Mechatronics Engineering Program

Program Specification

A- Basic Information

	Program Title			
	Mechatronics Engineering			
Program Type	Single		**Category**	Undergraduate
Dept. Offering the Program	Mechanical Engineering Department		**System**	Credit Hours
Units Required for Graduation	208 units		**Awarded Degree**	BSc. In Mechatronics Engineering
Program Stages	**Preparatory Year (Level 0)**	44 Units	**NO. of Levels**	5 Levels
	Diploma (Level 1-2)	83.5 Units	**NO. of Semesters**	15 Semesters
	Bachelor (Level 3-4)	80.5 Units	**Academic Year**	2022/2023
Program Coordinator	Dr. Abd El-Salam Ezzat			
External Evaluator (s)	Prof. Dr. Abo Hashima Mostafa El sayed Assist. Prof. Dr. Mohamed RedaOsman Ali			
The most recent approvalDate of program specification		**Dept. council**	5/9/2022	
		Academic council	No.(46) 19/9/2022	

B- Specific Information

1- Program Vision and Mission

The program's vision and mission are both originate from the vision and mission of El-Minya high institute for engineering and technology.

The Vision	The Mission
The program aims at graduating a well-qualified mechatronics engineer, capable of understanding recent technology, carrying research to professionally achieve development that eventually bring benefits for community and country	The program seeks to prepare a distinguished mechatronics engineer adopting the National Academic Reference Standards, able to compete locally and regionally, equipped with research tools to facilitate services in community and industry.

2- Program Aims:

A. Engineering Aims:

1. Apply knowledge of mathematics, chemistry, physics, and engineering concepts to the solution of engineering problems.
2. Design a system; component and process to meet the required needs within realistic constraints.
3. Identify, formulate and seek the appropriate solution for engineering problems.
4. Work and communicate effectively within multi-disciplinary teams.
5. Analyze, design and evaluate a system related to the mechatronics systems to meet the required needs within realistic constraints.
6. Consider the impacts of engineering solutions on society & environment.
7. Use the scientific techniques, personal skills, and engineering different tools, necessary for engineering practice and project management.
8. Display professional and ethical responsibilities, and contextual understanding.
9. Communicate effectively.
10. Participate in and lead quality improvement projects.

B. Mechatronics Aims:

1. Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problem.
2. Integrate knowledge, understanding and gained skills and apply concepts and laws taught in mechatronics, control, automation and, modelling and simulation of dynamic systems and digital control to solve real industrial problems
3. Develop and use analytical in the fields of mechatronics, robotics, CNC, and Unmanned aerial vehicle.as well as computational models to solve mechatronics engineering problems.
4. Apply knowledge of mathematics, and engineering concepts to solve the mechatronics and engineering problems.
5. Professionally adapt with the progressively technological advancement.
6. Enhance safety awareness and apply industrial safety.
7. Lead a group, present ideas, communicate effectively and carry out the duties and professional responsibilities.

2.1Academic Standards

The program adopts the National Academic Reference Standards, NARS for engineering in general and Mechanical Engineering in specific approved by the department council 19/12/2019 and the institute academic council No. (13) 26/12/2019 in addition to ARS in the department council 14/4/2020 and the institute academic councilNo. (16) 21/4/2020

2.2Program Aims in Relation to NARs Graduate Attributes

	NARS Graduate Attributes	Program Aims
Engineering	*Upon successful completion of program, the graduate should be able to:* Na) Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.	*Upon successful completion of program, the graduate should be able to:* 1. Apply knowledge of mathematics, chemistry, physics, and engineering concepts to the solution of engineering problems.
	Nb) Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.	2. Design a system; component and process to meet the required needs within realistic constraints.
	Nc) Behave professionally and adhere to engineering ethics and standards.	3. Identify, formulate and seek the appropriate solution for engineering problems.
	Nd) Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance;	4. Work and communicate effectively within multi-disciplinary teams.
	Ne) Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community;	5. Analyze, design and evaluate a system related to the mechatronics systems to meet the required needs within realistic constraints.
	Nf) Value the importance of the environment, both physical and natural, and work to promote sustainability principles;	6. Consider the impacts of engineering solutions on society & environment.
	Ng) Use techniques, skills and modern engineering tools necessary for engineering practice;	7. Use the scientific techniques, personal skills, and engineering different tools, necessary for engineering practice and project management.
	Nh) 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.	8. Display professional and ethical responsibilities; and contextual understanding.
	Ni) Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.	9. Communicate effectively.

	Nj) Demonstrate leadership qualities, business administration and entrepreneurial skills.	10. Participate in and lead quality improvement projects.
Mechatronics	Nk) Apply theories and concepts of chemistry, physics, mathematics, electronics and engineering principles to mechatronics and systems.	1. Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problem.
	NL) Apply and integrate knowledge, understanding and skills of different subjects to solve real problems in industries.	2. Integrate knowledge, understanding and gained skills and apply concepts and laws taught in mechatronics, control, automation and, modelling and simulation of dynamic systems and digital control to solve real industrial problems
	NM) Design and execute a project in the field of mechatronics and s engineering.	3. Develop and use analytical in the fields of mechatronics, robotics, CNC, and Unmanned aerial vehicle.as well as computational models to solve mechatronics engineering problems.
	NN) Use mathematical and computational skills in solving mechatronics and engineering problems.	4. Apply knowledge of mathematics, and engineering concepts to solve the mechatronics and engineering problems.
	NO) Adapt with technological evolutions.	5. Professionally adapt with the progressively technological advancement.
	NP) Apply industrial safety.	6. Enhance safety awareness and apply industrial safety.
	NQ) Communicate with others, present ideas and findings and lead a group.	7. Lead a group, present ideas, communicate effectively and carry out the duties and professional responsibilities.

2.2- Contribution of NARS to Program Competencies

	Program Competencies	NARS 2018 and ARS for Mechatronics Program
Engineering	*Upon successful completion of program, the graduate should have a knowledge and understanding of:*	*Upon successful completion of Mechatronics program, the graduate should be able to:*
	A1) Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	a1) Identify and solve quit simple basic engineering problems based on basic physics and engineering mathematics.
	A2) Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	a2)Recognize how to develop and conduct appropriate experimentation and/or simulation and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to reach a conclusion.
	A3) Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	a3)Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
	A4) Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	a4)Combine and exchange contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.
	A5) Practice research techniques and methods of investigation as an inherent part of learning.	a5)Acquire the practice research techniques and methods of investigation as an inherent part of learning
	A6) Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	a6)Organize, supervise, and monitor implementation of engineering projects, taking into consideration other trades requirements.
	A7) Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	a7)Collaborate Function efficiently as an individual and as a member of multidisciplinary and multicultural teams.
	A8) Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	a8) Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

	A9) Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	a9)Think creatively, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
	A10) Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	a10)Gain and apply new knowledge, and practice self, lifelong and other learning strategies.
Mechanical	B1) Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, , Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations	b1)Design and analyze physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, , Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations
	B2) Plan, manage and carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and a software contemporary to the mechanical engineering.	b2) Organize and design mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and a software contemporary to the mechanical engineering.
	B3) Select conventional mechanical equipment according to the required performance.	b3) Select conventional mechanical equipment according to the required performance.
	B4) Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.	b4) Select the suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.
mechatronics	C1) Analyzing the performance of mechatronic systems using scientific, mathematical and computer models and assessing their limits for specific cases.	c1) Analyze the performance of mechatronic systems using scientific, mathematical and computer models and assessing their limits for specific cases.
	C2) Defining and classifying the performance of mechatronic systems and components through the use of analytical methods and modeling techniques.	c2) analyze the performance of mechatronic systems and components through the use of analytical methods and modeling techniques.
	C3) Design mechatronic systems using a systems approach to meet specific specifications and requirements.	c3) Design mechatronic systems using a systems approach to meet specific specifications and requirements.
	C4) Incorporating a wide range of tools, analytical techniques, equipment and software packages for designing and developing mechatronic systems.	c4) Combine and exchange a wide range of tools, analytical techniques, equipment and software packages for designing and developing mechatronic systems.

2.3-Matrix of courses and program Competencies

Stage: Preparatory Year

Level: 0

Category	Course Title	Code	Engineering NARS												Mechanical NARS				MechatronicsARS			
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A01	A02	A03	B1	B2	B3	B4	C1	C2	C3	C4
Core Courses (Mandatory)	Industrial Chemistry	CHM 001	√	√																			
	Chemistry Laboratory	CHM 002	√	√																			
	Intro. to Computer	CS 001	√				√																
	Comp. Prog.(A)	CS 002	√				√																
	Eng. Drawing (A)	ENG 003	√							√													
	Eng. Drawing (B)	ENG 004	√							√													
	Prod. Tech. (A)	ENG 005	√	√																			
	Prod. Tech. (B)	ENG 006	√	√																			
	Workshop (A)	ENG 009	√	√																			
	Workshop (B)	ENG 010	√	√																			
	Technical Concepts	ENG 011					√			√													
	Mechanices (A)	ENG 021	√																				
	Mechanices (B)	ENG 022	√																				
	Civil Heritage	HUM 001					√								√								
	Intro. Indus. Training	ITR 001		√	√		√			√	√	√											
	Eng. Lang. (A)	LNG 001								√													
	Eng. Lang. (B)	LNG 002								√													
	Mathematics (A)	MTH 001	√																				
	Mathematics (B)	MTH 002	√																				
	Phys. Educ. & Activ. (A)	PHE 001								√			√										
	Phys. Educ. & Activ. (B)	PHE 002								√			√										
	Physics (A)	PHY 001	√	√																			
	Physics (B)	PHY 002	√	√																			

Stage: Diploma Stage

Level: 1 + 2 Mechatronics

Category	Course Title	Code	Engineering NARS												Mechanical NARS				MechatronicsARS			
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A01	A02	A03	B1	B2	B3	B4	C1	C2	C3	C4
Core Courses (Mandatory)	**Level (1)Mechatronics**																						
	Mathematics (C)	MTH 101	√																				
	Mechanics (B)	ENG 121	√																				
	Physics (C)	PHY 106	√	√																			
	Computer Programming (B)	CS 101		√	√	√		√		√	√												√
	Electrical Eng. Princp.	EE 191	√	√												√		√					
	Material Technology (A)	ENG 141	√	√			√									√							
	Thermodynamics (A)	ME 103	√	√												√							
	Fluid Mechanics (A)	ME 104	√	√												√		√					
	Theory of Machines (A)	ME 105	√	√	√											√	√			√			
	Production Technology (III)	ENG 101			√	√	√		√	√						√		√					
	Engineering Graphics (C)	ENG 111	√							√													
	Technical Reports	ENG 112					√			√													
	Phys. Educ. & Activ. (C)	PHE 101								√			√										
	Phys. Educ. & Activ. (D)	PHE 102								√			√										
	Eng. Lang. (C)	LNG 101								√													
	Industrial Training (1)	ITR 101		√	√		√			√	√	√				√	√	√	√	√	√		
	Level (2) Mechatronics																						
	Electrical Machines	EE 192	√	√														√					
	Automatic Control	ME 107	√	√																√	√		
	Thermofluids Laboratory (A)	ME 117	√	√												√		√					
	Machinery and Design Laboratory (A)	ME 118	√		√					√						√	√	√					
	Machine Design (1)	ME 101	√		√					√						√	√	√	√			√	
	Stress Analysis	ME 109	√	√												√		√					
	Production Technology Workshop (III)	ENG 103			√	√	√		√	√						√							

