Benha University
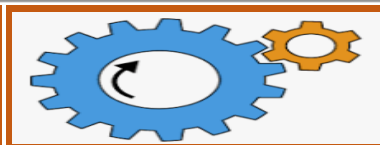# Benha Faculty of Engineering

Electromechanical Engineering Program

B.Sc. Program Matrices

Bylaw 2017 according to NARS2018

Benha University – Benha Faculty of Engineering

2023-2024

List of Contents

Program Coordinator: Assoc. Prof. Wael Abdel-Rahman Mohamed

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Date: 12 / 9 / 2023

1. Faculty Mission Vs. Program Mission Matrix

To judge the compatibility of faculty mission with the program mission, the following matrix is used:

Faculty Mission		Program Mission		
		Electromechanical Engineering Program is committed to graduate engineers with an outstanding knowledge and specialized skills, keeping up with the rapid developing trends, and providing research to serve society and the community.		
		Program is committed to graduate engineers with an outstanding knowledge and specialized skills	Keeping up with the rapid developing trends	Providing research to serve society and community
Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market, and capable of using and developing modern technology, and providing research in engineering fields to serve society and community.	Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market	*		
	Capable of using and developing modern technology		*	
	Providing research in engineering fields to serve society and community			*

2. Program Mission Vs. Program Objectives Matrix

To judge the compatibility of program objectives with its mission, the following matrix is used:

Program Mission		Program Objectives					
		PO1	PO2	PO3	PO4	PO5	PO6
Electromechanical Engineering Program is committed to graduate engineers with an outstanding knowledge, keeping up with the rapid developing trends, and providing research to serve society and the community.	Program is committed to graduate engineers with an outstanding knowledge and specialized skills	*				*	*
	Keeping up with the rapid developing trends		*	*	*	*	*
	Providing research to serve society and community.				*		*

3. Program Competencies Vs. (NARS 2018) CBE Matrix

To judge the compatibility of program competencies and the CBE (NARS 2018), the following matrix is used:

Program Competences	(NARS 2018) CBE Matrix																	
	A – Level										Mechanical				Electrical			
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B2	B3	B4	B5
A 1	*																	
A 2		*																
A 3			*															
A 4				*														
A 5					*													
A 6						*												
A 7							*											
A 8								*										
A 9									*									
A 10										*								
B 1											*							
B 2												*						
B 3													*					
B 4														*				
D 1															*			
D 2																*		
D 3																	*	
D 4																		*

4. Program Learning Outcomes Vs. (NARS 2018) CBE Matrix

Program Learning Outcomes	(NARS 2018) CBE Matrix																	
	A – Level										Mechanical				Electrical			
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B2	B3	B4	B5
PLO 1	*																	
PLO 2		*																
PLO 3			*															
PLO 4				*														
PLO 5					*													
PLO 6						*												
PLO 7							*											
PLO 8								*										
PLO 9									*									
PLO 10										*								
PLO 11											*							
PLO 12												*						
PLO 13													*					
PLO 14														*				
PLO 15															*			
PLO 16																*		
PLO 17																	*	
PLO 18																		*

5. ARS of Program Vs. B-Level Electrical (NARS 2018) Matrix

		B-Level Electrical (NARS 2018) (CBE)				
		B1	B2	B3	B4	B5
ARS of Program	D1		*			
	D2			*		
	D3				*	
	D4					*

6. Program Learning Outcomes Vs. Program Competencies

To judge the compatibility of program competencies and its learning outcomes, the following matrix is used:

Program Learning Outcomes	Program Competencies																	
	A – Level										B-Level				D-Level			
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
PLO 1	*																	
PLO 2		*																
PLO 3			*															
PLO 4				*														
PLO 5					*													
PLO 6						*												
PLO 7							*											
PLO 8								*										
PLO 9									*									
PLO 10										*								
PLO 11											*							
PLO 12												*						
PLO 13													*					
PLO 14														*				
PLO 15															*			
PLO 16																*		
PLO 17																	*	
PLO 18																		*

7. Program Mission Vs. (NARS 2018) CBE Matrix

To judge the compatibility of program mission with its competencies, the following matrix is used:

Program Mission		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
Electromechanical Engineering Program is committed to graduate engineers with an outstanding knowledge, keeping up with the rapid developing trends, and providing research to serve society and the community.	Program is committed to graduate engineers with an outstanding knowledge and specialized skills	*	*	*	*		*	*	*	*		*	*	*	*	*	*	*	*
	Keeping up with the rapid developing trends	*	*	*	*	*				*	*	*	*	*	*	*	*	*	*
	Providing research to serve society and community.	*	*			*	*		*		*	*	*	*		*			*

8. Program Objectives Vs. Program Competencies Matrix

To judge the compatibility of program objectives with its competencies, the following matrix is used:

Program Objectives	Program Competencies																	
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
PO1	*	*						*			*	*	*	*	*	*	*	
PO2			*			*												
PO3						*	*	*			*	*		*				
PO4				*			*		*				*		*			
PO5			*	*		*	*	*				*				*	*	*
PO6	*	*			*						*	*	*		*			*

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9. Program Objectives Vs. Graduate Attributes Matrix

To judge the compatibility of program objectives with its graduate attributes, the following matrix is used:

Program Objectives	Graduate Attributes													
	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12	GA13	GA14
PO1	*	*									*			
PO2			*		*	*							*	
PO3				*						*				
PO4								*	*					
PO5							*				*	*		*
PO6							*					*		*

10. Graduate Competencies Vs. Graduate Attributes

To judge the compatibility of program graduate attributes with its competencies, the following matrix is used:

Program Competencies	Graduate Attributes													
	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12	GA13	GA14
A1	*	*									*			*
A2		*												*
A3			*		*	*						*		
A4						*	*						*	
A5								*					*	
A6				*										
A7				*										
A8									*			*		
A9										*				
A10								*				*		
B1												*		*
B2											*	*		*

