hours according to the following requirements:

Table 2: Credit Hour Distribution in DSEE

No.	Courses' Type	Credits
I.	University Requirements	23
II.	Engineering Requirements	39
III.	Program (Electrical Engineering) Requirements	47
IV.	Specialization (Electric Power Engineering) Requirements	34
V.	Practices	18
Total		**161**



7. University Requirements

The university requirements must be completed as in the following:

- The DSEE students must successfully complete during their study ALL dual-study requirements courses listed inTable 3.
- The DSEE students must successfully complete during their study THREE cultural requirement courses listed inTable 3.
- Students must successfully complete a three credit-hour elective course fromTable 3.

Table 3: University Requirements Courses

Type	Course Number	Module Name	Credit Hours	Required Credits
u y, R e d	1800001	Basics of Business Administration	2	14

	1800002	Low-Intermediate English	2	
	1800003	Intermediate English	2	
	1800004	Upper-Intermediate English	2	
	1800010	Advanced English	2	
	1800011	Entrepreneurship	2	
	1800012	Communications Skills	2	
Cultural Course Requirements	1800070	History of Jerusalem	2	6
	1800071	Nature and Environment of Palestine	2	
	1800072	Language and Logic	2	
	1800073	Islamic Culture	2	
	1800074	International Civilizations	2	
Elective courses	1810050	Quality Control	3	3
	1810051	Project Management	3	
	1800005	German I	3	
	1810053	Engineering Economy	3	
		Total	**23**	

8. Engineering Requirements

The DSEE students must complete during their study all courses listed inTable 4.

Table 4: Engineering Requirements

	Course Number	Module Name	Credit Hours	Sum	Prerequisite / Corequisite
Sciences	1810101	Mathematics for Engineers I	3	20	-
	1810106	Mathematics for Engineers II	3		Mathematics for Engineers I (Pre)
	1810201	Mathematics for Engineers III	3		Mathematics for Engineers II (Pre)
	1810210	Complex Analysis and Engineering Transforms	3		Mathematics for Engineers II (Pre)
	1810213	Probability and Engineering Statistics	2		Mathematics for Engineers I (Pre)
	1810309	Numerical Engineering Analysis	2		Mathematics for Engineers III (Pre), Informatics II (Pre)
	1810102	Physics	3		-
	1810114	Physics Lab	1		Physics (Co)
Engineering Requirements	1810103	Fundamentals of Electrical Engineering I	3	19	-
	1810104	Fundamentals of Electrical Engineering I Lab	1		Fundamentals of Electrical Engineering I (Co)
	1810111	Informatics I	2		-
	1810112	Informatics I Lab	1		Informatics I (Co)
	1810204	Informatics II	2		Informatics I (Pre)
	1810205	Informatics II Lab	1		Informatics II (Co)

	1810211	Engineering Design and Drawing	2		-
	1810212	Engineering Materials	3		Physics (Pre)
	1810113	Thermodynamics	2		Physics (Pre)
	1810105	Engineering Workshop and Safety	2		-
		Total	**39**		

9. Electrical Engineering General Courses

The DSEE students must complete during their study all courses listed in Table 5.

Table 5: Electrical Engineering General Courses

Course Number	Module Name	Credit Hours	Prerequisite / Corequisite
1810107	Fundamentals of Electrical Engineering II	3	Fundamentals of Electrical Engineering I (Pre)
1810108	Fundamentals of Electrical Engineering II Lab	1	Fundamentals of Electrical Engineering II (Co)
1810109	Electronics I	2	Fundamentals of Electrical Engineering I (Pre)
1810202	Digital Logic Systems	3	Electronics I (Pre)
1810203	Digital Logic Systems Lab	1	Digital Logic Systems (Co)
1810206	Electronics II	2	Electronics I (Pre)
1810207	Electronics Lab	1	Electronics II (Co)
1810208	Instrumentation and Measurement	3	Fundamentals of Electrical Engineering I (Pre), Electronics I (Pre)
1810209	Instrumentation and Measurement Lab	1	Instrumentation and Measurement (Co)
1810205	Electrical Workshop I	2	Engineering Design and Drawing (Pre), Fundamentals of Electrical Engineering II (Pre)
1810302	Electromagnetic Theory	3	Fundamentals of Electrical Engineering II (Pre), Mathematics for Engineers III (Pre), Physics for Electrical Engineers (Pre)
1810303	Microprocessors and Microcontrollers	3	Electronics II (Pre), Digital Logic Systems (Pre)
1810304	Microprocessors and Microcontrollers Lab	1	Microprocessors & Microcontrollers (Co)
1810305	Electrical Workshop II	2	Electrical Workshop I (Pre)
1810310	Communication Systems	2	Probability and Engineering Statistics (Pre), Electromagnetic Theory (Co)
1810306	Embedded Systems	3	Microprocessor (Pre)
1810307	Electronic Interfacing and PCB Prototyping Workshop	2	Electronics II (Pre), Digital Logic Systems (Pre)
1810401	Electrical Installation and StandardsWorkshop	2	Electrical Workshop 1 (Pre)
	Graduation Projects	10	See Table 6
	Total	**47**	

Table 6: Graduation Project Modules

Course Number	Module Name	Credit Hours	Prerequisite / Corequisite
1810402	Introduction to Project	3	Student must have successfully completed a minimum of 120 Credit Hours + Microprocessor (Pre) + Electric Power Engineering II (Pre) + Power Systems and Transmissions (Pre)
1810490	Project I	3	Introduction to Project (Pre)
1810491	Project II	4	Project I (Pre)
	Total	**10**	

10. Specialization courses "Electric Power Engineering"

The DSEE students must complete during their study all courses listed in Table 7.