	Maintenance and Repair	**ME 106**			√	√	√		√	√						√			√				
	Diploma Project	**ME 111**		√				√	√	√	√	√					√	√					
	Eng. Economics	**ENG 151**								√				√					√				
	Management Princ.	**MNG 101**								√				√									
	Phys. Educ. & Activ. (E)	**PHE 103**								√			√										
	Industrial Training (2)	**ITR 102**		√	√		√			√	√	√				√	√		√	√	√	√	√
Elective Courses*	**Applied Mechanics**	**ENG 122**	√	√												√							
	Basic Electronics laboratory	**MTE 102**	√	√														√			√	√	
	Transducer and Interfaces laboratory	**MTE 103**	√	√														√			√	√	
	Mathematics (D)	**MTH 102**	√	√																			
	Numerical Techniques	**MTH 103**	√	√																			
	Mathematical Analysis	**MTH 104**	√	√																			
	Statistical Techniques	**MTH 105**	√	√																			
	Machine Design (B)	**ME 102**	√		√					√						√	√	√	√				
	Mechatronics	**ME 114**		√			√		√	√						√	√			√	√	√	√
	ELECTROMAG.FIE	**MTE 100**	√	√																	√	√	
	INSTR.&ELEC.CI	**MTE 101**	√	√																	√		
	MEASURM.&INSTR	**MTE 105**	√	√	√											√	√			√	√		
	Computer Systems(1)	**MTE 107**		√	√	√		√		√	√										√	√	
	Electronic Semiconductor Devices	**MTE 106**	√		√																√		
	Computer Aided Graphics	**CS 102**	√							√						√							
	Industrial Engineering (I)	**ME 137**								√				√									
	Operations Researchs	**ME 142**								√													
	Energy And Electrmechanical S.L	**MTE 104**	√													√							
	Modern Egyptian History	**HUM 102**								√													
	Islamic Civilization	**HUM 103**								√					√								
	Arabic Literature	**HUM 104**								√					√								

Stage: Bachelor Stage | **Level: 3 + 4 Mechatronics**

Category	Course Title	Code	Engineering NARS												MechanicalNARS				Mechatronics ARS			
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A01	A02	A03	B1	B2	B3	B4	C1	C2	C3	C4
Core Courses (Mandatory)	**Level (3) Mechatronics**																						
	Projects Management	MNG 201								√				√									
	Mathematics (E)	MTH 201	√	√												√							
	Computer App. in Eng. Industry	CS 201		√	√	√		√		√	√												√
	Electrical Machinery and Control	EE 201	√	√															√	√	√	√	
	Tech. Writing and Tech. Communications	ENG 212								√													
	Information Processing	ENG 213		√	√	√		√		√	√												√
	Engineering Materials	ENG 241	√	√					√							√		√	√				
	Egyptian History	HUM 201								√					√								
	Industrial Training	ITR 201		√	√		√			√	√	√				√	√	√	√	√	√	√	√
	Eng. Lang. (D)	LNG 201								√													
	Production Engineering	ME 201			√	√	√		√	√						√							
	Production Engineering Workshop	ME 202			√	√	√		√	√						√							
	Thermodynamics (B)	ME 203	√	√												√	√						
	Fluid Mechanics (B)	ME 204	√	√												√	√						
	Theory of Machines (B)	ME 205	√	√	√											√	√	√		√			
	Automation Control Systems	ME 207	√	√																√		√	√
	Heat and Mass Transfer	ME 209	√	√												√	√						
	Mechanical Systems Design	ME 210		√												√	√			√		√	√
	Machinery and Design Laboratory (B)	ME 218	√		√					√						√	√	√	√	√			
	Phys. Educ. & Act. (1)	PHE 201								√			√										
	Phys. Educ. & Act. (2)	PHE 202								√			√										
	Level (4) Mechatronics																						

	Industrial Training (4)	**ITR 202**		√	√		√			√	√	√				√	√		√	√	√		√
	B.Sc. Project	**ME 211**		√				√	√	√	√	√				√	√	√	√	√	√	√	√
	Heat Engines and fluids Laboratory (B)	**ME 217**	√	√												√	√						
	Phys. Educ. & Act. (3)	**PHE 203**								√			√										
Elective Courses*	**Simulation & Modeling**	**ENG 221**		√												√	√			√	√	√	√
	Electrodynamics	**MTE 200**	√	√												√	√						
	Digital system laboratory	**MTE 201**	√		√											√	√	√		√			
	Statistical Analysis	**MTH 204**								√													
	Robot Applications	**ME 224**														√	√			√	√	√	√
	Fluid Machinery	**ME 232**	√	√												√	√						
	Thermal Engineering	**ME 231**	√	√												√	√						
	Computer Aided Manufacturing (CAM)	**ME 223**	√													√	√					√	
	Digital Signal Processing	**MTE 204**	√		√															√	√		
	Control of manufacturing Automation	**MTE 203**																		√	√	√	√
	Heat Transfer Equipment	**ME 241**	√	√												√	√						
	Combustion	**ME 245**	√	√												√	√						
	Combustion Engines	**ME 246**	√	√												√	√						
	Renewable Energy	**ME 247**	√	√												√	√						
	Digital Circuits	**MTE 202**	√	√												√	√			√	√		
	Computer Systems (2)	**MTE 205**	√	√			√									√							
	Computer Controlled Machines	**MTE 207**	√	√												√	√			√	√	√	√
	Designing Smart Machines	**MTE 208**	√	√												√	√			√	√	√	
	Engineering Economics	**MNG 221**								√				√									
	Industrial Psychology	**HUM 204**								√				√									
	Organizational Behavior	**MNG 222**								√													
	Economics for Management	**MNG 223**								√				√									
	English Literature	**HUM 202**								√													
	Commercial Law	**HUM 203**								√				√									
	Islamic Civilization	**HUM 205**								√					√								
	German Language (B)	**LNG 203**								√													
	Air Conditioning	**ME 244**											√	√		√	√						

4- Program Competencies with adopted Teaching and Learning Methods:

ILOs		Lectures	Distance learning	Tutorials and studio workshops	Open Discussion	Computer lab	projects	Report writing	Site visits – field survey	Case study	Office meeting
Engineering	A1	√	√	√	√		√		√	√	√
	A2	√		√	√	√		√			
	A3			√	√		√	√	√	√	
	A4	√	√					√	√		
	A5	√	√		√			√			
	A6			√	√		√		√	√	√
	A7			√			√	√	√	√	
	A8				√		√		√		√
	A9			√	√		√	√	√	√	√
	A10				√		√		√	√	
mechanical	B1	√		√	√	√				√	
	B2				√	√	√		√		
	B3	√	√		√	√		√		√	
	B4	√	√	√		√					
mechatronics	C1	√	√		√	√				√	
	C2	√	√	√				√		√	
	C3			√		√	√			√	√
	C4	√	√	√		√	√		√	√	√

5- Program Competencies with adopted Assessment Methods:

ILOs		Written mid-term Exam	Oral Exam	Progress Test	Tutorial assignments	Reports	Project review	Homework	Oral Presentation	Written final term Exam
Engineering	A1	√	√	√	√		√	√	√	√
	A2	√	√	√	√	√				√
	A3		√	√	√	√	√	√	√	
	A4	√			√	√			√	√
	A5	√		√	√	√				√
	A6		√	√	√		√	√	√	
	A7		√		√	√	√	√	√	
	A8			√	√		√		√	
	A9		√	√	√	√	√	√	√	
	A10			√	√		√	√	√	
Mechanical	B1	√	√	√				√		√
	B2			√	√		√		√	
	B3	√		√	√	√		√		√
	B4	√	√							√
mechatronics	C1	√		√				√		√
	C2	√	√		√	√		√		√
	C3		√		√		√	√		
	C4	√	√		√		√	√	√	√

6- Program Courses Hours gap analysis in Relation to NARS Subject Areas:

Stage	Level	Category	Code	Course Title	Total Credit Hours	NARS Subject Areas						
						A	B	C	D	E	F	G
						Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary Subjects
Preparatory Year	Level (0)	Core Courses (Mandatory)	CHM 001	Industrial Chemistry	2			**2**				
			CHM 002	Chemistry Laboratory	1				**1**			
			CS 001	Intro. to Computer	2					**2**		
			CS 002	Comp. Prog.(A)	2					**2**		
			ENG 003	Eng. Drawing (A)	2			**2**				
			ENG 004	Eng. Drawing (B)	2			**2**				
			ENG 005	Prod. Tech. (A)	3			**3**				
			ENG 006	Prod. Tech. (B)	3			**3**				
			ENG 009	Workshop (A)	1				**1**			
			ENG 010	Workshop (B)	1				**1**			
			ENG 011	Technical Concepts	1	**1**						
			ENG 021	Mechanices (A)	2		**2**					
			ENG 022	Mechanices (B)	2		**2**					
			HUM 001	Civil Heritage	1	**1**						
			ITR 001	Intro. Indus. Training	5						**5**	
			LNG 001	Eng. Lang. (A)	1	**1**						
			LNG 002	Eng. Lang. (B)	1	**1**						
			MTH 001	Mathematics (A)	3		**3**					
			MTH 002	Mathematics (B)	3		**3**					
			PHE 001	Phys. Educ. & Activ. (A)	0.5	**0.5**						
			PHE 002	Phys. Educ. & Activ. (B)	0.5	**0.5**						
			PHY 001	Physics (A)	3		**3**					
			PHY 002	Physics (B)	3		**3**					

Stage	Level	Category	Code	Course Title	Total Credit Hours	NARS Subject Areas						
						A	B	C	D	E	F	G
						Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary Subjects
Diploma Stage	Level (1) Mechatronics	Core Courses (Mandatory)	MTH 101	Mathematics (C)	3		3					
			ENG 121	Mechanics (B)	3		3					
			PHY 106	Physics (C)	3		3					
			CS 101	Computer Programming (B)	2					2		
			EE 191	Electrical Eng. Princp.	3			3				
			ENG 141	Material Technology (A)	2			2				
			ME 103	Thermodynamics (A)	3			3				
			ME 104	Fluid Mechanics (A)	3			3				
			ME 105	Theory of Machines (A)	2			2				
			ENG 101	Production Technology (III)	2			1	1			
			ENG 111	Engineering Graphics (C)	1				1			
			ENG 112	Technical Reports	1	1						
			PHE 101	Phys. Educ. & Activ. (C)	0.5	1						
			PHE 102	Phys. Educ. & Activ. (D)	0.5	1						
			LNG 101	Eng. Lang. (C)	1	1						
			ITR 101	Industrial Training (1)	5						5	
			EE 192	Electrical Machines	3			1	2			
			ME 107	Automatic Control	2			1				
			ME 117	Thermofluids Laboratory (A)	1				1			
	Level (2) Mechatronics		ME 118	Machinery and Design Laboratory (A)	1				1			
			ME 101	Machine Design (1)	2			2				
			ME 109	Stress Analysis	2			1	1			
			ENG 103	Production Technology Workshop (III)	1				1			
			ME 106	Maintenance and Repair	1			1				
			ME 111	Diploma Project	2						2	
			ENG 151	Eng. Economics	1	1						
			MNG 101	Management Princ.	1	1						
			PHE 103	Phys. Educ. & Activ. (E)	0.5	0.5						

