Benha University

Faculty of Engineering at Shoubra

Electrical Engineering Department

Internal Quality System Project

Program Specifications

Electric Power and Machines Section

Program Specification

Benha University, Faculty of Engineering at Shoubra

The Program Specifications

A- Basic Information

1. Program Title: electric power and machines.
2. Program Type: single.
3. Department: electrical engineering.
4. Co-ordinator: Prof. Dr. Sayed Abo_Elsood.
5. External Reviewer: the faculty council has nominated an external reviewer on / /2013.
6. Date of Approval of Specification:: by faculty committee in / /2013.

B- Professional Information

1. Program Objectives:

1. To prepare undergraduate students who will be able to create new ways to meet society's needs through the applications of fundamentals of engineering sciences to practical problems using design, analyses and syntheses of electrical components, circuits, and systems. Thus, becoming successful engineering problems solvers, life long learners, innovators, and professionals in the field of electrical power and machines.

2. To prepare engineers who will become leaders in the electrical power and machines engineering profession, and be able to shape the social, intellectual, business and technical activities.

3. To prepare engineers who will be able to work on electrical power and machines systems including the design and realization of such systems.

4. To insure that students are exposed to elements of social sciences, humanities and environmental studies so that they understand the necessities for professionalism, ethical responsibilities and the needs to function in multidisciplinary teams.

5. To prepare students to express themselves effectively in both oral and written communication.

6. To prepare students for engineering analyses and problem solving using appropriate mathematical and computational methodologies.

7. To teach students to use experimental and data analysis techniques for electrical power and machines engineering applications.

8. To provide students with awareness of tools and skills necessary for participating effectively in building a strong national economy and to meet current and future modern industry needs.

9. To provide various industries by highly qualified electrical power and machines engineers who have a broad knowledge of electrical engineering and related principles, theories and applications.

2. Course Educational Outcomes:

A- Knowledge and Understanding

The student should be able to:

a.1) Concepts and theories of mathematics and sciences, appropriate to the discipline.
a.2) Basics of information and communication technology (ICT).
a.3) Characteristics of engineering materials related to discipline.
a.4) Principles of design including elements design, process and/or a system related to specific disciplines.
a.5) Methodologies of solving engineering problems, data collection interpretation.
a.6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.
a.7) Business and management principles relevant to engineering.
a.8) Current engineering technologies as related to disciplines.
a.9) Topics related to humanitarian interests and moral issues
a.10) Technical language and report writing.
a.11) Professional ethics and impacts of engineering solutions on society and environment.
a.12) Contemporary engineering topics
a.13) Analytical and computer methods appropriate for electrical power and machines engineering.
a.14) Design methods and tools for electrical power and machines equipment and systems.
a.15) Principles of operation and performance specifications of electrical and electromechanical engineering systems.
a.16) Fundamentals of engineering management.
a.17) Basic electrical power system theory.
a.18) Theories and techniques for calculating short circuit, motor starting and voltage drop.
a.19) Diverse applications of electrical equipment.

a.20) Logic circuits.
a.21) Basic power system design concepts for underground, cable tray, grounding and lighting systems.
a.22) Basics of low voltage power systems.
a.23) Principles of performing electrical systems calculations, including load flow, earthing and equipment sizing.

B- Intellectual Skills

The students should be able to

b.1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.
b.2) Select appropriate solutions for engineering problems based on analytical thinking
b.3) Think in a creative and innovative way in problem solving and design.
b.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
b.5) Assess and evaluate the characteristics and performance of components, systems and processes.
b.6) Investigate the failure of components, systems, and processes
b.7) Solve engineering problems, often on the basis of limited and possibly contradicting information.
b.8) Select and appraise appropriate ICT tools to a variety of engineering problems.
b.9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
b.10) Incorporate economic, social, environmental dimensions and risk management in design.
b.11) Analyze results of numerical models and appreciate their limitations.
b.12) Create systematic and methodic approaches when dealing with new and advancing technology.
b.13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.
b.14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines.
b.15) Integrate electrical, electronic and mechanical components and equipment with transducer, actuators and controllers in creatively computer controlled systems.
b.16) Analyze the performance of electrical power generation, control and distribution systems.