Table 7: Specialization courses "Electric Power Engineering"

Course Number	Module Name	Credit Hours	Prerequisite / Corequisite
1810320	Electric Power Generation	2	Physics for Electrical Engineers (Pre), Fundamentals of Electrical Engineering II (Pre)
1810321	Electric Power Engineering I	2	Physics for Electrical Engineers (Pre), Fundamentals of Electrical Engineering II (Pre)
1810323	Electrical Machines	3	Fundamentals of Electrical Engineering II (Pre), Electromagnetic Theory (Co)
1810330	Control Systems	3	Fundamentals of Electrical Engineering II (Pre), Electronics II (Pre), System Theory (Pre), Mathematics for Engineers III (Pre)
1810322	Electric Power Engineering II	3	Electric Power Engineering I (Pre)
1810324	Electrical Machines	1	Electrical Machines (Pre)
1810430	Power System Automation	3	Control Systems I (Pre), Control and Automation Lab (Co)
1810421	Electric Drive Engineering	3	Fundamentals of Electrical Engineering II (Pre), Electronics II (Pre),Electrical Machines (Pre)
1810325	Power Electronics	3	Electronics II (Pre)
1810422	Power Electronics and Drive Technology Lab	1	Electric Drive Engineering (Co)
1810423	Renewable Energy	3	Physics for Electrical Engineers (Pre), Electric Power Engineering I (Pre), Electric Power Generation (Pre)
1810424	Power Systems and Transmissions	3	Electric Power Engineering II (Pre)
1810420	Control and Automation Lab	1	Control Systems (Pre), Digital Logic Systems (Pre), Electronics II (Pre)
1810425	Electric Power Lab	1	Electric Power Engineering II (Pre)
1810431	Special Topics in Electrical/ Power Engineering	2	
	Total	**34**	

11. Practice phases

Table 8: Practice phases of three months that must be carried out in a dual study partner company

Course Number	Module Name	Credit Hours	Prerequisite / Corequisite
1810190	Practice I	3	-
1810191	Practice II	3	Practice I
1810290	Practice III	3	Practice II
1810291	Practice IV	3	Practice III
1810390	Practice V	3	Practice IV
1810391	Practice VI	3	Practice V
	Total	**18**	

12. Course distribution

Table 9: Courses distribution in the first academic years

1st Year of Study		Credits			
Semester #		Semester 1		Semester 2	
Course	Course Code	Theory	Lab	Theory	Lab
Mathematics for Engineers I	1810101	3			
Physics	1810102	3			
Fundamentals of Electrical Engineering I	1810103	3			
Fundamentals of Electrical Engineering I Lab	1810104		1		
Basics of Business Administration	1800001	2			
Low-Intermediate English	1800002	2			
Communications Skills	1800012	2			
Engineering Workshop and Safety	1810105	1	1		
Mathematics for Engineers II	1810106			3	
Fundamentals of Electrical Engineering II	1810107			3	
Fundamentals of Electrical Engineering II Lab	1810108				1
Physics Lab	1810114				1
Thermodynamics	1810113			2	
Electronics I	1810109			2	
Informatics I	1810111			2	
Informatics I Lab	1810112				1
Intermediate English	1800003			2	
Total (Semester)		**16**	**2**	**14**	**3**
Total (Year)		**35**			

Table 10: Courses distribution in the second academic years

2nd Year of Study		**Credits**			
Semester #		**Semester 3**		**Semester 4**	
Course	**Course Code**	**Theory**	**Lab**	**Theory**	**Lab**
Mathematics for Engineers III	1810201	3			
Digital Logic Systems	1810202	3			
Digital Logic Systems Lab	1810203		1		
Informatics II	1810204	2			
Informatics II Lab	1810205		1		
Complex Analysis and Engineering Transforms	1810210	3			
Upper-Intermediate English	1800004	2			
University Requirement I	180007X	2			
Electronics II	1810206			2	
Electronics Lab	1810207				1
Instrumentation and Measurement	1810208			3	
Instrumentation and Measurement Lab	1810209				1
Electromagnetic Theory	1810302			2	
Engineering Materials	1810212			3	
Electrical Workshop I	1810301			1	1
Engineering Design and Drawing	1810211			2	
Advanced English	1800010			2	
Total (Semester)		**15**	**2**	**15**	**3**
Total (Year)		**35**			

Table 11: Courses distribution in the third academic years

3rd Year of Study		Credits			
Total credits per year	**38**	**Semester 5**		**Semester 6**	
Course	**Course Code**	**Theory**	**Lab**	**Theory**	**Lab**
Electrical Machines	1810323	3			
Probability and Engineering Statistics	1810213	2			
Electric Power Engineering I	1810321	2			
Electronic Interfacing and PCB Prototyping Workshop	1810307		1		
Control Systems	1810330	3			
Microprocessor	1810303	3			
Microprocessor Lab	1810304		1		
Entrepreneurship	1810011	2			
Electric Power Generation	1810320			2	
Electrical Workshop II	1810305			1	1
Electric Power Engineering II	1810322			3	
Embedded Systems	1810306			3	
Communication Systems	1810310			2	
Electrical Machines Lab	1810324				1
Power Electronics	1810325			3	
Control and Automation Lab	1810420				1
Total (Semester)		**15**	**2**	**14**	**3**
Total (Year)		**34**			

Table 12: Courses distribution in the fourth academic years

4th Year of Study		**Credits**			
Total credits per year	**2**	**Semester 7**		**Semester 8**	
Course	**Course Code**	**Theory**	**Lab**	**Theory**	**Lab**
Electrical Installation and Standards Workshop	1810401	1	1		
Numerical Engineering Analysis	1810309	2			
Electric Drive Engineering	1810421	3			
Power Electronics and Drive Technology Lab	1810422		1		
Renewable Energy	1810423	3			
University Requirement II	180007X	2			
Introduction to Graduation Project	1810402	3			
Power Systems and Transmissions	1810424			3	
Power System Automation	1810430			3	
Electric Power Lab	1810425				1
Elective – Electrical Engineering	181005X			3	
University Requirement III	180007X			2	
Special Topics in Electric Power Engineering	1810426			2	
Total (Semester)		**14**	**2**	**13**	**1**
Total (Year)		**30**			

13. Education System and Admission Requirements

Following up the latest trend of involving the practitioners in the teaching education, there will be theoretical lectures enhanced with practical hands on, exploration of private sector and practitioners where applicable

a. Transcripts and References

All applicants who wish to apply for the DSEE program should provide original transcripts of the Tawjihi exam in addition to school transcripts for 11th and 12th grades. Applicants must also pass an exam and/or interview set by partner companies.

b. Grade Point Standing

Applicants wishing to enroll to the Dual Studies bachelor in EE must have at least an average of 80 % in Tawjihi exam.

c. Admission Process

A complete application consists of the following:

- Al-Quds University graduate application form
- Dual Studies supplemental application form
- Application fee
- An official Transcript of Tawjihi in addition to 11^{th} and 12^{th} grades
- An interview or exam given by interested partner companies

d. The program director

It is to note that the program director of the dual study electrical engineering is responsible to advise current and incoming students of the program, and assist them with registration questions. Moreover, he is responsible to supervise the students with the help of the private sector tutors during the eight practical periods.