Stage	Level	Category	Code	Course Title	Total Credit Hours	NARS Subject Areas						
						A	B	C	D	E	F	G
						Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary Subjects
			ITR 102	Industrial Training (2)	5						5	
			ENG 122	Applied Mechanics	2				2			
			MTE 102	Basic Electronics laboratory	1			1				
		Elective Courses for	MTE 103	Transducer and Interfaces laboratory	1				2			
			MTH 102	Mathematics (D)	3		3					
			MTH 103	Numerical Techniques	3		3					
			MTH 104	Mathematical Analysis	2		3					
			MTH 105	Statistical Techniques	2		3					
			ME 102	Machine Design (B)	2				2			
			ME 114	Mechatronics	3				3			
			MTE 100	ELECTROMAG.FIE	3			3				
			MTE 101	INSTR.&ELEC.CI	3			3				
			MTE 105	MEASURM.&INSTR	3				3			
Bachelor Stage	Level (3) Mechatronics	Core Courses (Mandatory)	MNG 201	Projects Management	1	1						
			MTH 201	Mathematics (E)	3		3					
			CS 201	Computer App. in Eng. Industry	1					3		
			EE 201	Electrical Machinery and Control	2			2				
			ENG 212	Tech. Writing and Tech. Communications	1	1						
			ENG 213	Information Processing	1				1			
			ENG 241	Engineering Materials	2			2				
			HUM 201	Egyptian History	1	1						
			ITR 201	Industrial Training	5						5	
			LNG 201	Eng. Lang. (D)	1	1						
			ME 201	Production Engineering	2				2			
			ME 202	Production Engineering Workshop	1				1			
			ME 203	Thermodynamics (B)	3				3			
			ME 204	Fluid Mechanics (B)	3				3			
			ME 205	Theory of Machines (B)	3				3			
			ME 207	Automation Control Systems	2				2			

Stage	Level	Category	Code	Course Title	Total Credit Hours	NARS Subject Areas						
						A	B	C	D	E	F	G
						Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary Subjects
			ME 209	Heat and Mass Transfer	3			3				
			ME 210	Mechanical Systems Design	2			2				
			ME 218	Machinery and Design Laboratory (B)	1				1			
	Level (4) Mechatronics		PHE 201	Phys. Educ. & Act. (1)	0.5	0.5						
			PHE 202	Phys. Educ. & Act. (2)	0.5	0.5						
			ITR 202	Industrial Training (4)	5						5	
			ME 211	B.Sc. Project	3						5	
			ME 217	Heat Engines and fluids Laboratory (B)	1				1			
			PHE 203	Phys. Educ. & Act. (3)	0.5	0.5						
			ENG 221	Simulation & Modeling	2				1	1		
			MTE 200	Electrodynamics	3			3				
			MTE 201	Digital system laboratory	1				1			
			MTH 204	Statistical Analysis	3		3					
			ME 224	Robot Applications	2				2			
			ME 232	Fluid Machinery	3			3				
		Elective Courses for Bachelor	ME 231	Thermal Engineering	3			3				
			ME 223	Computer Aided Manufacturing (CAM)	2					2		
			MTE 204	Digital Signal Processing	2			2				
			MTE 203	Control of manufacturing Automation	2			2				
			ME 241	Heat Transfer Equipment	3				3			
			ME 245	Combustion	3				3			
			ME 246	Combustion Engines	3				3			
			ME 247	Renewable Energy	3				3			
			MTE 202	Digital Circuits	3				3			
			MTE 205	Computer Systems (2)	2				2			
SUM OF Units						**30**	**43**	**61**	**71**	**16**	**32**	**0**
GAP (PRE%)						**14.42**	**20.67**	**29.33**	**34.13**	**7.69**	**15.38**	**0.00**

Stage	Level	Category	Code	Course Title	Total Credit Hours	NARS Subject Areas						
						A	**B**	**C**	**D**	**E**	**F**	**G**
						Humanities and Social Sciences	Mathematics and Basic Sciences	Basic Engineering Sciences	Applied Engineering and Design	Computer Applications and ICT	Projects and Practice	Discretionary Subjects
NARS						**9% - 12%**	**20%- 26%**	**20% - 23%**	**20% - 22%**	**9% - 11%**	**8% - 10%**	**6% - 8%**

Gap Analysis Summery

	Subject Area	Hours	NARS	EXISTING
A	**Humanities and Social Sciences**		**09:12**	
B	**Mathematics and Basic Sciences**		**20:26**	
C	**Basic Engineering Sciences**		**20:23**	
D	**Applied Engineering and Design**		**20:22**	
E	**Computer Applications and ICT**		**09:11**	
F	**Projects and Practice**		**08:10**	
G	**Discretionary Subjects**		**06:08**	
Total			**100%**	**100%**

7- Program Structure and Contents:

7-a- Program Duration:

The program duration is at least five academic years including 3 semesters per year (Summer semester is optional) with max. total number of 15 semesters. Each semester is 15 weeks long except summer one that can extend to only 8 weeks. The maximum study duration is 8 years. The student who cannot fulfill the graduation requirements during this period could re-apply for the study conditioned on the number of credit hours not exceed (2/3) the graduation required credit hours.

7-b- Program Structure:

The program is based on credit-hours system where the credit hour (Cr-h) is the study measurement unit that equals one lecture hour or two practical / exercise hours in a weak within one semester.

Total (Cr-h) required for graduation = 208 Cr-h
Core (Mandatory) = 149 Cr-h
Elective = 59 Cr-h

7-c- Program Stages &Levels:

The program has two stages in addition to the preparatory year (Diploma stage and Bachelor stage). In general, it consists of five levels over its all stages as follow:
Preparatory year = Level (0) = 44 Cr-h
Diploma stage = Level (1) + Level (2) = 83.5 Cr-h
Bachelor stage = Level (3) + Level (4) = 80.5 Cr-h

7-c- Program Registration Rules:

- The student can apply for 20 Cr-h in each first and second semesters of the academic year.
- The student can apply for two courses only with 7 Cr-h or less in the summer semester.

8- Courses Contributing to the Program:

8-1 Preparatory Year: Level (0)

Code	*Course Title*	Weekly hours					Program Competencies covered by course
		Lect.	Exc.	Lab	Total	Total Cr-h	
CHM 001	Industrial Chemistry	2	2	0	4	3	A1, A2
CHM 002	Chemistry Laboratory	2	2	0	4	2	A1, A2
CS 001	Intro. to Computer	2	0	2	3	1	A1,A5
CS 002	Comp. Prog.(A)	1	0	2	3	2	A1,A5
ENG 003	Eng. Drawing (A)	2	2	0	4	2	A1,A8
ENG 004	Eng. Drawing (B)	2	1	0	3	2	A1,A8
ENG 005	Prod. Tech. (A)	2	2	0	4	3	A1, A2
ENG 006	Prod. Tech. (B)	2	2	0	4	3	A1, A2
ENG 009	Workshop (A)	0	1	0	3	1	A1, A2
ENG 010	Workshop (B)	0	0	0	2	1	A1, A2
ENG 011	Technical Concepts	1	0	0	0	1	A5,A8
ENG 021	Mechanices (A)	2	2	0	0	2	A1
ENG 022	Mechanices (B)	2	2	0	0	2	A1
HUM 001	Civil Heritage	1	0	0	0	1	A5
ITR 001	Intro. Indus. Training	0	0	0	4	5	A2,A3,A5,A8, A9,A10
LNG 001	Eng. Lang. (A)	1	2	0	2	1	A8
LNG 002	Eng. Lang. (B)	1	2	0	2	1	A8
MTH 001	Mathematics (A)	2	2	0	4	3	A1
MTH 002	Mathematics (B)	2	2	0	4	3	A1
PHE 001	Phys. Educ. & Activ. (A)	1	0	0	1	0.5	A8
PHE 002	Phys. Educ. & Activ. (B)	1	0	0	1	0.5	A8
PHY 001	Physics (A)	2	2	2	4	3	A1,A2
PHY 002	Physics (B)	2	2	2	4	3	A1,A2
Total Weekly Hours						**44**	

8-2 Diploma Stage Core Courses (Mandatory): Level (1)

Code	*Course Title*	Weekly hours					Program Competenciescovered by course
		Lect.	Exc.	Lab	Total	Total Cr-h	
MTH 101	Mathematics (C)	2	2	0	4	3	A1
ENG 121	Mechanics (B)	2	2	0	4	3	A1
PHY 106	Physics©	2	1	0	3	3	A1,A2
CS 101	Comp. Prog.(B)	1	0	2	3	2	A2,A3,A4,A6,A8,A9,B4,C4
EE 191	Elec. Eng. Princp.	2	2	0	4	3	A1,A2,B4
ENG 141	Material Technology(A)	2	1	0	3	2	A1,A2,A5,B1
ME 103	Thermodynamics(A)	2	2	0	4	3	A1,A2,B1,B2
ME 104	Fluid Mechanics (A)	2	2	0	4	3	A1,A2,B1,B3
ME 105	Therory of Machines(A)	2	1	0	3	2	A1,A2,A3,B1,B2,B3,C1
ENG 101	Production Technology (III)	2	0	0	2	2	A3,A4,A5,A7,A8,B1
ENG 111	Engineering Graphics(C)	0	3	0	3	1	A1,A8,B1
ENG 112	Technical Reports	1	0	0	1	1	A5,A8
PHE 101	Phys. Educ. &Activ. (C)	0	0	1	1	0.5	A8
PHE 102	Phys. Educ. &Activ. (D)	0	0	1	1	0.5	A8
LNG 101	Eng. Lang. (C)	1	1	0	2	1	A8
ITR 101	Industrial Training (1)	0	0	30	30	5	A2,A3,A5,A8,A9,A10,B1,B2, C1,C2
Total Weekly Hours							

8-3 Diploma Stage Core Courses (Mandatory): Level (2)

Code	*Course Title*	Weekly hours					Program Competencies covered by course
		Lect.	Exc.	Lab	Total	Total Cr-h	
EE 192	Electrical Machines	2	2	0	4	3	A1,A2,B3,B4
ME 107	Automatic Control	2	1	0	3	2	A1,A2,C1,C2
ME 117	Thermofluids Laboratory (A)	0	0	2	2	1	A1,A2,B1,B3,
ME 118	Machinery & Design Laboratory (A)	0	2	0	2	1	A1,A3,A8,B1,B2,B3
ME 101	Machine Design (1)	1	2	0	3	2	A1,A3,A8,B1,B2,B3
ME 109	Stress Analysis	2	1	0	3	2	A1,A2,B1
ENG 103	Production Technology Workshop (III)	0	0	2	2	1	A3,A4,A5,A7,A8,B1
ME 106	Maintenance and Repair	1	0	0	1	1	A3,A4,A5,A7,A8,B1
ME 111	Diploma Project	0	0	4	4	2	A2,A6,A7,A8,A9,A10,B1,B2, C1,C2,C3,C4
ENG 151	Eng. Economics	1	0	0	1	1	A8
MNG 101	Management Princ.	1	0	0	1	1	A8

PHE 103	Phys. Educ. &Activ. (E)	0	0	1	1	0.5	A8
ITR 102	Industrial Training (2)	0	0	30	30	5	A2,A3,A5,A8,A9,A10,B1,B2, C1,C2
Total Weekly Hours							