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Program Competencies	Graduate Attributes													
	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12	GA13	GA14
B3													*	
B4													*	
D1														*
D2											*	*		*
D3											*	*		
D4													*	

11. Graduate Attributes Vs. Requirements Matrix

Graduate Attributes	Key Words of Requirements			
	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements
GA1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.		√	√	
GA2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.			√	√
GA3. Behave professionally and adhere to engineering ethics and standards.		√		
GA4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.		√		

Graduate Attributes	Key Words of Requirements			
	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements
GA5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community.				√
GA6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles.	√			
GA7. Use techniques, skills, and modern engineering tools necessary for engineering practice.		√	√	
GA8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.	√			
GA9. Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.	√			
GA10. Demonstrate leadership qualities, business administration and entrepreneurial skills.	√			
GA11. Communicate effectively with experience to the use of computer applications in various electromechanical engineering disciplines.				√
GA12. Produce a design system that satisfies a given specification in electromechanical system.				√
GA13. Evaluate the sustainability and environmental issues related to electromechanical systems.				√
GA14. Solve problems in the areas of integrated mechanics, electronics, computers, and software systems, and analyze and investigate the inter-disciplinary characteristics of mechanical, electrical, and hydraulic systems.				√

12. Program Objectives Vs. Requirements Matrix

Program Objectives	Key Words of Requirements			
	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements
PO1. Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in real life situation.		√		
PO2. Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.		√	√	
PO3. Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.				√
PO4. Master self-learning and life-long learning strategies to communicate effectively in academic/professional fields	√			
PO5. Solve problems in the areas of integrated mechanics, electronics, computers, and software systems.			√	√
PO6. Capable of analyzing and investigating the inter-disciplinary characteristics of mechanical, electrical, and hydraulic systems.				√

13. Program Objectives Vs. Subject Area

Program Objectives	Key Words of Subject Area						
	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subject
PO1. Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in real life situation.	√	√		√		√	
PO2. Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.	√			√			√
PO3. Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.			√		√		√
PO4. Master self-learning and life-long learning strategies to communicate effectively in academic/professional fields	√	√	√			√	
PO5. Solve problems in the areas of integrated mechanics, electronics, computers, and software systems.				√		√	√

Program Objectives	Key Words of Subject Area						
	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subject
PO6. Capable of analyzing and investigating the inter-disciplinary characteristics of mechanical, electrical, and hydraulic systems.				√		√	√

14. Graduates Attributes Vs. Subject Area

Graduate Attributes	Key Words of Subject Area						
	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subject
GA1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.	√	√		√			
GA2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.				√		√	√
GA3. Behave professionally and adhere to engineering ethics and standards.	√		√				√
GA4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.			√		√		√

Graduate Attributes	Key Words of Subject Area						
	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subject
GA5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community.		√	√			√	
GA6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles.	√	√	√				
GA7. Use techniques, skills, and modern engineering tools necessary for engineering practice.					√		√
GA8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post-graduate and research studies.	√	√	√				
GA9. Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.	√		√		√		
GA10. Demonstrate leadership qualities, business administration and entrepreneurial skills.				√	√		
GA11. Communicate effectively with experience to the use of computer applications in various electromechanical engineering disciplines.					√		√
GA12. Produce a design system that satisfies a given specification in electromechanical system.				√		√	√
GA13. Evaluate the sustainability and environmental issues related to electromechanical systems.			√	√			√

Graduate Attributes	Key Words of Subject Area						
	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary (Institution character-identifying) subject
GA14. Solve problems in the areas of integrated mechanics, electronics, computers, and software systems, and analyze and investigate the inter-disciplinary characteristics of mechanical, electrical, and hydraulic systems.				√	√		√

15. Subject Area

15.1 Table of % of Subject Area

Subject Area	Program Total Credit Hours		NARS Requirements
	Cr.Hrs. of Five Levels	% Cr.Hrs. of Five Levels	
Humanities and Social Sciences (Univ. Req.)	18	10.11	9-12%
Mathematics and Basic Sciences	36	20.22	20-26%
Basic Engineering Sciences (Faculty/Spec. Req.)	39	21.91	20-23%
Applied Engineering and Design	39	21.91	20-22%
Computer Applications and ICT	15	9	9-11%
Projects and Practice	18	10.11	8-10%
Discretionary (Institution character-identifying) subjects	12	6.74	6-8%
Total	177	100	**100%**

15.2 Program Courses Vs. Subject Area

Year	Term	Courses Code	Course Title	Prerequisites	Cr. Hrs.	Lect.	Tut.	Lab.	Total	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
First Year	1st Term	FRB101	Mathematics I	……	3	2	2	0	4		3					
		FRB103	Mechanics I	……	3	2	2	0	4		3					
		FRB105	General Chemistry	……	3	2	1	2	5		3					
		FRB107	Physics I	……	3	2	2	2	6		3					
		FRM109	Engineering Graphics	……	4	2	4	1	7			4				
		HS101	English language	……	2	2	0	0	2	2						
	2nd Term	FRB102	Mathematics II	FRB101	3	2	2	2	6		3					
		FRB104	Mechanics II	FRB103	3	2	2	0	4		3					
		FRM106	Production Engineering	……	3	2	0	3	5			3				
		FRB108	Physics II	FRB107	3	2	2	2	6		3					
		FRE110	Computer Programming	……	3	2	0	3	5		3					
		HS102	Human Rights	……	2	2	0	0	2	2						
d	1st Term	FRB201	Mathematics III	FRB102	3	2	2	0	4		3					
		EMM201	Computer Aided Drafting (CAD)	FRM109	3	2	0	3	5					3		