14. Assessment

With regards to official assessment methods, the Dual Studies program follows assessment policies and procedures of Al-Quds University for the theoretical part as follows:

1. Grading: 0-100 scale is adopted as the grading scale across all courses.

2. A student passes a course if he/she scores 60% or more.

3. Grading within a course is usually divided as follows:

    a. First Hour Exam 15-30%.

    b. Second Hour Exam 15-30%.

c. Project/assignments 20-40%.

d. Final Exam 30-40%.

4. Depending on the nature of the course, the course instructor can adapt the items a, b, c in point 3 to serve the course goals. (For example, he/she might have a mid-term exam and put more emphasis on project(s), assignments).

5. Minimum grade for the final exam is 30%.

6. If a course requires lab sessions, part of the project/assignments grade is allocated for the lab sessions.

7. Students will pass the lab if he/she passes the course regardless of his/her lab grade. If a student's fails the course and passes the lab, he/she is required to retake the course without retaking lab sessions.

8. A student should score a GPA 65% or higher for a status of Normal students.

9. An Honor-listed student must score 85% or more in all subjects per semester.

10. A student with GPA lower than 65% will be placed on probation and will be allowed to register a maximum of 6 credit hours.

11. If a student's GPA is lower than 65% for the third time, he/she is dismissed from the program.

As for the practical period, both partner companies and the Dual Studies faculty assess students' performance as follow:

1. Students register a course (Practice Period I – VIII) that is compliant with the 0 - 100 grading scale mentioned above.

2. Upon conclusion of a practical period, students submit a report detailing all activities performed at the work place.

3. Partner companies also submit an evaluation form that assesses student's performance.

4. Students make a presentation to the Dual Studies faculty and discussion of the report and evaluation form is initiated.

5. Final grade is distributed as follows:

    - Student's report 30%.
    - Evaluation form 50%.
    - Presentation 20%.

6. Pass grade for a practical period is 70%.

7. If a student fails a practical period, he/she should retake it in the next available practical period. Delays are not permitted as each practical period is a prerequisite for the next one.

Absentees and withdrawal:

A. Theoretical Period

   a. Students must attend classes.

   b. If a student skips 20% of classes, he/she is considered withdrawn from the course.

   c. If a student skips 30% of classes, he/she automatically fails the course.

   d. Cases with acceptable excuses (i.e. sick leaves) are excluded.

   e. Students can normally withdraw a course in the first week of the semester. They will be able to retain course fees and add another course if they like.

   f. Late withdrawals are permitted before the second hour exam. Students will lose the course fees and will not be able to add a replacement course.

B. Practical Period

   a. Students should adhere to company's policies and regulations regarding showing up to work.

   b. Company can take whatever measure it sees fit in order to encourage students to adhere to company's policies and regulations.

   c. Attendance is an item that companies assess students in the evaluation form, mentioned above.

   d. Students cannot withdraw from a practical period unless for emergency situation (i.e. long-term illness, political unrest/violence/inability to reach workplace, etc.)

Table 13 contains a form which has been designed to help tutors in companies in evaluating students objectively in comparison to other students or personnel assigned similar tasks. Their remarks are helpful because this evaluation will serve as a basis for helping the student gain additional skills as he/she continues to improve.

Table 13: Dual Studies Evaluation for Practical Periods
Study Path: Dual Study Electrical Engineering (DSEE)

Company:

Tutor in Company:

Student name:

Evaluation criterion	needs improve-ment (1)	adequate (2)	good (3)	very good (4)	excellent (5)
quality of work					
quantity of work					
efficiency of work					
shows problem solving ability					
listens and carries out instructions					
meets deadlines and schedules					
demonstrates ability to make decisions or to seek appropriate help					
exhibits ability to learn					
exhibits intellectual ability					
demonstrates leadership ability and administrative potential					
exhibits emotional stability and maturity					
displays honesty					
exhibits interest and enthusiasm about the job					
maintains appropriate dress and grooming habits					
maintains good attendance and tardiness report					
adheres to organizational regulations					

Progress report:

Comments:

15. Course-ILOs-Mapping

Table 14 maps the courses numbers and the declared ILOs.

Table 14: DSEE Courses and their relations with the ILOs of the DSEE program

Intended Learning Outcomes			
Course #	**Course Name**	**Year**	**ILO**
1810101	Mathematics for Engineers I	1	a,e
1810102	Physics	1	a,e
1810103	Fundamentals of Electrical Engineering I	1	a,e
1810104	Fundamentals of Electrical Engineering I Lab	1	a,b
1810114	Physics Lab	1	a,e
1810001	Basics of Business Administration	1	h,l,m
1800002	Low-Intermediate English	1	g,i
1800012	Communications Skills	1	a,d,g,h
1810105	Engineering Workshop and Safety	1	c
1810106	Mathematics for Engineers II	1	a,e
1810107	Fundamentals of Electrical Engineering II	1	a,e
1810108	Fundamentals of Electrical Engineering II Lab	1	a,b
1810109	Electronics I	1	a,e
1810110	Electronics I Lab	1	a,b
1810111	Informatics I	1	a,e
1810112	Informatics I Lab	1	b
1800003	Intermediate English	1	g,i
1810201	Mathematics for Engineers III	2	a,e
1810202	Digital Logic Systems	2	a,c,e
1810203	Digital Logic Systems Lab	2	a,b,l
1810204	Informatics II	2	c,e
1810205	Informatics II Lab	2	b,d
1800004	Upper-Intermediate English	2	G
1800005	German I	2	g,i
1810206	Electronics II	2	a,c,e
1810207	Electronics II Lab	2	a,b
1810208	Instrumentation and Measurement	2	a,b,c,e
1810209	Instrumentation and Measurement Lab	2	a,b,d,i,l
1810210	Complex Analysis and Engineering Transforms	2	a,e
1810211	Engineering Design and Drawing	2	a,c
1810213	Probability and Engineering Statistics	3	
1800010	Advanced English	2	G
1810301	Electrical Workshop I	3	e,k
1810320	Electric Power Generation	3	a,e,i
1810302	Electromagnetic Theory	3	a,e,i
1810321	Electric Power Engineering I	3	a,e,i
1810330	Control Systems I	3	a,c,e
1810303	Microprocessor	3	a,c,e
1810304	Microprocessor Lab	3	a,b,d,i,k
1800011	Entrepreneurship		a,b,d,i,k
1810305	Electrical Workshop II	3	a,c,e,j,k
1810322	Electric Power Engineering II	3	a,c,e,j