8-4 Diploma Stage Elective Courses*: Level (1&2)

Code	*Course Title*	Weekly hours					Program Competenciescovered by course
		Lect.	Exc.	Lab	Total	Total Cr-h	
ENG 122	Applied Mechanics	2	1	0	3	2	A1,A2,B1
MTE 102	Basics Electronics Laboratory	0	0	3	3	1	A1,A2,B3,B4
MTE 103	Transducer & Interfaces laboratory	0	0	3	3	1	A1,A2,B3,B4
MTH 102	Mathematics (D)	2	2	0	4	3	A1,A2,B1
MTH 103	Numerical Techniques	2	2	0	4	3	A1,A2
MTH 104	Mathematical Analysis	2	1	0	3	2	A1,A2
MTH 105	Statistical Techniques	2	1	0	3	2	A1,A2
ME 102	Machine Design (B)	1	2	0	3	2	A1,A3,A8,B1,B2,B3
ME 114	Mechatronics	2	2	0	4	3	A2,A5,A7,A8,B1,B2,B4,C1,C3
MTE 100	ELECTROMAG.FIE	2	2	0	4	3	A1,A2,B4,C2
MTE 101	INSTR.&ELEC.CI	2	2	0	4	3	A1,A2,C2
MTE 105	MEASURM.&INSTR	2	0	2	4	3	A1,A2,A3,B1,B2,C1,C2
MTE 107	Computer System(1)	2	0	2	4	3	A2,A3,A4,A6,A8,A9,C4
MTE 106	Electronic Semiconductor Devices	2	2	0	4	3	A1,A3,B4,C2
CS 102	Computer Aided Graphics	0	0	2	2	1	A1,A8,B1
ME 137	Industrial Engineering (I)	2	0	0	2	2	A8
ME 142	Operations Researches	2	1	0	3	2	A8
MTE 104	Energy & Electromechanical S.L	0	0	2	2	1	A1,B1
HUM 102	Modern Egyptian History	1	0	0	1	1	A8
HUM 103	Islamic Civilization	1	0	0	1	1	A8
HUM 104	Arabic Literature	1	0	0	1	1	A8
Total Weekly Hours							

8-5 Bachelor Stage Core Courses (Mandatory): Level (3)

Code	*Course Title*	Weekly hours					Program Competencies covered by course
		Lect.	Exc.	Lab	Total	Total Cr-h	
MNG 201	Projects Management	1	0	0	1.00	1	A8
MTH 201	Mathematics E	2	2	0	4.00	3	A1, A2,B1
CS 201	Computer App. in Eng. Industry	0	0	2	2.00	1	A2, A3, A4, A6, A8,A9,C4
EE 201	Electrical Machinery and Control	2	1	0	3.00	2	A1,A2,B4,C1
ENG 212	Tech. Writing and Tech. Communications	1	0	0	1.00	1	A8
ENG 213	Information Processing	1	0	0	1.00	1	A2,A3, A4, A6, A8, A9,C4
ENG 241	Engineering Materials	2	1	0	3.00	2	A1, A2,A7, B1, B2
HUM 201	Egyptian History	1	0	0	1.00	1	A8
ITR 201	Industrial Training(3)	0	0	30	30.00	5	A2,A3,A5,A8,A9,A10,B1, B2, C1, C2
ME 201	Production Engineering	2	0	0	2.00	2	A3, A4, A5, A7,A8, B1
ME 202	Production Engineering Workshop	0	0	2	2.00	1	A3, A4,A5,A7,A8, B1
ME 203	Thermodynamics (B)	2	2	0	4.00	3	A1, A2, B1,B2
ME 204	Fluid Mechanics (B)	2	2	0	4.00	3	A1,A2, B1, B2
ME 205	Theory of Machines (B)	2	2	0	4.00	3	A1,A2, A3, B 1,B2, B3, C1
ME 207	Automation Control Systems	1	0	2	3.00	2	A1, A2, C1, C3,C4
ME 209	Heat and Mass Transfer	2	2	0	4.00	3	A1, A2, B1, B2
ME 210	Mechanical Systems Design	1	2	0	3.00	2	A2, B1, B2, C1
ME 218	Machinery and Design Laboratory (B)	0	2	0	2.00	1	A1, A3, A8, B1, B2, B3,C1
PHE 201	Phys. Educ. & Act. (1)	1	0	0	1.00	0.5	A8
PHE 202	Phys. Educ. & Act. (2)	1	0	0	1.00	0.5	A8
Total Weekly Hours							

8-6 Bachelor Stage Core Courses (Mandatory): Level (4)

Code	*Course Title*	Weekly hours					Program Competencies covered by course
		Lect.	Exc.	Lab	Total	Total Cr-h	
ITR 202	Industrial Training (4)	0	0	30	30	5	A2, A3, A5,A8,A9,A10, B1, B2, C1, C2
ME 211	B.Sc. Project	0	2	5	7	3	A2, A6, A7, A8, A9, A10,B2, B3, C1, C2, C3, C4
ME 217	Heat Engines and fluids Laboratory (B)	0	0	2	2	1	A1,A2, B2, B3
PHE 203	Phys. Educ. & Act. (3)	1	0	0	1	0.5	A8
Total Weekly Hours							

8-7 Bachelor Stage Elective Courses*: Level (3&4)

Code	*Course Title*	Weekly hours					Program Competencies covered by course
		Lect.	Exc.	Lab	Total	Total Cr-h	
ENG 221	Simulation & Modeling	2	0	0	3	2	A2, C1, C2
MTE 200	Electrodynamics	2	2	0	4	3	A1, A2, B1, B2, B4
MTE 201	Digital system laboratory	0	0	2	2	1	A1, A3, B1, B2, B3, B4, C1
MTH 204	Statistical Analysis	2	2	0	4	3	A8
ME 224	Robot Applications	1	2	0	3	2	C1,C2,C3
ME 232	Fluid Machinery	2	2	0	4	3	A1,A2, B1, B2
ME 231	Thermal Engineering	2	2	0	4	3	A1,A2, B1, B2
ME 223	Computer Aided Manufacturing (CAM)	1	0	2	3	2	A1, B1, B2, C1
MTE 204	Digital Signal Processing	2	1	0	3	2	A1, A3, C2
MTE 203	Control of manufacturing Automation	2	1	0	3	2	C1, C4
ME 241	Heat Transfer Equipment	2	2	0	4	3	A1, A2, B1, B2
ME 245	Combustion	2	2	0	4	3	A1,A2, B 1,B2
ME 246	Combustion Engines	2	2	0	4	3	A1,A2, B1, B2
ME 247	Renewable Energy	2	2	0	4	3	A1,A2,B1,B2
MTE 202	Digital Circuits	2	0	2	4	3	A1, A2, B1, B4, C1
MTE 205	Computer Systems (2)	1	0	2	3	2	A1
MTE 207	Computer Controlled Machines	1	0	2	3	2	A1, A2, C1, C2,C4
MTE 208	Designing Smart Machines	1	2	0	3	2	A1, A2,B1, B2,C1, C2,C3
MNG 221	Engineering Economics	1	0	0	1	1	A8
HUM 204	Industrial Psychology	1	0	0	1	1	A8
MNG 222	Organizational Behavior	1	0	0	1	1	A8

MNG 223	Economics for Management	1	0	0	1	1	A8
HUM 202	English Literature	1	0	0	1	1	A8
HUM 203	Commercial Law	1	0	0	1	1	A8
HUM 205	Islamic Civilization	1	0	0	1	1	A8
LNG 203	German Language (B)	1	1	0	2	1	A8
Total Weekly Hours							

9- Courses Contents:

Code	Course title	Contents
Preparatory Year – Level (0)		
MTH 001	**Mathematics (A)**	Functions, limits of functions, techniques for finding limits, limits involving infinity, continuous functions, the derivative, techniques of differentiation, differentials, the chain rule, implicit differentiation applications of the derivatives, extreme of functions, the mean value theorem, optimization problems, Newton's method, antiderivative and indefinite integration, the definite integral, the fundamental theorem of calculus.
MTH 002	**Mathematics (B)**	Applications of the definite integral, area, solids of revolution, arc length and surfaces of revolution, logarithmic and exponential functions and their derivatives, inverse trigonometric and hyperbolic functions and their derivatives and integrals, techniques of integration, integration by parts, trigonometric integrals, integrals of rational functions, reduction formulae, indetermined forms and improper integrals.
PHY 001	**Physics (A)**	Properties of Matter: physical quantities, standard units, dimensions, oscillations. Gravitation. Fluid statics, surface tension, fluid dynamics, viscosity. Elasticity, waves in elastic media, sound waves. Heat: temperature and temperature measurement, thermal expansion, heat transfer, the first law of thermodynamics, kinetic theory of gases, entropy and the second law of thermodynamics. Coulomb's law, the electric field, Gauss law, the electric potential, capacitance and dielectrics, current electricity, electric circuits.
PHY 002	**Physics (B)**	Electricity and magnetism: charge and matter, the electric field, Gauss law, electric potential, capacitors and dielectrics, current resistance and electromotive forces, the magnetic field, Ampere's law, Biot-Savart law. Maxwell's equations in integral form.
CHM 001	**Industrial Chemistry**	Kinetic molecular theory of gases, ideal gases. Boyle's law, Charlie's law, Avogadrro's law, ideal gas equation, some useful forms derived from ideal gas equation, Dalton's law, Graham's law and it's practical application, deviation of gases from ideal behavior, real gases, Van Der Waal's equation, liquifaction of gases and Joule-Thomson effect and it's application, Liquid state. Environmental chemistry petroleum.
CHM 002	**Chemistry Laboratory**	Qualitative analysis: identification of a simple salt. Quantitative analysis, volumetric analysis (neutralization, titration, oxidation, reduction, complex formation, precipitation).
CS 001	**Introduction to Computer Science**	Computer terminology and concepts. The history, state of the art and future of data processing Basic hardware and software concepts. The computer's effect on society, Operating Systems, DOS as an example.
CS 002	**Computer Programming.(A)**	Structured programming with the high level language PASCAL. The techniques of good programming style and how to design, code, debug, and document program laboratory assignments. Topics progress from basic PASCAL syntax and semantics to sequential non-text files. The control features, data structures, standard I/0 libraries and the operators of the language.
ENG 003	**Engineering Graphics (A)**	Drawing practice, graphics geometry and tangency construction, projection of bodies of simple geometric, pictorial representation and technical sketching, orthographic projection, pictorial drawing and sectioned views.
ENG 004	**Engineering Graphics (B)**	Types of sectioned views, assembly drawing, familiarity with specifications, reading of blue prints, interpretation of various symbols commonly used, interpretation of material lists and bills of materials.
ENG 005	**Production**	Introduction to production (manufacturing processes), manufacturing

