Faculty of Engineering and Technology

Student Guide

According to:

Bylaw 2022

2022 - 2023

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1. FACULTY OF ENGINEERING

1.1. Vision

To be a distinguished educational and research institution in engineering sciences and applications, and effectively serve the society

1.2. Mission:

To provide outstanding engineering programs that keep pace with the scientific development and society needs, and provide engineering graduates qualified for boosting the country and competing domestically and globally, and effectively contribute to serving the industry and society, and enrich the scientific research

1.3. Strategic Objectives

1- To regularly develop academic programs in accordance with local and global reference standards and the needs of the job market
2- To attract outstanding faculty members and teaching assistants with diverse scientific backgrounds
3- To attract top-ranked students for joining the faculty and its academic programs
4- To acquire local and global accreditation of academic programs
5- To develop research capabilities of faculty members and teaching assistants
6- To provide for scientific research and excellent publications in research areas of domestic and global interests
7- To complete having specialized and internationally accredited research labs
8- To develop the center for engineering consultations and professional services
9- To participate in developing the society, providing solutions for environmental and community problems, and interacting with local institutions and authorities
10- To partner with distinguished institutions and international universities for academic and professional collaborations
11- To be rated in regional and international academic rankings

1.4. Strategic Plan:

✓ *Core Values*

As professionals, we are committing to the institutional values of Badr University in Cairo and to the codes of ethics that govern the engineering professions at the national & international levels.

✓ *Integrity and Work Ethics*

We seek respect, trust, and fair treatment amongst our community of students, faculty members and staff. We hold ourselves accountable for our actions and words; we insist on ethical behavior, personal honor, transparency, and avoiding all conflicts of interest.

✓ *Leadership*

We lead by making a difference in our faculty and society; inspiring our students to succeed and innovate in modern business, industry, and communities; and creating a learning environment that

encourages our members and students to reach their full potential through development of personal knowledge and skills.

✓ *Creativity and Innovation*

We encourage new ideas, innovative learning tactics, individual diversity, and intellectual curiosity among our faculty and students; we embrace different forms of expression, student discovery, entrepreneurial activities, and international outreach.

✓ *Quality and Excellence*

We offer rigorous international curricula in different engineering disciplines; we provide our students with diverse learning events and competitions. We are balancing between teaching, scholarly, and professional activities.

✓ *Collaboration*

We encourage team work; promote members of our community to support for each other's success; support interdisciplinary research. We value open communication and collaborative decision-making; and we seek partnerships with industry, government, and academic institutions.

✓ *Societal Commitment*

We commit to engineering consultations and professional services for business, industry, and community; we encourage our students to become productive and responsible citizens; we commit to continuous progress of our community; we promote public engagement and interaction; and we participate in the development of sustainable infrastructures.

1.5. Strategic Goals:

1. Excellence in Education and Learning
2. Excellence in scientific research and innovation
3. Excellence in society service and environment development
4. Effective global partnerships

1.6. Departments

Each department administers the following undergraduate academic programs.

Department	Academic Program
Basic Sciences	*Administers the preparatory year for* **all academic programs**
Architectural Engineering	1. Architecture
Civil Engineering	2. Structural Engineering
Mechanical Engineering	3. Energy Engineering and Renewable Energies
	4. Mechatronics Engineering
Electrical Engineering	5. Electronics Engineering and Electrical Communications
	6. Computers Engineering and Systems
Chemical and Petrochemicals Engineering	7. Chemical Engineering *(Inactive Program)*
	8. Petrochemicals Engineering *(Inactive Program)*

1.7. Degrees:

The School of Engineering and Technology offers the following Bachelor of Science degrees:

1. B.Sc. in Architecture
2. B.Sc. in Structural Engineering
3. B.Sc. in Energy Engineering and Renewable Energies
4. B.Sc. in Mechatronics Engineering
5. B.Sc. in Electronics Engineering and Electrical Communications
6. B.Sc. in Computers Engineering and Systems
7. B.Sc. in Chemical Engineering *(Inactive)*
8. B.Sc. in Petrochemicals Engineering *(Inactive)*

1.7. Degrees:

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2. GENERAL PROVISIONS (REFERRED TO BYLAW 2022)

2.1. The Study System

− The study is conducted in the English language and according to the credit hour system. The study extends over five levels, each level includes two semesters of no less than 14 weeks each, in addition to a summer semester of no less than seven weeks. Studying for all programs begins with the general level, which is followed by four specialized levels according to the nature of each program.

− The College Council may, after taking the opinion of the concerned department council and according to the nature of the courses, decide to teach and hold tests for one or more courses in educational modes and electronic tests (hybrid education), so that the study in the course is 60% face-to-face and 40% by the distance education system, or by any means. Another percentage, provided that this is presented to the University Education and Student Affairs Council for approval and submitting it to the University Council for approval.

2.2. The features of the credit hours system

The programs follow the credit hour (CH) system, which is the system used in the United States and many countries worldwide. The credit hour is calculated as follows:

One Credit Hour = one Lecture hour or 2 hours exercises or 3 hours laboratory

The Bylaw shows the number of credit hours and the hours of lectures, exercises and laboratories for each course.

The completion rates for each student are calculated at the end of each semester and upon graduation as follows:

− The course points achieved by the student in each course are calculated as the number of credit hours for this course multiplied by the grade points according to the following table.

− The total points achieved by the student in any semester are calculated as the sum of the points of the courses that the student passed in this semester.

− The semester average is calculated as the total points achieved by the student in the courses in this semester divided by the total number of credit hours for these courses.

− The cumulative GPA of the student is calculated at the end of any semester as the total points achieved by the student in all the courses that were studied, divided by the total number of credit hours for these courses, taking into account the rules related to clearing, repetition and improvement.

− The cumulative GPA for graduation is the cumulative GPA at graduation and after passing all graduation requirements.

The following table shows the student's position in the study system, depending on the number of credit hours that the student finishes studying in relation to the total number of hours for each program:

Level	Student Classification	Percentage of credit hours passed successfully
1	Freshman	From 0% to 20%
2	Sophomore	More than 20% to 40%
3	Junior	More than 40% to 70%
4	Senior	From 70% to 100%

2.3. Conditions of Students Registration

The Secondary School students (Thanawia Ammah), Mathematics division, or its equivalent, shall be allowed to enroll in the faculty of Engineering according to the conditions established by the Council of Private Universities.

2.4. Dates of Study and Registration

The academic year consists of three semesters:

- **The first main semester (autumn):** starts around the middle of September and lasts for a period of no less than 14 weeks, followed by 3 weeks of exams, provided that courses are registered within three weeks before the start of the semester.

- **The second main semester (spring):** starts in February and lasts for no less than 14 weeks, followed by 3 weeks of exams. Courses must be registered within one week before the start of the semester.

- **Summer Semester:** It begins in late June or early July and lasts for a period of no less than seven weeks, followed by one week for exams and study for a period of no less than 7 weeks. Courses must be registered within one week before the start of the semester.

Course registration is considered final after the approval of the academic advisor and the approval of the program coordinator.

New students join the program throughout the year, after fulfilling the requirements of the program and paying the enrollment fees according to the status of each student.

Registration for the summer semester is optional.

2.5. Duration of Study

The study period for a regular student is 10 semesters. The outstanding student can finish his studies in a shorter period in accordance with the registration conditions (Article 12) and fulfill the graduation requirements. In all cases, the duration of the study does not exceed 20 semesters, not including the suspended semesters for reasons accepted by the College Council. After this period, the student is dismissed from the program in which he is enrolled. A student who fulfills the graduation requirements is granted a bachelor's degree in one of the graduation cycles: January semester - May semester - September semester.

2.6. The Academic Advisor

An academic advisor is appointed for each student, who is selected from among the faculty members, to follow up with the student and assist him in selecting courses in each semester according to the study plans. The academic advisor does the following:

- Guiding the student academically and socially, and following up on the student to help him overcome difficulties throughout his studies
- Guiding the student and assisting him in choosing the academic path and assisting in determining the academic courses in which he is registered in each semester according to the registration conditions.
- Assisting the student in choosing a minor and graduation project.
- The academic advisor may advise the student to repeat courses in which the student has already succeeded, or ask him to enroll in additional courses, with the aim of raising the cumulative average to fulfill the conditions for graduation.

2.7. Conditions of Registration

- A student can register for courses in the main semester, after the approval of the academic advisor, with a maximum number of approved hours in accordance with the following rules:
    o Up to 21 credit hours for a student with a GPA greater than or equal to 3.0.
    o Up to 18 credit hours for a student with a GPA greater than or equal to 2.4 but less than 3.0, and this number is recorded in the first semester after the student enrolls.
- A student can register for courses in the summer semester, after the approval of the academic advisor, with a maximum number of approved hours according to the following rules:
    o Up to 9 credit hours for a student with a GPA greater than or equal to 3.0.
    o Up to 8 credit hours for a student with a GPA of less than 3.0.
    o The student can register one additional academic course for the previous limits after the approval of the academic advisor, if this will lead to his graduation.
- The student must pass 70% of the approved hours for the program as a condition for registering the graduation project, which is divided into two semesters, two semesters, which the student must study according to their arrangement.
- Students studying at non-academic degrees are allowed to register for academic courses according to the rules of the maximum hours. The student receives a statement of the courses he has studied and the grades he has obtained.
- Regular students, as well as students with non-academic degrees, can register as listeners in some courses, and they are not allowed to enter the final exam for these courses.
- Each program is allowed to specify the courses that are offered each semester and the methods of students' registration in them, except for the courses specified as required to study other courses or necessary for graduation, so they must be made available for registration every semester as needed.

2.8. Requirements for obtaining a bachelor's degree

- To obtain a Bachelor of Engineering degree, the student must successfully complete the required credit hours in accordance with the conditions stipulated in each program (a cumulative grade point average of no less than C+).

- The student must meet success in the graduation project.

- The student must perform summer training for a period of 8 weeks during the years of study in an industrial or service establishment or consulting expertise house related to his specialization, and this is under the supervision of the college and he submits a comprehensive report on the training period and the training is evaluated by a committee with the knowledge of the concerned department. Provided that the training begins after the successful completion of 30 credit hours, and it is required that half of the training period be after passing 60 credit hours.

2.9. Conditions for deletion, addition and withdrawal

- The student has the right to change the courses in which he was previously registered with another one within two weeks of the start of the study in the regular semester or one week in the summer semester.

- Deleting or adding academic courses should not lead to a violation of the minimum and maximum number of credit hours registered for each semester.

- The student has the right to withdraw from any course until the end of the fourth week of the semester, with a full refund of the prescribed fees for registering the course. The student is allowed to withdraw from the course until the end of the eighth week with a refund of only 40% of the prescribed fees for registering the course, provided that the absenteeism rate does not exceed 25% in this course.

- If the student submits a request to withdraw from a course after the end of the eighth week, he may withdraw from the course until the end of the tenth week, and the fees will not be refunded to him, provided that he has not performed one of the final exams and is not subject to deprivation due to exceeding the percentage of absence in this course.

- The withdrawn student must repeat the courses from which he withdrew in a subsequent semester, study and exam, after paying the prescribed educational service fees, and the previous time he withdrew from is not counted as a failure.

2.10. Method of the student assessment

Scores for each course are distributed as percentages of the total score for a course. Scores are divided into student activities scores, mid-semester exam scores, practical exam scores, and final exam scores as shown in the following table.

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Table 1. The distribution of course scores according to the nature of the course exam

The nature of the exam course	Great degree	Assessment elements and grade distribution				
		Mid-semester exam	assignments (reports) short exams Discussions and presentations	Practical exam	oral exam	Term end exam (written)
Final written only	100 marks	20%	30%	-	-	50%
Practical + Final written	100 marks	15%	25%	10%	-	50%

- In the case of the project decision, 50% of the grade is allocated for the periodic follow-up (the work of the year), 50% for the oral discussion.

- The student's grade depends on his performance in each course during the semester, including exams, or reports that are requested of him, or interaction with the professor in explanation rooms, video conferences, or any other means that help evaluate the student's performance.

- The specification of each course provides for the distribution of grades on the different assessment methods. The College Council may amend the distribution of grades after coordination with the concerned department and announcing that distribution to students before the start of the semester.

- The student fails the course and gets an grade (F) if the total grades obtained in the course are less than 60% of the total grades of the course, or he was prevented from attending the final exam due to exceeding the percentage of absence, or by a disciplinary decision, or he did not attend the exam without presenting an acceptable excuse. from the College Board.

- In order for the student to be considered successful in the course, he must obtain at least 40% of the final written exam score specified for the course. This condition does not apply to courses in which there is no final exam. If the student does not achieve this percentage, he gets an grade (F), regardless of the total scores obtained in this course.

- The student must attend at least 75% of the total hours of lectures, exercises and laboratories for the course in order to be allowed to attend the final exam of the course.

- Some courses, such as practical training and seminars, are evaluated on the basis of (pass/fail) and are not included in the GPA calculation.

- The College Council may, after taking the opinion of the concerned department council and according to the nature of the academic courses, decide to hold the exam electronically in one or more courses. The exam may also be held in all or part of the course, allowing it to be corrected electronically, provided that this is presented to the University's Education and Student Affairs Council for approval and submitting it to the University Council for approval.

2.11. Courses Ratings

- The number of points for each course is calculated according to the total score obtained during studying this course (activities - mid-semester exam - practical exam - final exam). The following table shows the number of points and the grade obtained through grades:

Grade		Points	The percentage obtained by the student
Excellent	A+	3.80-4.00	From 95% to 100%
	A	3.60-3.79	From 90% to less than 95%
	A-	3.40-3.59	From 85% to less than 90%
Very Good	B+	3.20-3.39	From 80% to less than 85%
	B	3.00-3.19	From 75% to less than 80%
Good	C+	2.80-2.99	From 70% to less than 75%
	C	2.60-2.79	From 65% to less than 70%
	D	2.40-2.59	From 60% to less than 65%
Fail	F	0	Less than 60%

- The courses in which the student is registered as a listener or in which he must pass only, or the student did not complete them because of his college admission, and are not included in the calculation of the average points, for which one of the following estimates is made:

Grade	Meaningful	
AU	Audit	Listener
P	Pass	Successful
F	Fail	Failed
W	Withdrawn	Withdrawn
I	Incomplete	غير مكتمل

2.12. Honors and awards of excellence

- Honors are granted to a student whose cumulative average is not less than 3 upon graduation with achieving at least such a cumulative average during all semesters of study, and it is required that the student has not obtained an F grade in any course during his studies in the college and that he has not been signed No disciplinary penalty on the student during this period.

- The college sets a system to encourage outstanding students by reducing tuition fees in gradual proportions with the cumulative average, and announces at the beginning of each semester the list of outstanding students and the rates of reducing expenses for each student.

2.13. Academic warning - dismissal from studies - mechanisms for raising the GPA

- If the student's semester average drops to less than 2.4 in any main semester, he is given an academic warning, and it is decided that the student must raise his semester average to at least 2.4.

- The student is dismissed from the study if he repeatedly receives an academic warning for six consecutive main semesters. If the student's semester average exceeds 2.4 in any semester, the academic warnings are recalculated from the beginning, starting from the next semester.

- If the student does not fulfill the conditions for graduation within the maximum period of study, which is ten years, he will be dismissed.

- The College Council may consider the possibility of granting the student who is exposed to dismissal as a result of his inability to raise his cumulative average to at least 2.4, one and last chance for two main semesters in addition to the summer semester to raise his cumulative average to and fulfill the graduation requirements, provided that he has successfully completed At least 80% of the total number of credit hours required for graduation, and that there is an opportunity for the student to raise his semester GPA to at least 2.4.

- The student may re-study the courses in which he has previously succeeded in order to improve the GPA.

2.14. Calculation of average points and cumulative rate

- The points obtained by the student in each course are calculated as the number of credit hours for the course multiplied by the points obtained by the student according to the grade table.

- The Semester-GPA for any semester is calculated as the result of dividing the total points obtained by the student in that semester, divided by the total credit hours for these courses.

- The cumulative-GPA points average is calculated at the end of each semester as the result of dividing the total points of all courses studied by the student by the total credit hours for these courses.