1810306	Embedded Systems	3	a,c,e,i,j
1810307	Electronic Interfacing and PCB Prototyping Workshop	3	a,b,j
1810309	Numerical Engineering Analysis	3	
1810331	Control Systems II	3	a,c,e,j
1810323	Electrical Machines	3	
1810324	Electrical Machines Lab	1	a,b,d,e,j,l
1810212	Engineering Materials	3	a,b,d,e,j,l
180007X	University Requirement I	3	h,j
1810401	Electrical Installation and Maintenance Lab	4	a,b,d,,e,h,j,l
1810430	Power System Automation	4	e,i,j
1810421	Electric Drive Engineering	4	a,i,j
1810422	Power Electronics and Drive Technology Lab	4	a,b,d,j,l
1810423	Renewable Energy	4	a,e,h,i,j
180007X	University Requirement II	4	h,j
1810424	Power Systems and Transmissions	4	a,c,e,i,j,
1810420	Control and Automation Lab	4	a,b,e,j,k,l
1810425	Electric Power Lab	4	a,b,e,j,k
181005X	Elective – Electrical Engineering	4	h,i,j
180007X	University Requirement III	4	h,j
1810402	Introduction to Graduation Project	4	a,b,d,e,f,g,i,k,l
1810426	Special Topics in Electric Power Engineering	4	k,l
1810190	Practice I	1	d,g,i,k,l,m,n
1810191	Practice II	1	d,g,i,k,l,m,n
1810290	Practice III	2	a,b,c,d,e,f,g,i,j,k,l,m,n
1810291	Practice IV	2	a,b,c,d,e,f,g,i,j,k,l,m,n
1810390	Practice V	3	a,b,c,d,e,f,g,h,i,j,k,l,m,n
1810391	Practice VI	3	a,b,c,d,e,f,g,h,i,j,k,l,m,n
1810490	Graduation Project I	4	a,b,c,d,e,f,g,h,i,j,k,l,m,n
1810491	Graduation Project II	4	a,b,c,d,e,f,g,h,i,j,k,l,m,n

16. Courses' Descriptions

1810101 Mathematics for Engineers I 3 credits

This course contents the basics of mathematics for usage in specific courses for Electrical Engineering: System of linear equations and elementary row operations, linear transformations and matrix representation. Vectors in plane and polar functions: vectors, polar coordinates and graphs-introduction of complex numbers, operations and functions. Derivate: the derivate as a function and as a rate of change, derivate of products, quotients and negative powers, derivate of trigonometric functions, the chain rule, implicit differentiation and related rates.

1810102 Physics 3 credits

This course gives an introduction to basics of physics, except those subjects that are taught in the two courses Fundamentals of Electrical Engineering I and II. Units, vectors, motion in 1, 2 and 3 dimensions, work and energy, linear and angular momentum, kinematics, kinetics, geometrical optics.

1810114 Physics Lab 1 credit

Density and measurements of π, kinematics, vectors, Newton's second law, inclined plane, spring, simple pendulum, projectile motion, conservation of energy, conservation of momentum, free falling. Electric field, magnetic field, induction, specific heat capacity.

1810103 Fundamentals of Electrical Engineering I 3 credits

Basic definitions, power, circuit schematic and ideal basic circuit elements, voltage and current sources, resistance, Ohm's law, Kirchhoff's laws, circuit analysis techniques: nodal, mesh, linearity, superposition. The venin's and Norton theorems, source transformation capacitance, I-V relationship for capacitance and inductors.

1810104 Fundamentals of Electrical Engineering I Lab 1 credits

Introduction to basic safety rules, instrument familiarization, and usage of multimeter: Measuring of voltage, current, Ohm´s Law, basic DC circuits, and characteristics of passive electronic components.Diode DC characteristics, half-wave rectification, full-wave diode rectification.

1800001 Basics of Business Administration 2 credits

Important business terms (costs, revenue, profit, return on investment), factors of location decisions, production & operation management, basics of marketing; management structures and decisions.

1800002 Low-Intermediate English 2 credits

This course is the first of a series of four English courses which is designed for English language learners who can communicate in familiar topics and texts which contain common vocabulary, and understand the main points of a conversation, but with some difficulty and with the need of much more vocabulary. The course aims at enhancing students' competency in comprehending passages of medium length, and improving students' fluency in expressing themselves orally and in writing through conducting short conversations and forming simple and compound sentences. It promotes students' real life listening skills and enables them to comprehend spoken English in conversations

and talks of average length. It develops students' writing skills at the level of forming a well-structured sentences based on the given input.

1810105 Engineering Workshop and Safety 2 credits

This workshop gives the student basic knowledge and ability for simple mechanical tasks for metalworking shop layout, industrial safety, materials, soldering, welding, fitting, metal cutting, drilling, milling and tapping. Safety engineering and management with emphasis on control of hazardous materials, fire prevention, safety considerations in production facility design and maintenance, and operation of effective safety programs.

1810106 Mathematics for Engineers II 3 credits

Transcendental functions and differential equations. Integrals, definite integrals, substitution in definite integrals, application of integrals, the mean value and fundamental theorems of calculus first order separable differential equations and first order linear differential equations. Infinite series: limit of sequence of numbers subsequences and bounded sequences, test for convergence, alternating series, absolute and conditional convergence, power series, Taylor and McLaurin series, application of power series.