| Year | Term | Code | Course Title | Prerequisites | Weekly Contact Hours | | | | | Credit Hours of Subject Area | | | | | | |
					Cr. Hrs.	Lect.	Tut.	Lab.	Total	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
		EMM203	Fluid Mechanics I	FRB104	3	2	1	1	4			3				
		EMM205	Mechanics of Machinery	FRB104	3	2	1	1	4			3				
		EME207	Electric Circuits I	FRB108	3	2	1	1	4			3				
		EMM209	Measurements and Instrumentation	FRB108	3	2	1	2	5				3			
		HS201	Technical Writing	……	2	2	0	0	2	2						
	2nd Term	FRB202	Math IV	FRB201	3	2	2	0	4		3					
		EMM202	Strength and properties of Materials	FRB104	3	2	1	1	4			3				
		EME204	Logic Circuits and Micro processors	EME207	3	2	1	1	4			3				
		EMM206	Thermodynamics I	FRB107	3	2	1	1	4			3				
		EME208	Electric Circuits II	EME207	3	2	1	1	4			3				
		EMM210	Manufacture Technology	FRM106	3	2	2	1	5				3			
		HS202	Engineering Economics	……	2	2	0	0	2	2						
Third Year	1st Term	FRB301	Numerical Methods	FRB201	3	2	2	0	4		3					
		EMM301	Fluid Mechanics II	EMM203	3	2	2	1	5			3				
		EMM303	Projects Management	……	2	2	0	0	4			2				
		EMM305	Heat Transfer	EMM206	3	2	2	1	5			3				
		EME307	Electrical Power Systems	EME208	3	2	2	1	5				3			

Year	Term	Code	Course Title	Prerequisites	Cr. Hrs.	Lect.	Tut.	Lab.	Total	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
		EMM309	Design of Machine Elements	FRM109, EMM202	3	2	2	0	4				3			
	2nd Term	FRB302	Probabilities & Statistics	FRB201	3	2	2	0	4		3					
		EMM302	Thermodynamics II	EMM206	3	2	2	1	5			3				
		EMM304	Vibrations and System Dynamics	EMM205	3	2	2	1	5				3			
		EME306	Electronic Devices and Circuits	EME208	3	2	2	1	5				3			
		EMM308	Solid Mechanics	FRB103	3	2	2	1	5				3			
		HS3XX	**Humanities-Elective 1**	**……**	**2**	**2**	**0**	**0**	**2**	**2**						
Fourth Year	1st Term	EMM401	Refrigeration	EMM302	3	2	2	1	5				3			
		EMM403	Fluid Machinery	EMM301	3	2	2	1	5				3			
		EME405	Automatic Control	EMM304	3	2	2	1	5					3		
		EMM407	Plumbing Systems	EMM301	3	2	2	1	5						3	
		EME409	Electric Power Distribution Systems I	EME307	3	2	2	1	5						3	
		HS401	Legislation & Engineering Ethics	……	2	2	0	0	2	2						
	2nd Term	EMM402	Air Conditioning Systems	EMM302	3	2	2	1	5				3			
		EME404	Low Current Distribution Systems	EME208	3	2	2	1	5					3		

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Year	Term	Code	Course Title	Prerequisites	Cr. Hrs.	Lect.	Tut.	Lab.	Total	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
Fifth Year		EMM406	Fire Fighting Systems	EMM301	3	2	2	1	5						3	
		EME410	Electric Power Distribution Systems II	EME409	3	2	2	1	5						3	
		EMM408	Combustion and Engines	EMM302	3	2	2	1	5				3			
		HS4XX	Humanities – Elective 2	……	2	2	0	0	2	2						
	1st Term	EME501	Process Control and Building management System	EME405	3	2	2	1	5					3		
		EMM503	Refrigeration and AC Systems/Components	EMM401, EMM402	3	2	2	1	5				3			
		EMM5XX	Elective I	*	3	2	2	1	5							3
		EME5XX	Elective II	*	3	2	2	1	5							3
		HS5XX	Humanities –Elective 3	……	2	2	0	0	2	2						
		EM507	Project I	**	3	3	0	1	4						3	
	2nd Term	EME502	Electrical Machines	EME208	3	2	2	1	5				3			
		EME504	Computer Applications in El/Mec System	EMM402, EME409	3	2	2	1	5					3		
		EME5XX	Elective III	*	3	2	2	1	5							3
		EMM5XX	Elective IV	*	3	2	2	1	5							3
		HS5XX	Humanities –Elective 4	……	2	2	0	0	2	2						
		EM508	Project II	**	3	3	0	1	4						3	

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Year	Term	Code	Course Title	Prerequisites	Cr. Hrs.	Lect.	Tut.	Lab.	Total	Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary
Courses					**Weekly Contact Hours**					**Credit Hours of Subject Area**						
FT	FT 103	FT 103	Field Training I	***												
	FT 203	FT 203	Field Training II	***												
Total hours of five years										18	36	39	39	15	18	12
% Hours of five years										10.11	20.22	21.91	21.91	9	10.11	6.74
Reference Ratio from NARS										9-12%	20-26%	20-23%	20-22%	9-11%	8-10%	6-8%

** The student can register for the Project I and Project II courses after passing 125 hr, as well as passing FT103 and FT203.