	Technology (A)	elements, properties of engineering materials, classification according to machinability, cast-ability. Principles of cutting and forming properties. Tools and tool geometry, machine tools simplified analysis, forming machines simplified analysis, wood working, timber kinds and properties, Wood working tools and equipment, wood working machines, types of joints technology, finessing and protection processes, safety, costing. Sheet metal working, developing of surfaces. Shearing bending, duct tubes rolling, seam joints, safety, costing. Bench works, marking sawing, chiseling, filing, etc.Casting of metals, the foundry, foundry sands, molding technology, pattern making, core making, melting in the foundry, pouring different casting processes, felting, cleaning, finishing and inspection. Powder metallurgy, rolling, forging process, wire drawing, extrusion, cupping and deep drawings, spinning, blanking and piercing, enclosing, coining and stamping.
ENG 006	**Production Technology (B)**	Welding: Joining of metals, mechanical joining, metallurgical joining, fusion welding, oxyacetylene welding and cutting, under water welding and cutting, electric arc welding. Physics of arc, power sources, TIG and MIG, argon welding, coated electrodes classifications, standards, coding systems, CO2 welding, carbon arc welding. Cold welding cladding. Hot pressure welding, forge welding, electric resistance welding, spot and seam welding, flash welding, percussive welding, projection welding, friction welding, diffusion welding, ultrasonic welding. Brazing, soldering, surfacing tests, welding defects, safety, costing.Machining processes: Theory of metal cutting, tool geometry, cutting speeds, feeds, cutting fluids, tool materials, work piece materials and properties, machinability. Machine tools classification, the lathe, description of mechanisms, turning processes, cylindrical, internal, taper, threads. Profile copying, cam turning, NC and CNC machines. Shaping and planing, boring, milling, sawing, broaching, gear cutting, indexing, gear sharpening, hobbling, non-conventional and modern machining processes.
ENG 009	**Production Technology Workshop (A)**	Practical training on the basic workshops like, machining (lathe, milling, shaping, drilling, and grinding machines). Identification of the main parts of each machine and how to select the cutting variables on each machine performance of simple exercises. Wood working; hand tools, types of wood and machines, filing. Welding; simple joints on arc welding and oxyacetylene welding. Length and angle measurements using micrometer, vernier and protractors. Sheet metal works; Cutting, Rolling, Binding and making joints on sheets. Casting; recognition of the main elements and tools used in casting and how to make a mold using a core and a pattern for a simple casting.
ENG 010	**Production Technology Workshop (B)**	Machining: Practical training on metal cutting, operations on center lathe, milling m/c, shaper and drilling m/c, gear cutting on milling m/c. hand press and mechanical press of different capacities, shearing (blanking, piercing and deep drawing processes). Welding: Oxyacetylene; different techniques used in oxyacetylene welding, fluxes, welding and cutting torches, prepare and make some joints, safety during welding operations. Arc welding; the main elements, different coatings, welding methods, prepare and make some joints, safety. Resistance welding; main elements, joints of different shapes. Soldering and brazing; the main differences between them and the tools used, joints by soldering.
ENG 011	**Technical Concepts**	Industry and technology. Engineering materials, standardization and interchange-ability. Material handling and storage. Energy. Pollution and waste disposal. Information systems. Report writing. Selected industries (textiles, garment, plastics, refrigeration, pumps, electric, etc.).
ENG 021	**Mechanics (1)**	Introduction to engineering mechanics. Vector analysis. Forces on particles and rigid bodies, equilibrium of particles and rigid bodies, forces and moments, applications on beams. Analysis of simple structures, kinematics of particles. displacement, velocity and acceleration using scalar and vectorial methods, kinetics of particles. Newton's law, work and energy, impulse and momentum.

ENG 022	**Mechanics (2)**	Dynamics of a Particle: Kinematics of a Particle. Motion of a particle (position, displacement, velocity and acceleration). Coordinate systems (Cartesian, natural, polar and cylindrical). Kinetics of a Particle. Equation of motion. Applications (projectile, simple harmonic motion, motion in resisting medium). Work and. energy. Principle of conservation of energy. Momentum. Impulse. Impact.
HUM 001	**Culture Heritage**	Definition of Cultural heritage, its source, ups and downs, objectives and motivations. Throwing light on some of the scientific facts brought about by human civilization.
LNG 001	**English Language (A)**	Cambridge English course, developing reading skills, listening and keep listening. Basic technical English, from current course books and other authentic materials. English grammar in use.
LNG 002	**English Language (B)**	Headway intermediate course, developing reading skills, authentic reading, writing skills, task listening. Basic technical English interface, English for technical communication Grammar.
PHE 001	**Physical Education (A)**	General physical education concepts and theoretical topics. Introduction of sports psychology. The effect of movement activities on Organs of the body. Physical gymnastic exercises (1)
PHE 002	**Physical Education (B)**	Functional anatomy of muscles skeletal system, biomechanics of connective tissue, functional aspects of muscle and a discussion of mechanics and energetic. Factors that contribute to sport injuries, principles of prevention and car, first aid management, the treatment of injuries, rehabilitation techniques in sports medicine and safe practice and the low.
ITR 001	**Industrial Training (A)**	The student learns to identify the various production units and the way they inter-connect in the production process. The student is also trained to operate the various pieces of machinery in order to recognize his technical inclinations as a prelude to his selection of a specification within the institute. The student is also trained to identify the raw materials, as well as the handling, processing and machining of materials to obtain intermediate and final products. The duration of this industrial training is thirty hours per week spread over a minimum of five days for one academic term.
Diploma Stage Core Courses (Mandatory)– Level (1)		
MTH 101	**Mathematics (C)**	Sequences, convergent or divergent series, positive terms series, convergence tests, alternating series and absolute convergence, power series, Maclaurin and Taylor series, conic sections, rotation of axes, polar coordinates, integrals in polar coordinates, polar equations of conics, functions of several variables, limits and continuity, partial derivatives, chain rule, directional derivatives, extreme, double integrals, area and volume, double integrals in polar condinates, change of variables and Jacobians.
PHY 106	**Physics (C)**	Physical optics: interference, diffraction, polarization, electro- and magneto- optical effects.Modern physics: basic constituents of matter, the atomic structure, the interaction of similar and dissimilar atoms, the interaction of photons and electrons, basic properties of atomic nuclei, radioactivity.
CS 101	**Computer Programming (B)**	Advanced computer programming techniques are taught and practiced in laboratory assignments. Emphasis is on the advanced features of the language, including such topics as recursive routines, records, pointers, and sets. Basic data structures such as stacks, queues, and lists are covered along with the algorithms for their implementation
ENG 101	**Production Technology (III)**	Foundry technology; pattern and core making design and manufacture, foundry sands, selection, preparation, testing, sand moulds, moulding boxes, solidification mechanism, gating and risering design, melting furnaces, charges calculations, casting processes, sand casting, permanent molds, Plaster of Paris shell moulds, lostwax, centrifugal casting, die casting continuous casting, mechanized foundry, felting, inspection, testing, casting defects, repairs, safety, costing.
ENG 103	**Production**	Sand casting methods, how to design a pattern and shapes. Shrinkage and

	Technology Workshop (III)	machining allowances. Prepare a mould for pouring, taking into consideration the riser, pouring and venting gates. Putting and inspection of casting.
ENG 111	**Engineering Graphics (C)**	Construction drawing, working drawing, threads, fasteners, locking devices, drawing representation of welding, rivets gears, pulleys and bearings, types of keys and splins fits and tolerance. -Introduction in computer-aided drafting.
ENG 121	**Mechanics (C)**	Distributed loads, friction, center of gravity and moments of inertia work and potential energy. Kinetics of system of particles, kinematics of rigid bodies in plane motion. work. energy and momentum of rigid bodies, vibration.
ENG 141	**Material Technology (A)**	Atomic structure of matter, X-ray diffraction, crystallography, solidification mechanism, grains and grain boundaries, theory of alloys, binary and ternary alloys, thermal equilibrium diagrams, iron carbon diagram, TTT diagrams, heat treatments, carbon steels, alloy steels, cast iron, non ferrous metals and alloys, conventional alloys used in mechanical and electrical engineering.
ENG 151	**Engineering Economics**	Equivalence, time value of money, present and future worth of SINGLE, uniform and gradients, normal and effective interest rates, comparing alternatives using present worth, comparing alternatives using annual worth and comparing alter-natives using rate of return.
ME 103	**Thermodynamics (A)**	Covers the fundamentals of thermodynamics; thermodynamic properties, processes, reversible and irreversible processes, and first and second law of thermodynamics. Properties of pure substances, and gas laws are considered. Carnot and Rankine cycle is studied.
ME 104	**Fluid Mechanics (A)**	Covers fundamentals of fluid mechanics including basic physical laws governing the static and dynamics of fluids. It includes theory and applications of continuity, impulse-momentum, and Bernoulli equation principles. Fluid flow in piping systems, pneumatic, hydraulic and fluid measurements are covered.
ME 105	**Theory of Machines (A)**	Mechanisms. Kinematics of links. Turning moment diagrams, gear trains. Belts, brakes and clutches. Balancing. Vibration principles.
ME 109	**Stress Analysis**	Introduction, definitions, stress, strain, etc. Generalized Hooke's Law, pressure vessels, torsion, bending, transformation of stress, yield and fracture criteria, elastic stress analysis. Introduction to experimental stress analysis.
EE 191	**Electrical Engineering Principals.**	Introduction, linear circuits, resistive circuits, capacitance, inductance & impedance. AC circuits, electronic devices and circuits, transistors and integrated circuits. Digital logic.
MNG 101	**Management Principals.**	Overview of functional responsibilities of managers such as planning, organizing, leading and control. The student applies same to a real life project of his choice.
LNG 101	**English Language (C)**	Headway upper intermediate, developing ready --- authentic materials, ideas for a story. English for communication. Grammar.
PHE 101	**Physical Education& Activities (C)**	General culture topic may be selected from the following areas: comparative study of liberal and socialist systems party systems, and their role in democratic societies the role of the media in forming public opinion reports on field trips to social societies museums, news media writing brochures, leaflets, TV and press interviews.
ME 123	**Cooling technology**	Introduction, orientation & safety, Refrigerator & domestic air-conditioners, Primary & secondary refrigerants, Thermal insulation, Gas charging, testing & faults diagnosis, Commercial RAC plants & Car air-conditioners
ITR 101	**Industrial Training (1)**	The student should study one or two electronic systems. The student must be able to write a technical report describing the main details of the system.
Diploma Stage Core Courses (Mandatory)– Level (2)		
ME 101	**Machine Design (1)**	Phases of design, codes and standards, materials in mechanical design, stress analysis, combined stresses and Mohr's circle, design of different