1810107 Fundamentals of Electrical Engineering II 3 credits

This course gives the student the knowledge for analyzing AC fundamentals and single-phase analysis: Harmonic frequency in AC circuit, AC voltages and currents, complex representation of sinusoids, phasors, complex impedances of inductors and capacitors, driving-point impedance, frequency response of circuits, Bode Plots, power in AC circuits, energy storage in capacitors and induction, parallel and serial combination of capacitors and inductors.

1810108 Fundamentals of Electrical Engineering II Lab 1 credits

Oscilloscope, AC amplitude measurements, measuring AC voltage, current and impedance, inductors, inductive reactance and impedance, phase angles, serial and parallel RL/RC circuits.

1810109 Electronics I 2 credits

Insulators, conductors and semiconductors, intrinsic and extrinsic semiconductors, impurities, doping, n-type and p-type semiconductors, the p-n junction diode, characteristic and applications. The Zener diode: characteristics and applications. Special purpose diodes, npn, pnp BJTs, DC biasing techniques.

1810111 Informatics I 2 credits

Introduction to computing, computer organization and architecture, main & mass storage, operating systems, information representation, numbering systems, Boolean operations, gates Boolean circuits, machine language/instruction set traditional programming concepts , procedure & functions, implementation (translation, linking and loading), algorithm representation & discovery, flowcharting, pseudo coding, iterative structures, introduction to C-programming, formatted input/output in C-language, expressions in C-language, one-way, two-way & multiple-way selections in C.

1810112 Informatics I Lab 1 credits

Computer architecture, hardware & software, maintenance, Windows & Linux, file & folders, internet, MS Office; Word/ Excel/PowerPoint/Access/Visio, writing C-programs, C-language: formatted input/output, expressions & selection statements in C.

1800003 Intermediate English 2 credits

This course is the second of a series of four English courses which is designed for learners who have good knowledge of English, understand the main points when listening to a native speaker if the topic is familiar and understand the main ideas in texts which contain high frequency or job related vocabulary, and can use basic tenses, but have problems with more complex grammar and vocabulary. It aims at developing students' levels of accuracy and fluency in English speaking and writing, awareness of the writing process and reading and listening sub-skills. During this course, students will have the opportunity to practice the skills of reading, writing, listening and speaking in English. Reading materials will range from notices and brochures to short articles and letters. Different types of spoken English used in a range of social situations will be used for listening comprehension, and students will be encouraged to write accurate English.

1810113 Thermodynamics 2 credits

Definitions and basic concepts. Perfect gases, laws related to perfect gases, mixtures of perfect gases. Properties and states of simple substances.The first law of thermodynamics.Kinetic energy, potential energy, work, and heat transfers. Control volume energy analysis, conservation of mass and energy for control volume. The second law of thermodynamics, heat engines and refrigeration systems, Carnot cycles. Entropy, T & S equations.

1810210 Complex Analysis and Engineering Transforms 3 credits

Complex numbers and functions.Complex integration.Power series, Taylor series.Laurent series, residue integration. Fourier Series. Fourier transform. Laplace Transform, Z Transform

1810201 Mathematics for Engineers III 3 credits

Multivariable calculus, limits and continuity, partial differentiation, multiple integration, Gradient theorem, Stoke's theorem, Gauss's theorem, probability principles and set theory. Random variables and operations performed on random variables. Various distribution functions.

1810202 Digital Logic Systems 3 credits

Boolean algebra and its laws, theorems, operations, simplification.Description the logical system behavior in an algebra expression.Using Karnaugh maps, combinational logic networks and applications. Logic functions implementation using multiplexer, decoder, read-only memories and programmable logic arrays, SR, JK, T and D flip-flops. Design and analysis of synchronous sequential logic networks and applications.

1810203 Digital Logic Systems Lab 1 credits

Combinational logic circuits design comparators and adders, code conversion and multiplexers, sequential circuit design, counters, sequential adders/subtractors, shift registers, design project.

1810204 Informatics II 2 credits

Revision of C language, basic types, iterative structures(loops), arrays, functions recursion, local and global variables, pointer and arrays, pointer and functions, strings, dynamic data structures, files, introduction in OOP, standard algorithms: Linear search ,binary search, sorting, file-handling.

1810205 Informatics II Lab 1 credits

Implementing C programs, C language basic data types, iterative structures (loops), arrays, function, recursion, local and global variables, pointer and arrays, pointers and functions, dynamic data structures, files, classes and objects.

1810213 Probability and Engineering Statistics 2 credits

Set theory, basic concepts of probability, conditional probability, independent events, Baye's Theorem, discrete and continuous random variables, distributions and density functions, probability distributions (binomial, Poisson, hyper geometric, normal, uniform and exponential), mean, variance, standard deviations, moments and moment generating functions, linear regression and curve fitting, limits theorems and applications.

1800004 Upper-Intermediate English 2 credits

This course is the third of a series of four English courses, which is designed for learners who can understand lectures of familiar topics, understand the news on television reasonably well, interact with some fluency and spontaneity and take an active part in discussions on familiar topics. It aims at developing students' levels of accuracy and fluency in English speaking and writing, awareness of the writing process and reading and listening sub-skills. At this course, students can understand the main ideas of complex texts, including technical discussions in their field of specialization, interact with a degree of fluency and spontaneity that makes regular interaction with native speakers. In addition, they will be able to produce clear and structured texts on familiar subjects.

1800005 German I 2 credits

This introductory course aims to provide students with the ability to understand, speak, read and write simple German. Primary goals are to introduce beginning students to basic structures of the German language by developing vocabulary and a command of idiomatic expressions; to familiarize students with sentence structure through written exercises and short compositions; to give students a foundation in German history and culture; and to interest students in traveling to German-speaking countries.