*** Completion of 120 Credit Hours

16. Program Courses Vs. Requirements

16.1 Compulsory Courses Vs. Requirements

Year	Term	Courses		Prerequisites	Weekly Contact Hours					Credit Hours of Requirements			
		Code	Course Title		Cr. Hrs.	Lect.	Tut.	Lab.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirement
First Year	1st Term	FRB101	Mathematics I	……	3	2	2	0	4		3		
		FRB103	Mechanics I	……	3	2	2	0	4		3		
		FRB105	General Chemistry	……	3	2	1	2	5		3		
		FRB107	Physics I	……	3	2	2	2	6		3		
		FRM109	Engineering Graphics	……	4	2	4	1	7		4		
		HS101	English language	……	2	2	0	0	2	2			
	2nd Term	FRB102	Mathematics II	FRB101	3	2	2	2	6		3		
		FRB104	Mechanics II	FRB103	3	2	2	0	4		3		
		FRM106	Production Engineering	……	3	2	0	3	5		3		
		FRB108	Physics II	FRB107	3	2	2	2	6		3		
		FRE110	Computer Programming	……	3	2	0	3	5		3		
		HS102	Human Rights	……	2	2	0	0	2	2			
Second Year	1st Term	FRB201	Mathematics III	FRB102	3	2	2	0	4		3		
		EMM201	Computer Aided Drafting (CAD)	FRM109	3	2	0	3	5			3	
		EMM203	Fluid Mechanics I	FRB104	3	2	1	1	4			3	
		EMM205	Mechanics of Machinery	FRB104	3	2	1	1	4			3	
		EME207	Electric Circuits I	FRB108	3	2	1	1	4			3	

Year	Term	Code	Course Title	Prerequisites	Cr. Hrs.	Lect.	Tut.	Lab.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirement
		EMM209	Measurements and Instrumentation	FRB108	3	2	1	2	5			3	
		HS201	Technical Writing	……	2	2	0	0	2	2			
	2nd Term	FRB202	Math IV	FRB201	3	2	2	0	4		3		
		EMM202	Strength and properties of Materials	FRB104	3	2	1	1	4			3	
		EME204	Logic Circuits and Micro processors	EME207	3	2	1	1	4			3	
		EMM206	Thermodynamics I	FRB107	3	2	1	1	4			3	
		EME208	Electric Circuits II	EME207	3	2	1	1	4			3	
		EMM210	Manufacture Technology	FRM106	3	2	2	1	5			3	
		HS202	Engineering Economics	……	2	2	0	0	2	2			
Third Year	1st Term	FRB301	Numerical Method	FRB201	3	2	2	0	4		3		
		EMM301	Fluid Mechanics II	EMM203	3	2	2	1	5			3	
		EMM303	Projects Management	……	2	2	0	0	4			2	
		EMM305	Heat Transfer	EMM206	3	2	2	1	5			3	
		EME307	Electrical Power Systems	EME208	3	2	2	1	5			3	
		EMM309	Design of Machine Elements	FRM109, EMM202	3	2	2	0	4			3	
	2nd Term	FRB302	Probabilities & Statistics	FRB201	3	2	2	0	4		3		
		EMM302	Thermodynamics II	EMM206	3	2	2	1	5			3	
		EMM304	Vibrations and System Dynamics	EMM205	3	2	2	1	5			3	

Year	Term	Code	Course Title	Prerequisites	Cr. Hrs.	Lect.	Tut.	Lab.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirement
Fourth Year		EME306	Electronic Devices and Circuits	EME208	3	2	2	1	5			3	
		EMM308	Solid Mechanics	FRB103	3	2	2	1	5			3	
		HS3XX	Humanities-Elective 1	……	2	2	0	0	2	2			
	1st Term	EMM401	Refrigeration	EMM302	3	2	2	1	5				3
		EMM403	Fluid Machinery	EMM301	3	2	2	1	5				3
		EME405	Automatic Control	EMM304	3	2	2	1	5			3	
		EMM407	Plumbing Systems	EMM301	3	2	2	1	5				3
		EME409	Electric Power Distribution Systems I	EME307	3	2	2	1	5				3
		HS401	Legislation & Engineering Ethics	……	2	2	0	0	2	2			
	2nd Term	EMM402	Air Conditioning Systems	EMM302	3	2	2	1	5				3
		EME404	Low Current Distribution Systems	EME208	3	2	2	1	5				3
		EMM406	Fire Fighting Systems	EMM301	3	2	2	1	5				3
		EME410	Electric Power Distribution Systems II	EME409	3	2	2	1	5				3
		EMM408	Combustion and Engines	EMM302	3	2	2	1	5			3	
		HS4XX	Humanities – Elective 2	……	2	2	0	0	2	2			
Fifth Year	1st Term	EME501	Process Control and Building management System	EME405	3	2	2	1	5				3
		EMM503	Refrigeration and AC Systems/Components	EMM401, EMM402	3	2	2	1	5				3
		EMM5XX	Elective 1	*	3	2	2	1	5				3

Year	Term	Code	Course Title	Prerequisites	Cr. Hrs.	Lect.	Tut.	Lab.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirement
		EME5XX	**Elective 2**	*	**3**	**2**	**2**	**1**	**5**				**3**
		HS5XX	**Humanities –Elective 3**	……	**2**	**2**	**0**	**0**	**2**	**2**			
		EM507	Project I	**	3	3	0	1	4				3
	2nd Term	EME502	Electrical Machines	EME208	3	2	2	1	5			3	
		EME504	Computer Applications in El/Mec System	EMM402, EME409	3	2	2	1	5				3
		EME5XX	**Elective III**	*	**3**	**2**	**2**	**1**	**5**				**3**
		EMM5XX	**Elective IV**	*	**3**	**2**	**2**	**1**	**5**				**3**
		HS5XX	**Humanities –Elective 4**	……	**2**	**2**	**0**	**0**	**2**	**2**			
		EM508	Project II	**	3	3	0	1	4				3
FT		**FT 103**	**Field Training I**	***									
		FT 203	**Field Training II**	***									
Total hours of five years										**18**	**43**	**65**	**51**
% Hours of five years										**10.17**	**24.29**	**36.72**	**28.81**
Reference Ratio										**Min 8%**	**Min 20%**	**Min 35%**	**Max 30%**
** The student can register for the Project I and Project II courses after passing 125 hr, as well as passing FT103 and FT203.													
*** Completion of 120 Credit Hours													