2.15. Graduation Grade

An estimate of obtaining a bachelor's degree may be mentioned in the graduation certificate based on the cumulative total at graduation and according to the following table

Cumulative total at graduation	Graduation Grade
More than 85%	Excellent
More than or equal to 75% and less than 85%	Very Good
More than or equal to 65% and less than 85%	Good

2.16. Coding courses in each program

Courses in all study programs are coded according to the following format

الكود	القسم
HUM	مواد إنسانية (الجامعة)
BAS	العلوم الأساسية
ARE	الهندسة المعمارية
CVL	الهندسة المدنية
ELC	الهندسة الكهربية
MCH	الهندسة الميكانيكية
CHP	الهندسة الكيميائية و البتروكيماويات
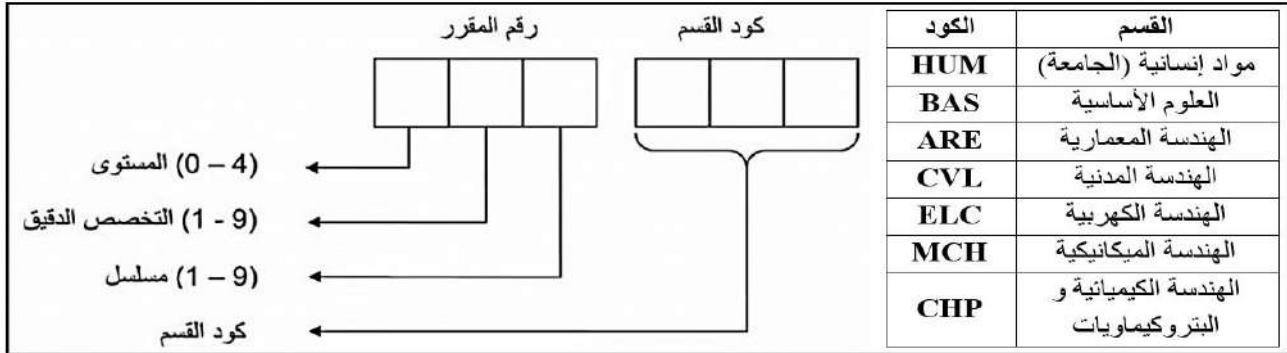
The course code is linked to the scientific section that offers it, regardless of the specialization of the program and the students for whom the course is offered. The first part is the code for the scientific section of three letters, provided that the second part is divided into three numbers, as follows:

- The first number (0 to 4) is the academic level in the program
- The second number (1 to 9) indicates the exact specialization within the department. Departments should show a list of these specializations at the beginning of each program.
- The third number (1 to 9), which is the series of the course within the subspecialty.

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3. UNIVERSITY & FACULTY REQUIRED COURSES

3.1. University and Faculty Requirements

General courses are offered for all academic programs as:

- **University Requirements (UR);** Humanities courses = 8 Courses = 14 CH
  These courses are taught by general university teachers.
- **Faculty of Engineering Requirements (FR);** Basic science courses = 14 Courses = 38 CH
  These courses are taught by Basic Science Department at the Faculty of Engineering and Technology- Badr University (BUC).

3.1.1 University Requirements (UR) Courses (For All Programs)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses (4 CH):							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUMx14	Scientific thinking and Technical Report Writing Skills	**1**	1	0	0	1
3	HUM012	English Language	**2**	1	2	0	3
Elective Courses: (University (Humanities) Elec.) Student must select **five courses (10 CH)** from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

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3.1.2 Faculty of Engineering (FR) Requirements Courses (For All Programs)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses (38 CH): for all programs							
1	BAS011	Mathematics (1): Differentiation and algebra	**3**	2	2	0	4
2	BAS012	Mathematics (2): Analytical geometry and integration	**3**	2	2	0	4
3	BAS021	Physics (1)	**3**	2	1	2	5
4	BAS022	Physics (2)	**3**	2	1	2	5
5	BAS023	Computer Programming (1)	**2**	1	0	3	4
6	BAS031	Mechanics (1): Statics	**3**	2	2	0	4
7	BAS032	Mechanics (2): Dynamics	**3**	2	2	0	4
8	BAS033	Engineering Production	**3**	2	0	3	5
9	BAS041	Chemistry	**3**	2	1	2	5
10	BAS061	Engineering Drawing and Projection	**4**	1	4	2	7
11	BASx51	Statistics	**2**	2	1	0	3
12	BASx61	Engineering Economics	**2**	2	1	0	3
13	HUMx25	Engineering History and Introduction to Engineering Science	**2**	2	0	0	2
14	HUMx71	Legislations and Professional Ethics	**2**	2	0	0	2
Additional Courses: Programs select from the followings to achieve their own requirements							
-	BAS113	Mathematics (3): Multivariable calculus and complex analysis	**3**	2	2	0	4
-	BAS114	Differential Equations	**3**	2	2	0	4
-	BAS115	Complex Functions	**3**	2	2	0	4
-	BAS116	Numerical Techniques	**3**	2	1	2	5

3.2. Graduate Attributes and Competencies

The UR and FR courses are offered to contribute in achieving the general attributes and the general competencies for all graduate engineers for all programs. Where; according to the National Academic Reference Standards (NARS-2018), The Engineering graduate must be able to acquire the following general attributes:

1- Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.

2- Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.

3- Behave professionally and adhere to engineering ethics and standards.

4- Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.

5- Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community.

6- Value the importance of the environment, both physical and natural, and work to promote sustainability principles.

7- Use techniques, skills, and modern engineering tools necessary for engineering practice.

8- 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.

9- Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.

10- Demonstrate leadership qualities, business administration and entrepreneurial skills.

In addition, graduate Engineer must possess the following competencies:

Level A. General Engineering Competencies: Every graduate engineer must possess these competencies.

Level B. Engineering Specialization Competencies: Specific to each branch of Engineering (Electrical, Civil, Architect, Mechanical…etc.). These competencies will be mentioned in each program description.

Level C. Engineering Sup-Specialization Competencies: Specific for each specialization inside the main branch. This group of competencies will be mentioned in each program description.

Level D. Interdisciplinary Competencies: This group will be mentioned for interdisciplinary only (if exist) in each program description.
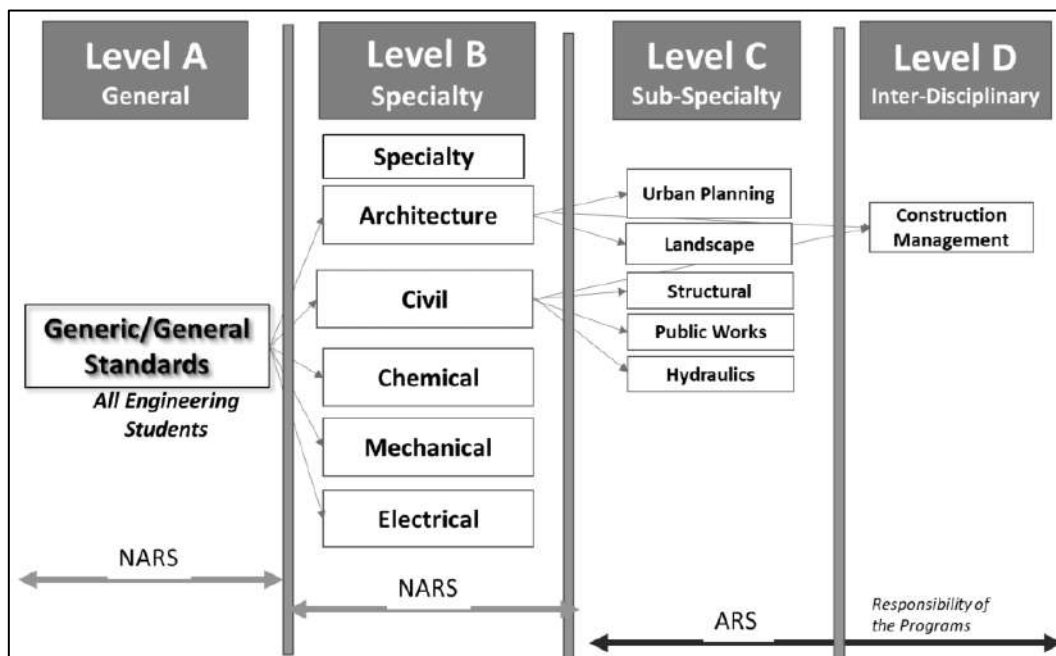
Structure of The National Academic Reference Standards (NARS), 2nd Edition 2018

According to the National Academic Reference Standards (NARS-2018), The Engineering Graduate must be able to (**NARS 2018 A-Level**):

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and 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.

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.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

A6. Plan, supervise and monitor implementation of engineering projects.

A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

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.

A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

A11. Master the basic principles of computer and information technology and utilize available software packages relevant to discipline.

4. ACADEMIC PROGRAMS

4.1. ARCHITECTURE PROGRAM

4.1.1 Program Mission

The architecture program provides advanced education to prepare qualified competencies of architects that meet the needs of the labor market, and provides community and research services, which contribute to achieving sustainable development using modern education and the contemporary technical tools.

4.1.2 Program Objectives

The Department of Architecture aims to graduate highly professional and competitive architects in the local, regional and international market as the following:

1. Prepare trained qualified, experienced architects in the field of architecture who can uphold the ethics and traditions of the profession and possess the requisite scientific knowledge and awareness of the requirements of the specialization.

2. Motivate students to acquire and use contemporary theoretical and applied engineering knowledge and sciences in their field of expertise, and participate in research activities to ensure ongoing self-learning

3. Improve students' ability to follow the scientific method in creating ideas, problems solving, decisions making, and participating in developing practical design solutions to address current societal problems, as well as enhancing their capacity to contribute productively to a team effort.

4. Broaden students' perspectives, train them and develop their abilities and skills to understand the interaction between people and buildings as well as between buildings and their environment to assure the realization of the fundamental principles of sustainable design

5. Create a unique graduate who is able to prepare and assemble a portfolio of work in the architectural and urban designs suitable with the environmental requirements by using the latest technologies and tools, in addition to preparing their documents.

4.1.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-Level), the Architectural Engineering graduate must be able to (B-Level):

B1- Create architectural, urban, and planning designs that satisfy both aesthetic and technical requirements, using adequate knowledge of history and theory, related fine arts, local culture and heritage, technologies, and human sciences.

B2- Produce designs that meet building users' requirements through understanding the relationship between people and buildings, and between buildings and their environment; and the need to relate buildings and the spaces between them to human needs and scale.

B3- Generate ecologically responsible, environmental conservation and rehabilitation designs; through understanding of structural design, construction, technology, and engineering problems associated with building designs.

B4- Transform design concepts into buildings and integrate plans into overall planning within the constraints of project financing, project management, cost control and methods of project delivery; while having adequate knowledge of industries, organizations, regulations, and procedures involved.

B5- Prepare design project briefs and documents, and understand the context of the architect in the construction industry, including the architect's role in the processes of bidding, procurement of architectural services and building production

In addition to the general attributes of an engineer, the architect/graduate of the Architecture Program must be able to - According Special competencies (C-Level)

C1- Create a sustainable architecture considering the environmental aspect, People greenery, Energy and Economic factors using contemporary technologies and performance evaluation systems.

C2- Provide a building matching with operation and maintenance requirements to maintain the building life durability.

C3- Establish and organize information system from a variety of sources, including drawings, specifications, codes of practice, related to principals of environmental architecture.

4.1.4 **Job Opportunities**

1- Architecture Design.

Architects plan and design buildings and other structures using their technical and creative skill to design structures that suit the requirements of their clients. Architects design new buildings or extensions or alterations to existing structures and advise on the restoration and conservation of old properties. They are working closely with clients and users to make sure that projected designs match requirements and are functional, safe, economical, and in some cases highly innovative.

2- Landscape Design.

Architects in this field enhance the space, appearance, and functionality of outdoor areas. For example, professionals may add gardens, walkways, or trees to areas like homes, colleges, playgrounds, and others. These designers may use computer design and drafting software to build sketches for their projects.

3- Interior Design.

Architects in this field design the insides of buildings projects include single-room and multi-level renovations for homes or organizations. These changes relate to aesthetics, functionality, and safety. These designers must draw sketches by hand or with software.

4- Urban Design.

Urban designers focus on creating and implementing designs for communities' physical structures and landscapes. These designs should reflect the character and needs of the town, city, or neighborhood and include details like buildings, transportation systems, and playgrounds. This career path involves creating project proposals and engaging in research and data analysis.

5- Regional Planning.

Regional planners find ways to use land for community betterment. These professionals discuss opportunities with public officials and developers. They make decisions based on market and field research, current regulations, and building codes. Town planner will be involved in the management

and development of cities, towns, villages, and the countryside. they aim will be to balance the conflicting demands of housing, industrial development, agriculture, recreation, transport, and the environment in order to allow appropriate development to take place.

6- Construction Drawings and Documents Preparation.

Architects use software to convert the designs of architects and engineers into technical drawings. Architects use their creativity and technical knowledge to turn innovative designs into durable and sustainable constructions.

7- Construction Supervision and Manager.

Construction supervisor and manager is responsible for ensuring that a building project is completed safely, within an agreed timeframe and budget from start to finish. They make sure that building regulations are followed when buildings are designed and constructed and when altered, extended, or converted.

4.1.5 Architecture Program Required Courses

4.1.5.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2
7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2
Elective Courses: Student must select five courses from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

4.1.5.2 Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	CH	Lec	Tut	Lab	Total
1	BAS011	Mathematics (1): Differentiation and algebra	3	2	2	0	4
2	BAS012	Mathematics (2): Analytical geometry and integration	3	2	2	0	4
3	BAS021	Physics (1)	3	2	1	2	5
4	BAS022	Physics (2)	3	2	1	2	5
5	BAS023	Computer Programming (1)	2	1	0	3	4
6	BAS031	Mechanics (1): Statics	3	2	2	0	4
7	BAS032	Mechanics (2): Dynamics	3	2	2	0	4
8	BAS033	Engineering Production	3	2	0	3	5
9	BAS041	Chemistry	3	2	1	2	5
10	BAS061	Engineering Drawing and Projection	4	1	4	2	7
11	BASx51	Statistics	2	2	1	0	3
12	BASx61	Engineering Economics	2	2	1	0	3
13	HUMx25	Engineering History and Introduction to Engineering Science	2	2	0	0	2
14	HUMx71	Legislations and Professional Ethics	2	2	0	0	2

4.1.5.3 Architectural Engineering Discipline Requirements (68 CH = 41.2% of the total 165 CH)

#	Code	Course Title	CH	Lec	Tut	Lab	Total
23	ARE111	Architectural Design Fundamentals	2	1	3	0	4
24	ARE112	Architectural Drawings and techniques	3	1	5	0	6
25	ARE131	Building Construction (1)	3	1	5	0	6
26	ARE121	History of Architecture (1)	2	1	2	0	3
27	CVL111	Structural Analysis	2	2	1	0	3
28	ARE113	Shadow and perspective	3	2	3	0	5
29	ARE141	Architectural Computer Applications (1)	2	1	0	3	4
30	ARE132	Building Construction (2)	3	1	4	0	5
31	ARE114	Architectural Design Studio (1)	3	0	6	0	6
32	CVL121	Construction Materials	2	2	0	1	3
33	ARE222	History of Architecture (2)	2	1	2	0	3
34	ARE233	Building Construction (3)	3	1	4	0	5
35	ARE215	Architectural Design Studio (2)	4	0	8	0	8
36	CVL241	Construction Survey	2	2	0	1	3
37	ARE223	Theories of Architecture	2	1	2	0	3
38	ARE242	Architectural Computer Applications (2)	2	1	0	3	4
39	ARE216	Architectural Design Studio (3)	4	0	8	0	8
40	CVL251	Concrete Structures	2	2	1	0	3
41	ARE317	Architectural Design Studio (4)	4	0	8	0	8
42	ARE336	Working design (1)	3	1	4	0	5
43	ARE361	Landscape Architecture and Site Planning	3	2	2	0	4
44	CVL361	Steel Structures	2	2	1	0	3
45	ARE318	Architectural Design Studio (5)	4	0	8	0	8

| 46 | ARE337 | Working design (2) | **3** | 1 | 4 | 0 | 5 |
| 47 | ARE362 | Urban Design | **3** | 2 | 2 | 0 | 4 |