		modes of failure, columns, springs, static shaft design, keys, power screw and fasteners, bolted connections welded joints and machine frame, seals, pipes, shrink fits and press.
ME 106	**Maintenance and Repair**	Performance criteria. Maintenance strategies. Components inspection. Flow diagrams of action. Fault diagnosis. Dismantling and assembly. Acceptance tests. Practical cases.
ME 107	**Automatic Control**	Block diagrams and feedback principles. System (closed loop systems), control actions, stability of control systems. Design criteria, sensors for various fields. Amplications.
ME 111	**Diploma Project**	The student selects one of the available projects in the department with the help of the academic staff. The full plan of the project should prove that the student has satisfactorily achieved the following: Understanding of both the theoretical and practical aim of the project, Ability to search for references and to survey for technology, Ability to express his ideas and present his project in acceptable form.
ME 117	**Thermofluids Laboratory (A)**	Introduction and types of fluid meters, velocity measurements, flow rate measurements. Types of tests and measuring instruments in ICE. Ignition timing measurements, compression pressure test. Exhaust gas analysis, engine analyzer. Refrigeration cycle, performance, coefficient of performance. Air conditioning systems, Performance, coefficient of performance.
ME 118	**Machinery and Design Laboratory (A)**	Introduction, project description, design calculation, construction, detail drawings and tolerances and fits. Processes of manufacturing, presentation and evaluation.
EE 192	**Electrical Machines**	Transformers, losses, tests, efficiency and auto transformer. DC machines, DC generator, DC motor, losses and efficiency. AC machine, induction machines, synchronizer machines.
ENG 112	**Technical Reports**	Introduction to technical reports, identification of the problem, identification of the audiences and readers survey on the problem and work already done about it. What did you do? Results and conclusions, projects and evaluation.
PHE 102	**Physical Education& Activities (D)**	Introduction to music, The main features include :.theoretical orientation, musical instruments, musical note, playing music, training on solo and choir singing.
PHE 103	**Physical Education& Activities (E)**	Introduction to knitting : a brief study of knitting machines, kinds of strings, training on various types of hand made stitches, computerized knitting, basics of knitting machine maintenance.
ITR 102	**Industrial Training (2)**	The student should study one electronic system, and should do detailed analysis and evaluation of the system.
Diploma Stage Elective Courses – Level (1&2)		
ME 102	**Machine Design (B)**	Static and fatigue strength, power transmitted elements. dynamics shaft design, motion control: clutches and brakes, gears; spur, helical, bevel and worm gearing, belts and chains, bearings hydrodynamics, hydrostatic and anti-friction bearings.
ME 110	**Heat Technology (I)**	Basic applications of thermodynamics in the study of internal combustion engines, compressors, gas turbines, steam power stations, refrigeration, air conditioning and combustion processes are studied.
ME 112	**Thermo-Fluid Machines**	Application of fluid mechanics and thermodynamics to fluid flow machines is considered. Theory, design, and performance characteristics of pumps, compressors and turbines are studied.
ME 113	**Electromechanics**	Stationary alternating current and direct current magnetic circuits. Transformers. Electromechanical systems. Direct current commutator machines. Electronic control of electric motors. General theory of electric machines.
ME 114	**Mechatronics**	A comprehensive introduction to electronics covering the design of modern electronic networks (both digital and analog) with emphasis on mechanical applications of integrated circuits and on circuit design.
ME 115	**Fault Detection**	Introduction, Maintenance principles, Stands for failure modes effects and critically analysis, Basic vibration, Free and force response, Vibration and shock isolation, Modulation and beats, Failure analysis, Time and

		frequency domain analysis.
ME 119	**Machine Design (C)**	Applications of hydraulics, pneumatics, gears. Vacuum and pressure vessels, vibration parameters in design, project design, design layouts specifications. CAD.
ME 127	**Industrial Pollution and Control (I)**	Types of pollutants, units and concentrations, analysis of industrial waste, safe limits of solid, liquid and gaseous industrial pollution, pollution control and waste treatment.
ME 129	**Energy Technology Laboratory**	Project to be designed during this lab course.
ME 131	Introduction to computer design	Working Drawings, Sectional views, Advanced orthographic and pictorial drawings, 3D modeling software, Auxiliary views, Revolutions, Design Problems, Engineering drawings and sketching.
ME 135	**Metrology**	Principles of metrology and the relationship of precise measurement to design practice and production processes are studied. The theory of design and utilization of various precision measurement instruments is covered. The laboratory applications of precision measurement devices.
ME 136	**Cost Analysis**	A study of the methods of preparing cost estimates to be used in the management of an industrial enterprise. Methods of operations estimating, product estimating and project estimating are introduced
ME 140	**Production and Inventory Control**	The concept of a basic production control system and the requirements of production control for both continuous and intermittent manufacturing are covered. Management of inventory is treated as an integral part of the production control system. Various methods and techniques are studied in detail. Lab.oratory activities include the use of microcomputers to develop a simple manufacturing requirement planning model and other applications. Simulation is used as a tool for decision making in the lab.
ME 143	**Industrial Safety**	A study of industrial controls that assist engineers in the reduction of hazards associated with OSHA standards, occupational disease and injury, as well as use and abuse of materials. Machinery and equipment. Emphasis is on identification and abatement of potential losses through the application of OSHA Standards and the effects upon workers compensation rates. A major course project involves an in-plant safety inspection. Written and oral reports of findings and recommendations.
MTE 100	**ELECTROMAG.FIELDS**	Maxwell's equations and the lorentz force law . Quasi-static froms of Maxwell's equations. Studies of Electro-quasi-static fields and their sources through solutions of Poisson's and Laplace's equations. Steady conduction and polarization. Charge relaxation. Magneto-quasi-static approximation, magnetic boundary. Value problems, magnetization, induction, current induced in stationary and moving conductors . Electric and magnetic forces derived from energy. Electromagnetic waves Extensive use of engineering examples.
ME 137	**Industrial Engineering (I)**	Concept of Optimization, Linear programming and simplex Method, Non linear Programming problem and their solution, Brief review of probability theory, queuing theory, Models of Queuing systems, application
ME 142	**Principles of Operations Research**	A study of the quantitative techniques used in the solution of industrial engineering operations problems. Topics include graphical and simple linear programming, assignment and transportation algorithms, decision making under uncertainty, Bayes formula, queuing theory and simulation, computer-based solution techniques are used where appropriate.
MTE 101	**INSTRUMENTS &ELECTRICAL CIRCUITES**	Fundamentals of Lumped Networks, Resistive Elements and Networks, Energy Storage elements, Dynamics of First – and Second – order Networks. Sinusoidal Steady – State Analysis, Network Equivalence Theorems, Electonic Devices, Circuits and Applications.
MTE 102	**Basic Electronics laboratory**	The aim of the lab is to introduce to the student to the operational principles of active and passive elements and their applications in circuits – Taking this lab will enable the student to implement transistors or operational amplifiers in simple circuits such as switching or amplification and will enable the student to include diodes and passive elements (resistors, capacitors and inductors) in wave shaping circuits.

MTE 103	**Transducer and Interfaces laboratory**	Experiments on digital – to – analog and analog to digital conversion, data transfer, serial and parallel ports. Transducers for velocity, temperature, pressure, and light are to be covered.
MTE 104	**Energy And Electromechanical Systems Laboratory**	Independent laboratory work involving electromechanical systems, power electronics, high – voltage systems, rotating electric machinery, bio-electromechanical, energy systems, and control. Student choice of project is either from a list of suggested topics or developed by student in conjunction with instructor.
MTE 105	**Measurement& Instrumentation**	Introduces measurement principles, transducers, signal conditioning, recording and analysis instrument. Measurement process. Brief description of transducers for measurement of pressure, temperature, flow strain , force, acceleration, etc..., instrumentation types and measurement techniques, data analysis and error analysis. Emphasizes a hands-on approach with a wealth of laboratory experiments. Brief introduction to computer data acquisition.
MTE 106	**Electronic Semiconductor Devices**	Semiconductor band structure, electron transport, semiconductor barriers: P – N junction, schottley junction, Ohmic contacts, hetero – junction. Applications to bipolar transistors and metal-semiconductors Transistors.
MTE 107	**Computer Systems(1)**	Multilevel Memory Systems ; Naming and Binding; Privacy of information – Atomaicity and Coordination of parallel Activities. Recovery and Reliability. Networks and Distributed System .
MTH 102	**Mathematics (D)**	First order differential equations, separable and exact differential equations, linear differential equations, homogenous differential equations with constant coefficients, nonhomogenous differential equations, the method of undetermined coefficients, the method of variation of parameters, series solutions of differential equations, Legendre polynomials, Bessel functions, Laplace transformation, convolution theorem inverse Laplase transformation solution of initial and boundary value problems using Laplace transformation.
MTH 103	**Numerical Techniques**	Types of errors, algorithms and convergence, solutions of equations in one variable, interpolation and polynomial approximation, divided differences, central differences, inverse interpolation, numerical differentiation and integration, composite integration, Romberg integration, numerical solution of ordinary differential equations, initial value problems, Euler's method, Runge - Kutta methods, multi step methods.
MTH 104	**Mathematical Analysis**	Complex numbers, regions in the complex plane, limits, continuity, derivative, analytic functions, Cauchy - Riemann conditions, elementary functions dud mapping by them definite integral, line integrals in the complex plane, Cauchy's theorem, Cauchy's integral theorem, derivatives of analytic functions, power series, Taylor series, Laurent series, poles, singularities, residue theorem evaluation of real integrals, conformal mapping.
MTH 105	**Statistical Techniques**	Definition of statistics, frequency tables and histograms, cumulative frequency, basic statistical concepts, probability, conditional probability and independence, rules of probability, random variables and their expected values, discrete probability distributions, continuous probability distributions, bivariate and marginal probability distribution expected values of functions of random variables.
CS 102	**Computer Aided Graphics**	An introduction to computer graphics, including hardware. programming concepts, and a survey of applications. The interactive Graphics Software will be developed in projects using the microcomputer. A component of the course will be a graphics project utilizing the BASIC programming language and AutoCAD.
MNG 111	**Operation Management (I)**	A study of the major topics and practices of Operations Management. Emphasis is on the management process for improving productivity in both product and service organizations. Topics include product and service design, process design, workforce design, conversion process, material management, quality control; maintenance practice, and operations strategy.
MNG 112	**Project Planning**	A study of planning and control methods for industrial and production

		projects, including the Critical Path Methods (CPM) and Program Evaluation and Review Technique (PERT) . Topics include scheduling, updating and controlling with schedules, time-cost trade-off. resource allocation. cost control for projects, and the roles of project personnel in project organizations.
MNG 113	**Feasibility Studies**	An integrated look at project evaluation taking into consideration technical, economic, manpower, financial and environmental aspects. Case studies reflecting real life situations will be included.
MNG 114	**Marketing**	A study of Marketing topics which focus on the relationship between the firm and the environment, and the requirements for sensitivity to the changing needs of these sectors. The course will also address the systematic relationship between marketing functions and other technical production functions.
LNG 103	**German Language (A)**	Beginner's course. Development of speaking ability and mastering of German basic structures. Reading and understanding of simple texts
LNG 104	**French Language (A)**	An elementary French course. Drill in pronounciation, elementary principles of inflection and basic sentence patterns. Reading of easy texts.
HUM 102	**Modern Egyptian History**	Particular attention is given to important events determining the life of the Egyptian in the twentieth century. The appearance development and growth of Egyptian middle class and its role in the national movement.
HUM 103	**Islamic Civilization (A)**	Difference between culture and civilization , Ibn Khaldun's concept of civilization, the foundation of Islamic civilization. The decline of Islamic civilization.
HUM 104	**Arabic Literature**	Introduction to Arabic literature, students are introduced to various Arabic literature forms selected readings from representative contemporary literary figures.
Bachelor Stage Core Courses (Mandatory)– Level (3)		
ME 201	**Production Engineering**	Welding, thermit welding, electron beam welding, cold welding, diffusion welding, plasma welding, arc welding, closed welding, ultrasonic welding, surfacing tests, welding defects, safety, costing. Theory of plasticity (simplified), stress-strain and yield criteria, methods of determination of residual, stresses and strain hardening, dimensional changes. Forming processes: product design, process variables technological aspects, defects, inspection and testing of finished products. Hot forging, drop forging, die. forging cold and hot extrusion, impact extrusion, Wire and tube drawing, safety, costing.
ME 203	**Thermodynamics (B)**	Thermodynamic analysis of power and reversed cycles, and an application to internal combustion engines, gas turbines. compressors, refrigeration and air conditioning. Fundamentals of gas dynamics: adiabatic, fanno and Rayleigh one dimensional flow.
ME 204	**Fluid Mechanics (B)**	Governing equations of fluid flow, continuity, momentum and energy equations. Potential flow and hydrodynamics. Real fluid flow, Navier Stokes equations, boundary layer, laminar and turbulent flow.
ME 205	**Theory of Machines (B)**	The course covers the dynamics of machines and linkage, gear trains, and mechanical vibrations.
ME 207	**Automation Control Systems**	The course covers the interfacing of numerical control machines and robot control systems with a host computer, programming techniques, sensory techniques, and work cell simulations.
ME 210	**Mechanical Systems Design**	Forming machine design, eccentric systems design, frame casting, fabrication design, hydraulic systems, pump selection power requirement, valves, accumulators, reliability, projects evaluation,
ME 218	**Machinery and Design Laboratory (B)**	Course is practical training on the steps taken to design and manufacture a certain item which will be chosen by the students.
ENG 213	**Information Processing**	A course designed to build skills in the use of commercially available personal computer software. Representative programs include work processing, spreadsheets, and database management systems.
ENG 241	**Engineering Materials**	Metallic materials, polymeric materials, ceramic materials, composite material and advanced electronic material.
EE 201	**Electrical Machinery**	Topics covered include AC and DC machines, transformers, feedback