16.2 Elective Courses Vs. Requirements

Level		Code	Course Title	Pr. Req.	Cr.Hrs	Lect.	Lab.	Tut.	Total	University Requirements	Faculty Requirements	Discipline Requirements	Program Requirements
Elective Course I	Five	EMM505	Renewable Energy	EMM206	3	2	1	2	5				3
		EMM507	Elevators and Escalators	……	3	2	1	2	5				3
		EMM509	Solar Thermal and PV systems	EMM305	3	2	1	2	5				3
Elective Course II	Five	EME511	Advanced Industrial Electronics	EME306	3	2	1	2	5				3
		EME513	Communications Engineering	EME404	3	2	1	2	5				3
		EME515	Electrostatic and Electromagnetic Fields	EME208	3	2	1	2	5				
Elective Course III	Five	EME506	Electro-hydraulic circuits	EMM501	3	2	1	2	5				3
		EME508	Codes and Specification of Electromechanical Systems	……	3	2	1	2	5				3
		EME510	Computer Network	……	3	2	1	2	5				3
Elective Course IV	Five	EMM512	Cold Stores and Industrial Refrigeration	EMM401	3	2	1	2	5				3
		EMM514	Automotive Engineering	EMM408	3	2	1	2	5				3
		EMM516	Thermal power stations	EMM302	3	2	1	2	5				3

17. Program Competencies Vs. Courses

Compulsory Courses			Program Competencies																		
Year		Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
First Year	1st Term	FRB101	Mathematics I	1	1																
		FRB103	Mechanics I	1	1																
		FRB105	General Chemistry	1	1																
		FRB107	Physics I	1	1																
		FRM109	Engineering Graphics						1		1										
		HS101	English language					1			1		1								
	2nd Term	FRB102	Mathematics II	1	1																
		FRB104	Mechanics II	1	1																
		FRM106	Production Engineering				1		1												
		FRB108	Physics II	1	1																
		FRE110	Computer Programming	1	1																
		HS102	Societal Issues					1		1			1								
Second Year	1st Term	FRB201	Mathematics III	1	1																
		EMM201	Computer Aided Drafting (CAD)	1			1				1										
		EMM203	Fluid Mechanics I		1									1							
		EMM205	Mechanics of Machinery	1											1						
		EME207	Electric Circuits I	1														1	1		
		EMM209	Measurements and		1												1			1	

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Compulsory Courses			Program Competencies																	
Year	Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
2nd Term (Third Year)		Instrumentation		■												■			■	
	HS201	Technical Writing								1	1									
	FRB202	Math IV	1	1																
	EMM202	Strength and properties of Materials		1									1							
	EME204	Logic Circuits and Microprocessors		1	1												1	1		
	EMM206	Thermodynamics I	1	1									1							
	EME208	Electric Circuits II	1														1	1		
	EMM210	Manufacture Technology											1	1						
	HS202	Engineering Economics	1								1									
Third Year 1st Term	FRB301	Numerical Method	1	1																
	EMM301	Fluid Mechanics II											1		1					
	EMM303	Projects Management												1						
	EMM305	Heat Transfer		1									1							
	EME307	Electrical Power Systems															1		1	
	EMM309	Design of Machine Elements											1	1						
Third Year 2nd Term	FRB302	Probabilities & Statistics	1	1																
	EMM302	Thermodynamics II	1	1									1	1						
	EMM304	Vibrations and System Dynamics											1	1				1		
	EME306	Electronic Devices and	1														1	1		

Compulsory Courses			Program Competencies																	
Year	Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
Fourth Year		Circuits	■														■	■		
		EMM308 Solid Mechanics											1	1						
		HS3XX Humanities-Elective 1				1	1													
	1st Term	EMM401 Refrigeration		1									1	1						
		EMM403 Fluid Machinery	1	1									1		1					
		EME405 Automatic Control	1														1		1	
		EMM407 Plumbing Systems	1	1									1							
		EME409 Electric Power Distribution Systems I															1			1
		HS401 Legislation & Engineering Ethics									1	1								
	2nd Term	EMM402 Air Conditioning Systems	1	1									1	1						
		EME404 Low Current Distribution Systems																	1	1
		EMM406 Fire Fighting Systems				1								1		1				
		EMM408 Combustion and Engines	1	1									1							
		EME410 Electric Power Distribution Systems II															1			1
		HS4XX Humanities-Elective 2				1	1				1									
Fifth Year	1st Term	EME501 Process Control and Building Management											1	1				1	1	
		EMM503 Refrigeration and AC Systems / Components	1	1									1	1						
		EMM5XX Elective I											1		1					
		EME5XX Elective II															1	1		1

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Compulsory Courses			Program Competencies																	
Year	Code	Course Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
2nd Term	HS5XX	Humanities –Elective 3								1	1									
	EM507	Project I		1	1			1	1			1		1	1	1		1		
	EME502	Electrical Machines					1										1			1
	EME504	Computer Applications in Elec./Mech. Systems											1	1		1				
	EME5XX	Elective III				1							1	1						1
	EMM5XX	Elective IV											1	1	1					
	HS5XX	Humanities –Elective 4				1				1										
	EM508	Project II		1	1			1	1			1		1	1	1		1		
FT	EMM/E380	Field Training I							1			1		1						
	EMM/E480	Field Training II							1			1		1						

18. Program Competencies Vs. Learning and Teaching Methods

Teaching and Learning Methods	Program Competencies (Program Learning Outcomes)																	
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
Lecture	*		*	*		*		*			*	*	*	*	*	*	*	*
Tutorials	*		*	*		*		*			*	*	*	*	*	*	*	*
Computer-based Instruction		*		*								*			*		*	
Problem-based Learning	*			*					*		*	*		*				*
Project-based Learning			*			*	*		*			*		*	*	*		*
Interactive Learning		*					*	*	*	*		*	*					
Presentations		*	*	*	*				*						*	*		
Report				*		*			*	*			*	*				*
Co-operative Learning					*		*									*	*	
Brain Storming				*			*	*	*				*	*				*
Projects			*			*	*	*	*				*	*	*	*	*	*
Discussion	*	*	*					*		*	*		*	*			*	*
Self-Learning					*				*						*	*	*	
Case Study			*	*					*	*			*	*	*	*	*	*
Practical-based Learning		*		*		*	*	*			*						*	*
Hybrid Learning	*		*	*	*				*	*	*	*	*	*	*	*	*	*

19. Program Competencies Vs. Assessment Methods

Assessment Methods		Program competencies (Program Learning Outcomes)																	
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	D1	D2	D3	D4
Formative Assessment Method																			
Tests	Oral Test	*	*	*		*	*	*	*	*	*	*							
	Mid-term	*		*	*		*		*			*	*	*	*	*	*	*	*
	Experimental		*					*				*					*	*	
	Quizzes	*	*	*	*		*		*			*	*	*	*	*	*	*	*
Reports		*	*	*	*	*		*	*	*	*	*			*				*
Observation		*	*		*	*		*	*	*		*							
Discussions		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Projects	Projects	*	*	*	*	*	*	*	*	*	*	*			*	*	*	*	*
	Mini Projects	*	*	*		*	*	*	*	*	*	*			*	*	*	*	*
Assignments		*	*	*	*		*		*	*		*	*	*	*	*	*	*	*
Presentations				*	*	*	*	*		*	*	*	*	*	*	*	*	*	*
Summative Assessment Method																			
Practical			*		*		*					*	*				*	*	
Oral Exam		*	*	*		*	*	*	*	*	*	*							
Final Exam		*		*	*		*		*		*	*	*	*	*	*	*	*	*

20. Assessment Methods Vs. Teaching and Learning Methods

Assessment Methods		Teaching and Learning Methods															
		Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Report	Co-operative Learning	Brain Storming	Projects	Discussion	Case Study	Practical-based Learning	Self-Learning	Hybrid Learning
Tests	Oral Test					*		*	*			*	*	*	*	*	*
	Mid-term	*	*										*				*
	Experimental			*											*		
	Quizzes	*	*										*				*
Reports								*	*				*			*	*
Observation					*		*			*	*						
Discussions		*	*		*	*		*	*		*		*	*			*
Projects	Projects				*		*	*	*	*		*	*	*	*	*	*
	Mini Projects				*	*	*	*		*			*	*	*		*
Assignments			*	*	*												*
Presentations		*				*		*	*			*			*		*	*
Practical				*											*		
Oral Exam						*		*	*			*	*		*	*	*
Final Exam		*	*										*				*

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21. Courses Vs. Teaching and Learning Methods

21.1 Compulsory Courses Vs. Teaching and Learning Methods

Year	Code	Course Title	Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Reports	Co-operative Learning	Brain Storming	Projects	Discussion	Self-Learning	Case Study	Practical based learning	Hybrid Learning
First Year — 1st Term	FRB101	Mathematics I	*	*		*												
	FRB103	Mechanics I	*	*														
	FRB105	General Chemistry	*	*		*		*									*	
	FRB107	Physics I	*	*													*	
	FRM109	Engineering Graphics	*	*										*			*	
	HS101	English language	*					*						*	*			
First Year — 2nd Term	FRB102	Mathematics II	*	*	*													
	FRB104	Mechanics II	*	*														
	FRM106	Production Engineering	*	*		*				*			*	*				
	FRB108	Physics II	*	*													*	
	FRE110	Computer Programming	*		*									*				
	HS102	Societal Issues	*							*					*			*
2nd Year — Te	FRB201	Mathematics III	*	*	*	*								*				

Year		Code	Course Title	Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Reports	Co-operative Learning	Brain Storming	Projects	Discussion	Self-Learning	Case Study	Practical based learning	Hybrid Learning
Compulsory Courses				**Teaching and Learning Methods**															
Third Year	2nd Term	EMM201	Computer Aided Drafting (CAD)	*		*									*				
		EMM203	Fluid Mechanics I	*	*										*				
		EMM205	Mechanics of Machinery	*	*										*				
		EME207	Electric Circuits I	*	*							*							
		EMM209	Measurements and Instrumentation	*	*		*											*	
		HS201	Technical Writing	*					*										
		FRB202	Math IV	*	*	*	*								*				
		EMM202	Strength and properties of Materials	*	*										*			*	
		EME204	Logic Circuits and Microprocessors	*	*							*		*					
		EMM206	Thermodynamics I	*	*										*				
		EME208	Electric Circuits II	*	*							*							
		EMM210	Manufacture Technology	*	*	*					*			*	*				
		HS202	Engineering Economics	*	*		*	*			*				*				
	1st Term	FRB301	Numerical Method	*	*		*												
		EMM301	Fluid Mechanics II	*	*										*	*			
		EMM303	Projects Management	*											*				
		EMM305	Heat Transfer	*	*										*				

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Year		Code	Course Title	Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Reports	Co-operative Learning	Brain Storming	Projects	Discussion	Self-Learning	Case Study	Practical based learning	Hybrid Learning
Fourth Year	2nd Term	EME307	Electrical Power Systems	*	*						*								
		EMM309	Design of Machine Elements	*	*										*				
		FRB302	Probabilities & Statistics	*	*					*					*				
		EMM302	Thermodynamics II	*	*										*				
		EMM304	Vibrations and System Dynamics	*	*									*	*				
		EME306	Electronic Devices and Circuits	*	*														
		EMM308	Solid Mechanics	*	*										*			*	
		HS3XX	Humanities-Elective 1	Refer to the matrix after the next one															
	1st Term	EMM401	Refrigeration	*	*										*				
		EMM403	Fluid Machinery	*	*		*								*			*	
		EME405	Automatic Control	*	*														
		EMM407	Plumbing Systems	*	*										*				
		EME409	Electric Power Distribution Systems I	*	*														
		HS401	Legislation & Engineering Ethics	*					*										
	2nd Term	EMM402	Air Conditioning Systems	*	*										*				
		EME404	Low Current Distribution Systems	*	*														
		EMM406	Fire Fighting Systems	*	*					*					*				

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Year		Code	Course Title	Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Reports	Co-operative Learning	Brain Storming	Projects	Discussion	Self-Learning	Case Study	Practical based learning	Hybrid Learning
Fifth Year		EMM408	Combustion and Engines	*							*				*				
		EME410	Electric Power Distribution Systems II	*	*														
		HS4XX	Humanities-Elective 2	Refer to the matrix after the next one															
	1st Term	EME501	Process Control and Building Management	*	*		*	*			*								
		EMM503	Refrigeration and AC Systems / Components	*	*										*				
		EM507	Project I	*						*					*				
		EMM5XX	Elective I	Refer to the next matrix															
		EME5XX	Elective II	Refer to the next matrix															
		HS5XX	Humanities-Elective 3	Refer to the matrix after the next one															
	2nd Term	EME502	Electrical Machines	*	*					*	*	*							
		EME504	Computer Applications in Elec./Mech. Systems	*											*				
		EM508	Project II	*						*					*				
		EMM5XX	Elective III	Refer to the next matrix															
		EME5XX	Elective IV	Refer to the next matrix															
		HS5XX	Humanities-Elective 4	Refer to the matrix after the next one															

21.2 Elective Courses Vs. Teaching and Learning Methods

No.	Code	Course Title	Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Reports	Co-operative Learning	Brain Storming	Projects	Discussion	Self-Learning	Case study	Practical based learning	Hybrid Learning
Elective 1	EMM505	Renewable Energy	*	*							*							
	EMM507	Elevators and Escalators	*	*										*		*		
	EMM509	Solar Thermal and PV systems	*	*							*							
Elective 2	EME511	Advanced Industrial Electronics	*	*					*		*			*				
	EME513	Communications Engineering	*	*			*		*		*							
	EME515	Electrostatic and Electromagnetic Fields	*	*						*							*	
Elective 3	EME506	Electro-hydraulic circuits	*	*										*			*	
	EME508	Codes and Specification of Electromechanical Systems	*	*						*							*	
	EME510	Computer Network	*	*		*	*	*									*	
Elective 4	EMM512	Cold Stores and Industrial Refrigeration	*							*						*		
	EMM514	Automotive Engineering	*							*						*		
	EMM516	Thermal power stations	*							*						*		

21.3 Humanity-Elective Courses Vs. Teaching and Learning Methods

		Humanity-Elective Courses	Teaching and Learning Methods														
No.	Code	Course Title	Lecture	Tutorials	Computer-based Instruction	Problem-based Learning	Project-based Learning	Interactive Learning	Presentations	Report	Co-operative Learning	Brain Storming	Projects	Discussion	Self-Learning	Case Study	Practical-based Learning	Hybrid Learning
Humanity-Elective 1	HS302	Human Resource Management	*			*	*			*		*		*				
	HS304	Strategic Management	*			*				*				*				
	HS306	Computer and Society	*						*	*				*				
	HS308	Accounting	*						*	*				*				
Humanity-Elective 2	HS402	Foundations of Marketing	*			*						*		*				*
	HS404	Introduction to Finance	*			*						*		*				*
	HS406	Human Computer Interaction	*			*						*		*				*
	HS408	Sustainable Development	*						*	*				*				*
Humanity-Elective 3	HS501	Specifications and feasibility studies	*				*							*		*		*
	HS503	Analytical Skills and Critical Thinking	*							*								*
	HS505	Communication Laws and Codes	*							*				*				*
	HS507	Construction Contracts and Law	*											*				*
Humanity-Elective 4	HS502	Professional Communication Skills	*											*				*
	HS504	Principles of industrial health							*	*								*
	HS506	Social Risks and Security of Computer Systems	*											*				*
	HS508	Risk Management	*											*				*

22. Courses Vs. Assessment Methods

22.1 Compulsory Courses Vs. Assessment Methods

Compulsory Courses			Assessment Methods												
Year	Code	Course Title	Oral Test	Midterm	Experimental	Quizzes	Reports	Observation	Discussions	Projects	Mini-Projects	Assignments	Presentations	Practical Exam	Oral Exam	Final Exam
First Year — 1st Term	FRB101	Mathematics I		*					*							*
	FRB103	Mechanics I		*		*						*				*
	FRB105	General Chemistry		*	*			*								*
	FRB107	Physics I	*	*	*											*
	FRM109	Engineering Graphics		*		*						*				*
	HS101	English language		*			*	*	*							*
First Year — 2nd Term	FRB102	Mathematics II		*								*				*
	FRB104	Mechanics II		*		*						*				*
	FRM106	Production Engineering		*			*		*		*					*
	FRB108	Physics II	*	*	*											*
	FRE110	Computer Programming		*					*					*	*	
	HS102	Societal Issues		*			*						*			*
Second Year — 1st Term	FRB201	Mathematics III		*					*			*				*
	EMM201	Computer Aided Drafting (CAD)		*		*								*	*	
	EMM203	Fluid Mechanics I	*	*		*										*
	EMM205	Mechanics of Machinery		*								*				*
	EME207	Electric Circuits I		*	*											*
	EMM209	Measurements and Instrumentation	*	*		*										*

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	Year	Code	Course Title	Oral Test	Midterm	Experimental	Quizzes	Reports	Observation	Discussions	Projects	Mini-Projects	Assignments	Presentations	Practical Exam	Oral Exam	Final Exam
			Compulsory Courses							**Assessment Methods**							
		HS201	Technical Writing		*				*								*
	2nd Term	FRB202	Math IV		*					*			*				*
		EMM202	Strength and properties of Materials		*							*	*				*
		EME204	Logic Circuits and Microprocessors	*	*	*											*
		EMM206	Thermodynamics I		*	*							*				*
		EME208	Electric Circuits II		*					*							*
		EMM210	Manufacture Technology	*	*		*	*					*				*
		HS202	Engineering Economics		*			*		*				*			*
Third Year	1st Term	FRB301	Numerical Method		*					*							*
		EMM301	Fluid Mechanics II	*	*								*				*
		EMM303	Projects Management		*			*					*				*
		EMM305	Heat Transfer	*	*	*							*				*
		EME307	Electrical Power Systems	*	*					*							*
		EMM309	Design of Machine Elements		*							*	*				*
	2nd Term	FRB302	Probabilities & Statistics		*		*			*			*				*
		EMM302	Thermodynamics II	*	*								*				*
		EMM304	Vibrations and System Dynamics	*	*								*				*
		EME306	Electronic Devices and Circuits		*		*	*									*
		EMM308	Solid Mechanics	*	*	*							*				*
		HS3XX	Humanities-Elective 1	Refer to the matrix after the next one													
Fourth Year	1st Term	EMM401	Refrigeration	*	*		*					*					*
		EMM403	Fluid Machinery	*	*	*											*

Year		Code	Course Title	Oral Test	Midterm	Experimental	Quizzes	Reports	Observation	Discussions	Projects	Mini-Projects	Assignments	Presentations	Practical Exam	Oral Exam	Final Exam
			Compulsory Courses														
		EME405	Automatic Control	*	*	*	*										*
		EMM407	Plumbing Systems	*	*		*	*			*						*
		EME409	Electric Power Distribution Systems I	*	*		*										*
		UHS401	Legislation & Engineering Ethics		*												*
	2nd Term	EMM402	Air Conditioning Systems		*		*				*						*
		EME404	Low Current Distribution Systems	*	*		*										*
		EMM406	Fire Fighting Systems		*		*			*			*				*
		EMM408	Combustion and Engines	*	*		*	*									*
		EME410	Electric Power Distribution Systems II	*	*		*										*
		HS4XX	Humanities-Elective 2	Refer to the matrix after the next one													
Fifth Year	1st Term	EME501	Process Control and Building Management		*	*								*			*
		EMM503	Refrigeration and AC Systems / Components	*	*		*				*						*
		EM507	Project I					*			*			*		*	
		EMM5XX	Elective I	Refer to the next matrix													
		EME5XX	Elective II	Refer to the next matrix													
		HS5XX	Humanities-Elective 3	Refer to the matrix after the next one													
	2nd Term	EME502	Electrical Machines		*	*		*									*
		EME504	Computer Applications in Elec./Mech. Systems		*						*						*
		EM508	Project II					*			*			*		*	
		EMM5XX	Elective III	Refer to the next matrix													
		EME5XX	Elective IV	Refer to the next matrix													
		HS5XX	Humanities-Elective 4	Refer to the matrix after the next one													

22.2 Elective Courses Vs. Assessment Methods

		Elective Courses		Assessment Methods													
No.	Code	Course Title		Oral Test	Midterm	Experimental	Quizzes	Reports	Observation	Discussions	Projects	Mini-Projects	Assignments	Presentations	Practical Exam	Oral Exam	Final Exam
Elective I	EMM505	Renewable Energy			*					*							*
	EMM507	Elevators and Escalators			*						*		*				*
	EMM509	Solar Thermal and PV systems			*					*							*
Elective II	EME511	Advanced Industrial Electronics		*	*	*											*
	EME513	Communications Engineering		*	*	*						*					*
	EME515	Electrostatic and Electromagnetic Fields			*	*							*				*
Elective III	EME506	Electro-hydraulic circuits		*	*		*										*
	EME508	Codes and Specification of Electromechanical Systems			*	*											*
	EME510	Computer Network			*	*				*		*	*				*
Elective IV	EMM512	Cold Stores and Industrial Refrigeration		*	*		*	*									*
	EMM514	Automotive Engineering		*	*		*	*									*
	EMM516	Thermal power stations		*	*		*	*									*

22.3 Humanity-Elective Courses Vs. Assessment Methods

		Humanity-Elective Courses	Oral Test	Midterm	Experimental	Quizzes	Reports	Observation	Discussions	Projects	Mini-Projects	Assignments	Presentations	Practical Exam	Oral Exam	Final Exam
No.	Code	Course Title														
Humanity-Elective 1	HS302	Human Resource Management		*			*	*	*				*			*
	HS304	Strategic Management		*			*		*				*			*
	HS306	Computer and Society		*			*		*				*			*
	HS308	Accounting		*			*						*			*
Humanity-Elective 2	HS402	Foundations of Marketing		*			*						*			*
	HS404	Introduction to Finance		*			*						*			*
	HS406	Human Computer Interaction		*			*				*					*
	HS408	Sustainable Development		*			*		*				*			*
Humanity-Elective 3	HS501	Specifications and feasibility studies		*			*				*					*
	HS503	Analytical Skills and Critical Thinking		*			*									*
	HS505	Communication Laws and Codes		*			*		*							*
	HS507	Construction Contracts and Law		*					*							*
Humanity-Elective 4	HS502	Professional Communication Skills		*			*									*
	HS504	Principles of industrial health		*			*									*
	HS506	Social Risks and Security of Computer Systems		*					*							*
	HS508	Risk Management		*					*							*

Coordinator of Program Quality Assurance Committee

Beshoy Abdou

Dr. Beshoy Abdou Aziz
Date: 12 / 9 / 2023

Program Coordinator

Wael A. Mohamed

Assoc. Prof. Wael Abdel-Rahman Mohamed
Date: 12 / 9 / 2023

فريق توصيف البرنامج وتبنى المعايير الأكاديمية لبرنامج الهندسة الكهروميكانيكية (نظام الساعات المعتمدة) بالبرامج المتعددة التخصصات بكلية الهندسة ببنها ــ جامعة بنها.

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