1810206 Electronics II 2 credits

Field-Effect Transistor (FET) theory, DC biasing and symmetrical swing, small signal analysis of BJT and FET amplifiers, multistage amplifiers, Darlington pair amplifiers.Frequency response of single and multistage BJT and FET amplifiers. Differential amplifiers, operational amplifiers: theory, slew rate, offset, frequency response. Basic Op-Amp applications: summation, subtraction, integration and differentiation.

1810207 Electronic Lab 1 credits

Rectification, power supply filtering, voltage doubler, Zener diode and its regulation, testing the junction of a transistor, emitter-based bias potentialsBJT's and FETs: characteristics, DC biasing,

circuit design, amplifiers and frequency responses, differential amplifiers, operational amplifiers basic applications filters.

1810208 Instrumentation and Measurement 3 credits

Introduction to the principles and practice of instrumentation and measurement systems in an engineering context.Basic principles and instrument characteristics.Measurement errors, basic statistics, noise and its control.Dynamic characteristics of instruments, time and frequency domain responses.System identification using correlation techniques.Amplifiers, filters, ADCs and DACs.Position, strain, pressure and motion sensors (resistive, capacitive, inductive, optical). Flow sensors. Ultrasonic sensors.

1810209 Instrumentation and Measurement Lab 1 credits

Usage of different measuring instruments, error analysis, energy, dynamic measurement, amplifier and filter analysis, non-electric.

1810210 System Theory 3 credits

Continuous and discrete-time systems analysis with illustrative applications.Linear and time-invariant systems, transfer functions. Fourier series, Fourier transform. System modelling and simulation; Linearization; the state space module; Laplace transforms; time and frequency response of linear systems; block diagrams; feedback; stability of linear systems; introduction to discrete-time signals and systems.

1810211 Engineering Design and Drawing 2 credits

To provide students with an understanding of engineering design, drawing practice and modelling in an applied context. Drawing, lettering, geometric constructions, sketching and shape description, multiviews projections, sectional views, perspective views, dimensioning.

1810302 Electromagnetic Theory 3 credits

Vector analysis, electrostatic fields.magnetostatic fields, solution of Laplace’s and Poisson’s equations, Faraday’s law and applications, Maxwell's equations, transmission lines. Plane waves propagation, reflection and refraction.

1800010 Advanced English 2 credits

This course is the fourth of a series of four English courses which is designed for learners who can understand lectures in the target language on both familiar and unfamiliar topics, and understand news on television and radio well, taking an active part in discussions on both familiar and unfamiliar topics, but still make mistakes and fail to make themselves understood occasionally. During this course, students will develop accuracy and fluency in speaking and writing, awareness of the writing process and reading and listening sub-skills. Learners can understand a wide range of demanding, longer texts and recognize implicit meaning. They can also express themselves fluently and spontaneously without much obvious searching for expressions, use English flexibly and effectively for social, academic and professional purposes and produce clear, well-structured and detailed texts on different subjects, showing controlled use of organizational patterns connectors and

cohesive devices. In addition, it aims at familiarizing students with the internationally recognized proficiency tests such as (TOEFL & IELTS) to ensure students have the integrated skills needed in taking the proficiency tests.

1800011 Entrepreneurship 2 credits

The course will cover the basic skills needed to improve the personality characteristics and enhance the interpersonal skills of the students. Broadening the student's visions and focusing on internal success factors are key elements of the course. The course will tackle issues like; entrepreneurship and entrepreneurial life, SMEs successes and failures, motivation and self-management, creativity and innovation, leadership and teamwork, networking and negotiation and developing personal goals and objectives, basic fundamental skills and functions needed to start a new business. Thinking of being unique, able to produce and sell and understanding the product life cycle are issues to be covered in this course.

1800012 Communications Skills 3 credits

This course provides the engineering student with vital knowledge that will expand his skills in aspects regarding technical terminology including scientific prefixes and suffixes, writing short and correct technical definitions, writing headings and titles, connecting ideas and sentences, writing a scientific paragraph and essay, writing scientific abstracts, and finally writing a technical report with a correct bibliography and citation. Oral, written and graphical communication principles are covered and exercised through the study of case histories, practical workshops and detailed assignments.

1800006 German II 2 credits

This course emphasizes on conversation skills and aims to enable students to communicate effectively with German speaking people. It focuses on interactive teaching materials.

1810205 Electrical Workshop I 2 credits

Drawing of electrical networks and building installations, electrical wiring, main supply, protective measures, lightning and excess voltage protection, residential circuit protection, network quality, lightning systems and circuits.

1810310 Communication Systems 2 credits

Amplitude Modulation: Baseband and carrier communications. Noise: Mathematical representation, Signal to Noise Ratio, Noise in AM, FM, and PM systems Pulse Modulation**:** Sampling and Quantization, Pulse Amplitude Modulation, Pulse Position and Pulse width Modulation, Quantization Noise, Signal to Quantization Noise Ratio, Pulse code Modulation, Delta Modulation, Frequency Shift Keying, Phase Shift Keying.

1810323 Electrical Machines 3 credits

Electrical Machinery Principles: Magnetic Field and Circuits, Magnetization curves Characteristics of hard and soft magnetic materials, losses.Transformers: Ideal Transformer, Single Phase transformer: Operation and Equivalent Circuit, auto-transformer. DC Machinery fundamentals: Basics, loop rotating between pole faces, Commutation, Windings, Armature reaction, Induced Voltage and torque equation. Power flow and losses, Types of DC motors, Permanent magnet DC motors. AC Machinery fundamentals: Rotating Magnetic Field, Magneto motive force and flux

distribution, Induced Voltage and Torque, Windings, Power Flow and Losses, Introduction to Induction Machines. Special Purpose Motors: Introduction to Single phase Induction Motors, Switched Reluctance motors, Hysteresis motors, Stepper, brushless DC motors.

1810320 Electric Power Generation 2 credits

In this course the student gets the knowledge of the production of electric power in different types of power plants: Basics of thermodynamics, energy management basics, power plant types: steam turbine process, gas turbine process, gas turbine power plant, steam turbine, combined cycle plants, nuclear power stations, control of power plants, reciprocating engine (piston engine), micro turbines, Stirling engines.

1810321 Electrical Power Engineering I 2 credits

Review of network theory, AC power flow in linear networks, polyphase networks, introduction to symmetrical components, components.

1810330 Control Systems 3 credits

Modeling of electrical, mechanical control systems, Open and closed-loop systems, Block diagrams. Second order systems. Step and impulse response.Performance criteria.Steady state error.Sensitivity, s-plane system stability. Analysis and design with the root loci method. Frequency domain analysis, Bode plots, Nyquist criterion, gain and phase margins, Nichols charts. The State-space method, state equations, flow graphs, stability, compensation techniques. Simulation and Controller design using MATLAB

1810309 Numerical Engineering Analysis 2 credits

Floating point number system, error analysis, solutions of equations, interpolation, splines, numerical differentiation and integration, numerical methods in linear algebra, systems of linear equations, method of least squares, eigenvalues, eigenvectors, solution of ordinary and partial differential equations. This subject is to be supplemented with extensive MatLab exercises.

1810303 Microprocessorand Microcontroller 3 credits

Basic architecture of a microprocessor family, introduction to assembly programming, memory mapping, interfacing and addressing. I/O interface programming, serial I/O interfacing, interrupt system, DMA, coprocessor, bus-interfacing modules.

1810304 Microprocessorand MicrocontrollersLab 1 credits

Assembly language programming, I/O programming, timer, counter, A/D & D/A programming.

1810305 Electrical Workshop II 1 credits

Advanced skills electrical wiring; industrial wiring projects; building installations for communication, building automation with KNX.

1810322 Electric Power Engineering II 3 credits

Switchgear, design of power lines and power systems under normal operation, load-flow calculation, AC-transmission, HVDC-transmission, flexible AC-transmission systems (FACTS).

1810306 Embedded Systems 3 credits

Computer communications, networks distributed systems, real-time operating systems, sensors and actors, serial and parallel bus systems, e.g. CAN, USB, LAN.

1810307 Electronic Interfacing and PCB Prototyping Workshop 1 credits

Electronic interfacing: basic concepts and principles of interfacing, interrupt interfacing, parallel and serial interfacing, programmable interfacing devices, data conversion. PCB prototyping: drawing, routing, placing, drilling, soldering etc.

1810331 Control Systems II 3 credits

Modern control: Introduction to state-space techniques, solution of state equations; controllability; pole placement regulator design; observability; estimator design. Non-linear control. Digital control: Review of digital control basics; direct design techniques; pole placement design; state-space control.

1810324 Electric Machines Lab 1 credits

DC machines, AC machines, three-phase asynchronous machines, three-phase synchronous machines, servomotors, single- and three-phase transformers.

1810212 Engineering Materials 3 credits

Materials for conductors and resistors, semiconductors, dielectric materials, insulating materials, fibrous insulating materials, ceramics, mica, glass, rubber, magnetic materials.

1810401 Electrical Installation and Standards Workshop 2 credits

Lamps and appliance circuits, door communication systems, basics of building management system, building management: Line coupling unit, lighting management.

1810325 Power Electronics 3 credits

Principles of power electronics, converters and applications, circuit components and their effects, control aspects. Power Electronic Devices: Power diode, power BJT, power MOSFET, IGBT and SCR, GTO and TRIAC and DIAC. Construction, characteristics, operations, losses, ratings, control and protection of thyristors.Semi controlled and fully controlled rectifiers, three-phase rectifiers: un-controlled, semi controlled and full controlled, six-pulse, twelve-pulse and 24-pulse rectification, PWM converters, DC to AC converters, three-phase inverter, six-pulse, twelve-pulse inverters, PWM inverters, switching mode power supplies, DC to DC conversation, buck converter, boost converter and buck-boost converters, isolated converters, forward converters, flyback converters.

1810421 Electric Drive and Engineering 3 credits

Electrical Drive Systems: Translational and rotational motion, power rating and classes of duty. 4-quadrant operation. Torque/power limits. Note on closed-loop control of drives. Electrical and mechanical transformers. DC drives: Brushed and brushless, and intro to their control issues. AC motors: examples of motor drives (e.g. induction motors), and intro to their control issues. Servomotors and stepper motors: principles and their control, examples of modern electrical drives in engineering applications.

1810422 Power Electronics and Drive Technology Lab 1 credits

Semiconductors for power engineering, IGBT, fundamentals of converter circuits, static converter valves, uncontrolled and line - commutated static converter circuits, controlled static converter circuits: Self-commutated static converter circuits: Turn-off static converters and chopper converters, switched-mode power supply, inverters, compact static converter - fed DC machines, frequency converter drive, static converter fed asynchronous machines.

1810423 Renewable Energy 3 credits

Renewable energy in the context of our primary energy needs , global energy consumption, climate protection and sustainability, national and international regulations, solar thermal energy, solar photovoltaic, bioenergy, hydroelectricity, tidal power, wind energy, integrating renewable energy into energy systems.

1810424 Power Systems and Transmission 3 credits

Power system, the symmetrical three-phase system, power system components, synchronous generators, power and control transformers, transmission lines, the characteristics of the loads, network analysis, voltages, currents and powers at sending and receiving ends. Fault analysis, systematic short-circuit computations, unbalanced system analysis, symmetrical component theory. Power system economics, embedded or dispersed generation, issues and technical impacts of embedded generation. Introduction to smart grids and future power systems.

1810420 Control and Automation Lab 1 credits

Analog control Temperature control and liquid level (Measurement and control), speed control, recording of frequency responses, digital control, control of an industrial machine 300 W, basic circuits of control technology, inductive proximity switches, capacitive and optical proximity switches, automation and bus technology, PLC.

1810425 Electric Power Lab 1 credits

Synchronization circuit, power station control: Generator Cos Phi Control, power transmission/power distribution: Three-phase transformers, power transmission/power distribution: Transmission line model 380 KV, power transmission/power distribution: Generator fed transmission system with RLC loads, protection of power engineering systems: Current and voltage transformers, protection of a power transmission line.

1810430 Power System Automation 3 credits

Basics of data transmission techniques, structure of network control, distribution network control, protection in power plants and other industrial plants, analysis of failures and other disruptions,

expert works of grids condition, concepts work concerning objects protection, short-circuit calculations, commissioning of protection systems for generators and GT units., PLC, SCADA.Power system software tools ETAP and PWS.

181005X Elective – Electrical Engineering 3 credits

The DSEE student can select one course of the elective courses.

1810402 Study Project 3 credits

During the study project, which extends over one semester, the student will be assigned a specialized engineering application problem of limited scope under the supervision of a faculty member. The problem definition spans from gathering all pertinent information and data through studying, analyzing and recording the problem. This study project must be done at Al-Quds University and it can be a design project, an analytical paper or an experimental work in the form of hard- or software. The associated work is an individual effort that demands initiative, creativity and individual responsibility. At the end of the project, the result of the student's findings must be provided in form of a report, and an additional system demo and/or an oral examination.

1810426 Special Topics in Electric Power Engineering 2 credits

The final content of this course will be decided in the third study year. The course shall give the opportunity to deal with important topics in the field of Electrical Engineering (Electric Power Engineering). As Electrical Engineering is a very dynamic area with very short product cycles, new services and actual trends shall be discussed.

1810050 Quality Control 3 credits

The principles of quality management and quality systems; quality management in both production and service environments; quality management systems with an emphasis on ISO 9000; statistical process control; the measurement and benchmarking of quality; tools and techniques for quality improvement; organizational and teamwork requirements for quality implementation; strategic issues in quality management; current developments in quality management.

1810051 Project Management 3 credits

Project management concepts, lifecycle of a project, project team, planning, scheduling, controlling and monitoring, resource allocation, and performance measurement.

1810052 German III 3 credits

This course aims to expand students' German linguistic skills as well as cultural knowledge, with a major emphasis on developing reading strategies and using the language to express ideas. By the end of the course students should be able to understand a range of authentic text types and increase their ability to communicate thoughts in German, both orally and in writing.

1810053 Engineering Economy 3 credits

Engineering and engineering economy.Economic and cost concepts.Interest formula derivations.Calculations of economic equivalence.Inflation and purchasing power of money.Bases for comparison of alternatives.Decision making along alternatives.Evaluating replacement alternatives.Breakeven and minimum cost analysis.Evaluation of public activities.

1810490 Graduation Project I 3 credits
1810491 Graduation Project II 4 credits

The last year will take care of the professionalization of students. Theory and practice have to match and the student shows being capable of solving market related problems. The graduation project demonstrates the student's ability to deal and solve practice-related problems from the respective field by using practical and scientific knowledge and methods. The graduation project is a specific, well-described task out of the company. The students have to apply their acquired complex theoretical knowledge and practical experiences to solve this task by a scientific and systematic approach. Note that the project is monitored and assessed by two counsellors, lecturer from the university and a qualified supervisor from the company. The various attributes and specifications of the DSEE program's graduates after successfully completing the graduation project are listed in the following:

- Knowledge and Understanding
  - The student demonstrates in an autonomous work that he/she can work out or to develop solutions for complex technical problems in Electrical Engineering by applying scientific methods.
  - The student understands the scientific basis of Electrical Engineeringand has demonstrated that he/she can deepen and apply it.
  - The student knows the current state of research in his/her specific project area.
  - The student writes the project report according to the rules of scientific work.
  - The student can create a project plan for monitoring and tracking of the project.
- Cognitive/Intellectual/social skills
  - The student has analyzed the problems and evaluated alternative solutions.
  - The student can expand his knowledge and interpret current knowledge.
  - He can formulate subject-specific solutions and can communicate to customers and colleagues.
  - As a team member, he/she takes over responsibility for a task.

1810190 Practice I 3 credits
1810191 Practice II 3 credits

In the first year, the fundamentals of Electrical Engineering will be taught. They enable students to understand the design of electrical circuits and to use them in applications. In addition, multidisciplinary basic knowledge is taught and skills are built up for personal development. In the practical phases of the first year, the DSEE student should get to know the organization and area of business of their company. The students have learnt basic theory to understand the simple networks of electric elements and will apply this in this period under intensive monitoring. In addition to the understanding of the workflow processes, out of the knowledge and skills acquired in the theory modules, they will be applied and deepened through little practical tasks. The student has to write a practice report and to submit it. The following lists contain some examples of the knowledge and skills to be acquired during this practice phase:

- General Electrical Engineering knowledge
  - Simple Electrical Applications and Installations
  - Measurement techniques
  - Analog Electronics
  - Mechanical Basic Skills
  - Introduction to computer systems
  - Working with standard computer applications
  - Basics of programming
- Additional Skills:
  - Organization structure
  - Documentation
  - English

1810290 Practice III 3 credits
1810291 Practice IV 3 credits

In the second year of theory, the digital systems are introduced and the programming skills of the students had been increased. Furthermore, the soft skills are further developed. The practical phases of the second year are typically characterized by use in projects in which the students already perceive small, independent tasks. Ideally, the knowledge of the theory phases are immersed in at least one or two of the module topics. A personal project of the practical phase shall be documented as a practical report and be provided as a presentation for discussion. The following lists contain some examples of the knowledge and skills to be acquired during this practice phase:

- Electrical Engineering knowledge
  - Analog and digital electronics
  - Basic understanding of electrical network and circuits
  - Instrumentation and measurement
  - Internet-service
  - Programming in C
  - Engineering Design and Drawing
- Additional skills:
  - Cost and budgets
  - time management
  - product quality
  - production

1810390 Practice V 3 credits
1810391 Practice VI 3 credits

The third year will take care of the professionalization of students. It will deepen existing knowledge and topics and, at the same time, expanded the horizon by the treatment of specific methods and research-related technologies. They can specialize in this year towards their future professional focus, normally in line with the demand of their employer. The students become in this year already a valuable, esteemed staff member in their companies, taking over responsibility for limited tasks. With supervision, they are used to work on their own and to deliver their problem solutions in time. The following lists contain some examples of the knowledge and skills to be acquired during this practice phase:

- Electrical Engineering knowledge
  - Power electronics
  - Electrical installation and Applications
  - Control Systems
  - Microprocessor Applications
  - Electrical Machines and Transformers
  - Embedded Systems
  - Product comparison and market analysis
- Additional skills:
  - Cost and budgets
  - time management
  - project management
  - Business skills