	and Control	control, polyphase circuits, distribution and instrumentation.
MTH 201	**Mathematics (E)**	Complex numbers, regions in the complex plane, limits, continuity, derivative, analytic functions, Cauchy-Riemann conditions, elementary functions and mapping by them, definite integral, line integrals in the complex plane, Cauchy's theorem, Cauchy's integral theorem, derivatives of analytic functions, power series, Taylor series, Laurent series, Poles, singularities, residue theorem, evaluation of real integrals, conformal mapping.
MNG 201	**Projects Management**	A study of management techniques for planning scheduling, controlling, costs and leveling resource requirement. The completion of a project schedule using the. critical path method is required. Topics covered are the estimate as a basis for scheduling, networks, arrow diagrams, time scaled diagram, resource leveling and computer applications.
LNG 201	**English Language (D)**	Language power, discovering discourse, writing academic English, Technical English.
PHE 201	**Physical Education& Activities (I)**	Introduction to Plastic Arts : Appreciation of the artistic aspects of natural elements, studying the artistic effect of light and shadow, arts workshop woodwork practice, making simple original color designs on glass material, metal and leather artistic creation.
PHE 202	**Physical Education& Activities (II)**	Introduction to Dramatic Arts : Origin and development of dramatic art vocal training and oral performance character representation dealing with the audience study of different dramatic forms, play acting .
ITR 201	**Industrial Training (3)**	student must be able to show his ability of understanding a specific application.
Bachelor Stage Core Courses (Mandatory)– Level (4)		
CS 201	**Computer Applications in Engineering Industry**	A study of the commercially available spreadsheet project management, Database and Work Processing programs as problem solving tools in an industrial Engineering Technology environment. The course should be taken early in the student's program of study so that the skills and techniques learned will be available in subsequent courses. Lab.oratories are scheduled on an individual self-paced basis with extensive use being made of microcomputers.
ME 202	**Production Engineering Workshop**	Construction of processes and operations sheets, time study, cost estimation. Projects evaluation
ME 209	**Heat and Mass Transfer**	Fundamentals of heat transfer by conduction; steady and Unsteady, convection, forced and natural radiation. Mass transfer; fundamental and operations. Analysis of industrial heat and mass transfer operations, equipment design.
ME 211	**B.Sc. Project**	The student selects one of the available projects in the department with the help of the academic staff. The fulfillment of the project should prove that the student has satisfactorily achieved the following: Understanding of both theoretical and practical aspects of the problem in his project; Ability to search for references and to survey modern technology; Ability to suggest solution for the problem and the acceptable and useful conclusions to solve the problem Ability to express his ideas and present his project in the acceptable form.
ME 217	**Thermofluids Laboratory (B)**	Function and performance of measuring instruments, calibration. Temperature and heat flux measurements, boiling and evaporation, conduction, convection, heat exchanger. Refrigeration cycle performance. Flow in pipes and ducts. Performance of pumps and turbines. Performance of steam generator. Performance of internal combustion engines.
ENG 212	**Technical Writing and Technology Communications**	Study of basic organization, style and mechanics of technical and administrative reports. The course includes practice in assignments such as technical descriptions, proposals, instructions and recommendations. Emphasis is placed on planning, organizing and writing reports, design of visual aids, elements of technical editing and preparation of final drafts.
HUM 201	**Egyptian History**	The development of the social, political and economic systems. The rise and development of the national movement and its role in achieving

		independence and democracy.
PHE 203	**Physical Education& Activities (III)**	Photography : History of Photography from 1826 up to the present time, theoretical aspects of photography types of cameras : Polaroid, automatic, single reflex (SLR) etc. photography in practice taking photo picture, developing , printing, making home made line films, using video .
ITR 202	**Industrial Training (4)**	The student should continue in this training in the same topic of specialization of ITR 201 with deep understanding of the topic, in addition to the realization and measurement of a selected project in the same field.
Bachelor Stage Elective Courses – Level (3&4)		
ME 221	**System Analysis**	The systems approach, the concept of systems analysis, steps of systems analysis, data gathering techniques, symbols of systems analysis, flow charting techniques, applications of systems analysis.
ME 222	**Computer Aided Design (CAD)**	An introduction to the fundamentals of computer aided design and drafting. The use of personal, computer and commercial CAD software as tools in graphic communications. Computer applications to machine design calculations and other Mechanical Engineering Technology, areas using high level language. Emphasis on mechanical drafting.
ME 223	**Computer Aided Manufacturing (CAM)**	Fundamental concepts of manufacturing and automation. Numerical controls of manufacturing systems. Fundamentals of CAD/CAM. Computers in manufacturing. Computer process monitoring. Modeling and analysis of process control. Manufacturing support systems. Integrated manufacturing systems.
ME 224	**Robot Applications**	A general survey of the applications of industrial robots to manufacturing processes. Programming of robots for manufacturing operations and material handling.
ME 231	**Thermal Engineering**	Applications of thermodynamics and heat transfer to power stations, combustion engines, industrial plants. Emphasis is given to energy planning and economic utilization. Cogeneration of energy in industrial systems is needed.
ME 232	**Fluid Machinery**	Energy transfer considerations. Theory and design of pumps, turbines, and compressors performance characteristics. Selection criteria. Operations and system
ME 234	**System Diagnosis**	Data processing and analysis, vibration analysis, contaminant analysis and sound analysis. Discrete frequencies. Fault analysis, planning and system availability, Reliability/failure concepts, Reliability data sources.
ME 237	**Industrial Engineering (II)**	Factory planning, material flow, plant planning, material handling equipment, quality control, statistical methods, costing, cost analysis, direct and indirect costs, machine hour rate, depreciation, industrial safet
ME 241	**Heat Transfer Equipments**	Analysis of heat and mass transfer operations in industrial system and design considerations. Emphasis on boilers, cooling towers, condensers, evaporators, and reactors.
ME 242	**Energy Conversion**	Analysis of conventional energy; conversion systems. Steam and gas power turbine stations, system components design, energy, planning and economical considerations.
ME 243	**Refrigeration**	Topics covered: refrigeration cycle analysis, refrigerants, equipment design and selection, cold stores, cryogenics and liquification of gases.
ME 244	**Air Conditioning**	A study of the design of heating and cooling systems for residential and industrial applications. System components and analysis, heating and cooling load estimates, detailed design calculations are conducted for the sizing of fail, ducts, pumps and piping.
ME 245	**Combustion**	The course covers the thermodynamics of combustion, fuels. chemical kinetics, fundamentals of gas dynamics, detonation and shock waves. normal and detonating combustion, combustion in internal engines, gas turbines, and industrial, furnaces, alternate fuels.
ME 246	**Combustion Engines**	The course covers system analysis components, performance characteristics, and diagnosis of internal combustion engines and gas turbines.
ME 247	**Renewable Energy**	The course covers energy sources, fundamentals of nuclear, solar, wind, waves, and biomass energies. Emphasis on availability and utilization, system design and economic considerations.

ME 248	**Energy Conservation and Management**	A study of the optimization energy resources, and economic utilization. The course covers the second law of thermodynamics, availability, analysis of industrial energy transfer processes: energy losses, optimization of mass and energy transfer, power Cogeneration in industrial systems, and energy storage.
ME 249	**Energy Laboratory (Special)**	Project to be designed during this course.
ME 261	**Industrial Pollution and Control (II)**	A continuation of the course ME 127 with emphasis on tile analysis, measurement and control of industrial pollution in Ramadan Tenth City.
ME 262	**Small Projects Planning & Management**	Definition of small project, characteristics of small project, planning of small project, small project organization, small project control, performance evaluation.
ME 263	**Production Financial Analysis**	Interpretation of financial and related data for internal and external use of industrial firms, horizontal and vertical analysis, computation of various ratio and their impact on the decision.
ME 264	**Quality Control (II)**	Quality planning, quality organization, the economics of quality, concept of quality system, elements of quality system, the concept of total quality management, standard quality systems ISO 9000.
ME 265	**Machine Tool Design**	Basic principles of the design of tools for material removal are studied; blanking, bending, forming, drawing, casting joining, and inspection processes are covered. Applied laboratory exercises illustrate the course material through a case study APPROACH
ME 267	**Production Cost Analysis**	A study of general accounting principles. particularly in relationship to the systematic recording. organizing and analysis of financial data for effective decisions. Emphasis is placed upon systems of cost control in job order, process, standard and variable costing systems, and recording and control of material, direct labor, and overhead cost.
ME 268	**Material Handling Equipment**	Interplant transporting facilities and handling equipment, types of materials handling equipment components (chains ropes, pulleys, sprockets drums, gears, brakes, clutches and bearings) and theory of hoisting equipment, crane frame structures. stability of cranes. Elevators.
ME 269	**Operation Research**	Linear programming, simplex method, duality theory, algorithms, applications of elementary game theory, logic structures and models in queueing theory with application to decision making, inventory models, network analysis, types in non linear and integer programming.
MTE 200	**Electrodynamics**	Plane waves in three dimensions; radiation from elementary electric dipoles current distributions, and arrays; diffraction and interference. Waves on continuous transmission lines , periodic structures, and dielectric and metallic wave guides, propagation and evanexence; energy flow and impedance matching . Phase and group velocity . Natural frequencies and modes of closed electromagnetic structures; coupling to resonant structures, loaded and unloaded Q's Examples taken from the fields of acoustics, optics , and microwaves.
MTE 201	**Digital system laboratory**	The aim of the lab is to introduce to the student all basic components of digital design. Taking this lab will enable the student to understand and utilize digital components such as counter, registers, memories, multiplexers and decoders in order to implement logic functions . In addition, microprocessors should be introduced towards the end of the course, and simple assembly language programs should be written to implement functions such as addition, multiplication and so on .
MTE 202	**Digital Circuits**	Combinational / Sequential Logic – Flip – Flops – Multipiexers- Decoders – Counters – Synchronization Techniques .
MTE 203	**Control of manufacturing Automation**	Provides background for applying computer. Based control system techniques to batch manufacturing Processes. Follows a brief review of classical control concepts and servo-systems with an in-depth study of the modeling and control problems associated with several manufacturing processes . These include metal cutting , metal forming , and welding processes.
MTE 204	**Digital Signal Processing**	Representation , analysis , and design of discrete time signals and systems, Z-transforms and the discrete Fourier transform. Difference equations -