4.1.5.4 Architecture Program Requirements (45 CH= 27.3% of the total 165 CH)

| # | Code | Course Title | CH | Contact Hours / week | | | |
				Lec	Tut	Lab	Total
48	ARE251	Introduction to environmental science	**2**	1	2	0	3
49	ARE234	Construction Technology	**2**	1	2	0	3
50	ARE352	Principles of Sustainable Architecture	**2**	1	2	0	3
51	ARE235	Electromechanical systems in buildings	**3**	1	4	0	5
52	ARE353	Acoustics and Daylighting in Buildings	**2**	1	2	0	3
53	ARE343	Building Information Modeling	**2**	1	0	3	4
54	ARE38x	Elective-A-1	**2**	1	2	0	3
55	ARE38x	Elective-A-2	**2**	1	2	0	3
56	ARE444	Simulation of building performance	**2**	1	0	3	4
57	ARE438	Working design (3)	**3**	1	4	0	5
58	ARE419	Architectural Design Studio (6)	**4**	1	6	0	7
59	ARE439	Building Economic and Construction documents	**3**	1	4	0	5
60	ARE454	Building Environmental Rating Systems	**2**	1	2	0	3
61	CVL489	Project management	**2**	1	2	0	3
62	ARE49x	Elective-B-1	**3**	2	2	0	4
63	ARE49x	Elective-B-2	**3**	2	2	0	4
64	ARE471	Graduation project 1	**2**	1	2	0	3
65	ARE472	Graduation project 2	**4**	0	8	0	8
Program Elective Courses							
Elective A1 & A2 Courses: Student must select **two courses** from the followings							
-	ARE381	Human Aspects in Architecture	**2**	1	2	0	3
-	ARE382	Vernacular Architecture	**2**	1	2	0	3
-	ARE383	Housing	**2**	1	2	0	3
-	ARE384	Architectural and urban heritage	**2**	1	2	0	3
-	ARE385	Renewable Energy in Buildings	**2**	1	2	0	3
Elective B1 & B2 Courses: Student must select **two courses** from the followings							
-	ARE491	Interior Design	**3**	2	2	0	4
-	ARE492	Architectural Criticism and Project Evaluation	**3**	2	2	0	4
-	ARE493	Parametric Design and Digital Fabrication	**3**	2	2	0	4
-	ARE494	Geographical Information System (GIS)	**3**	2	2	0	4
-	ARE495	Building life cycle assessment	**3**	2	2	0	4

4.1.6 Proposed Study Plan – Architecture Program

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN *(Common for all programs)*	**Semester I – Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 – Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	7	8	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 – Fall**								
	ARE111	Architectural Design Fundamentals	**2**	6	1	3	0	4	
	ARE112	Architectural Drawings and techniques	**3**	9	1	5	0	6	
	ARE131	Building Construction (1)	**3**	9	1	4	0	5	
	ARE121	History of Architecture (1)	**2**	6	1	2	0	3	
	CVL111	Structural Analysis	**2**	6	2	1	0	3	BAS031
	BASx51	Statistics	**2**	6	1	2	0	3	
	HUMxxx	University Elective (2)	**2**	6	2	0	0	2	
		Total	**16**	**48**	**9**	17	0	**26**	
	Semester 4 – Spring								
	ARE113	Shadow and perspective	**3**	9	2	3	0	5	ARE112
	ARE141	Architectural Computer Applications (1)	**2**	6	1	0	3	4	
	ARE132	Building Construction (2)	**3**	9	1	4	0	5	ARE131
	ARE114	Architectural Design Studio (1)	**3**	9	0	6	0	6	ARE111 + ARE112
	CVL121	Construction Materials	**2**	6	2	0	1	3	
	HUM111	Human Rights	**1**	3	1	0	0	1	
	HUMxxx	University Elective (3)	**2**	6	2	0	0	2	
		Total	**16**	**48**	**9**	13	4	**26**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 5- Fall								
	ARE222	History of Architecture (2)	**2**	6	1	2	0	3	ARE121
	ARE233	Building Construction (3)	**3**	9	1	4	0	5	ARE132
	ARE251	Introduction to environmental science	**2**	6	1	2	0	3	
	ARE215	Architectural Design Studio (2)	**4**	12	0	8	0	8	ARE114
	CVL241	Construction Survey	**2**	6	2	0	1	3	
	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	3	1	0	0	1	
		Total	**14**	**42**	**6**	**16**	**1**	**23**	
	Semester 6 – Spring								
	ARE223	Theories of Architecture	**2**	6	1	2	0	3	ARE222
	ARE242	Architectural Computer Applications (2)	**2**	6	1	0	3	4	ARE141
	ARE234	Construction Technology	**2**	6	1	2	0	3	ARE132
LEVEL 2	ARE216	Architectural Design Studio (3)	**4**	12	0	8	0	8	ARE215
	ARE235	Electromechanical systems in buildings	**3**	9	1	4	0	5	ARE132
	CVL251	Concrete Structures	**2**	6	2	1	0	3	CVL111 + CVL121
	HUMxxx	University Elective (4)	**2**	6	1	2	0	3	
		Total	**17**	**51**	**7**	**19**	**3**	**29**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 7 – Fall								
	ARE352	Principles of Sustainable Architecture	**2**	6	1	2	0	3	ARE251
	ARE336	Working design (1)	**3**	9	1	4	0	5	ARE233
	ARE317	Architectural Design Studio (4)	**4**	12	0	8	0	8	ARE216
	ARE361	Landscape Architecture and Site Planning	**3**	9	2	2	0	4	
	CVL361	Steel Structures	**2**	6	2	1	0	3	CVL111 + CVL121
	BASx61	Engineering Economics	**2**	6	2	1	0	3	
	ARE38x	Elective-A-1	**2**	6	1	2	0	3	
		Total	**18**	**54**	**9**	**20**	**0**	**29**	
	Semester 8 – Spring								
	ARE353	Acoustics and Daylighting in Buildings	**2**	6	1	2	0	3	ARE251
	ARE343	Building Information Modeling	**2**	6	1	0	3	4	ARE242
LEVEL 3	ARE318	Architectural Design Studio (5)	**4**	12	0	8	0	8	ARE317
	ARE337	Working design (2)	**3**	9	1	4	0	5	ARE336
	ARE362	Urban Design	**3**	9	2	2	0	4	ARE361
	ARE38x	Elective-A-2	**2**	6	1	2	0	3	
		Total	**16**	**48**	**6**	**18**	**3**	**27**	

Remarks: Field training to be completed in the summer sessions.

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Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 4	**Semester 9 – Fall**								
	ARE444	Simulation of building performance	**2**	6	1	0	3	4	ARE352
	ARE438	Working design (3)	**3**	9	1	4	0	5	ARE337
	ARE419	Architectural Design Studio (6)	**4**	12	1	6	0	7	ARE318
	ARE439	Building Economic and Construction documents	**3**	9	1	4	0	5	ARE233
	ARE49x	Elective-B-1	**3**	9	2	2	0	4	
	ARE471	Graduation project 1	**2**	6	1	2	0	3	ARE318
		Total	**17**	**51**	**7**	**18**	**3**	**28**	
	Semester 10 – Spring								
	ARE454	Building Environmental Rating Systems	**2**	6	1	2	0	3	ARE352
	CVL489	Project management	**2**	6	1	2	0	3	BASx61
	HUMx71	Legislations and Professional Ethics	**2**	6	2	0	0	2	
	ARE49x	Elective-B-2	**3**	9	2	2	0	4	
	ARE472	Graduation project 2	**4**	12	0	8	0	8	ARE419 + ARE471
	HUMxxx	University Elective (5)	**2**	6	2	0	0	2	
		Total	**15**	**45**	**8**	**14**	**0**	**22**	

4.2. STRUCTURAL ENGINEERING PROGRAM

4.2.1 Program Mission

To provide outstanding engineering education according to the national reference standards to graduate professional structural engineers who meet the needs of the building and construction industry, contribute to community development, qualified for competing domestically and globally, and have the ability of lifelong learning and scientific research.

4.2.2 Program Objectives

The program aims to graduate highly professional and competitive structural engineers who are able to analyze, design and construct powerful structures that resist permanent loads as well as temporary loads resulting from wind, earthquakes and change in temperature and to focus on safety, economic design, comfort of users and environmental aspects. The main objectives of the program:

1- To graduate structural engineers aware of the fundamentals of analysis, design and construction of buildings and their facilities under the impact of all types of applied loads.
2- To prepare structural engineers who understand all stages of the building's life cycle, starting from the implementation stage and developing construction technology, passing through the stage of use and maintenance of buildings until the later stages of use and how to rehabilitate and retrofit buildings.
3- To equip structural engineers who can identify and assess causes of structural problems, and choose the most appropriate solution considering loading conditions, cost, available resources, and environmental impacts.
4- To graduate engineers who have the sufficient knowledge of the used building materials and how to test them, familiar with the latest trends in engineering construction materials and their properties, and know how to choose the most appropriate materials for environment and loading conditions.
5- To develop the students' skills in using information technology and computer software in the analysis and design of structures, preparing construction drawings, calculating the bills of materials quantities, and project management tasks.
6- To offer practical training experience and follow up on the implementation of projects, by means of partnerships with engineering firms.
7- To encourage students to innovate by participating in scientific competitions, where the students will practice and sharpen their academic research and presentation skills.

4.2.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-level: see Bylaw Article 5.2), the CIVIL Engineering graduate must be able to **(NARS 2018 B-Level)**:

B1. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics and Fluid Mechanics.

B2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics:

Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbors; or any other emerging field relevant to the discipline.

B3. Plan and manage construction processes; address construction defects, instability and quality issues; and maintain safety measures in construction and materials.

B4. Deal with biddings, contracts and financial issues including project insurance and guarantees; and assess environmental impacts of civil engineering projects.

In addition to the competences for all Engineering Programs (NARS 2018 A-Level) and the competencies for the Civil Engineering Discipline (NARS 2018 B-Level), the Structural Engineering Program graduate in Badr University in Cairo (BUC) must be able to (**ARS 2021 C-Level**):

C1. Model and perform structural analysis for different structures using advanced analysis software and considering different loading conditions.

C2. Design of special structures such as bridges, high rise buildings, pre-stressed concrete structures, and masonry structures.

C3. Deal with deterioration of structures and methods of repair and strengthening.

4.2.4 Job Opportunities

The graduate students of Structural Engineering program can work as:

- Design engineer and/or shop drawing engineer in consulting and engineering firms
- Site engineer in construction and real estate companies
- Quality control engineer in ready mix concrete plants and quality assurance departments
- Projects manager for small, moderate and mega structures
- Highway and infrastructure engineer in national ministries
- Supervision engineer and reviewer in public governorates
- Laboratory technical engineer in research centers
- Academic staff member for highly postgraduate students

4.2.5 Structural Engineering Program Required Courses

4.2.5.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2
7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2
Elective Courses: Student must select **five courses** from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3

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-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

4.2.5.2 Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
9	BAS011	Mathematics (1): Differentiation and algebra	**3**	2	2	0	4
10	BAS012	Mathematics (2): Analytical geometry and integration	**3**	2	2	0	4
11	BAS021	Physics (1)	**3**	2	1	2	5
12	BAS022	Physics (2)	**3**	2	1	2	5
13	BAS023	Computer Programming (1)	**2**	1	0	3	4
14	BAS031	Mechanics (1): Statics	**3**	2	2	0	4
15	BAS032	Mechanics (2): Dynamics	**3**	2	2	0	4
16	BAS033	Engineering Production	**3**	2	0	3	5
17	BAS041	Chemistry	**3**	2	1	2	5
18	BAS061	Engineering Drawing and Projection	**4**	1	4	2	7
19	BASx51	Statistics	**2**	2	1	0	3
20	BASx61	Engineering Economics	**2**	2	1	0	3
21	HUMx25	Engineering History and Introduction to Engineering Science	**2**	2	0	0	2
22	HUMx71	Legislations and Professional Ethics	**2**	2	0	0	2

4.2.5.3 Civil Engineering Discipline Requirements (65 CH = 39.4% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
23	BAS114	Differential Equations	**3**	2	2	0	4
24	BAS116	Numerical Techniques	**3**	2	1	2	5
25	ARE133	Building Construction	**2**	1	3	0	4
26	CVL131	Engineering Geology	**3**	2	2	0	4
27	CVL112	Analysis of structures (1)	**3**	2	2	0	4
28	CVL113	Analysis of structures (2)	**3**	2	2	0	4
29	CVL122	Properties and strength of materials	**3**	2	1	2	5

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#	Code	Course Title	CH				
30	CVL123	Properties and Tests of building materials	**3**	2	1	2	5
31	CVL181	Civil Drawing	**3**	1	3	2	6
32	CVL214	Analysis of structures (3)	**3**	2	2	0	4
33	CVL224	Concrete Technology	**3**	2	1	2	5
34	CVL232	Soil Mechanics (1)	**3**	2	2	1	5
35	CVL233	Soil Mechanics (2)	**3**	2	1	2	5
36	CVL242	Plane Surveying	**3**	2	0	2	4
37	CVL243	Topographic Surveying	**3**	2	0	2	4
38	CVL252	Design of Reinforced Concrete structures (1)	**3**	2	2	0	4
39	CVL253	Design of Reinforced Concrete structures (2)	**3**	2	2	0	4
40	CVL371	Fluid Mechanics and Hydraulics	**3**	2	2	1	5
41	CVL372	Environmental and Sanitary Engineering	**3**	2	2	2	6
42	CVL382	Construction Project Management	**2**	2	1	0	3
43	CVL445	Highway and Airports Engineering	**2**	2	1	0	3
44	CVL473	Design of Irrigation Works	**3**	2	2	1	5
45	CVL486	Bids Documents and Contracts	**2**	2	1	0	3

4.2.5.4 Structural Engineering Program Requirements (48 CH= 29.4% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
46	CVL215	Analysis of structures (4)	**3**	2	2	0	4
47	CVL316	Finite element method	**3**	2	2	0	4
48	CVL334	Shallow Foundations	**3**	2	2	0	4
49	CVL335	Deep Foundations	**3**	2	2	0	4
50	CVL354	Design of Reinforced Concrete structures (3)	**3**	2	2	0	4
51	CVL355	Design of Reinforced Concrete structures (4)	**3**	2	2	0	4
52	CVL362	Design of Steel structures (1)	**3**	2	2	0	4
53	CVL363	Design of Steel structures (2)	**3**	2	2	0	4
54	CVL3xx	Program Elective 1	**2**	2	1	0	3
55	CVL3xx	Program Elective 2	**2**	2	1	0	3
56	CVL4xx	Program Elective 3	**2**	2	1	0	3
57	CVL4xx	Program Elective 4	**2**	2	1	0	3
58	CVL417	Computer-aided Structural Analysis	**2**	1	0	3	4
59	CVL418	Structural Dynamics and Earthquakes	**3**	2	2	0	4
60	CVL464	Design of Steel Bridges	**3**	2	2	0	4
61	CVL491	Graduation project (1)	**3**	1	4	0	5
62	CVL492	Graduation project (2)	**5**	2	6	0	8
Program Elective Courses							
Elective 1 & 2 Courses: Student must select **two courses** from the followings							
-	CVL325	Masonry structures	**2**	2	1	0	3
-	CVL326	Composite Materials	**2**	2	0	1	3
-	CVL336	Soil Improvement	**2**	2	1	0	3
-	CVL344	Photogrammetry and Remote Sensing	**2**	2	0	1	3
-	CVL345	Transportation Planning and Railways	**2**	2	1	0	3

-	CVL356	Repair and strengthening of Concrete structures	**2**	2	1	0	3
-	CVL383	Construction equipment and methods	**2**	2	1	0	3
-	CVL384	Technical and sanitary Installations in buildings	**2**	2	1	0	3
-	CVL385	Building Information Modelling	**2**	1	0	2	3
Elective 3 & 4 Courses: Student must select **two courses** from the followings							
-	CVL437	Tunnels and Underground structures	**2**	2	1	0	3
-	CVL457	Prestressed Concrete structures	**2**	2	1	0	3
-	CVL458	Special concrete structures	**2**	2	1	0	3
-	CVL465	Low and Mid-Rise Steel Buildings	**2**	2	1	0	3
-	CVL466	Heavy Industrial Steel Structures	**2**	2	1	0	3
-	CVL474	Waste water treatment	**2**	2	1	0	3
-	CVL475	Water infrastructures	**2**	2	1	0	3
-	CVL487	Financial Management and Accounting for Construction Works	**2**	2	1	0	3
-	CVL488	Risk management and safety	**2**	2	1	0	3

4.2.6 Proposed Study Plan - Structural Engineering Program

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN *(Common for all programs)*	**Semester I – Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 – Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	**7**	**8**	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 – Fall**								
	BAS114	Differential Equations	**3**	9	2	2	0	4	BAS012
	CVL112	Analysis of structures (1)	**3**	9	2	2	0	4	BAS031
	CVL122	Properties and strength of materials	**3**	9	2	1	2	5	
	BASx51	Statistics	**2**	6	2	1	0	3	
	CVL181	Civil Drawing	**3**	9	1	3	2	6	BAS061
	HUMxxx	University Elective 2	**2**	6	2	0	0	2	
		Total	**16**	**48**	**11**	**9**	**4**	**24**	
	Semester 4 – Spring								
	BAS116	Numerical Techniques	**3**	9	2	1	2	5	BAS114
	CVL113	Analysis of structures (2)	**3**	9	2	2	0	4	CVL112
	CVL123	Properties and Tests of building materials	**3**	9	2	1	2	5	CVL122
	CVL131	Engineering Geology	**3**	9	2	2	0	4	
	ARE133	Building Construction	**2**	6	1	3	0	4	
	HUMxxx	University Elective 3	**2**	6	2	0	0	2	
		Total	**16**	**48**	**11**	**9**	**4**	**24**	

Remarks: Field training to be completed in the summer sessions.

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Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 2	**Semester 5 – Fall**								
	CVL242	Plane Surveying	**3**	9	2	0	2	4	
	CVL214	Analysis of structures (3)	**3**	9	2	2	0	4	CVL113
	CVL224	Concrete technology	**3**	9	2	0	3	5	CVL123
	CVL232	Soil Mechanics (1)	**3**	9	2	2	1	5	CVL131
	CVL252	Design of Reinforced Concrete structures (1)	**3**	9	2	2	0	4	CVL113 + ARE133
	HUM111	Human Rights	**1**	3	1	0	0	1	
		Total	**16**	**48**	**11**	**6**	**6**	**23**	
	Semester 6 – Spring								
	CVL243	Topographic Surveying	**3**	9	2	0	2	4	CVL242
	CVL215	Analysis of structures (4)	**3**	9	2	2	0	4	CVL214
	BASx61	Engineering economics	**2**	6	2	1	0	3	
	CVL233	Soil Mechanics (2)	**3**	9	2	1	2	5	CVL232
	CVL253	Design of Reinforced Concrete structures (2)	**3**	9	2	2	0	4	CVL252
	HUMx14	Scientific thinking and Technical Report Writing Skills	**1**	3	1	0	0	1	
		Total	**15**	**45**	**11**	**6**	**4**	**21**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 3	**Semester 7 – Fall**								
	CVL362	Design of Steel Structures (1)	**3**	9	2	2	0	4	CVL113
	CVL316	Finite element method	**3**	9	2	2	0	4	CVL215
	CVL382	Construction Projects Management	**2**	6	2	1	0	3	BASx61
	CVL334	Shallow Foundations	**3**	9	2	2	0	4	CVL233
	CVL354	Design of Reinforced Concrete structures (3)	**3**	9	2	2	0	4	CVL253
	CVL371	Fluid Mechanics and Hydraulics	**3**	9	2	2	1	5	
		Total	**17**	**51**	**12**	**11**	**1**	**24**	
	Semester 8 – Spring								
	CVL363	Design of Steel structures (2)	**3**	9	2	2	0	4	CVL362
	CVL3xx	Program Elective 1	**2**	6	2	1	0	3	CVLxxx
	CVL3xx	Program Elective 2	**2**	6	2	1	0	3	CVLxxx
	CVL335	Deep Foundations	**3**	9	2	2	0	4	CVL233
	CVL355	Design of Reinforced Concrete structures (4)	**3**	9	2	2	0	4	CVL354
	CVL472	Environmental and Sanitary Engineering	**3**	9	2	2	2	6	CVL371
		Total	**16**	**48**	**12**	**10**	**2**	**24**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 4	**Semester 9 – Fall**								
	CVL464	Design of Steel Bridges	**3**	9	2	2	0	4	CVL363
	CVL4xx	Program Elective 3	**2**	6	2	1	0	3	CVLxxx
	CVL4xx	Program Elective 4	**2**	6	2	1	0	3	CVLxxx
	CVL417	Computer-aided Structural Analysis	**2**	6	1	0	3	4	CVL316
	CVL419	Structural Dynamics and Earthquakes	**3**	9	2	2	0	4	CVL354
	CVL491	Graduation project (1)	**3**	9	1	4	0	5	CVLxxx
	HUMxxx	University Elective 4	**2**	6	2	0	0	2	
		Total	**17**	**51**	**12**	**10**	**3**	**25**	
	Semester 10 – Spring								
	CVL446	Highway and Airports Engineering	**2**	6	2	1	0	3	CVL243
	HUMx71	Legislations and Professional Ethics	**2**	6	2	0	0	2	
	HUMxxx	University Elective 5	**2**	6	2	0	0	2	
	CVL486	Bids Documents and Contracts	**2**	6	2	1	0	3	CVL382
	CVL473	Design of Irrigation Works	**3**	9	2	2	1	5	CVL371
	CVL492	Graduation project (2)	**5**	15	2	6	0	8	CVL491
		Total	**16**	**48**	**11**	**12**	**1**	**24**	

4.3. ENERGY AND RENEWABLE ENERGY ENGINEERING PROGRAM

4.3.1 Program Mission

The Program Presents High Quality Engineering Education in the Fields of Energy and Renewable Energy and their Applications in order to Graduate Engineers Well Qualified to Serve in the National and Regional Work Environment, and to Offer Social and Research Services that aid Sustainable Development, Using State-Of The-Art Means and Technologies.

4.3.2 Program Objectives

This program aims at graduating an energy engineer with a deep knowledge about the characteristics, operation, and economy of different sources of renewable energy such as solar, photovoltaic, wind energy etc…, and can also analyze their performance to meet the requirements of power plants. To add on, the graduate should be able to address the drawbacks of the conventional energy sources and provide alternative solutions using sources of renewable energy to lessen the world dependence on fossil fuels thus reducing their detrimental environmental impact. The Program of Energy and Renewable Energies Engineering Program aims to graduate highly professional and competitive Engineers in the local, regional and international market.

The main program's educational objectives are to develop the graduates' capabilities to:

1- Apply basic concepts in mathematics, science, and engineering to Provide Solutions to the Problems of Generating and Using Various Types of Energy.
2- Use Scientific Analytical and Innovative Design Methods in Managing Energy Generation and Distribution Firms.
3- Using Effective Professional Scientific Tools of Analysis, Including Engineering and Software Packages Relevant to the Fields of Energy and Renewable Energy.
4- Applying Maintenance and Operation Techniques in Various Energy Generation Stations.
5- Supervising Engineering Projects Relevant to Energy and Renewable.
6- Participating in Quality Improvement of Different Energy Projects, that Address the Negative Effects on Environment and Society
7- Effective Contribution to Research and Development Programs in Different Research and Industrial Facilities.

4.3.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-level: see Bylaw Article 5.2), the MECHANICAL Engineering graduate must be able to **(NARS 2018 B-Level)**:

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, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamic and Vibrations.

B2. Plan, manage and carry out designs of Mechanical systems and machine elements using appropriate materials via both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.

B3. Select conventional mechanical and electric 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.

In addition, the graduate of Energy and Renewable Energy Program must also be able to achieve Special competencies (**ARS 2021 C-Level**):

C1. Design Energy systems that are reliable and effective by mitigating risk and reducing failure

C2. Gather requirements and develop models and create prototypes in timely and effective manner to increase project safety and success

C3. Develop simple computer programs to be used in Energy Systems Management, Measurement and Control applications

C4. Carry out the basic design calculations for conventional Mechanical/Electrical and Hybrid Machines in accordance to engineering standards and regulations

In addition, the graduate of Energy and Renewable Energy Program must also be able to achieve Subspecialty competencies (**ARS 2021 D-Level**):

D1. Understand the basic scope of disciplines that support renewable energy systems in theory and practice

D2. Demonstrate knowledge of integration within the modern mechanical and electrical systems in industrial applications

D3. Apply the system fundamentals and demonstrate an understanding of the basic of different renewable energy methods in various applications.

4.3.4 Job Opportunities

Job opportunities for energy and renewable energies graduates are:

- Maintenance and Operation Techniques in Various Energy Generation Stations
- Quality assurance engineer in the Factories of photovoltaic panels manufacturing
- Managing Energy Generation and Distribution Firms.
- Mechanical power engineer in all factories
- Research and Development Engineer in Different Research and Industrial Facilities

4.3.5 Energy and Renewable Energy Engineering Program Required Courses

4.3.5.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2

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7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2

Elective Courses: Student must select **five courses** from the followings

-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

4.3.5.2   Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
9	BAS011	Mathematics (1): Differentiation and algebra	**3**	2	2	0	4
10	BAS012	Mathematics (2): Analytical geometry and integration	**3**	2	2	0	4
11	BAS021	Physics (1)	**3**	2	1	2	5
12	BAS022	Physics (2)	**3**	2	1	2	5
13	BAS023	Computer Programming (1)	**2**	1	0	3	4
14	BAS031	Mechanics (1): Statics	**3**	2	2	0	4
15	BAS032	Mechanics (2): Dynamics	**3**	2	2	0	4
16	BAS033	Engineering Production	**3**	2	0	3	5
17	BAS041	Chemistry	**3**	2	1	2	5
18	BAS061	Engineering Drawing and Projection	**4**	1	4	2	7
19	BASx51	Statistics	**2**	2	1	0	3
20	BASx61	Engineering Economics	**2**	2	1	0	3
21	HUMx25	Engineering History and Introduction to Engineering Science	**2**	2	0	0	2
22	HUMx71	Legislations and Professional Ethics	**2**	2	0	0	2

4.3.5.3   Discipline Requirements (66 CH = 40% of the total 165 CH)

#	Code	Couse Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
23	BAS113	Mathematics (3)	**3**	2	2	0	4
24	BAS121	Differential Equations	**3**	2	2	0	4
25	MCH111	Machine Drawing and Construction	**3**	2	3	0	5

#	Code	Couse Title	CH	Lec	Tut	Lab	Total
26	MCH112	Properties and Testing of Materials	**3**	2	1	2	5
27	MCH113	Stress Analysis	**3**	2	2	0	4
28	MCH114	Machine Manufacturing and Techniques	**3**	2	3	0	5
29	MCH121	Thermodynamics	**3**	2	1	2	5
30	MCH131	Measuring Instruments	**3**	2	1	2	5
31	MCH211	Mechanical Design of Machine parts	**3**	2	2	0	4
32	MCH212	Theory of machines	**3**	2	2	0	4
33	MCH221	Fluid Mechanics	**3**	2	1	2	5
34	MCH222	Heat Transfer	**3**	2	2	0	4
35	MCH231	Engineering Measurements	**3**	2	1	2	5
36	MCH251	Introduction to System Dynamics	**3**	2	2	0	5
37	MCH312	Mechanical Vibrations	**3**	2	2	0	4
38	MCH321	Combustion and Furnaces	**3**	2	1	2	5
39	MCH323	Internal Combustion Engine	**3**	2	1	2	5
40	ELC142	Electrical Circuits (Mech. Eng, Dep.)	**3**	2	1	2	5
41	ELC122	Electronic Circuits	**3**	2	1	2	5
42	ELC241	Electrical Machine and Drives	**3**	2	1	2	5
43	ELC341	Power Electronics	**3**	2	1	2	5
44	ELC254	Microprocessor and Microcontroller (Mech. Eng. Dep.)	**3**	2	1	2	5

4.3.5.4 Program Requirements (47 CH = 28.5% of the total 165 CH)

#	Code	Couse Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Mandatory courses = 35 CH							
45	MCH353	Analogue Control systems	**2**	1	2	1	4
46	MCH322	Thermal Power Plants	**3**	2	2	0	4
47	MCH371	Sources of Renewable Energy	**3**	2	2	0	4
48	MCH372	Solar Energy	**3**	2	1	2	5
49	MCH373	Wind Energy	**3**	2	2	0	4
50	MCH471	Turbo machinery	**3**	2	2	0	4
51	MCH472	Energy System Management	**2**	2	0	0	2
52	MCH491	Project (1)	**3**	1	0	6	7
53	MCH492	Project (2)	**5**	2	2	6	10
54	ELC232	Electromagnetic Fields	**3**	2	1	2	5
55	ELC342	Photovoltaic	**3**	2	1	2	5
56	ELC446	Connecting Renewable Energy Sources with Grids	**2**	2	1	0	3
57, 58, 59, 60 : Elective courses = 12 CH: Student will choose only **(4) courses** from the followings:							
-	MCH421	Fluid Machines	**3**	2	1	2	5
-	MCH422	Fluid Power System	**3**	2	1	1	4
-	MCH423	Air conditioning and Refrigeration	**3**	2	2	0	4
-	MCH441	Quality Control	**3**	2	2	0	4
-	MCH442	Projects Planning	**3**	2	2	0	4
-	MCH443	Risk Management	**3**	2	2	0	4
-	MCH444	Energy Economics	**3**	2	2	0	4
-	MCH473	Energy Modeling	**3**	2	1	2	5
-	MCH481	Environmental Impact of Projects	**3**	2	2	0	4

-	ELC447	Advanced Control System in Electrical power	**3**	2	2	0	4
-	ELC448	Advanced Grid Tie Systems	**3**	2	2	0	4
-	ELC449	Electrical Drive System	**3**	2	2	0	4
-	CHP475	Nuclear and Radiation Engineering	**3**	2	2	0	4

4.3.6 Proposed Study Plan - Energy and Renewable Energies Engineering Program

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN *(Common for all programs)*	**Semester I – Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 – Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	**7**	**8**	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 – Fall**								
	BASX51	Statistics	2	6	1	2	0	3	
	BAS113	Mathematics (3)	3	9	2	2	0	4	BAS012
	MCH112	Properties and Testing of Materials	3	9	2	1	2	5	
	MCH114	Machine Manufacturing and Techniques	3	9	2	1	2	5	BAS033
	MCH121	Thermodynamics	3	9	2	1	2	5	BAS022
	ELC142	Electrical Circuits (Mech. Eng, Dep.)	3	9	2	1	2	5	
		Total	**17**	**51**	**11**	**8**	**8**	**27**	
	Semester 4 – Spring								
	HUM111	Human Rights	2	6	2	0	0	2	
	BAS121	Differential Equations	3	9	2	2	0	4	BAS012
	MCH111	Machine Drawing and Construction	3	9	2	3	0	5	BAS061
	MCH113	Stress Analysis	3	9	2	2	0	4	BAS031
	MCH131	Measuring Instruments	3	9	2	1	2	5	
	ELC122	Electronic Circuits	3	9	2	1	2	5	ELC142
		Total	**17**	**51**	**12**	**9**	**4**	**25**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 2	**Semester 5 – Fall**								
	HUMX14	Scientific Thinking & Tech Report Writing Skills	2	6	1	2	0	3	
	MCH211	Mechanical Design of Machine parts	3	9	2	2	0	4	MCH111-MCH 113
	MCH221	Fluid Mechanics	3	9	2	1	2	5	BAS121
	MCH231	Engineering Measurements	3	9	2	1	2	5	MCH131
	ELC232	Electromagnetic Fields	3	9	2	1	2	5	
	HUMXXX	University Elective (1)	2	9	2	0	0	2	
		Total	**16**	**48**	**11**	**7**	**6**	**24**	
	Semester 6 – Spring								
	HUMX13	Communication and Presentation Skills	2	6	1	2	0	3	
	MCH212	Theory of machines	3	9	2	2	0	4	BAS032
	MCH222	Heat Transfer	3	9	2	2	0	4	MCH121
	MCH251	Introduction to Systems Dynamic	3	9	2	2	0	5	
	ELC241	Electrical Machine and Drives	3	6	2	1	2	5	
	HUMXXX	University Elective (2)	2	6	2	0	0	2	
		Total	**16**	**48**	**11**	**8**	**2**	**23**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 3	**Semester 7 – Fall**								
	BASX61	Engineering Economics	2	6	2	1	0	3	
	MCH312	Mechanical Vibrations	3	9	2	2	0	4	MCH212
	MCH323	Internal Combustion Engines	3	9	2	1	2	5	MCH121
	MCH353	Analogue control systems	2	6	1	2	1	4	MCH251
	MCH371	Sources of Renewable Energy	3	9	2	2	0	4	MCH222
	ELC341	Power Electronics	3	9	2	1	2	5	ELC122
		Total	**16**	**48**	**11**	**9**	**5**	**25**	
	Semester 8 – Spring								
	MCH321	Combustion and Furnaces	3	9	2	1	2	5	MCH121
	MCH322	Thermal Power Plants	3	9	2	2	0	4	MCH121
	MCH372	Solar Energy	3	9	2	1	2	5	MCH371
	MCH373	Wind Energy	3	9	2	2	0	4	MCH371 – MCH 221
	ELC254	Microprocessor and Microcontroller (Mech. Eng. Dep.)	3	9	2	1	2	5	ELC151
	ELC342	Photovoltaic	3	9	2	1	2	5	
		Total	**18**	**54**	**12**	**8**	**8**	**28**	

Remarks: Field training to be completed in the summer sessions.

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Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 9 - Fall								
	MCH471	Turbo machinery	3	6	2	2	0	4	MCH221
	MCH491	Project (1)	3	9	1	0	6	7	
	ELC446	Connecting Renewable Energy Sources with Grids	2	6	2	1	0	3	ELC341
	XXXXXX	Program Elective (1)	3	9	2	2	0	4	
	XXXXXX	Program Elective (2)	3	9	2	2	0	4	
		Total	14	42	9	7	6	22	
	Semester 10 - Spring								
	HUMX71	Legislations and Professional Ethics	2	6	2	0	0	2	
	MCH472	Energy System Management	2	6	2	0	0	2	
LEVEL 4	MCH492	Project (2)	5	15	2	2	6	10	MCH491
	XXXXXX	Program Elective (3)	3	9	2	2	0	4	
	XXXXXX	Program Elective (4)	3	9	2	2	0	4	
		Total	15	45	10	6	6	22	

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4.4. MECHATRONICS ENGINEERING PROGRAM

4.4.1 Program Mission

The Mechatronics Program Presents High Quality Education in The Basic Engineering Fields of Mechanical, Electrical, Control Systems, Computer Programming and Their Interdisciplinary Applications. The Program Is to Graduate Engineers That Effectively Serve in The National and Regional Work Environment and Offer Social and Research Activities That Aid Sustainable Development, Using State-Of-The-Art Means and Technologies.

4.4.2 Program Objectives

This program aims to prepare competent Mechatronics Engineers capable of playing an active role in formulating the practice, meeting the challenges and creating opportunities in up-to date contemporary industrial and commercial applications.

Students will acquire core design capabilities, which are developed and enhanced progressively through the program that explores the principles underlying the design and implementation of concurrent digital systems. This is essentially needed in a variety of problem domains and provides the opportunity of building and operating such systems. The main program's educational aims are to develop the graduates' capabilities to:

1. To apply basic mathematics, scientific and engineering concepts for providing solutions for problems in Mechatronics Engineering.
2. The use of scientific analytical and innovative design methods in the management of Mechatronics Engineering.
3. To apply effective professional scientific analysis tools including engineering and software packages relevant to the field of Mechatronics Engineering.
4. To adopt maintenance routines and operation of Mechatronics Engineering.
5. Supervising engineering projects relevant to Mechatronics Engineering.
6. Participating in quality improvement efforts that address the negative effects of different projects on environmental and society.
7. To effectively contribute to the research and development programs at different research and industrial facilities.

4.4.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-level: see Bylaw Article 5.2), the MECHANICAL Engineering graduate must be able to **(NARS 2018 B-Level)**:

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, Measurements, Instrumentation, Electrical and Electronic Engineering Control Theory and Systems, Software Engineering.

B2. Plan, manage and carry out designs of Mechatronic systems and control machine using appropriate technology both traditional means and computer-aided tools and software contemporary to the mechatronic engineering field.

B3. Select conventional mechanical and electric 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 mechatronic equipment and systems.

In addition, the graduate of Mechatronics Program must also be able to achieve Special competencies **(ARS 2021 C-Level)**:

C1. Design Mechatronic systems that are reliable and effective by mitigating risk and reducing failure.
C2. Gather requirements and develop models and create prototypes in timely and effective manner to increase project safety and success.
C3. Develop simple computer programs to be used in Mechatronics Measurement and Control applications.
C4. Carry out the basic design calculations for conventional Mechanical/Electrical and Hybrid Machines in accordance to engineering standards and regulations.

In addition, the graduate of Mechatronics Program must also be able to achieve Subspecialty competencies **(ARS 2021 D-Level)**:

D1. Understand the basic scope of disciplines that support mechatronic systems in theory and practice
D2. Demonstrate knowledge of integration within the modern mechanical and electrical systems in industrial applications
D3. Apply the system fundamentals and demonstrate an understanding of the basic use and integration of processors and microcontrollers in different transportation, automotive, electro-hydraulic and electro-mechanical applications.

4.4.4 Job Opportunities

Job opportunities for Mechatronics graduates are:

- Maintenance and Operation engineer in various production lines (industrial, medical, pharmacy, food industries, packaging, electronics, …)
- Research and development engineer at different research and industrial facilities of mechatronic engineering.
- Design and implementation of robotic

4.4.5 Mechatronics Program Required Courses

4.4.5.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1

2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2
7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2
Elective Courses: Student must select **five courses** from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

4.4.5.2   Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	**CH**	Contact Hours / week			
				Lec	Tut	Lab	Total
9	BAS011	Mathematics (1): Differentiation and algebra	**3**	2	2	0	4
10	BAS012	Mathematics (2): Analytical geometry and integration	**3**	2	2	0	4
11	BAS021	Physics (1)	**3**	2	1	2	5
12	BAS022	Physics (2)	**3**	2	1	2	5
13	BAS023	Computer Programming (1)	**2**	1	0	3	4
14	BAS031	Mechanics (1): Statics	**3**	2	2	0	4
15	BAS032	Mechanics (2): Dynamics	**3**	2	2	0	4
16	BAS033	Engineering Production	**3**	2	0	3	5
17	BAS041	Chemistry	**3**	2	1	2	5
18	BAS061	Engineering Drawing and Projection	**4**	1	4	2	7
19	BASx51	Statistics	**2**	2	1	0	3
20	BASx61	Engineering Economics	**2**	2	1	0	3
21	HUMx25	Engineering History and Introduction to Engineering Science	**2**	2	0	0	2
22	HUMx71	Legislations and Professional Ethics	**2**	2	0	0	2

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4.4.5.3 Discipline Requirements (66 CH = 40% of the total 165 CH)

#	Code	Couse Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
23	BAS 113	Mathematics (3)	**3**	2	2	0	4
24	BAS 121	Differential Equations	**3**	2	2	0	4
25	MCH 111	Machine Drawing and Construction	**3**	2	3	0	5
26	MCH 112	Properties and Testing of Materials	**3**	2	1	2	5
27	MCH 113	Stress Analysis	**3**	2	2	0	4
28	MCH 121	Thermodynamics	**3**	2	1	2	5
29	MCH 131	Measuring Instruments	**3**	2	1	2	5
30	MCH 211	Mechanical Design of Machine parts	**3**	2	2	0	4
31	MCH 212	Theory of machines	**3**	2	2	0	4
32	MCH 221	Fluid Mechanics	**3**	2	1	2	5
33	MCH 222	Heat Transfer	**3**	2	2	0	4
34	MCH 231	Engineering Measurements	**3**	2	1	2	5
35	MCH 232	Data Acquisition and Lab-View	3	2	1	2	5
36	MCH 241	Modeling and Simulation of Engineering Systems	3	2	1	2	5
37	MCH 251	Introduction to System Dynamics	**3**	2	2	0	5
38	ELC 142	Electrical Circuits (Mech. Eng, Dep.)	**3**	2	1	2	5
39	ELC 122	Electronic Circuits	**3**	2	1	2	5
40	ELC 151	Logical Design	3	2	2	1	5
41	ELC 166	Computer Programming with Python	3	2	0	2	4
42	ELC 241	Electrical Machine and Drives	**3**	2	1	2	5
43	ELC 341	Power Electronics	**3**	2	1	2	5
44	ELC 254	Microprocessor and Microcontroller (Mech. Eng. Dep.)	**3**	2	1	2	5

4.4.5.4 Program Requirements ((47 CH = 28.5% of the total 165 CH))

#	Code	Couse Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Mandatory courses = 35 CH							
45	MCH 311	Cutting and Computerized Design	3	2	1	2	5
46	MCH 351	Control Systems	3	2	2	1	5
47	MCH 352	Signal and Digital Control	3	1	2	2	5
48	MCH 361	Robotics	3	2	2	0	4
49	MCH 362	Design of Mechatronics Systems	3	2	2	0	4
50	MCH 422	Fluid Power Systems	3	2	2	0	4
51	MCH 451	Motion Control	3	2	1	2	5
52	MCH 452	Programmable Logic Control	3	2	1	2	5
53	MCH 461	Auto-Mechatronics	3	2	1	2	5
54	MCH 491	Project (1)	3	1	0	6	7
55	MCH 492	Project (2)	5	2	2	6	10
56, 57, 58, 59 : Elective courses = 12 CH: Student will choose only (4) courses from the followings:							
-	MCH 312	Mechanics of Vibration	3	2	2	0	4
-	MCH 323	Internal Combustion Engines	3	2	2	0	4
-	MCH 371	Sources of Renewable Energy	3	2	2	0	4

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-	MCH 411	Advanced Materials Engineering	3	2	2	0	4
-	MCH 423	Air Conditioning and Refrigeration	3	2	2	0	4
-	MCH 442	Projects Planning	3	2	2	0	4
-	MCH 443	Risk Management	3	2	2	0	4
-	MCH 445	Fire Fighting	3	2	2	0	4
-	MCH 453	SCADA and Automatic Systems	3	2	2	0	4
-	ELC 362	Database	3	2	2	0	4
-	ELC 369	Fundamentals of Image Processing	3	2	2	0	4
-	ELC 375	Neural Networks	3	2	2	0	4
-	ELC 378	Expert Systems	3	2	2	0	4
-	ELC 454	Artificial Intelligence (Mechanical Engineering Department)	3	2	2	0	4

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4.4.6 Proposed Study Plan

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN *(Common for all programs)*	**Semester I - Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 - Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	7	8	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 - Fall**								
	BAS113	Mathematics (3)	3	9	2	2	0	4	BAS012
	BASX51	Statistics	2	6	1	2	0	3	------
	ELC142	Electrical Circuits	3	9	2	1	2	5	------
	MCH111	Machine Drawing and Construction	3	9	2	3	0	5	BAS061
	MCH112	Properties and Testing of Materials	3	9	2	1	2	5	------
	MCH121	Thermodynamics	3	9	2	1	2	5	BAS022
		Total	**17**	**51**	**11**	10	6	**27**	
	Semester 4 - Spring								
	BAS121	Differential Equations	3	9	2	2	0	4	BAS012
	ELC166	Computer Programming with Python	3	9	1	2	3	6	BAS023
	ELC122	Electronic Circuits	3	9	2	1	2	5	ELC142
	HUM111	Human Rights	1	3	1	0	0	1	------
	MCH113	Stress Analysis	3	9	2	2	0	4	BAS031
	MCH131	Measuring Instruments	3	9	2	1	2	5	------
		Total	**16**	**48**	**10**	8	7	**25**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 2	**Semester 5 - Fall**								
	ELC151	Logical Design	3	9	2	2	1	5	------
	HUMX14	Scientific Thinking & Tech Report Writing Skills	1	3	1	0	0	1	------
	MCH211	Mechanical Design of Machine parts	3	9	2	2	0	4	MCH111/ MCH113
	MCH221	Fluid Mechanics	3	9	2	1	2	5	BAS121
	MCH212	Theory of machines	3	9	2	2	0	4	BAS032
	MCH232	Data Acquisition & LABVIEW	3	9	2	1	2	5	MCH131
		Total	**16**	**48**	**11**	**8**	**5**	**24**	
	Semester 6 - Spring								
	ELC341	Power Electronics	3	9	2	1	2	5	ELC122
	HUMxxx	University Elective 2	**2**	6	2	0	0	2	------
	MCH231	Engineering Measurements	3	9	2	1	2	5	MCH131
	MCH222	Heat Transfer	3	9	2	2	0	4	MCH121
	MCH241	Modeling and Simulation of Engineering Systems	3	9	2	1	2	5	BAS111
	MCH251	Introduction to Systems Dynamics	3	9	2	2	0	4	BAS121
		Total	**17**	**51**	**12**	**7**	**6**	**25**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 3	**Semester 7 - Fall**								
	MCH361	Robotics	3	9	2	2	2	6	MCH212
	ELC254	Microprocessors & Microcontrollers	3	9	1	2	2	5	ELC151
	ELC241	Electrical Machines & Drives	3	9	2	1	2	5	ELC142
	HUMxxx	University Elective 3	**2**	6	2	0	0	2	------
	MCH351	Control Systems	3	9	2	1	2	5	MCH251
	MCH311	Cutting and Computerized Design	3	9	2	1	2	5	BAS033
		Total	**17**	**51**	**11**	**7**	**10**	**28**	
	Semester 8 - Spring								
	HUMxxx	University Elective 4	**2**	6	2	0	0	2	------
	HUMxxx	University Elective 5	**2**	6	2	0	0	2	
	BASX61	Engineering Economics	2	6	2	1	0	3	------
	MCH352	Signal and Digital Control	3	9	1	2	2	5	MCH241
	MCH362	Design of Mechatronics	3	9	2	2	0	4	MCH213
	XXXXXX	Program Elective (1) --------	3	9	2	2	0	4	------
		Total	**15**	**45**	**11**	**7**	**2**	**20**	

Remarks: Field training to be completed in the summer sessions.

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Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 9 - Fall								
	MCH422	Fluid Power Systems	3	9	2	1	2	5	MCH221
	MCH451	Motion Control	3	9	2	1	2	5	MCH351
	MCH452	Programmable Logic Control	3	9	2	1	2	5	ELC151
	MCH491	Project (1)	3	9	1	0	6	7	------
	XXXXXX	Program Elective (2) ------	3	9	2	2	0	4	------
		Total	**15**	**45**	**9**	**5**	**12**	**26**	
	Semester 10 - Spring								
LEVEL 4	HUMX31	Legislations and Professional Ethics	2	6	2	0	0	2	------
	MCH492	Project (2)	5	15	2	2	6	10	MCH491
	MCH461	Auto Mechatronics	3	9	2	1	2	5	MCH362
	XXXXXX	Program Elective (3)-------	3	9	2	2	0	4	-----
	XXXXXX	Program Elective (4) ------	3	9	2	2	0	4	-----
		Total	**16**	**48**	**10**	**7**	**8**	**25**	

4.5. COMPUTER ENGINEERING AND SYSTEMS PROGRAM

4.5.1 Program Mission

The Computer Engineering and Systems Program provides advanced education to prepare qualified competencies of engineers that meet the needs of the labor market and provides community and research services, contributing to providing solutions for engineering problems using computer-based solutions, modern education and contemporary technical tools.

4.5.2 Program Objectives

The Department of Computer Engineering and Systems aims to graduate highly professional and competitive engineer in the local, regional and international market as the following:

1- To provide the market with a highly skilled engineer who understands blending science and technology requirements. Skills that give graduates the ability to create and share ideas, solve problems, make decisions, and participate in the development of practical solutions based on the scientific foundation to address current engineering problems.

2- To prepare students to keep up with scientific and technical advancement that pushing them toward creativity, innovation and development.

3- To develop solid-based knowledge courses for practical and professional exploration to help students in future professional growth and further study.

4- To develop interaction among human beings and computer technologies and connect with international developments in different fields.

5- To encourage students to participate in practical, research and academic activities with other academic bodies to gain more knowledge, different experiences, and broader view.

6- To abide by the demotic regulations and laws mandated by authorities and to follow the business code of ethics.

4.5.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-level: see Bylaw Article 5.2), the **Electrical Engineering** graduate must be able to (**NARS 2018 B-Level**):

B1- Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.

B2- Design, model, analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

B3- Design and implement elements, modules, sub-systems, or electrical/electronic/digital engineering systems using technological and professional tools.

B4- Estimate and measure the performance of an electrical/electronic/digital system and the circuit under specific input excitation, and evaluate its suitability for a specific application.

B5- Adopt suitable national and international standards and codes to design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.

In addition to the general attributes of an engineer, the graduate of the Computer Engineering and Systems Program must be able to - **According to Special competencies (C)**

C1- Design modern and efficient computer programs and systems that are reliable and cost-effective.

C2- Gather recent information about computer engineering, systems and technologies in a timely and efficient manner

C3- Carry out the basic decision-making calculations following the market, engineering standards and regulations.

C4- Understand the basic scope of disciplines for computer systems in theory and practice.

C5- Demonstrate knowledge of integration within modern computer platforms and systems for different fields.

4.5.4 <u>Job opportunities</u>

The graduates of the computer engineering program can work in:

- Industrial areas surrounding the university, such as the industrial zone in Badr City, the industrial zone in the Tenth of Ramadan City, and the industrial zone in Obour City
- Database management companies
- Companies working in the field of software design and implementation such as Valeo, IT works, Synergy, IBM, Microsoft, Dell
- Companies specialized in the field of cyber security (information security)
- Companies working in network design and programming such as EGYWEB, Nile web, Cisco
- Multimedia
- International and local engineering and construction companies such as Arab Contractors, Dar Al-Handasah, automobile manufacturing and design companies, petroleum companies, and private universities are also accepted for their appointment.

4.5.5 <u>Program Required Courses</u>

4.5.5.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2
7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2
Elective Courses: Student must select **five courses** from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2

	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

4.5.5.2 Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
9	BAS011	Mathematics (1): Differentiation and algebra	**3**	2	2	0	4
10	BAS012	Mathematics (2): Analytical geometry and integration	**3**	2	2	0	4
11	BAS021	Physics (1)	**3**	2	1	2	5
12	BAS022	Physics (2)	**3**	2	1	2	5
13	BAS023	Computer Programming (1)	**2**	1	0	3	4
14	BAS031	Mechanics (1): Statics	**3**	2	2	0	4
15	BAS032	Mechanics (2): Dynamics	**3**	2	2	0	4
16	BAS033	Engineering Production	**3**	2	0	3	5
17	BAS041	Chemistry	**3**	2	1	2	5
18	BAS061	Engineering Drawing and Projection	**4**	1	4	2	7
19	BASx51	Statistics	**2**	2	1	0	3
20	BASx61	Engineering Economics	**2**	2	1	0	3
21	HUMx25	Engineering History and Introduction to Engineering Science	**2**	2	0	0	2
22	HUMx71	Legislations and Professional Ethics	**2**	2	0	0	2

4.5.5.3 Core Computer Engineering (66 CH = 40.0% of the total 165 CH)

#	Code	Couse Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
23	BAS115	Complex Functions	3	2	2	-	4
24	BAS114	Differential Equations	3	2	2	-	4
25	BAS116	Numerical Techniques	3	2	1	2	5
26	ELC124	Basic Electronics	3	2	1	2	5
27	ELC141	Electrical Circuits	3	2	1	2	5
28	ELC151	Logic Design	3	2	1	2	5
29	ELC152	Computer Organization and Architecture	3	2	2	-	4
30	ELC161	Computer Programming (2)	3	2	1	2	5
31	ELC164	Linear Algebra	3	2	3	-	5
32	ELC215	Signal Analysis & Systems	3	2	1	2	5
33	ELC252	Microprocessor & Microcontroller	3	2	1	2	5
34	ELC265	Database Systems	3	2	-	2	4
35	ELC280	Control systems	3	2	1	2	5
36	ELC314	Data Communication and Networks	3	2	1	2	3

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37	ELC316	Digital Signal Processing	3	2	1	2	8
38	ELC343	Electrical Machine and Drives	3	2	1	2	5
39	ELC352	Real-time Systems	3	2	-	2	4
40	ELC361	Embedded Systems	3	2	-	3	5
41	ELC363	Image Processing	3	2	-	2	4
42	ELC371	Artificial Intelligence	3	2	-	2	4
43	ELC450	Quality Engineering	3	2	2	-	4
44	ELC461	Computer Networks	3	2	1	2	5

4.5.5.4 Specialization Requirements Computer Engineering and Systems (47 CH = 28.5% of the total 165 CH)

#	Code	Couse Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
45	ELC162	Data Structures and Algorithms	3	2	1	2	5
46	ELC364	Software Engineering	3	2	1	2	5
47	ELC261	Algorithms Analysis and Design	3	2	-	2	4
48	ELC351	Parallel and Distributed Systems	3	2	-	2	4
49	ELC262	Theory of Computing	3	2	2		4
50	ELC376	Introduction to data science and Machine Learning	3	2	-	2	4
51	ELC469	Network Security	3	2	2		4
52	ELC3xx	Specialization Elective (1)	3	2	-	2	4
53	ELC263	Operating Systems	3	2	-	2	4
54	ELC462	Compiler	3	2	-	2	4
55	ELC493	Project (1)	3	1	-	5	6
56	ELC494	Project (2)	5	2	-	6	8
57	ELC4xx	Specialization Elective (2)	3	2	-	2	4
58	ELC4xx	Specialization Elective (3)	3	2	-	2	4
59	ELC4xx	Specialization Elective (4)	3	2	-	2	4

4.5.5.5 Specialization Elective Courses Per Specialization

Code	Couse Title	CH	Contact Hours / week			
			Lec	Tut	Lab	Total
1- Embedded Systems						
ELC356	Advanced Embedded Systems	**3**	2	-	2	4
ELC459	Advanced Security	**3**	2	-	2	4
ELC451	Sensor Network and Internet of Things	**3**	2	-	2	4
ELC452	Selected Topics in Embedded Systems	**3**	2	-	2	4
2- Robotics						
ELC381	Robotics	**3**	2	-	2	4
ELC471	Computer Vision	**3**	2	-	2	4
ELC482	Intelligent and Autonomous Robotic Systems	**3**	2	-	2	4
ELC483	Selected Topics in Robotics	**3**	2	-	2	4
3- Artificial Intelligence and Machine Learning - AI-ML						
ELC372	Pattern Recognition	**3**	2	-	2	4
ELC478	Artificial Neural Networks	**3**	2	-	2	4
ELC472	Deep Learning	**3**	2	-	2	4
ELC473	Selected Topics in Artificial Intelligence and Machine Learning	**3**	2	-	2	4
4- Distributed and Mobile Computing						
ELC357	Cloud Computing	**3**	2	-	2	4
ELC460	Network and Internet Programming	**3**	2	-	2	4

ELC451	Sensor Network and Internet of Things	**3**	2	-	2	4
ELC453	Selected Topics in Distributed and Mobile Computing	**3**	2	-	2	4
	5- Multimedia and Computer Graphics					
ELC373	Multimedia and Computer Graphics	**3**	2	-	2	4
ELC479	Augmented and Virtual Reality	**3**	2	-	2	4
ELC471	Computer Vision	**3**	2	-	2	4
ELC474	Selected Topics in Multimedia and Computer Graphics	**3**	2	-	2	4
	6- Automatic Control Systems					
ELC383	Nonlinear and Adaptive Control Systems	**3**	2	-	2	4
ELC484	Process Control & Automation	**3**	2	-	2	4
ELC485	Intelligent and Autonomous Systems	**3**	2	-	2	4
ELC486	Selected Topics in Automatic Control System	**3**	2	-	2	4
	7- Big data Analytics					
ELC374	Data Mining	**3**	2	-	2	4
ELC475	Information Storage Systems	**3**	2	-	2	4
ELC476	Big data analytics	**3**	2	-	2	4
ELC477	Selected Topics in Big data Analytics	**3**	2	-	2	4
	8- Software Engineering – SWE					
ELC367	Advanced database systems	**3**	2	-	2	4
ELC463	Web and cloud-based systems	**3**	2	-	2	4
ELC464	Advanced Software Engineering	**3**	2	-	2	4
ELC465	Selected Topics in Software Engineering	**3**	2	-	2	4
	9- Network and Cyber Security					
ELC368	Introduction to Malware Analysis	**3**	2	-	2	4
ELC466	Systems and Internet Security Technologies	**3**	2	-	2	4
ELC467	Embedded Security Tools and Techniques	**3**	2	-	2	4
ELC468	Selected Topics in Network and Cyber Security	**3**	2	-	2	4

4.5.6 Proposed Study Plan

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN (Common for all programs)	**Semester I - Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 - Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	7	8	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 – Fall**								
	BAS114	Differential Equations	3	9	2	2	-	4	BAS012
	ELC164	Linear Algebra	3	9	2	3	-	5	-
	ELC151	Logic Design	3	9	2	1	2	5	-
	ELC161	Computer Programming (2)	3	9	2	-	2	4	BAS023
	ELC141	Electrical Circuits	3	9	2	1	2	5	BAS022
	HUMxxx	University Elective (2)	2	6	2	-	-	2	
		Total	**17**	**51**	**12**	7	6	**25**	
	Semester 4 – Spring								
	BAS115	Complex functions	3	9	2	2	-	4	BAS114
	ELC162	Data Structures and Algorithms	3	9	2	1	2	5	ELC161
	HUMxxx	University Elective (3)	2	6	2	-	-	2	-
	ELC152	Computer Organization and Architecture	3	9	2	2	-	4	ELC151
	HUM111	Human rights	1	3	1	-	-	1	--
	ELC124	Basic Electronics	3	9	2	1	2	5	--
		Total	**15**	**45**	11	6	4	21	

Remarks: Field training to be completed in the summer sessions.

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Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 2	**Semester 5 – Fall**								
	BASx51	Statistics	2	6	2	-	-	2	-
	ELC215	Signal Analysis & Systems	3	6	2	1	2	5	BAS115
	ELC265	Database Systems	3	9	2	-	2	4	ELC161
	ELC261	Algorithms Analysis and Design	3	9	2	-	2	4	ELC161
	ELC252	Microprocessor & Microcontroller	3	9	2	1	2	5	ELC152
	HUMx14	Scientific thinking skills and writing technical reports	1	3	1	-	-	1	-
		Total	**15**	**45**	**11**	**2**	**8**	**21**	
	Semester 6 – Spring								
	BAS116	Numerical Techniques	3	9	2	1	2	5	BAS114
	ELC280	Control systems	3	9	2	1	2	5	ELC215
	ELC262	Theory of Computing	3	9	2	2		4	ELC261
	ELC263	Operating Systems	3	9	2	-	2	4	ELC152
	BASx61	Engineering Economics	2	6	2	1	-	3	-
	HUMxxx	University Elective (4)	2	6	2			2	-
		Total	**16**	**48**	**12**	**5**	**6**	**23**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 3	**Semester 7 – Fall**								
	ELC314	Data Communication and Networks	3	9	2	1	2	5	----
	ELC316	Digital Signal Processing	3	9	2	1	2	5	ELC215
	ELC361	Embedded Systems	3	9	2	-	3	5	ELC252
	ELC364	Software Engineering	3	9	2	1	2	5	ELC161
	ELC371	Artificial Intelligence	3	9	2	-	2	4	ELC262
	ELC351	Parallel and Distributed Systems	3	9	2	-	2	4	ELC152
		Total	**18**	**54**	**12**	**3**	**12**	**27**	
	Semester 8 – Spring								
	ELC376	Introduction to Data science and Machine Learning	3	9	2	-	2	4	ELC371
	ELC352	Real-time Systems	3	9	2	-	2	4	ELC363
	ELC363	Image Processing	3	9	2	-	2	4	ELC316
	ELC343	Electrical Machine and Drives	3	9	2	1	2	5	ELC141
	ELC3xx	Specialization Elective (1)	3	9	2	-	2	4	
	HUMxxx	University Elective (5)	2	6	2			2	-
		Total	**17**	**45**	**10**	**1**	**10**	**21**	

Remarks: Field training to be completed in the summer sessions.

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Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 4	**Semester 9 – Fall**								
	ELC461	Computer Networks	3	9	2	1	2	5	ELC314
	ELC462	Compiler	3	9	2	-	2	4	ELC152
	ELC4XX	Specialization Elective (2)	3	9	2	-	2	4	
	ELC4XX	Specialization Elective (3)	**3**	9	2	-	2	4	
	ELC493	Project (1)	3	9	1	-	5	6	
		Total	**15**	**45**	9	1	13	23	
	Semester 10 – Spring								
	ELC469	Network Security	3	9	2	2		4	ELC461
	ELC450	Quality Engineering	**3**	9	2	2	-	4	----
	ELC494	Project (2)	**5**	15	2	-	6	8	
	HUMx71	Legislation and professional ethics	2	6	2	-	-	2	
	ELC4XX	Specialization Elective (4)	**3**	9	2	-	2	4	
		Total	**16**	**48**	10	4	8	22	

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4.6. ELECTRONICS ENGINEERING AND COMMUNICATIONS PROGRAM

4.6.1 Program Mission

To provide a distinguished engineering program and learning opportunities for our students in order to feed the community with highly qualified and competitive graduates that can address professional and technological advances; These graduates will commit to work ethics and lead the development of the society through scientific research and effective management in addition to engaging in partnerships with local and international academic and industrial institutions.

4.6.2 Program Objectives

The program aims to graduate electronics and electric communication engineers who are able to analyze and design elements electronics and electric communication systems that attain the design purposes and to develop. Their work focuses on the safety, develop the IT, Electronics and electric communication sectors.

The engineer graduates of the program will:

1- Apply knowledge of mathematics, science 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- Design and conduct experiments as well as analyze and interpret data.
4- Identify, formulate and solve fundamental engineering problems.
5- Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.
6- Work effectively within multi-disciplinary teams.
7- Communicate effectively.
8- Consider the impacts of engineering solutions on society & environment.
9- Demonstrate knowledge of contemporary engineering issues.
10- Display professional and ethical responsibilities; and contextual understanding
11- Engage in self- and life- long learning.
12- Participate in and lead quality improvement projects.
13- Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and design, to the troubleshooting with emphasis on electronic power devices.
14- Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing.
15- Deal with the computer's hardware, software, operating systems and interfacing.
16- Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.

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4.6.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-level: see Bylaw Article 5.2), the **Electrical Engineering** graduate must be able to **(NARS 2018 B-Level)**:

B1. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.

B2. Design, model, analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

B3. Design and implement elements, modules, sub-systems, or electrical/electronic/digital engineering systems using technological and professional tools.

B4. Estimate and measure the performance of an electrical/electronic/digital system and the circuit under specific input excitation, and evaluate its suitability for a specific application.

B5. Adopt suitable national and international standards and codes to design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.

In addition to the general attributes of an engineer, the architect/graduate of ELECTRONICS ENGINEERING AND COMMUNICATIONS Program must be able to - According Special competencies (Level-C)

C1. Understand the underlying physical phenomena and limitations of the performance of components and systems of electronics & electrical communication engineering.

C2. Demonstrate the ability to model and analyze systems in electronics & electrical communication engineering and identify the software tools required to optimize their performance.

C3. Compare between alternative components and systems in electronics & electrical communication, and, analyze, design, coding, testing, enhancement, and build algorithms to improve their quality performance.

C4. Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in electronics & electrical communication engineering.

C5. Demonstrate the knowledge about state of the art of components and systems in electronics & electrical communication engineering.

4.6.4 Job opportunities

The graduates of the Electric Communications Program can work in:

- Industrial areas surrounding the university, Industrial Zone in Badr City, 10th of Ramadan Industrial Zone, Industrial Zone in Obour City.

- Telecom companies such as Vodafone, Etisalat, Orange accept graduates of the program.

- Electronics companies such as Mentor Graphics, Si-Ware Systems, Valeo are also accepted

- Also, international and local engineering companies, such as Arab and engineering contracting, automobile manufacturing and design companies, petroleum companies, the Communications Regulatory Agency, private universities, and advertising and marketing companies in radio, television and media studios are accepted for his appointment.

4.6.5 Program Required Courses

4.6.5.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2
7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2
Elective Courses: Student must select **five courses** from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

4.6.5.2 Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
9	BAS011	Mathematics (1): Differentiation and algebra	**3**	2	2	0	4
10	BAS012	Mathematics (2): Analytical geometry and integration	**3**	2	2	0	4
11	BAS021	Physics (1)	**3**	2	1	2	5
12	BAS022	Physics (2)	**3**	2	1	2	5
13	BAS023	Computer Programming (1)	**2**	1	0	3	4
14	BAS031	Mechanics (1): Statics	**3**	2	2	0	4
15	BAS032	Mechanics (2): Dynamics	**3**	2	2	0	4
16	BAS033	Engineering Production	**3**	2	0	3	5
17	BAS041	Chemistry	**3**	2	1	2	5
18	BAS061	Engineering Drawing and Projection	**4**	1	4	2	7

19	BASx51	Statistics	**2**	2	1	0	3
20	BASx61	Engineering Economics	**2**	2	1	0	3
21	HUMx25	Engineering History and Introduction to Engineering Science	**2**	2	0	0	2
22	HUMx71	Legislations and Professional Ethics	**2**	2	0	0	2

4.6.5.3 Electronics and Electrical Communications Engineering Discipline Requirements Courses (60 CH = 36.36% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours/week			
				Lec	Tut	Lab	Total
23	BAS113	Mathematics (3)	3	2	2	-	4
24	BAS114	Differential Equations	3	2	2	-	4
25	ELC141	Electrical Circuits	3	2	1	2	5
26	ELC121	Electronics (I)	3	2	1	2	5
27	ELC151	Logic Design	3	2	1	2	5
28	ELC161	Computer Programming (2)	3	2	1	2	5
29	BAS115	Complex functions	3	2	2	-	4
30	ELC123	Electronics (II)	3	2	1	2	5
31	ELC152	Computer Organization and Architecture	3	2	1	2	5
32	ELC252	Microprocessors & Microcontrollers	3	2	1	2	5
33	ELC215	Signal Analysis & Systems	3	2	1	2	5
34	ELC280	Control Systems	3	2	1	2	5
35	BAS116	Numerical Techniques	3	2	1	2	5
36	ELC316	Digital Signal Processing	3	2	1	2	5
37	ELC361	Embedded Systems	3	2	-	3	5
38	ELC343	Electrical Machine and Drives	3	2	-	3	5
39	ELC314	Data Communication and Networks	3	2	-	3	5
40	ELC461	Computer Networks	3	2	1	2	5
41	ELC450	Quality Engineering	3	2	2	--	4
42	ELC132	Electromagnetics (1)	3	2	2	1	5

4.6.5.4 Electronics Engineering and Communications Program Requirements Courses (53 CH=32.12 % of the total 165 CH)

#	Code	Course Title	CH	Contact Hours/week			
				Lec	Tut	Lab	Total
Compulsory Courses							
43	ELC222	Electronic Circuits (I)	3	2	1	2	5
44	ELC231	Electromagnetics (2)	3	2	1	2	5
45	ELC211	Analog Communications	3	2	1	2	5
46	ELC226	Electronic Circuits (II)	3	2	1	2	5
47	ELC331	**Microwave Circuits**	3	2	1	2	5
48	ELC3xx	Elective course (1)	3	2	2	0	4
49	ELC313	Digital Communications	3	2	1	2	5
50	ELC3xx	Elective course (2)	3	2	2	0	4
51	ELC3xx	Elective Course (3)	3	2	2	0	4

52	ELC325	Integrated Circuits Design	3	2	1	2	5
53	ELC491	Graduation Project (I)	3	1	-	6	7
54	ELC4xx	Elective Course (4)	3	2	2	-	4
55	ELC431	Antenna	3	2	1	2	5
56	ELC492	Graduation Project (II)	5	1	-	12	13
57	ELC411	Optical Communication Systems	3	2	1	2	5
58	ELC4xx	Elective Course (5)	3	2	2	--	4
59	ELC413	Wireless and Mobile Communications	3	2	1	2	5

Elective Courses: Student must select 5 courses from the followings

Signals & Communications Courses

-	ELC415	Satellite communications	3	2	2	-	4
-	ELC369	Fundamental of Image Processing	3	2	2	-	4
-	ELC471	Computer Vision	3	2	2	2	4
-	ELC417	Audio & Video Signal Processing	3	2	2	0	4
-	ELC419	Medical Image Processing	3	2	2	0	4
	ELC412	Information Theory	3	2	2	-	4

Antenna & Microwave Courses

-	ELC311	Acoustics	3	2	2	-	4
-	ELC315	RADAR Systems	3	2	2	-	4
-	ELC332	Microwave Devices	3	2	2	-	4
-	ELC432	RF Circuit Design	3	2	2	-	4

Electronics Courses

-	ELC322	Optoelectronic Devices	3	2	2	-	4
-	ELC323	Nano-Electronics	3	2	2	-	4

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4.6.6 Proposed Study Plan

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN *(Common for all programs)*	**Semester I - Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 - Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	7	8	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 – Fall**								
	BAS113	Mathematics (3)	3	9	2	2	-	4	BAS012
	BAS114	Differential Equations	3	9	2	2	-	4	BAS012
	ELC141	Electrical Circuits	3	9	2	1	2	5	BAS022
	ELC121	Electronics (I)	3	9	2	1	2	5	------
	ELC151	Logic Design	3	9	2	1	2	5	------
	ELC161	Computer Programming (2)	3	9	2	1	2	5	BAS023
		Total	**18**	**54**	**12**	8	8	**28**	
	Semester 4 – Spring								
	HUM111	Human Rights	**1**	3	1	-	-	1	
	ELC132	Electromagnetics I	3	9	2	2	1	5	BAS022
	BASx51	Statistics	2	6	2	1	-	3	------
	BAS115	Complex functions	3	9	2	2	-	4	BAS114
	ELC123	Electronics (II)	3	9	2	1	2	5	ELC121
	ELC152	Computer Organization &Architecture	3	9	2	1	2	5	ELC151
		Total	**15**	**45**	11	7	5	23	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 5 – Fall								
	ELC252	Microprocessors & Microcontrollers	3	9	2	1	2	5	ELC152
	ELC222	Electronic Circuits (I)	3	9	2	1	2	5	ELC123
	ELC215	Signal Analysis & Systems	3	9	2	1	2	5	BAS115
	ELC231	Electromagnetics II	3	9	2	1	2	5	ELC132
	BASx61	Engineering Economics	2	6	2	1	-	3	------
	HUMxxx	University elective (2)	2	6	2	-	-	2	------
		Total	**16**	**48**	12	5	8	25	
LEVEL 2	**Semester 6 – Spring**								
	ELC211	Analog Communications	3	9	2	1	2	5	ELC215
	ELC280	Control Systems	3	9	2	1	2	5	ELC215
	BAS116	Numerical Techniques	3	9	2	1	2	5	BAS114
	ELC226	Electronic Circuits (II)	3	9	2	1	2	5	ELC222
	HUMxxx	University elective (3)	2	6	2	-	-	2	------
	HUMx14	Scientific thinking & Technical Report Writing Skills	1	3	1	-	-	1	------
		Total	**15**	**45**	11	4	8	23	

Remarks: Field training to be completed in the summer sessions

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 7 – Fall								
	ELC316	Digital Signal Processing	3	9	2	1	2	5	ELC215
	ELC331	Microwave Circuits	3	9	2	1	2	5	ELC231
	ELC3xx	Elective course (1)	3	9	2	2	-	4	------
	ELC361	Embedded Systems	3	9	2	-	3	5	ELC252
	ELC313	Digital Communications	3	9	2	1	2	5	ELC211
		Total	**15**	**45**	10	5	9	24	
LEVEL 3	**Semester 8 – Spring**								
	ELC3xx	Elective course (2)	3	9	2	2	-	4	------
	ELC343	Electrical Machine and Drives	3	9	2	1	2	5	ELC141
	ELC3xx	Elective Course (3)	3	9	2	2	-	4	------
	ELC314	Data Communications and Networks	3	9	2	1	2	5	------
	HUMxxx	University Elective (4)	2	6	2	-	-	2	------
	ELC325	Integrated Circuits Design	3	9	2	1	2	5	ELC226
		Total	**17**	**51**	12	7	6	25	

Remarks: Field training to be completed in the summer sessions

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 4	**Semester 9 – Fall**								
	ELC491	Graduation Project (I)	3	9	1	-	6	7	------
	ELC4xx	Elective Course (4)	3	9	2	2	-	4	------
	ELC431	Antenna	3	9	2	1	2	5	ELC331
	ELC461	Computer Networks	3	9	2	1	2	5	ELC314
	HUMx71	Legislations and Professional Ethics	2	6	2	-	-	2	--
	HUMxxx	University Elective (5)	2	6	2	-	-	2	
		Total	**16**	**48**	11	4	10	25	
	Semester 10 – Spring								
	ELC492	Graduation Project (II)	5	9	1	-	12	13	ELC491
	ELC411	Optical Communication Systems	3	9	2	1	2	5	ELC313
	ELC4xx	Elective Course (5)	3	9	2	2	--	4	------
	ELC450	Quality Engineering	**3**	9	2	2	--	4	------
	ELC413	Wireless and Mobile Communications	3	9	2	1	2	5	ELC313
		Total	**17**	**51**	9	6	16	31	

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4.7. CHEMICAL ENGINEERING PROGRAM

4.7.1 Program Mission

Prepare graduates for professional careers in chemical engineering and/or graduate study through a program of recognized excellence in teaching and research.

4.7.2 Program Objectives

The Program of chemical engineering aims to graduate highly professional and competitive Chemical Engineer in the local, regional and international market as the following:

1. Contribute to raising the professional competence and forming a generation of distinguished engineers and qualified researchers in the field of chemical engineering.
2. Prepare graduates for professional careers and a lifetime of learning.
3. Assist the graduate's ability for help in the sustainable development of the nation.
4. Develop a sense of citizenship, support team spirit, respect time and act as a way of life and progress.
5. Participate in achieving the development plan, putting science at its service to develop the society scientifically and culturally, and providing environmental services to new urban communities.
6. Developing human capabilities to meet the needs of new societies, including chemical engineers.

4.7.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-level: see Bylaw Article 5.2), the Basic Chemical Engineering graduate must be able to (NARS 2018 B-Level):

B1. Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.

B2. Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.

B3. Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.

B4. Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.

4.7.4 Job Opportunities

The chemical industry is one of the major driving forces of our nation's economy. From innovations and continual improvements made by chemical engineers flow every new medicine, electronic device and high-performance material, plus new technologies for cleaning the environment and feeding and clothing the world's people.

An education in chemical engineering can serve as the foundation for a wide variety of careers. Many, but not most, chemical engineering jobs can be found in the chemical process industry, including oil and chemical companies, but other large employers of chemical engineers include organizations involved with food and consumer products, semiconductors, energy and environmental engineering, pharmaceuticals, and cosmetics.

Chemical engineers typically work to design new processes, improve existing processes, reduce manufacturing costs, research and develop new processes and products, and manage corporate assets.

4.7.4.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2
7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2
Elective Courses: Student must select **five courses** from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

4.7.4.2 Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
9	BAS011	Mathematics (1): Differentiation and algebra	**3**	2	2	0	4
10	BAS012	Mathematics (2): Analytical geometry and integration	**3**	2	2	0	4

11	BAS021	Physics (1)	**3**	2	1	2	5
12	BAS022	Physics (2)	**3**	2	1	2	5
13	BAS023	Computer Programming (1)	**2**	1	0	3	4
14	BAS031	Mechanics (1): Statics	**3**	2	2	0	4
15	BAS032	Mechanics (2): Dynamics	**3**	2	2	0	4
16	BAS033	Engineering Production	**3**	2	0	3	5
17	BAS041	Chemistry	**3**	2	1	2	5
18	BAS061	Engineering Drawing and Projection	**4**	1	4	2	7
19	BASx51	Statistics	**2**	2	1	0	3
20	BASx61	Engineering Economics	**2**	2	1	0	3
21	HUMx25	Engineering History and Introduction to Engineering Science	**2**	2	0	0	2
22	HUMx71	Legislations and Professional Ethics	**2**	2	0	0	2

4.7.4.3 Chemical Engineering Core Courses Based on Discipline Requirements 113 CH = 68.5% of the total 165 CH)

Code	Course Title	CH	Contact Hours				Prerequisites
			Lec	Tut	Lab	Total	
(1) Basic Chemical Engineering Courses							
CHP111	Physical Chemistry	3	2	2	1	5	BAS041+BAS021
CHP112	Inorganic and Analytical Chemistry	3	2	--	3	5	BAS041
CHP113	Organic and biochemistry	3	2	--	3	5	BAS041
CHP214	Chemical Engineering Thermodynamics	3	2	2	1	5	BAS022
CHP215	Chemistry of Polymers	3	2	2	--	4	CHP113
CHP216	Industrial-organic Chemistry	3	2	--	3	5	CHP113
CHP217	Industrial-inorganic Chemistry	3	2	--	3	5	CHP112
CHP218	material science and new materials	3	2	2	1	5	CHP112
(2) Transport Phenomena &Separation process							
CHP221	Transport Phenomena	3	2	2	1	5	BAS031
CHP222	Heat Transfer	3	2	2	1	5	CHP214
CHP323	Mass Transfer	3	2	2	--	4	CHP132
CHP424	multistage separation process	3	2	2	--	4	CHP323
CHP425	Mechanical Unit Operations	3	2	2	1	5	
(3&4&5) Processes Design &Modeling							
CHP231	Monitoring systems and Quality Control	3	2	2	---	4	
CHP232	Electrochemistry and Corrosion Engineering	3	2	2	1	5	CHP111
CHP132	Fundamentals of mass and energy balance	3	2	2	--	4	
CHP334	Surface Chemistry and Catalysis	3	2	2	--	4	
CHP335	Kinetics and chemical reactors Design	3	2	2	--	4	CHP217
CHP336	Design and Management of Chemical Plants	3	2	2	--	4	CHP132
CHP337	Modeling and Simulation of Chemical Process	3	2	2	--	4	CHP336
CHP338	Applied biotechnology	3	2	2	--	4	CHP113
CHP339	Petrochemical industries and Technology of Natural gas	3	2	2	--	4	CHP216
CHP341	Engineering of Renewable Energy Resources	3	2	2	--	4	CHP222
CHP342	Control Systems and Treatment of Chemical Industry Pollutant	3	2	2	--	4	CHP113
CHP455	Control of Chemical processes	3	2	2	--	4	CHP336
CHP444	Economics of Chemical plants	3	2	2	--	4	
CHP445	Engineering Petroleum Refinery	3	2	2	--	4	CHP216
(6) Environmental Engineering							

CHP261	Environmental Chemistry and Solid Wastes Management	3	2	2	--	4	
CHP361	Environmental impact of plants	3	2	2	---	4	
(7&8) Program Electives							
CHP474	Water treatment (Elective 1 and 2)	3	2	2	---	4	
CHP475	Nuclear and radiological engineering (Elective 3 and 4)	3	2	2	---	4	
CHP476	Projects Management (Elective 3 and 4)	3	2	2	--	4	
CVL131	Engineering geology (Elective 1 and 2)	3	2	2	--	4	
CVL472	Environmental and Sanitary Engineering (Elective 1 and 2)	3	2	2	2	6	
CVL488	Risk management and safety (Elective 1 and 2)	3	2	2	--	4	
(9) Training &Graduation Project							
CHPX91	Training (1)	--	---	---	---	---	
CHPX92	Training (2)	--	---	---	---	---	
CHP491	Project (1)	3	1	--	6	7	
CHP492	Project (2)	5	1	--	9	10	
(10) Other Basic science							
BAS113	Mathematics (3): Multivariable calculus and complex analysis	**3**	2	2	0	4	BAS012
BAS115	Complex Functions	**3**	2	2	0	4	BAS113

4.7.5 Proposed Study Plan

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN *(Common for all programs)*	**Semester I - Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 - Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	**7**	**8**	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 – Fall**								
	BAS113	Mathematics 3: Multivariable calculus and complex analysis	3	9	2	2	--	4	BAS012
	BASx51	Statistics	2	6	1	2	--	3	
	CHP132	Fundamentals of mass and energy balance	3	9	2	2	--	4	
	CHP112	Inorganic and Analytical Chemistry	3	9	2	--	3	5	BAS041
	HUMxxx	University Elective 2	2	6	2	--	--	2	
	HUMxxx	University Elective 3	2	6	2	--	--	2	
		Total	**15**	**45**	**11**	**6**	**3**	**20**	
	Semester 4 – Spring								
	BAS115	Complex Functions	3	9	2	2	--	4	BAS012
	CHP113	Organic and biochemistry	3	9	2	--	3	5	BAS041
	CHP111	Physical Chemistry	3	9	2	2	1	5	BAS041
	HUM111	Human Rights	1	3	1	--	--	1	
	HUMxxx	University Elective 4	2	6	2	--	--	2	
		Total	**12**	**36**	**9**	**4**	**4**	**17**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 2	**Semester 5 – Fall**								
	CHP215	Chemistry of Polymers	3	9	2	2	--	4	CHP113
	CHP221	Transport Phenomena	3	9	2	2	1	5	BAS031
	CHP214	Chemical Engineering Thermodynamics	3	9	2	2	1	5	BAS022
	CHP232	Electrochemistry and Corrosion Engineering	3	9	2	2	1	5	CHP111
	CHP261	Environmental Chemistry and Solid Wastes Management	3	9	2	2	--	4	
	HUMx14	Scientific Thinking and Technical Report Writing Skills	1	3	1	--	--	1	
		Total	**16**	**48**	**11**	**10**	**3**	**24**	
	Semester 6 – Spring								
	CHP216	Industrial-organic Chemistry	3	9	2	--	3	5	CHP113
	CHP217	Industrial-inorganic Chemistry	3	9	2	--	3	5	CHP112
	CHP218	materials Science and new materials	3	9	2	2	1	5	CHP112
	CHP222	Heat Transfer	3	9	2	2	1	5	CHP214
	CHP231	Monitoring systems and Quality Control	3	9	2	2	--	4	
	HUMxxx	University Elective 5	2	6	2	--	--	2	
		Total	**17**	**51**	**12**	**6**	**8**	**26**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 3	**Semester 7 – Fall**								
	CHP323	Mass Transfer	3	9	2	2	--	4	CHP132
	CHP334	Surface Chemistry and Catalysis	3	9	2	2	--	4	
	CHP335	Kinetics and chemical reactors Design	3	9	2	2	--	4	CHP217
	CHP336	Design and management of Chemical Plants	3	9	2	2	--	4	CHP132
	CHP338	Applied biotechnology	3	9	2	2	--	4	CHP113
	BASx61	Engineering Economics	2	6	1	2	--	3	
		Total	**17**	**51**	**11**	**12**	**--**	**23**	
	Semester 8 – Spring								
	CHP337	Modeling and Simulation of Chemical Process	3	9	2	2	--	4	CHP336
	CHP339	Petrochemical industries and Technology of Natural gas	3	9	2	2	--	4	CHP216
	CHP341	Engineering of Renewable Energy Resources	3	9	2	2	--	4	CHP222
	CHP342	Control Systems and Treatment of Chemical Industry Pollutant	3	9	2	2	--	4	CHP113
	CHP361	Environmental impact of plants	3	9	2	2	--	4	
		Total	**15**	**45**	**10**	**10**	**--**	**20**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 9 – Fall								
	CHP444	Economics of chemical plants	3	9	2	2	--	4	
	CHP455	Control of chemical processes	3	9	2	2	--	4	CHP336
	CHP425	Mechanical Unit Operations	3	9	2	2	1	5	
	CHP491	Project (1)	3	9	1	--	6	7	
	CHP4xx	Elective special course (1)	3	9	2	2	--	4	
	CHP4xx	Elective special course (2)	3	9	2	2	--	4	
		Total	**18**	**54**	**11**	**10**	**7**	**28**	
	Semester 10 – Spring								
LEVEL 4	CHP424	Multistage Separation Processes	3	9	2	2	--	4	CHP323
	CHP445	Engineering Petroleum Refinery	3	9	2	2	--	4	CHP216
	CHP492	Project (2)	5	15	1	--	9	10	
	CHP4xx	Elective special course (3)	3	9	2	2	--	4	
	CHP4xx	Elective special course (4)	3	9	2	2	--	4	
	HUMx71	Legislation and professional ethics	2	4	2	--	--	2	
		Total	**19**	**55**	**11**	**8**	**9**	**28**	

4.8. PETROCHEMICALS ENGINEERING PROGRAM

4.8.1 Program Mission

Prepare graduates for professional careers in petrochemical engineering and/or graduate study through a program of recognized excellence in teaching and research.

4.8.2 Program Objectives

The Program of petrochemical engineering aims to graduate highly professional and competitive Petrochemical Engineer in the local, regional and international market as the following:

1- Contribute to raising the professional competence and forming a generation of distinguished engineers and qualified researchers in the field of petrochemical engineering.
2- Prepare graduates for professional careers and a lifetime of learning.
3- Assist the graduate's ability for help in the sustainable development of the nation.
4- Develop a sense of citizenship, support team spirit, respect time and act as a way of life and progress.
5- Participate in achieving the development plan, putting science at its service to develop the society scientifically and culturally, and providing environmental services to new urban communities.
6- Developing human capabilities to meet the needs of new societies, including petrochemical engineers.

4.8.3 Graduate Competencies

In addition to the Competencies for General Engineering Programs (A-level: see Bylaw Article 5.2), the Basic Petrochemical Engineering graduate must be able to (NARS 2018 B-Level):

B1. Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.

B2. Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.

B3. Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.

B4. Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.

4.8.4 Job Opportunities

The chemical industry is one of the major driving forces of our nation's economy. From innovations and continual improvements made by chemical engineers flow every new medicine, electronic device and high-performance material, plus new technologies for cleaning the environment and feeding and clothing the world's people.

An education in petrochemical engineering can serve as the foundation for a wide variety of careers. Many, but not most, petrochemical engineering jobs can be found in the chemical process industry, including oil and chemical companies, but other large employers of chemical engineers include organizations involved with food and consumer products, semiconductors, energy and environmental engineering, pharmaceuticals, and cosmetics.

Chemical engineers typically work to design new processes, improve existing processes, reduce manufacturing costs, research and develop new processes and products, and manage corporate assets.

4.8.5 Program Plan Description and Required Courses

4.8.5.1 University Requirements Courses (14 CH = 8.5% of the total 165 CH)

#	Code	Course Title	CH	Contact Hours / week			
				Lec	Tut	Lab	Total
Compulsory Courses							
1	HUM111	Human Rights	**1**	1	0	0	1
2	HUM012	English Language	**2**	1	2	0	3
3	HUMx14	Scientific Thinking and Technical Report Writing Skills	**1**	1	0	0	1
4	HUMxxx	University Elective 1	**2**	2	0	0	2
5	HUMxxx	University Elective 2	**2**	2	0	0	2
6	HUMxxx	University Elective 3	**2**	2	0	0	2
7	HUMxxx	University Elective 4	**2**	2	0	0	2
8	HUMxxx	University Elective 5	**2**	2	0	0	2
Elective Courses: Student must select **five courses** from the followings							
-	HUMx13	Communication and Presentation Skills	**2**	1	2	0	3
-	HUMx15	Management of Human Resources	**2**	2	0	0	2
-	HUMx16	Decision-making and Problem-solving skills	**2**	2	0	0	2
-	HUMx17	Industrial and environmental Safety	**2**	2	0	0	2
-	HUMx18	Arabic Art	**2**	2	0	0	2
-	HUMx19	Introduction to History of Civilizations	**2**	2	0	0	2
-	HUMx20	Egyptian Literary Heritage	**2**	2	0	0	2
-	HUMx21	Arab-Islamic Civilization	**2**	2	0	0	2
-	HUMx22	Information Technology	**2**	1	1	2	4
-	HUMx23	Contemporary Art Trends	**2**	2	0	0	2
-	HUMx24	Entrepreneurship	**2**	2	0	0	2
-	HUMx31	Community Issues	**2**	2	0	0	2
-	HUMx26	Arabic Literature	**2**	2	0	0	2
-	HUMx27	Egyptian History	**2**	2	0	0	2
-	HUMx28	Psychology and communication skills	**2**	2	0	0	2
-	HUMx29	Artistic Palatalizing	**2**	2	0	0	2
-	HUMx30	Music Palatalizing	**2**	2	0	0	2

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4.8.5.2   Faculty of Engineering Requirements Courses (38 CH = 23% of the total 165 CH)

#	Code	Course Title	CH	Lec	Tut	Lab	Total
				Contact Hours / week		
9	BAS011	Mathematics (1): Differentiation and algebra	3	2	2	0	4
10	BAS012	Mathematics (2): Analytical geometry and integration	3	2	2	0	4
11	BAS021	Physics (1)	3	2	1	2	5
12	BAS022	Physics (2)	3	2	1	2	5
13	BAS023	Computer Programming (1)	2	1	0	3	4
14	BAS031	Mechanics (1): Statics	3	2	2	0	4
15	BAS032	Mechanics (2): Dynamics	3	2	2	0	4
16	BAS033	Engineering Production	3	2	0	3	5
17	BAS041	Chemistry	3	2	1	2	5
18	BAS061	Engineering Drawing and Projection	4	1	4	2	7
19	BASx51	Statistics	2	2	1	0	3
20	BASx61	Engineering Economics	2	2	1	0	3
21	HUMx25	Engineering History and Introduction to Engineering Science	2	2	0	0	2
22	HUMx71	Legislations and Professional Ethics	2	2	0	0	2

4.8.5.3   Petrochemical Engineering Core Courses Based on Discipline Requirements (113 CH = 68.5% of the total 165 CH)

Code	Course Title	CH	Lec	Tut	Lab	Total	Prerequisites
			Contact Hours				
(1) Basic Chemical Engineering Courses							
CHP111	Physical Chemistry	3	2	2	1	5	BAS041+BAS021
CHP112	Inorganic and Analytical Chemistry	3	2	--	3	5	BAS041
CHP113	Organic and biochemistry	3	2	--	3	5	BAS041
CHP214	Chemical Engineering Thermodynamics	3	2	2	1	5	BAS022
CHP215	Chemistry of Polymers	3	2	2	--	4	CHP113
CHP216	Industrial-organic Chemistry	3	2	--	3	5	CHP113
CHP217	Industrial-inorganic Chemistry	3	2	--	3	5	CHP112
CHP218	material science and new materials	3	2	2	1	5	CHP112
(2) Transport Phenomena &Separation process							
CHP221	Transport Phenomena	3	2	2	1	5	BAS031
CHP222	Heat Transfer	3	2	2	1	5	CHP214
CHP326	Common Mechanical operations	3	2	2	1	5	CHP217
CHP327	Engineering Petroleum Refinery (1)	3	2	2	--	4	CHP216
CHP428	Mass transfer and multistage separation process (1)	3	2	2	1	5	CHP221
CHP429	Mass transfer and multistage separation process (2)	3	2	2	1	5	CHP428
(3&4&5) Processes Design &Modeling							
CHP231	Monitoring systems and Quality Control	3	2	2	---	4	
CHP232	Electrochemistry and Corrosion Engineering	3	2	2	1	5	CHP111
CHP132	Fundamentals of mass and energy balance	3	2	2	--	4	
CHP343	Kinetics and design of reactors &chemical devices	3	2	2	--	4	CHP217
CHP346	Computer applications in petrochemical engineering	3	2	2	--	4	CHP216
CHP347	Natural gas Engineering	3	2	2	--	4	CHP216
CHP348	Petrochemical industries	3	2	2	--	4	CHP216
CHP349	Control of oil refining operations (1)	3	2	2	--	4	CHP327

CHP444	Economics of Chemical plants	3	2	2	--	4	
CHP451	Engineering Petroleum Refinery (2)	3	2	2	1	4	CHP327
CHP452	Design of polymer reactors	3	2	2	--	4	CHP343
CHP453	Control of oil refining operations (2)	3	2	2	--	4	CHP349
CHP454	Management of petrochemical projects on the computer	3	2	2	--	4	CHP346
(6) Environmental Engineering							
CHP261	Environmental Chemistry and Solid Wastes Management	3	2	2	--	4	
CHP361	Environmental impact of plants	3	2	2	---	4	
(7&8) Program Electives							
CHP377	Petroleum materials tests (elective 1 and 2)	3	2	2	---	4	
CHP378	Rheological properties of petroleum materials (elective 1 and 2)	3	2	2	---	4	
CHP379	Biochemical Engineering (elective 1 and 2)	3	2	2	--	4	
CHP381	Fuel and combustion engineering (elective 1 and 2)	3	2	2	--	4	
CHP382	Statistics in the petrochemical industries (elective 1 and 2)	3	2	2	--	4	
CHP383	Lubricating oils (elective 1 and 2)	3	2	2	--	4	
CHP384	Catalysts in the petroleum manufacturing(elective 1 and 2)	3	2	2	--	4	
CHP385	Advanced separation methods (elective 1 and 2)	3	2	2	--	4	
CHP486	Engineering and Renewable Energy Resources (elective 1 and 2)	3	2	2	--	4	
CHP487	Synthetic rubber (elective 1 and 2)	3	2	2	--	4	
CHP488	Synthetic fibers (elective 1 and 2)	3	2	2	--	4	
CHP489	Surface treatment operations (elective 1 and 2)	3	2	2	--	4	
CHP475	Nuclear and radiological engineering (elective 3 and 4)	3	2	2	--	4	
CHP476	Projects Management (elective 3 and 4)	3	2	2	--	4	
(9)Training & Graduation Project							
CHPX95	Training (1)	--	---	---	---	---	
CHPX96	Training (2)	--	---	---	---	---	
CHP497	Project (1)	3	1	--	6	7	
CHP498	Project (2)	5	1	--	9	10	
(10) Other Basic Science							
BAS113	Mathematics (3): Multivariable calculus and complex analysis	**3**	2	2	0	4	BAS012
BAS115	Complex Functions	**3**	2	2	0	4	BAS113

4.8.6 Proposed Study Plan

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
FRESHMAN (Common for all programs)	**Semester I - Fall**								
	BAS011	Mathematics (1)	**3**	9	2	2	0	4	
	BAS021	Physics (1)	**3**	9	2	1	2	5	
	BAS031	Mechanics (1): Statics	**3**	9	2	2	0	4	
	BAS041	Chemistry	**3**	9	2	1	2	5	
	BAS061	Engineering Drawing and Projection	**4**	12	1	4	2	7	
	HUMxxx	University Elective 1	**2**	6	2	0	0	2	
		Total	**18**	**54**	**10**	10	8	**28**	
	Semester 2 - Spring								
	BAS012	Mathematics (2)	**3**	9	2	2	0	4	BAS011
	BAS022	Physics (2)	**3**	9	2	1	2	5	BAS021
	BAS032	Mechanics (2): Dynamics	**3**	9	2	2	0	4	
	BAS033	Engineering Production	**3**	9	2	0	3	5	
	BAS023	Computer Programming (1)	**2**	6	1	0	3	4	
	HUM012	English Language	**2**	6	1	2	0	3	
	HUMx25	Engineering History and Introduction to Engineering Science	**2**	6	2	0	0	2	
		Total	**18**	**54**	**12**	7	8	**27**	

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 1	**Semester 3 – Fall**								
	BAS113	Mathematics 3: Multivariable calculus and complex analysis	3	9	2	2	--	4	BAS012
	BASx51	Statistics	2	6	1	2	--	3	
	CHP132	Fundamentals of mass and energy balance	3	9	2	2	--	4	
	CHP112	Inorganic and Analytical Chemistry	3	9	2	--	3	5	BAS041
	HUMxxx	University Elective 2	2	6	2	--	--	2	
	HUMxxx	University Elective 3	2	6	2	--	--	2	
		Total	**15**	**45**	**10**	**8**	**3**	**21**	
	Semester 4 – Spring								
	BAS115	Complex Functions	3	9	2	2	--	4	BAS012
	CHP113	Organic and biochemistry	3	9	2	--	3	5	BAS041
	CHP111	Physical Chemistry	3	9	2	2	1	5	BAS041
	HUM111	Human Rights	1	6	2	--	--	2	
	HUMxxx	University Elective 4	2	6	2	--	--	2	
		Total	**12**	**39**	**10**	**4**	**4**	**18**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 2	**Semester 5 – Fall**								
	CHP215	Chemistry of Polymers	3	9	2	2	--	4	CHP113
	CHP221	Transport Phenomena	3	9	2	2	1	5	BAS031
	CHP214	Chemical Engineering Thermodynamics	3	9	2	2	1	5	BAS022
	CHP232	Electrochemistry and Corrosion Engineering	3	9	2	2	1	5	CHP111
	CHP261	Environmental Chemistry and Solid Wastes Management	3	9	2	2	--	4	
	HUMx14	Scientific Thinking and Technical Report Writing Skills	1	3	1	--	--	1	
		Total	**16**	**48**	**11**	**10**	**3**	**24**	
	Semester 6 – Spring								
	CHP216	Industrial-organic Chemistry	3	9	2	--	3	5	CHP113
	CHP217	Industrial-inorganic Chemistry	3	9	2	--	3	5	CHP112
	CHP218	materials Science and new materials	3	9	2	2	1	5	CHP112
	CHP222	Heat Transfer	3	9	2	2	1	5	CHP214
	CHP231	Monitoring systems and Quality Control	3	9	2	2	--	4	
	HUMxxx	University Elective 5	2	6	2	--	--	2	
		Total	**17**	**51**	**12**	**6**	**8**	**26**	

Remarks: Field training to be completed in the summer sessions.

Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
LEVEL 3	**Semester 7 - Fall**								
	CHP326	Common mechanical operations	3	9	2	2	1	5	CHP217
	CHP327	Engineering Petroleum Refinery (1)	3	9	2	2	1	5	CHP216
	CHP346	Computer applications in petrochemical engineering	3	9	2	2	--	4	CHP216
	CHP347	Natural gas Engineering	3	9	2	2	--	4	CHP216
	CHP3xx	Elective special course (1)	3	9	2	2	--	4	
	BASx61	Engineering Economy	2	6	1	2	--	3	
		Total	**17**	**51**	**11**	**12**	**2**	**25**	
	Semester 8 - Spring								
	CHP348	Petrochemical industries	3	9	2	2	--	4	CHP216
	CHP349	Control of oil refining operations (1)	3	9	2	2	--	4	CHP327
	CHP343	Kinetics and Design of reactors & chemical devices	3	9	2	2	--	4	CHP217
	CHP3xx	Elective special course (2)	3	9	2	2	--	4	
	CHP361	Environmental impact of plants	3	9	2	2	--	4	
	BASx71	Legislation and professional ethics	2	4	2	--	--	2	
		Total	**17**	**49**	**12**	**10**	**0**	**22**	

Remarks: Field training to be completed in the summer sessions.

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Year	Course Code	Course Title	CH	SWL / week	Contact Hours / week				Prerequisites
					Lec	Tut	Lab	Total	
	Semester 9 - Fall								
	CHP444	Economics of chemical plants	3	9	2	2	--	4	
	CHP428	Mass transfer and multistage separation process (1)	3	9	2	2	1	5	CHP221
	CHP451	Engineering Petroleum Refinery (2)	3	9	2	2	1	5	CHP327
	CHP4xx	Elective special course (3)	3	9	2	2	--	4	
	CHP497	Project (1)	3	9	1	--	6	7	
		Total	15	45	9	8	8	25	
	Semester 10 - Spring								
LEVEL 4	CHP452	Design of polymer reactors	3	9	2	2	--	4	CHP343
	CHP453	Control of oil refining operations (2)	3	9	2	2	--	4	CHP349
	CHP429	Mass transfer and multistage separation process (2)	3	9	2	2	1	5	CHP428
	CHP454	Management of petrochemical projects on the computer	3	9	2	2	--	4	CHP346
	CHP4xx	Elective special course (4)	3	9	2	2	--	4	
	CHP498	Project (2)	5	15	1	--	9	10	
		Total	20	60	11	10	10	31	