C- Professional and Practical Skills

The students should be able to

c.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems.
c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, product and/or services.
c.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.
c.4) Practice the neatness and aesthetics in design and approach.
c.5) Use computational facilities and techniques, measuring instruments, workshops and laboratories equipment to design experiments, collect, analyze, and interpret results.
c.6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer
c.7) Apply numerical modeling methods to engineering problems.
c.8) Apply safe systems at work and observe the appropriate steps to manage risks.
c.9) Demonstrate basic organizational and project management skills.
c.10) Apply quality assurance procedures and follow codes and standards.
c.11) Exchange knowledge and skills with engineering community and industry.
c.12) Prepare and present technical reports.
c.13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.
c.14) Test and examine components, equipment and systems of electrical power and machines.
c.15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.
c.16) Specify and evaluate manufacturing of components and equipment related to electrical power and machines.
c.17) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems

D- General Skills

The students should be able to

d.1) Collaborate effectively within multidisciplinary team.
d.2) Work in stressful environment and within constraints.
d.3) Communicate effectively.
d.4) Demonstrate efficient IT capabilities.
d.5) Lead and motivate individuals.
d.6) Effectively manage tasks, time, and resources.
d.7) Search for information and engage in life-long self learning discipline.
d.8) Acquire entrepreneurial skills.
d.9) Refer to relevant literatures.

3. Academic Standards:

3-A) External references for local and international standards

Local standard NARS and American standards ABET

Attached an appendix for qualification and approval standard ABET website : http://www.ABET.org

3-B) External references for local and international standards. Comparison not done yet.

4. Program Skelton and Contents:

4-A) Program duration: 5 years (10 semesters).

4-B) Program Skelton …

4-B-1) Week hours: 238+60 hr. for preparatory. Year ,131 lectures, 107 lab/tutorials, total 238.

4-B-2) Equivalent hours: 177.5+45.5 for pre. Year, obligatory 162.5, elective 15.

4-B-3) Equivalent hours for basic science: 54.5, 30.5%

4-B-4) Equivalent hours for social/humanities science 24,13.5%

4-B-5) Equivalent hours for specialized courses: 99, 56%

4-B-6) Equivalent hours for other courses.--

4-B-7) External training: three weeks in summer vacation at the end of the academic year.

No	Code	Subject name	No. of lectures per week			Equivalent hour	year	term	Objective results
			Lec.	Sec.	Tot.				
1	EPE111	Principles of Electrical Engineering	4	2	6	5	1st	1st	See Matrix
2	EPE112	Tests (1)	-	4	4	2			
3	EPE113	Electrical Properties of Materials	4	2	6	5			
4	EMP171	Mathematics(2)(A)	4	2	6	5			
5	EMP172	Physics	4	2	6	5			
6	GEN171	Language(2)	-	2	2	1			
		Total	16	14	30	23			
1	EPE121	Tests (2)	-	4	4	2	1st	2nd	See Matrix
2	EPE170	Electronics (1)	4	2	6	5			
3	ECE171	Computer programming	2	2	2	3			
4	MPE170	Mechanical engineering	4	2	6	5			
5	EMP173	Mathematics (2)(B)	4	2	6	5			
6	GEN173	Engineering Legislation	4	-	4	4			
		Total	18	12	30	24			

No	Code	Subject name	No. of lectures per week			Equivalent hour	year	term	Objective results
			Lec.	Sec.	Tot.				
1	EPE211	Electric circuits	4	2	6	5	2nd	1st	See Matrix
2	EPE212	Electromagnetic Fields	3	2	5	4			
3	EPE213	Measuring Instruments	4	2	6	5			
4	MP271	Mechanical engineering (2)	4	2	6	5			
5	EMP271	Mathematics (3)(A)	3	2	5	4			
6	GEN271	Technical Reports Writing	-	2	2	1			
		Total	**18**	**12**	**30**	**19**			
1	EPE221	Tests (3)	-	4	4	2	2nd	2nd	See Matrix
2	EPE222	Electrical Machines	4	2	6	5			
3	EPE223	Electrical Power Engineering	4	2	6	5			
4	ECE270	Electronic and Logic Circuits	3	2	5	4			
5	EMP272	Mathematics (3)(B)	3	2	5	4			
6	GEN272	Project managements	3	1	4	3.5			
		Total		13	30	23.5			

No	Code	Subject name	No. of lectures per week			Equiv. hour	year	term	Objective results
			Lec.	Sec.	Tot.				
1	EPE311	Transmission & Distribution of Electrical Power	**3**	**2**	**5**	**4**	**3rd**	**1st**	**See Matrix**
2	EPE312	Electrical machines (2)	**4**	**2**	**6**	**5**			
3	EPE313	Power electronics (1)	**4**	**2**	**6**	**5**			
4	EPE314	Automatic control (1)	**3**	**2**	**5**	**4**			
5	EPE315	Tests (4)	**-**	**4**	**4**	**2**			
6	GEN370	Economics of Electrical Energy Utilization	**3**	**1**	**4**	**3.5**			
		Total	**17**	**13**	**30**	**21.5**			
1	EPE321	Switch Gear and Protection	**4**	**2**	**6**	**5**	**3rd**	**2nd**	**See Matrix**
2	EPE322	Analysis and Design of Electric Machines	**4**	**2**	**6**	**5**			
3	EPE323	Tests (5)	**-**	**4**	**4**	**2**			
4	EPE324	Computer Applications in Electrical Power and Machines	**4**	**2**	**6**	**5**			
5	EPE325	High Voltage Engineering	**4**	**2**	**6**	**5**			
6	GEN37x	Humanities	**2**	**-**	**2**	**2**			
		Total	**18**	**12**	**30**	**24**			

No	Code	Subject name	No. of lectures per week			Equiv. hour	year	term	Objective results
			Lec.	Sec.	Tot.				
1	EPE411	Power Electronics(2)	**4**	**2**	**6**	**5**			
2	EPE412	Automatic control (2)	**3**	**2**	**5**	**4**			
3	EPE413	Tests and Specifications (A)	**1**	**3**	**4**	**2.5**			
4	EPE414	Project	**-**	**2**	**2**	**1**	**4th**	**1st**	**See Matrix**
5	EPE415	High Voltage Engineering	**3**	**2**	**5**	**4**			
6	EPE44x	Elective course (1) from first list	**2**	**2**	**4**	**3**			
7	EPE44x	Elective course (2) from second list	**2**	**2**	**4**	**3**			
		Total	**15**	**15**	**30**	**22.5**			
2	EPE421	Utilization of Electrical Energy	**4**	**2**	**6**	**5**			
3	EPE422	Tests and Specifications (B)	**1**	**3**	**4**	**2.5**			
4	EPE414	Project	**-**	**6**	**6**	**3**			
5	EPE44x	Elective course (1) from third list	**2**	**2**	**4**	**3**	**4th**	**2nd**	**See Matrix**
6	EPE44x	Elective course (2) from fourth list	**2**	**2**	**4**	**3**			
	GEN470	Environmental Impacts of Electrical Energy	**3**	**1**	**4**	**3.5**			
		Total	**12**	**16**	**28**	**20**			

Elective Courses

No	Code	Subject name	No. of lectures per week			Equiv. hour	year	term	Objective results
			Lec.	Sec.	Tot.				
1	EPE441	Power electronics	2	2	4	3	List #1		See Matrix
2	EPE442	Electrical Drive Systems (1)	2	2	4	3			
		Total	4	4	8	6			
1	EPE443	Computer Applications in High Voltage Engineering	2	2	4	3	List #2		See Matrix
2	EPE444	Analysis of Electrical Power Systems	2	2	4	3			
3	EPE445	Circuit Breakers and Substation	2	2	4	3			
4	EPE446	Numerical Analysis of Electromagnetic Fields (1)	2	2	4	3			
5	EPE447	Computer Applications in Power and Networks Engineering	2	2	4	3			
		Total	12	12	24	18			See Matrix
1	EPE448	Applications of Power Electronics	2	2	4	3	List #3		See Matrix
2	EPE449	Electrical Drive Systems (2)	2	2	4	3			
3	EPE450	Control of Electrical Machines	2	2	4	3			
		Total	6	6	12	9			

No	Code	Subject name	No. of Credit hours per week	Equiv. hour	year	term	Objective results

			Lec.	Sec.	Tot.				
1	EPE451	Advanced Study in High Voltage Engineering	**2**	**2**	**4**	**3**	**List #4**		**See Matrix**
2	EPE452	Load Forecasting in Electrical Power Systems	**2**	**2**	**4**	**3**			
3	EPE453	Dynamic Modeling of Power Systems	**2**	**2**	**4**	**3**			
4	EPE454	Advanced Study in Electrical Power System Analysis	**2**	**2**	**4**	**3**			
		Total	**8**	**8**	**16**	**12**			

1	GEN371	Economic and Management	**2**	**-**	**2**	**2**	Humanities	**See Matrix**
2	GEN375	Projects Feasibility Study	**2**	**-**	**2**	**2**		
		Total	**4**	**-**	**4**	**4**		

6. Progress Requirement:

Success in all courses or with one or two corrective courses.

7. Entry Requirement:

Subject for success in prep. Year based on the choices and marks.

8. Educational Results Evaluation:

Evaluator	Tool	Sample
End of term students	Questionnaire at the end of each semester	Third year students
Graduates	Questionnaire before project discussion	20% of fourth year students.

Beneficiary	Seminars and annual employment conference	----------
External Reviewer	Reviewing all document for program and courses specification and reports	All documents