		The fast Fourier transform (FFT) algorithm High – speed convolution – Time – and frequency – domain design techniques for recursive and non – recursive systems. Finite word length effects . Additional topics may include Homo – morphic signal processing, Hilbert transforms , parametric signal modeling, power spectrum estimation – applications.
MTE 205	**Computer Systems (2)**	Emphasizes the relationship among hardware organization, systems – programming, and language support in the evolution of computer architecture, Effect of instruction set design on performance and programmability; methods of addressing , creating , protecting, and storing data and procedure objects; processor and memory design and programming issues in vector and multiprocessor systems .
MTE 206	**System Identification**	Determination of valid mathematical models for physical and social systems, using observations of their behavior . Different philosophies of modeling ; stste space time series . Multiple input – output, nonlinear and time varying systems. Parameter estimation algorithms; full information maximum likelihood, least squares, parameter identifiability. Model validation; data – anomaly detection robust estimation. Discussion of available software packages .
MTE 207	**Computer Controlled Machines**	State – of – the - art technigues involving use of digital and analog computers to monitor and control physical processes. Topics : introduction to analog and digital hardware at the computing module level, programming techniques for digital minicomputers in real – time on line applications, and fundamental topics in signal conditioning and data reduction. Students should be able to program in a high level language and set up elementary simulations on an analog computer.
MTE 208	**Designing Smart Machines**	Introduction to designing smart products with embedded microcomputers. Topics include microprocessors as design elements, microprocessor architecture, interfacing, to mechanical devices, assembly and high level languages , design of real time software, hardware / software trade-off, implementation choices for smart products, smart product design process. Students undertake one or more preliminary projects and substantial term design project completed individually or in groups.
ENG 102	**Production Technology (IV)**	Structure of metals and alloys. Crystal imperfections, recovery, recrystalization and grain growth, cold and hot working, strain hardening, deformation by slipping and by twinning, idealized stress/strain curves, determination of flow cues. Theories of yielding, forging, theory, practice and die design. Rolling of metal, rolling and extrusion, extrusion of metals, wire drawing, tube drawing, deep drawing.
ENG 104	**Production Technology Workshop (IV)**	Determination of flow curves for different materials. Upsetting of lead and brass specimen. Extrusion of uniform or non-uniform shapes. Rolling of flat strips for different thicknesses. Determination of spring back in bending. Wire and tube drawing of copper. Deep drawing of aluminum and brass Sheering.
ENG 122	**Applied Mechanics**	Internal forces, friction, virtual work. Spatial kinematics of a rigid body. Gyroscopic motion.
ENG 142	**Material Technology (B)**	Mechanical properties of metals, tensile, compression, bending, torsion, shear, hardness, fatigue, creep, thermal shock. Thermal fatigue tests. Non-destructive test, physical properties of metal, dislocation theory, residual stresses, methods of measuring and determination. spectral and microanalysis of alloys.
ENG 215	Engineering Material Selection	The problem of material selection, the functional requirements of engineering metals, integration of design and economic analysis with materials and process selection, case studies.
ENG 221	**Simulation & Modeling**	An introduction to the basic role of simulation in system modeling. Presents approaches to organizing and conducting simulation studies. Emphasis is on the principles and practice of discrete-event simulation using one or more applicable programming languages.
ENG 231	**Automated Manufacturing**	An introduction to recent advances in manufacturing and in manufacturing support systems. Topics include group technology, automated process

	Systems	planning, cellular manufacturing robotics, and the automation of shop floor control and materials handling functions. Case studies and readings from current periodicals are used.
EE 203	**Applications of Industrial Computers**	Computer applications in CAD/CAM, Robotics. Computer applications in control of industrial processes, flow, pressure, temperature. Computer applications in autombile industry.
EE 292	**AC and DC Machines**	A study of motor control systems used in industry. A study of ladder diagrams, sequence control, and relay logic as a basic reference for the application of programmable controllers (PCs) and stability of the control system. Power rectification, inverted methods and SCR motor control will also be studied.
CS 103	**Computer Applications (I)**	Introduction to commercial software and microcomputers. The three main topics of software will be word processors. Spreadsheets, and database management. How to use microcomputers with different operating systems, and how to purchase microcomputers and packaged software will be covered.
MTH 202	**Mathematics (F)**	Fouries series, even and odd functions, half range expansions, quarter range expansions, Fourier transformation, basic concepts of partial differential equations, D'Alembert's solution of one dimensional wave equation, method of separation of variables, heat and wave equations, Laplace's equation, Laplace transformation and Fourier transformation applied to partial differential equations.
MTH 203	**Num. Tech. Analysis**	**Linear system of equations, Gauss elimination method, matrix inversion, norms of vectors and matrices, iterative techniques for solving linear systems, boundary value problems for ordinary differential equations, the shooting methods for linear and nonlinear problems, finite difference methods for linear and nonlinear problems, numerical solutions to partial diffrential equations, elliptic, parabolic and hyperbolic types.**
MTH 204	**Statistical Analysis**	Statistics and sampling distributions, the sample mean and variance, the normal approximation to the binomial distribution Hypothesis testing, two sided test of the mean, testing the variance, the chi - square test, testing of randomness, testing for goodness of fit, simple regression, probabilistic models, acceptance sampling.
MNG 202	**Material Management**	The concept of material management, material organization, material requirements planning, inventory control, purchasing procedures, purchasing methods, negotiation.
MNG 211	**Operation Management (II)**	A continuation of Operations Management I: emphasis is placed on strategic management and productivity as it relates to Operations Management. Course will focus on formulation and implementation of the operations management activities in a practical situation, specific applications identified and developed.
MNG 212	**Projects Planning and Management**	Project organization, tendering procedures, management of project resources, project management, information systems, project progress evaluation.
MNG 213	**Feasibility studies**	Project phases, pre investment studies, opportunity studies, pre feasibility studies, support studies, market analysis, project economic evaluation, sensitivity analysis, risk analysis.
MNG 214	**Industrial Marketing**	The basics of industrial marketing, industrial markets, products and purchasing practice, industrial marketing research, demand measuring and sales.
MNG 221	**Engineering Economics**	Costing and costing systems, depreciation methods, breakeven analysis, replacement analysis, decision making under certainty, decision making under risk, evaluation of public projects.
MNG 222	**Organizational Behavior**	A study of organization theories, concepts and structures, individual and group behavior, communication process, leadership, conflict management, motivation, management of change.
MNG 223	**Economics for Management**	Resource allocation money, material, machine and manpower. Economic aspects in marketing, economic considerations in decision making.
LNG 203	**German Language**	Systematic discussion of grammatical difficulties. Oral practice and

	(B)	reading of more difficult texts. Practice in guided composition.
LNG 204	**French Language (B)**	Continuation of the audio Lingual method of intensive elementary French. Review of grammatical patterns. Expansion of conversational and written skills and vocabulary.
HUM 202	**English Literature**	Introduction to the forms of literature, short story, novel, drama and poetry. Developing students' critical ability through carefully selected sample literary texts.
HUM 203	**Commercial Law**	Kinds of contracts, contract constituents, contract administration, the limitations as imposed by law, disputes, claims, arbitration, the legal variables encountered in business and commercial transactions.
HUM 204	**Industrial Psychology**	An introduction to the history, methods and the major theories, concepts of industrial psychology. The course provides non-majors with an overview of the field of industrial psychology, while majors gain a foundation for further study.
HUM 205	**Islamic Civilization (B)**	Intellectual aspect of Islam prominent Arab and Muslim scholars and their contribution to various scientific feed mathematics, astronomy, chemistry, medicine…..etc.
HUM 206	**Islamic Studies**	Traditions of prophet Mohamed , Islamic society in Madina , Muslims treatment of non Muslims. The role of the mosque in Islamic society .

10- Program Admission Requirements:

The Higher Institute of Engineering and Technology at New Minia accepts the Egyptian highschool certificate (scientific division) or equivalentcertificate awarded by foreign country according to the rules and grades that applied by the national admission office in the supreme council of universities.The specialist stages of the program start after a successful pass of the preparatory year (level 0) with at least 33 units out of the required 44 units. The students are then distributed among the different programs in the Higher Institute according to rules set by the institute council that depend on the final grade in the preparatory year as well as students' self-selection and departments requirements.

11- Regulations for Progression and Program Completion:

- The student should achieve at least 208 units in order to be graduated from the program with at least ---- GPA.
- The student is promoted to the next level of the program specialist stages if he/she fulfills the minimum registered and required units of his/her academic year.
- The student must attend more than 75% of the lectures, tutorials and laboratory exercises for each course, as a condition to be allowed to take the final exam. The student who does not meet the 75% attendance will not be allowed to take the final exam. He should make a request with an excuse that the department and institute councils can accept in order to be allowed to go through the final exam. In the case of request rejection, the student is considered "fail" in the course he/she was not allowed to attend its finals.
- The student is required to submit a graduation project in either architectural design or city planning fields according to his/her selection and the rules set by the department council. An extension of four weeks is given to students after the summer semester of level (4).
- The student is entitled to be examined in courses he failed with the students currently studying these courses. In case the student score is 65% and above from the course maximum mark, his mark is reduced to that of the upper limit of "Pass" grade.
- The mark and grade remain the same without change for the student who failed to appear for an examination due to an acceptable excuse.
- Without desecration of Articles 83, 84 and 85 of the executive bylaws of the University Regulation Law, the successful completion of a course is evaluated according to grade points as follows:

Grade	GPA	Equivalent Grade	Percentage
A+	4.0	Distinct (+)	More than 95%
A	3.7	Distinct	From 90 to less than 95%
A-	3.3	Distinct (-)	From 85 to less than 90%
B+	3.0	Very Good (+)	From 80 to less than 85%
B	2.7	Very Good	From 75 to less than 80%
C+	2.3	Good (+)	From 70 to less than 75%
C	2.0	Good	From 65 to less than 70%
D+	1.7	Pass (+)	From 60 to less than 65%
D	1.3	Pass	From 55 to less than 60%
D-	1.0	Pass (-)	From 50 to less than 55%
F	0.0	Fail	Less than 50%

12- Program Evaluation Methods:

Evaluator	Tool	Sample
1- Senior students	Questionnaire	Sample of 25% out of students in years 1,2 and 3
2- Alumni	Questionnaire	Sample of 25% of final year students
3- Stakeholders (Employers)	Questionnaire	Samples from different sectors
4-Internal Evaluator(s)	Internal Report	1-2 reports
5-ExternalEvaluator(s)	External Report	1-2 reports
6- Other	Student's scientific conference according to the universities law of 49 in 1972.	1-Senior students 2-Alumni 3-Employees 4-Stakeholders (Employers)

We certify that all of the information required to deliver this program is contained in the above specification and will be implemented.

Program Coordinator:	
Head of Mechanical Engineering(Mechatronics)Dept.	**Dr/ Abdelsalam Ezzat**
Signature:	

Quality Assurance Unit	
Dr. Medhat Mohammed Osman	
Signature:	

Dean and Chairman:	
Prof. Dr. Gamal El-Dean Ali Abo Al-Magd	
Signature: