Ain Shams University
Faculty of Engineering
Accredited Faculty from NAQAAE
Credit Hours Engineering Programs

ASU-CHEP STUDENT GUIDE

September 2014

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Message from CHEP Director

With new technologies emerging nowadays at full-speed, the technology gap between developing countries and industrial nations continues to widen at an alarming rate. The only hope to tighten this gap is through skilled engineers who are capable of integrating new technologies into the existing systems.

In year 2006, and as an Egyptian leading engineering educational institution, the Faculty of Engineering at Ain Shams University has established the Credit Hours Engineering Programs (CHEP) in critical emerging areas for this purpose. The main goal was to provide quality engineering educational experience and to graduate skilled engineers who can compete in the global market. This new system also seeks to offer high quality, student-centered learning environment with an aim to produce engineers equipped with skills, knowledge and keen desire for life-long learning.

The first two programs in Building and Materials Engineering were launched in 2006, followed by another two programs in Communication Systems and Manufacturing Engineering in 2007. In 2009, the Energy and Renewable Energy Engineering Program was also launched. In 2013, the Landscape Architecture, Computer Engineering and Software Systems, and Mechatronics Engineering and Automation started as added value to the programs. The previous eight programs are already running with plans to add more programs in the near future.

The programs feature dynamic and strong interdisciplinary cooperative education that is different from the mainstream. The system is also based on continuous evaluation and adequate delivery through interactive and critical teaching, as well as engineering reasoning. The curriculums include a socio-economic component with strong emphasis on communication skills and English language proficiency. Balancing the classroom theory with practical activity is also fulfilled through a mandatory co-op program with local and foreign industry; thus, providing the market with graduates having enough practical experience in their field. The previous unique features of the programs are finally optimized by the limited number of students, as well as the staff availability to regularly communicate with them concerning their marks and term records.

I strongly believe that the unique features of the CHEP will be further enhanced in the future by the devoted work of the Faculty and Programs' Administrations, as well as by the fruitful contribution of the talented Faculty Members of our institution. Needless to mention that the continuous feedback of the CHEP students will always be the milestone for the programs' success.

On behalf of the CHEP Administration, I would finally like to welcome our newly enrolled students and wish all success to our higher levels' students and graduates. I would also like to assure you of our full devotion to fulfill all our commitments in providing top quality engineering education and upgrading our facilities and infrastructure.

Prof. Dr. Abdel Wahab El-Ghandour

1. Introduction

ASU-CHEP seeks to offer high quality, student-centered learning environment to produce engineers equipped with skills, knowledge and keen desire for life-long learning. The programs feature interdisciplinary cooperative education and research that are different from the traditional mainstream, in terms of the features highlighted in Figure 1 below. The curriculum is inspired by Engineer 2020 vision and the assessment of delivery is based on the National Academic Reference Standards (NARS) criteria.

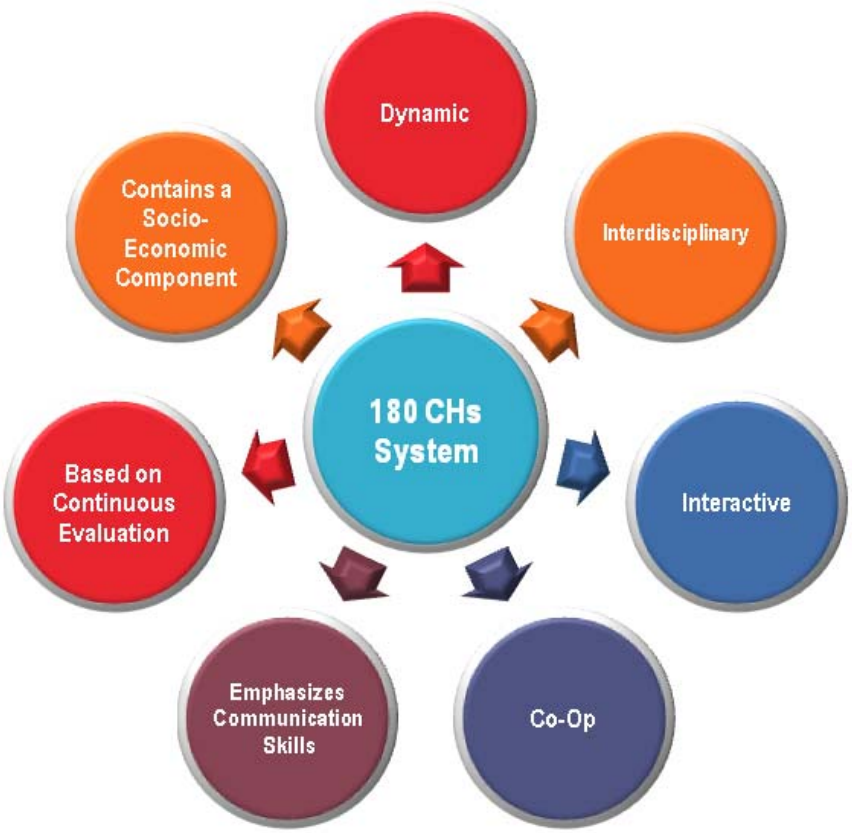


Figure 1. Features of the CHEP System

2. Advantages of the Programs

- Enhanced enjoyable education.
- Dynamic and strong interdisciplinary curriculum.
- Adequate delivery, based on interactive and critical teaching and engineering reasoning.
- Strong link between teaching and research.

- Effective university-industry collaborative research enterprise.
- Acquired experience through a mandatory co-op program with local and foreign industry.
- Strong emphasis on communication skills and English language proficiency.
- Adapted international textbooks.
- Lectures and tutorials with limited number of students.
- Accredited programs sought according to a combination of National Academic Reference Standards (NARS), the British Quality Assurance Agency (QAA-UK) and the Accreditation Board for Engineering and Technology (ABET).
- Staff available to communicate with students regularly.
- Students can discuss their marks and have full access to their term records.
- Continuous evaluation with final exam representing only 40%.
- Higher chance of getting employment with international companies in Egypt and abroad.
- A chance to do summer internship abroad.
- A better chance to study in foreign Universities and complete your graduate studies abroad.

3. Collaboration with Foreign Universities

According to the agreement signed in 2010/2011 with Clausthal University in Germany, students of the Materials Engineering Program can obtain a dual B.Sc. Degree from Ain Shams and Clausthal Universities, on condition of spending two semesters at Clausthal.

4. Running Programs

The Credit Hours System of the Faculty of Engineering, Ain Shams University offers B.Sc. degrees in the following majors:

Building Engineering: The program, started in 2006, is concerned with planning, design, construction, operation, renovation, and maintenance of buildings, as well as with their impact on the surrounding environment. Building Engineers deal with the architectural, structural, environmental, mechanical, electrical, plumbing, and construction and management aspects of building structures. The goal of building engineers is to achieve adequate performance, safety against overloading, initial low cost, operation and maintenance, as well as longevity and durability. Graduates of this program can be specialized in:

- Structural Engineering
- Construction Management
- Environmental Engineering

Materials Engineering: The program, started in 2006, is concerned with the manipulation of the atomic and molecular structure of substances to create desired properties for useful products for our everyday's use. Material Engineering crosses over civil, mechanical, electronic, and chemical engineering, in addition to engineering physics. Graduates of this program can be specialized in:

- Metals and alloys
- Polymers and composites
- Glasses and ceramics
- Cementitous materials
- Electronic materials
- Nano materials

Communication Systems Engineering: The program, started in 2007, is concerned with dealing with the wide areas of communication and telecommunication networks, wireless communications, cellular and satellite networks, microwave communication systems, electronic and optical communication systems. Graduates of this program can be specialized in:

- Telecommunications
- Data communications
- Signal processing
- Photonics
- Microwaves
- Optical communications
- Electronics

Manufacturing Engineering: The program, started in 2007, is concerned with the design, construction, and improvement of the engineering products. Manufacturing engineers convert raw materials into useful products with the required specifications and with minimum cost. Graduates of this program can be specialized in:

- Metal cutting and material forming
- Mechanical measurement and metrology
- Robotics and computer numerical controlled machines
- Product design
- Material fabrication
- Industrial organization manufacturing supply chain

Energy and Renewable Energy Engineering: The program, started in 2009, is concerned with dealing with the different renewable energy resources such as wind, photovoltaic, solar, hydro, fuel cells, and new technologies. It is a multi-disciplinary program that covers different topics to make future engineers understand the renewable energy resources, how they work, and how to use them in applications. Graduates of this program can be specialized in:

- Wind energy power plants

- Solar and photovoltaic energy
- Energy conversion
- Interfacing technology

Computer Engineering and Software Systems: The program, started in Spring 2013, is concerned with software engineering with a strong emphasis on computer engineering. It opens a whole world of career opportunities to its graduates in software product lines, mobile and pervasive computing, cloud computing, embedded systems, multimedia, 3D graphics, game design, and much more. Graduates of this program can be specialized in:

- Building software solutions using different technologies and architectures
- Software development life cycles
- Managing software projects
- Software analysis, modeling, design, and quality assurance
- Embedded systems
- Computer graphics and multimedia
- Cloud computing
- Mobile computing
- Big-data analytics
- Computer networking and security

Landscape Architecture: The program, started in Spring 2013, is concerned with graduating landscape architects specialized in landscape design. Its mission is to give the students through five years (ten terms) the specialization courses for landscape in an integrated framework with scientific courses of architecture, urban design and planning, in addition to basic scientific and engineering courses. Graduates of this program can be specialized in:

- The harmony between buildings design and open and green spaces
- The aesthetical and functional dimensions for landscape elements
- Dealing with different environments and levels as urban areas, coastal facades, and desert and mountainous sites
- Create designs that fulfill human needs, preserve the environment, save energy, and realize sustainability

Mechatronics Engineering and Automation: The program, started in Spring 2014, is concerned with Mechatronics Engineering and Automation with a strong emphasis on one of the fields: *Industrial Automation*, *Autotronics*, *Bio-Mechatronics*, and *Nano-Mechatronics*. Graduates of this program can be specialized in:

- Mechatronics systems
- Industrial automation systems
- Micro and Nano Electro-Mechanical Systems (MEMS/NEMS)
- Automotive systems

- Bio-Mechatronics systems
- Process control systems
- Embedded systems, robotics, CNC, CAD/CAM … etc.

5. Admission Requirements

Students eligible to get enrolled in the Credit Hours Engineering Programs are those with the general certificate of secondary education (Thanaweya Amma), mathematics section, or equivalent, who have been deployed to the Faculty through the Coordination Office, or transferred from other Faculties, in accordance with the rules and conditions established annually by the Supreme Council of Universities.

The Council of the Faculty of Engineering establishes general rules for admission to the programs considering the student preferences and the principle of equal opportunities as the basis for the admission of students to these programs.

When the student applies to the credit hours programs, the Council of the Faculty of Engineering may assign him a maximum of two basic courses as an admission prerequisite. These courses will not be included in the student's GPA and are recommended by the Programs Administration Council and approved by the Council of the Faculty of Engineering.

Concerning the internal students transfer to/from the credit hours system and the Transfer from outside the Faculty, kindly refer to Articles (43 and 44) of the Internal Regulations.

6. Tuition Fees

Tuition fees, set per credit hour, are specified yearly by the University administration based on the recommendation of the Programs Administration Council and the approval of the Council of the Faculty of Engineering. The tuition fees may be increased annually for newly enrolled students, according to the rules set by the Council of the Faculty of Engineering and the University administration based on the associated general regulations.

The student will sign a pledge to abide by the educational service charges proposed by the Faculty, and approved by the University, with the commitment of constant charges from admission until graduation.

The tuition fees are paid every semester (the first and the second main semesters) based on the number of credit hours registered by the student, with a minimum of the correspondence of educational service fees of 12 credit hours each semester, unless the number of credit hours

remaining for the fulfillment of the degree is less than that, in which case the student should pay the actual number of registered credit hours. The educational service fees for the Summer semester are determined based on the actual number of credit hours registered by the student.

7. Scholarships

The student who achieves an accumulative GPA of 3.6 or higher after any semester and did not fail any course throughout his course of study is included in the Dean's List and receives partial exemption from charges on the next semester. This exemption is dependent on the student's GPA as recommended by the Programs Administration Council in this regard and after approval of the Council of the Faculty of Engineering.

Student who keeps an accumulative GPA of 3.3 or higher in every semester all through his course of study and does not fail any course, graduates with an Honor Degree, which is documented in his graduation certificate.

The top 30 students in Thanaweya Amma, mathematics section, who enrolled in the credit hours programs, are fully exempted from paying any tuition fees in their first semester. To maintain this exemption in the following semesters, the student should maintain an accumulative GPA of 3.6 or higher in every semester. This exemption is declined once the student fails to achieve this accumulative GPA in any semester.

The faculty sets a system for encouraging distinguished students through reducing their tuition fees in accordance with their accumulative GPAs. At the beginning of each semester, the distinguished students' list is announced together with the associated tuition fees reductions.

8. Curriculum

CHEP is a credit hours system leading to the Bachelor Degree (B.Sc.) after completing 180 Credit Hours. Student evaluation is based not only on final exam, but also on midterm exams, quizzes, assignments, course projects, presentations, papers, essays, in/out of class participation and many other innovative activities. The curriculum is designed in such a way to contain the following broad sub-divisions, which are also emphasized in Figure 2.

1. **University Requirements**
   The student must pass the University requirements, which consist of humanities, social sciences, general culture courses. These courses represent 18 credit hours selected from a list of courses.

2. College Requirements

The student must pass the College requirements, which consist of basic sciences and engineering courses. These courses must be studied by all students and they represent 46 credit hours.

3. Program Major and Specialization Requirements

The student must pass a total of 116 credit hours.

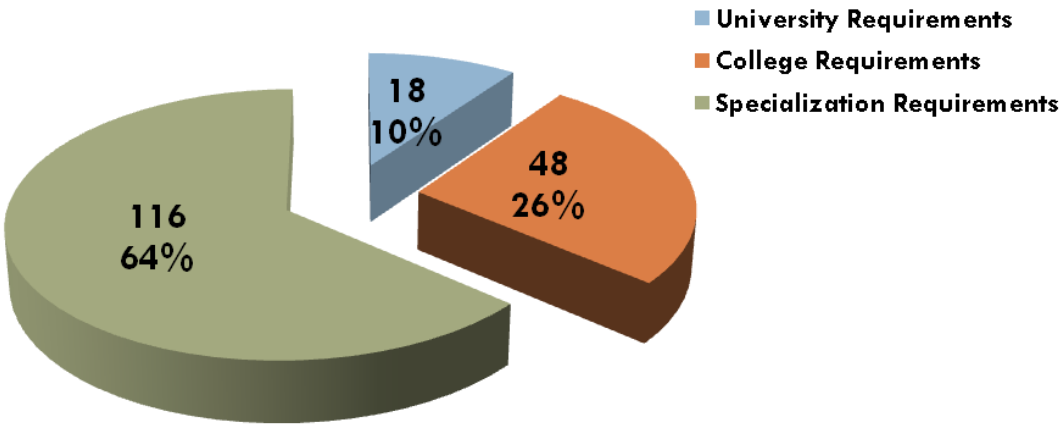


Figure 2.a. Curriculum Plan for all Programs Except for Landscape Architecture Program

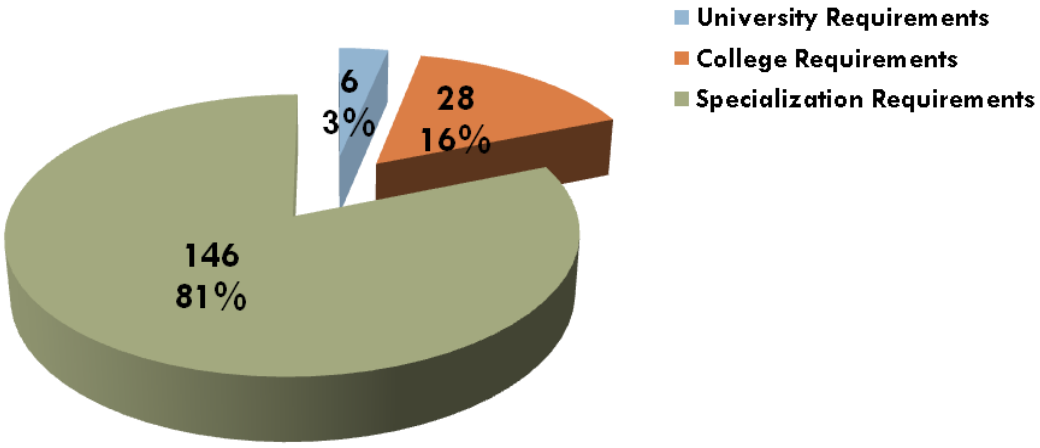


Figure 2.b. Curriculum Plan for Landscape Architecture Program

The distribution of the credit hours allocated to the study requirements for the Landscape Architecture Program can be different from above, due to the special features of this program.

9. Teaching Faculty Members

Course instructors in the CHEP are carefully selected from the distinct full-time world-class faculty members of the Faculty of Engineering at Ain Shams University.

10. Teaching Policy

Language: English language should be used for lecturing, discussions, exams, and all verbal and electronic communications. Use of Arabic language is strictly forbidden even in one-to-one conversation between the instructor and the students.

Course Syllabus: Each course syllabus should contain: course objectives, textbook, outline, material, assessments, grading policy and outcome. Outline should contain sections covered every week with reference to chapters/sections in the textbook. The instructor should give the course syllabus to the students in the first class. The syllabus serves as a contract between the instructor and the students.

Textbook: The instructor is free to select/recommend a textbook but it should be international and available. The textbook information should be provided to the administration office or the unit head before the first class of the course.

Attendance: Attendance is taken in lecture and tutorial classes. It is assigned a percentage based on the grading policy. Students should not be allowed to enter the class after 5 minutes from the scheduled time. No eating, drinking, or mobile use in the class. If the student wants to leave the class for any reason, he will not be allowed to come back to the class. The student's attendance should not be less than 75% during the course. Otherwise, the student should not be allowed to attend the final exam.

Assignments: Assignments are given every week (spelled out in the course syllabus), preferably from the textbook. Assignments should constitute 20% of the total grade. Instructors are allowed to drop the least assignment from the grade. The assignment is collected at the end of the tutorial period of the next week. Instructors may grade only selected problems from the assignment. The graded assignment should be returned and discussed with the class.

Quizzes: Unannounced quizzes are given in the tutorials to force the students to study and be ready all time. These quizzes should constitute 10% of the total grade. The quiz is given at the end of the session for 15 minutes max. Up to 6 quizzes can be given and the least one can be dropped from the grade. The graded quiz and the model answer should be returned the following tutorial and discussed with the class.

Exams: One midterm exam should be given. Time should be indicated in the course syllabus. The midterm exam should be given during the 6th-7th week. This exam will be held during lectures/tutorials based on course progress and will constitute 25% of the grade. The graded midterm exam and its model answer should be returned and discussed with the class. The instructor can arrange for a bigger or more suitable room for the midterm exam. The final exam constitutes 40% of the grade. It should be a comprehensive exam covering all material. The student fails the course if he gets less than 30% of the final exam total grade. Instructors may select to have all exams open-book or closed-book.

Cheating Policy: If a student is caught cheating during the midterm exam or the quizzes, he will get zero in this exam. If the student is caught cheating one more time, he will fail the course. Cheating during the final exam is strictly prohibited and faculty policy will be strictly applied.

Office Hours: For each hour (lectures or tutorials) the instructor should have an office hour. It could be twice a week for 1.5 hours each. Office hours will be determined in the first class and will be posted on the Instructor's office door.

Electronic Communication: The students can send e-mails to the instructors to ask questions or get information. The instructor should answer the students within 72 hours.

Class Location/Period: All classes (lectures, tutorials, or labs) should take place in the assigned room and time slot based on the published class schedule. The instructor can arrange for a different room for exams/quizzes if the assigned room is note suitable for that.

Cancelled Classes: If a class is cancelled for emergency or any reason, the students should be notified and a compensation class should be arranged with them.

Course Outcome: The learning outcomes are expressed for threshold levels that engineering students are expected to achieve upon graduation. It is anticipated that many programs may exceed these levels. The instructor should submit the course specifications to fit the program matrix at least.

Course Grading: The instructor should detail in the syllabus the course grading strategy and provide it to the students in the first class. The programs grading policy is as follows:

- Final exam 40%
- Quizzes 10%
- Assignments 20%
- Midterm 25%
- Attendance and participation 5%

Grades: The following table shows the letter grades for the courses:

Grade	Percentage	GPA
A+	97% and higher	4.0
A	93% to less than 97%	4.0
A-	89% to less than 93%	3.7
B+	84% to less than 89%	3.3
B	80% to less than 84%	3.0
B-	76% to less than 80%	2.7
C+	73% to less than 76%	2.3
C	70% to less than 73%	2.0
C-	67% to less than 70%	1.7
D+	64% to less than 67%	1.3
D	60% to less than 64%	1.0
F	Less than 60%	0.0

Students' Course Evaluation: The students will fill-in a course evaluation form at the end of the semester. They will evaluate the instructor delivery, course content, grading and textbook. The unit head of the program will pay unplanned visits to the classroom to evaluate delivery.

Add/Drop and Withdraw: The student can add/drop the course within the first two weeks (first week in summer semesters) of classes without any penalty. No add/drop is allowed after the second week (first week in summer semesters). The student can withdraw the course no later than the 8th week (4th week in summer semesters), where the course fees will not be deducted, but no academic penalties will be imposed.

Passing Courses: The student must get a minimum D Grade in order to pass a course.

Incomplete Courses: If a student does not attend the final exam of the course in a semester with an excuse that is accepted by the Programs Administration Council and approved by the Council of the Faculty of Engineering, another final exam is held after the semester final exams. The marks of the latter final exam should be added to the semester-work marks to calculate the overall grade of this course, after paying a re-examination fees equivalent to one credit hour.

Courses Improvement: The student can repeat a course for improvement if his grade satisfies the minimum passing requirement, according to the following rules:

1. The student gets the grade of the course after improvement, and this grade is the one that will be accounted for in the accumulative GPA, on condition that the improvement should be shown in the student's transcript.
2. The student can improve up to five courses during his study duration, except for

improving courses with the purpose of getting out of the academic warning or satisfying the graduation requirements.

3. The student should pay the credit hours fees for the course.

Courses Repetition: If the student fails a course (gets F grade), he should repeat the course (full attendance and performing all activities including examinations), according to the following rules:

1. The maximum grade of the repeated course is B+.
2. The student gets the grade of the course after repetition, and this grade is the one that will be accounted for in the accumulative GPA, on condition that the repetition should be shown in the student's transcript.
3. The student should pay the credit hours fees for the course.

Appeals: A student can submit an appeal to review his course marks within a week from the grades announcement, and after paying the required fees in accordance with the faculty regulations. In case of general complaints, a committee that includes the course instructor should review the students' marks.

Academic Advisor: Every student is assigned an Academic Advisor who is one of the faculty members and may continue with the student for the whole study duration. The Academic Advisor should follow-up with the student, assist him in selecting courses each semester, and request to place the student under probation for one semester, hence, limiting the number of registered credit hours for this student to a minimum of 12 credit hours in this semester. The Academic Advisor may ask the student to repeat courses which he already passed or ask him to register in additional courses to raise his accumulative GPA to that required for graduation.

11. Co-operative Education (Field Training)

Integrating classroom learning and progressive work experience is an educational strategy adopted by CHEP. Three summer co-op periods (4 weeks each), which start at the end of the Sophomore year, should be accomplished by the student before graduation. The Co-op in this program is the first of a kind in Egypt and its governing rules are detailed in Article (37) of the Internal Regulations.

12. Graduation Requirements

To obtain the Bachelor of Science Degree in Engineering, the student must successfully complete 180 credit hours in one of the programs according to the requirements stipulated in Article (30) of the Internal Regulations, with a GPA at graduation of at least 2.0.

A graduation project is an essential part of all the programs requirements for graduation. The graduation project may be completed over two successive semesters, as per the program's curriculum, and the student does not graduate unless he fulfills the project's pass requirements.

The student must perform summer training for 12 weeks during his study duration. Training must be performed in an industrial/service facility related to the student's program, and must be under the full supervision of the faculty according to the requirements stipulated in Article (37).of the Internal Regulations.

An English language placement test is held for all students at their first enrolment in the credit hours programs. Not passing the English language placement test will necessitate that the student register in the English Language course (HUM 011), after paying the prescribed fees. The evaluation of the student in this course will be based on success/fail and is not included in the calculation of the GPA. Passing the English language course is a prerequisite for completing the graduation requirements.

The student is allowed to register during the final semester in a number of credit hours according to his condition, even if the total number of credit hours during the student's study duration exceeds 180. The student who already accomplished his 180 credit hours is not allowed to register in a new semester, since he has already fulfilled the Bachelor Degree requirements.

In the case of a cooperative agreement between the credit hours engineering programs of the Faculty of Engineering and a foreign university, the student can study a number of courses in the foreign university, pending prior approval of the Faculty of Engineering. The credit hours of these courses are included in the student's graduation requirements, on condition that the total credit hours of these courses do not exceed 36 credit hours.

13. Study Dismissal and Academic Warning

A student gets an academic warning if his accumulative GPA at any main semester is less than 2.0. In such a case, he will not be allowed to register in more than 12 credit hours in the following semester until he revokes the academic warning.

The student will be dismissed from the study if he gets accumulative GPA less than 2.0 in six consecutive semesters excluding Summer semesters.

The student will be dismissed from the study if he failed to achieve the graduation requirements during the maximum study duration, which is ten years.

The Council of the Faculty of Engineering may allow the student who is exposed to study dismissal because he failed to achieve an accumulative GPA of at least 2.0, to have one and last chance to register in 2 consecutive main semesters to raise his accumulative GPA to 2.0 and achieve the graduation requirements, provided that he has successfully completed at least 80% of the total number of credit hours required for graduation.

14. Administration Skeleton

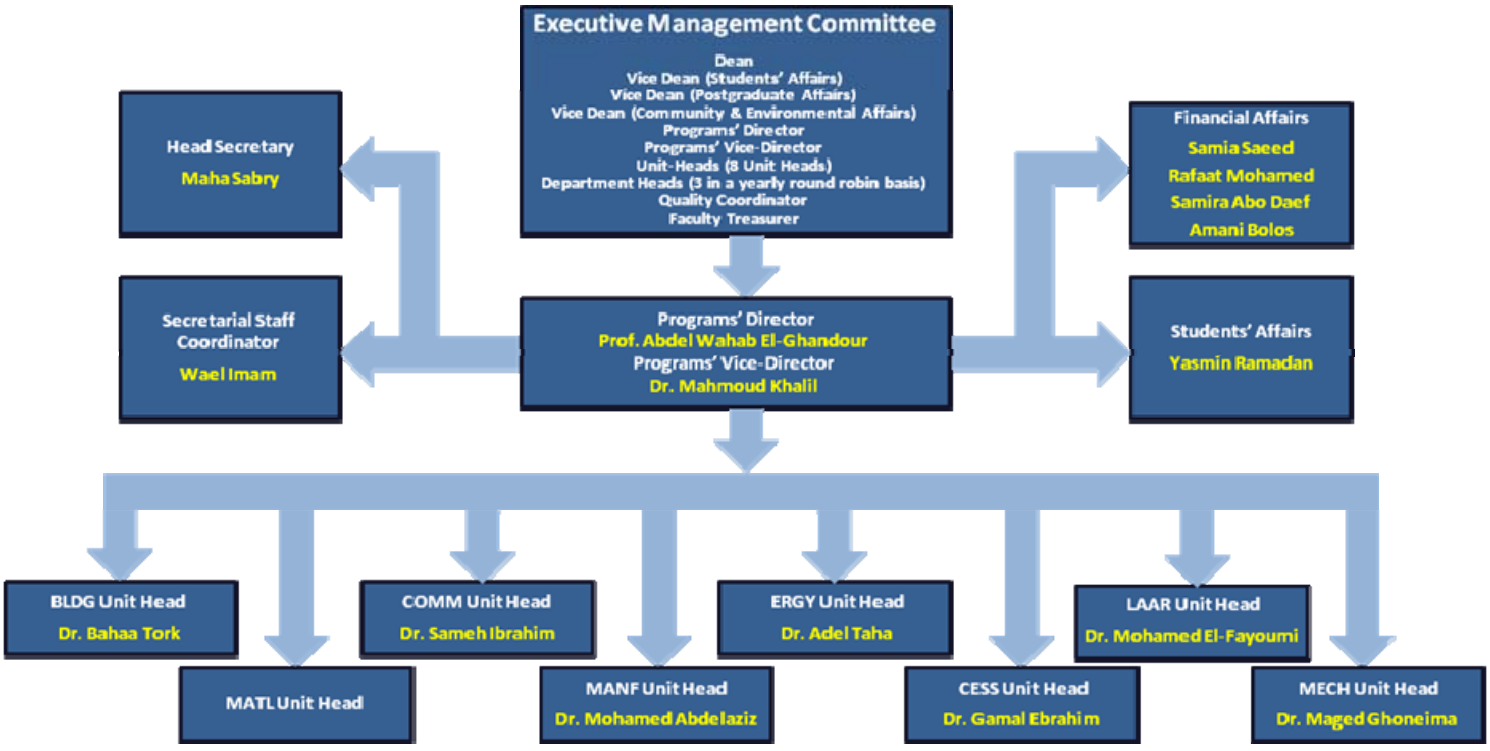


Figure 3. The Skeleton of Executive Management Committee (EMC)

15. Available Facilities

15.1 Students' Affairs Administration

The students' affairs administration is chaired by the Vice-Dean for education and students' affairs and is located in the main building, as shown in Figure 5 of section 17.5. This administration has representatives at the programs' administration offices (Ground Floor of the New Educational Building). The secretariat of each program (at the programs secretariat office – Ground Floor of the New Educational Building) also collaborates with the previous representatives in accomplishing the following tasks:

- Archiving of the students' files.
- Issuing the students' identity cards.
- Electronic recording of the students' course registration, drop/add, and withdraw.
- Emailing the registered students lists to the instructors.
- Processing the students' course evaluation at the end of each semester.
- Issuing the students' records at the end of each semester.
- Issuing the students' graduation certificates.
- Processing the students' appeals and requests.

15.2 Students' Union

The students' union is also under the general supervision of the Vice-Dean for education and students' affairs. As part of the Faculty of Engineering, the programs' students are members in the union and have similar rights and benefits as the mainstream students, including entering the union's yearly elections.

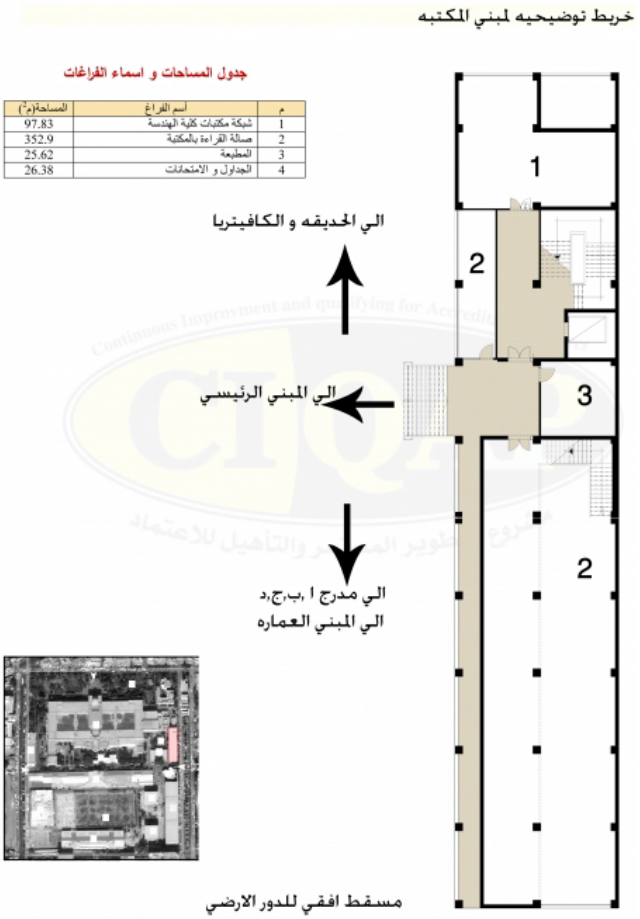
15.3 Financial Affairs Administration

The programs' financial affairs administration, located at the Ground Floor of the New Educational building, is responsible for issuing the payment orders for the students' tuition fees at the beginning of each semester. The administration is also responsible for collecting the copies of the students' payment receipts, which should be presented by the students after making their payment at the Faculty treasury. Programs' students who fail to present copies of the payment to the programs' financial administration risk having no payment records at the programs.

15.4 Library

The Faculty library provides a service specially designed to fulfill the requirements of all academic programs. It is open for all Faculty members for reference use and borrowing. The main library has a shelf space for over 40700 books on all subjects forming part of the Faculty curriculum. It has 353 technical periodicals (the Faculty receives 23 periodicals yearly in a regular basis). Additionally, it has more than 3340 Ph.D. and M.Sc. theses resulted from all Faculty departments' activities.

The students' library has multiple copies of textbooks, amounting to over 13000, available for short-term borrowing to students. According to the Engineering Faculties libraries development project, annexed to the Ministry of Higher Education, the library is inter-connected through the Internet with all the libraries of engineering faculties nationwide. VTLS library software system has been installed which contains all the modules to provide library services to the Faculty community.



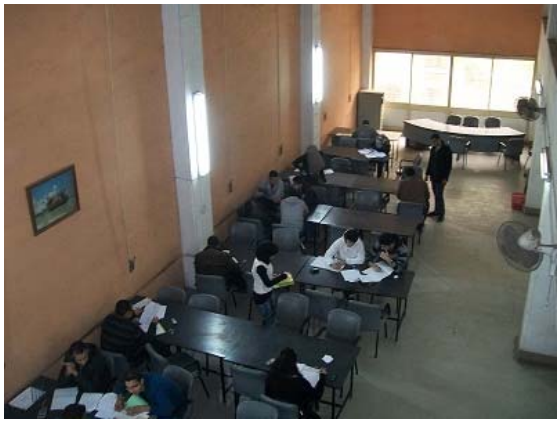


Figure 4. The Library of the Faculty of Engineering

15.5 Facilities and Administration Map

Figure 5 shows the main building map. In this map, you can locate the following locations:

Room	Description
21	Dean's Office
14	Community and Environmental Affairs Vice-Dean's Office
15	Post Graduated Affairs Vice-Dean's Office
16	Students' Affairs Vice-Dean's Office
45	Students' Affairs
69	Faculty Treasury
94	Cafeteria
43	Security Administration

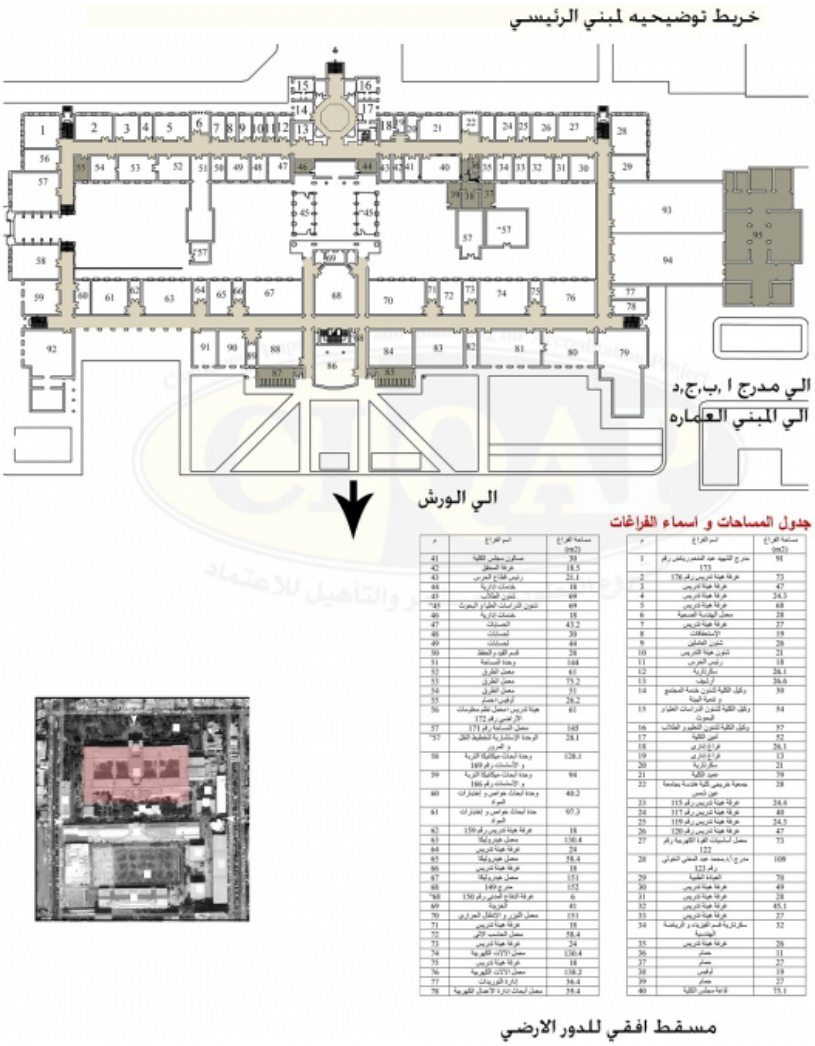


Figure 5. The Main Building Map

15.6 ASU-CHEP Web Page and Portal

A comprehensive web page for the ASU-CHEP is available at http://chep.eng.asu.edu.eg/ (shown in Figure 6). All relevant information about the ASU-CHEP is posted and updated regularly in this web page. Furthermore, the web portal of the Faculty of Engineering (shown in Figure 7) is available at http://portal.eng.asu.edu.eg/home.php. It provides unique electronic services to all students including curriculum of the programs, contact information of the instructors, e-learning capabilities for the courses, and much more.

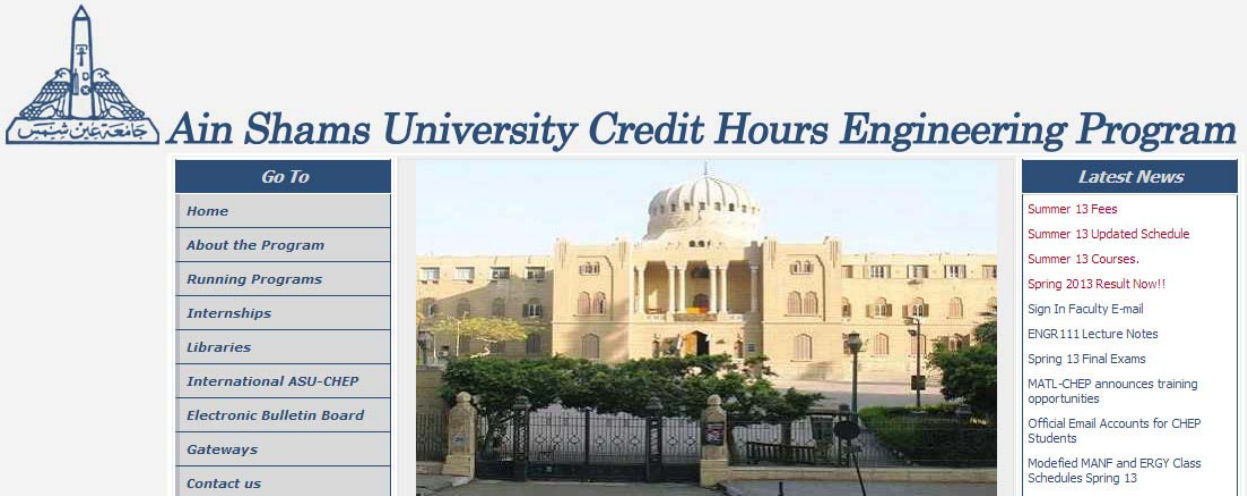


Figure 6. ASU-CHEP Web Page Available at http://chep.eng.asu.edu.eg/

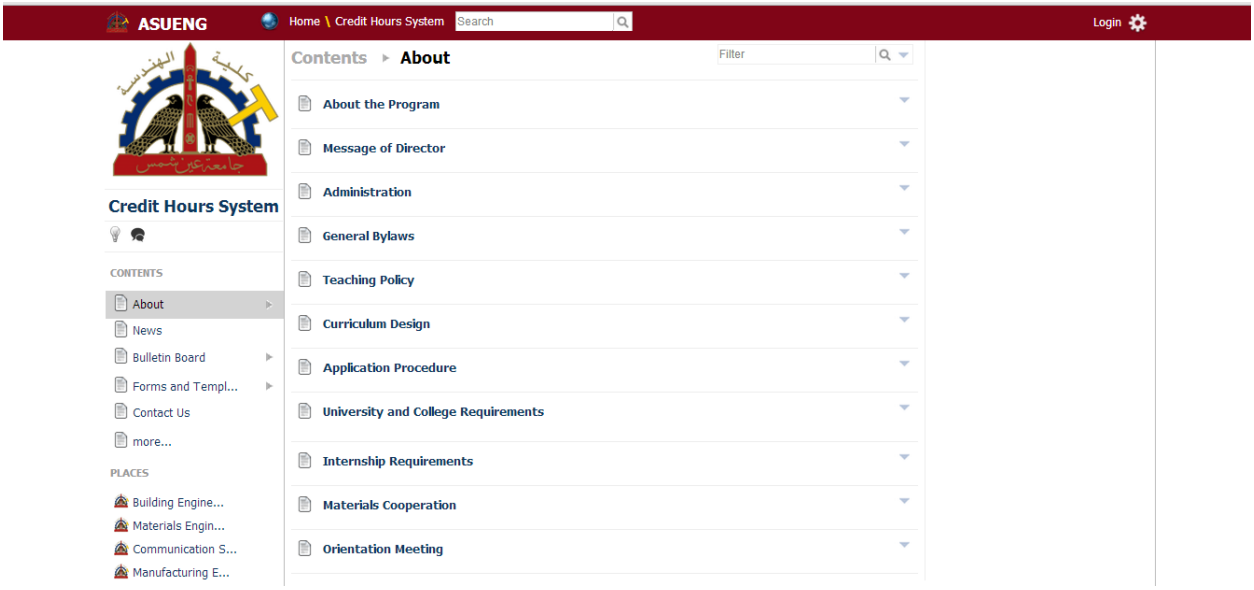


Figure 7. Faculty of Engineering Web Portal Available at http://portal.eng.asu.edu.eg/home.php

16. Building Engineering Program

The program aims at meeting the needs of the Egyptian construction industry by providing engineers familiar with the overall design of built facilities. The building engineer explores all phases of the life-cycle of the building and develops an appreciation of the building as an advanced technological system. Problems are identified and appropriate solutions are found to improve the performance of the building in areas such as: energy efficiency, passive solar engineering, lighting and acoustics, indoor air quality, construction management, HVAC, advanced building materials, building envelope, earthquake resistance, wind effects on buildings, and computer‐aided design. The job market in Egypt needs building engineers with such a background, especially in the course of the current national effort to render affordable and suitable housing for the people.

16.1 Program Outcomes

Program outcomes have been established based on the Program Educational Objectives. Graduates of the CHEP Program in building engineering are expected to have:

- Fundamental background in mathematics, natural science (physics and chemistry), and computer programming.
- Knowledge on the Integrated Design of built facilities; a building engineer can efficiently deal with a wider range of problems in the construction industry.
- Ability to the structural and environmental design, and construction management of buildings.
- Ability to collaborate effectively with others and to function on multidisciplinary teams. They will have teamwork skills to be able to productively contribute to group projects.
- Ability to identify, formulate, and solve engineering problems.
- Understanding of professional and ethical responsibility.
- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice, including computer programming and information technology.
- Ability to communicate effectively in writing and speaking with visual means.
- Knowledge of contemporary issues.
- Understanding of the impact of engineering solutions in their society. They will understand the effects of engineering decisions with regard to constraints such as economic, ethical, environmental, social, political, health and safety, manufacturability, and sustainability.
- Recognition of the need for, and an ability to engage in life-long learning.

16.2 Program Curriculum

16.2.1 University Requirements (Humanities)

The student will study (6) General Education Elective Courses (humanities) selected by him from the following list of courses, with a total of (18) credit hours.

Course Code	Course Title	Credit Hours
HUM 011	English Language	0
HUM 012	German Language	3
HUM 013	Technical Writing and Communication	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

16.2.2 College Requirements

16.2.2.1 Basic Science Courses

Course Code	Course Title	Credit Hours
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanics (1) - Statics	3
PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
PHM 113	Calculus for Engineering (3)	3
PHM 114	Statistics and Probability for Engineering	3
PHM 115	Differential Equations and Partial Differential Equations	3
	Total Credit Hours	**30**

16.2.2.2 Basic Engineering Courses

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
MDP 024	Production Engineering	3
MDP 061	Engineering Design and Graphics	4
MEP 112	Thermodynamics	3
MDP 132	Structures and Properties of Materials	3
	Total Credit Hours	**16**

16.2.3 General Specialization Courses

Course Code	Course Title	Credit Hours
MEP 113	Building Thermal Sciences	3
ARC 114	Building Engineering Drawing	3
CES 115	Structural Analysis (1)	3
CES 116	Strength of Materials	3
CES 121	Building Engineering Systems	3
CEI 122	Fluid Mechanics	3
CES 143	Building Engineering Materials	3
CEP 212	Surveying (1)	4
CEP 213	Surveying (2)	4
CES 213	Structural Analysis (2)	3
EPM 213	Acoustics & Lighting	4
CES 214	Numerical Methods in Building Engineering	3
CES 223	Concrete Structures Design (1)	3
CES 224	Building Systems Optimization	3
CES 231	Steel Structures Design (1)	3
CES 242	Concrete Technology (1)	3
CES 243	Concrete Technology (2)	3
MEP 311	Thermal Analysis of Buildings	3
MEP 312	HVAC System Design	3
CES 313	Computer Aided Structural Design	3
CES 323	Concrete Structures Design (2)	3
CES 324	Construction Engineering (1)	3
CES 352	Soil Mechanics	3

CES 353	Foundation Design	3
CES 361	Engineering Management Principles	3
ARC 414	Building Envelope Design	3
CES 418	Structural Dynamics	3
CES 419	Senior Seminar	2
CES 423	Construction Engineering (2)	3
CES 442	Modern Building Materials	3
CES 463	Project Management for Construction	3
CES 497	Graduation Project (1)	3
CES 498	Graduation Project (2)	3
	Total Credit Hours	**101**

16.2.4 Technical Electives

The student shall select five Technical Elective Courses from the following list. Four courses should be selected from one field and the fifth course can be selected from any field. Accordingly, a total number of 15 credit hours should be earned.

16.2.4.1 Technical Electives for Environmental Engineering

Course Code	Course Title	Credit Hours
ARC 362	Indoor Air Quality	3
EPM 411	Building Illumination and Day Lighting	3
MDP 445	Building Acoustics	3
CEP 449	Selected Topics in Environmental Engineering	3
ARC 453	Control Systems in Buildings	3
ARC 462	Building Energy Conservation Technologies	3

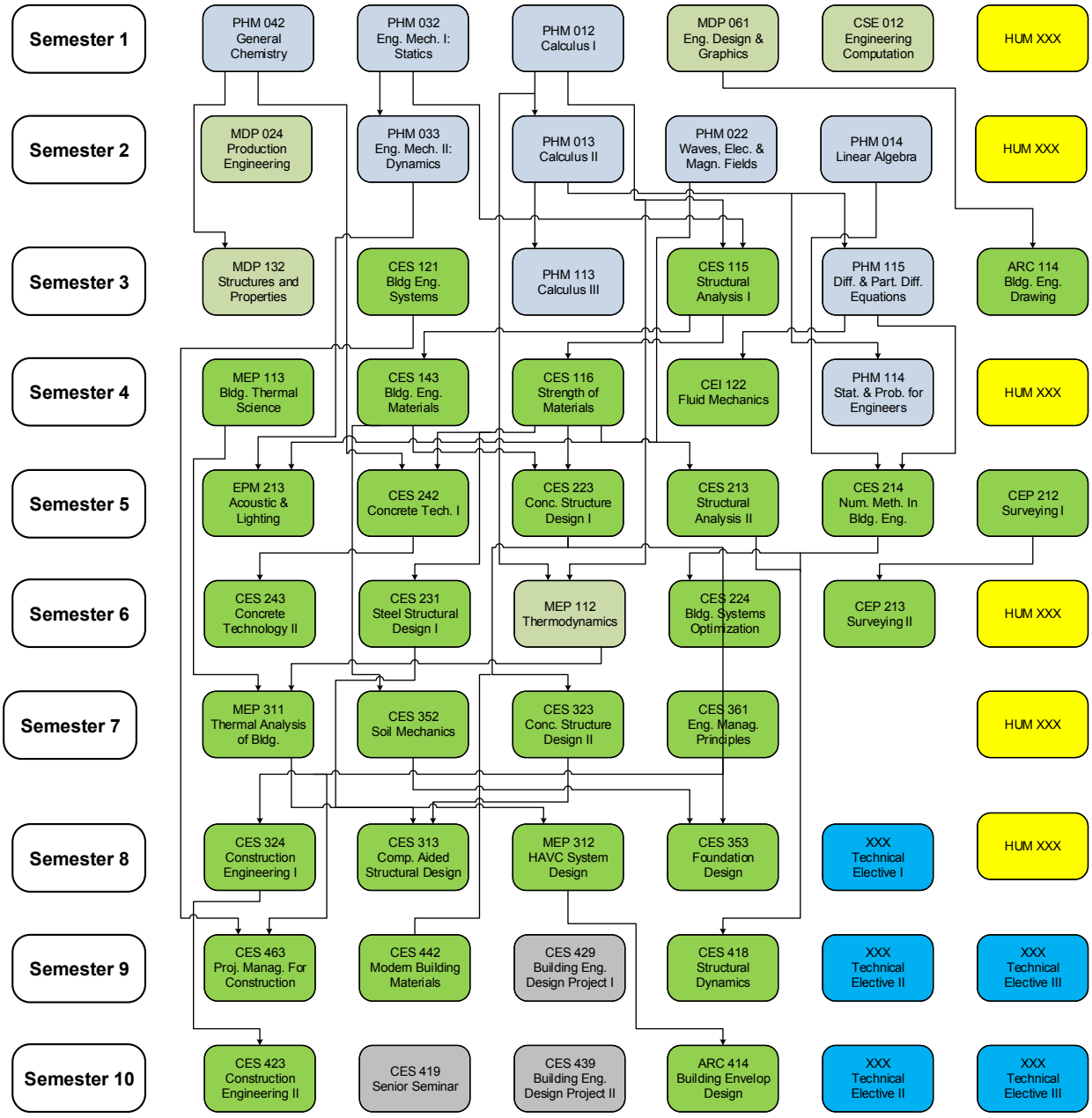
16.2.4.2 Technical Electives for Construction Engineering

Course Code	Course Title	Credit Hours
CES 362	Planning & Scheduling	3
CES 464	Resources Management	3
CES 465	Risk and Safety Management	3
CES 466	Legal Issues in Construction	3
CES 467	Selected Topics in Construction Engineering (1)	3
CES 468	Selected Topics in Construction Engineering (2)	3

16.2.4.3 Technical Electives for Structural Engineering

Course Code	Course Title	Credit Hours
CES 325	Concrete Structures Design (3)	3
CES 412	Selected Topics in Structural Engineering	3
CES 422	Design of Concrete and Steel Bridges	3
CES 424	Concrete Structures Design (4)	3
CES 439	Steel Structures Design (2)	3
CES 443	Masonry	3

16.3 Course Tree



16.4 Job Market

Design Offices and Construction Companies (Small Scale Buildings & Projects):

- Conducting Overall Design, as a consultant engineer.
- Supervising Construction, as a site engineer.

Multinational Bodies (Large Scale & National Projects):

- Contributing in Conceptual Design.
- Conducting Energy, Acoustics or Indoor Air Quality designs.
- Holding the Project Management during:
  1. Design phase.
  2. Construction phase.

Figure 8. Reinforced Concrete Lab

Figure 9. Materials Lab

16.5 Contact Information

Unit Head: Dr. Bahaa Tork
Email: BLDG.CHEP@eng.asu.edu.eg
Secretary: Mr. Mohamed Ahmed Fawzy and Miss Rehab Fayez

17. Communication Systems Engineering Program

The program aims at generating a graduate who is well trained in modern telecommunication industry as well as having a background in communication systems that enables him to fit easily within a modern telecommunication work environment and be able to identify market needs in this fast moving segment of business. The graduate is exposed to a wide variety of courses to build an open scope to telecommunication engineering which is interdisciplinary in nature. The graduate acquires his degree by taking a balanced curriculum that is pre-dominantly concerned with communication systems on different levels and which does not neglect required basic sciences used in this field.

17.1 Program Outcomes

Program outcomes have been established based on the Program Educational Objectives. Graduates of the CHEP Program in Communication systems engineering are expected to have:

- The fundamental background in mathematics, natural science (physics and chemistry), and computer programming.
- The ability to design and conduct experiments, as well as to analyze and interpret data.
- The ability to design a communication system, component or process to meet desired needs.
- The ability to collaborate effectively with others and to function on multidisciplinary teams. They will have teamwork skills to be able to productively contribute to group projects.
- The ability to identify, formulate, and solve engineering problems.
- Understanding of professional and ethical responsibility.
- The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice, including computer programming and information technology.
- The ability to communicate effectively in writing and speaking with visual means.
- A knowledge of contemporary issues.
- An understanding of the impact of engineering solutions in their society. They will understand the effects of engineering decisions with regard to constraints such as economic, ethical, environmental, social, political, health and safety, manufacturability, and sustainability.
- The ability to engage in life-long learning.

17.2 Program Curriculum

17.2.1 University Requirements (Humanities)

The student will study (6) General Education Elective Courses (humanities) selected by him from the following list of courses, with a total of (18) credit hours.

Course Code	Course Title	Credit Hours
HUM 011	English Language	0
HUM 012	German Language	3
HUM 013	Technical Writing and Communication	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

17.2.2 College Requirements

17.2.2.1 Basic Science Courses

Course Code	Course Title	Credit Hours
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanics (1) - Statics	3
PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
PHM 113	Calculus for Engineering (3)	3
PHM 114	Statistics and Probability for Engineering	3
PHM 115	Differential Equations and Partial Differential Equations	3
	Total Credit Hours	**30**

17.2.2.2 Basic Engineering Courses

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
MDP 024	Production Engineering	3
MDP 061	Engineering Design and Graphics	4
MEP 112	Thermodynamics	3
MDP 132	Structures and Properties of Materials	3
	Total Credit Hours	**16**

17.2.3 General Specialization Courses

Course Code	Course Title	Credit Hours
EPM 114	Electrical Circuits	3
PHM 116	Complex and Special Functions and Fourier Analysis	4
CSE 122	Computer Programming	3
PHM 123	Modern Physics and Quantum Mechanics	3
ECE 132	Electronic Materials	3
CSE 141	Logic Design	3
ECE 161	Electrostatics and Magnetostatics	3
CSE 212	Computer Architecture	3
PHM 212	Numerical Techniques	3
PHM 221	Optical and Thermal Physics	3
ECE 233	Solid State Electronic Devices	3
ECE 242	Electronic Circuits (1)	4
ECE 252	Signals and Systems	4
ECE 253	Analog Communication Systems	3
ECE 254	Digital Signal Processing	3
ECE 261	Engineering Electromagnetics	3
ECE 262	Waves and Transmission Lines	4
ECE 343	Electronic Circuits (2)	3
ECE 344	Digital Circuit Design	3
ECE 354	Digital Communications	3
ECE 355	Communication Networks	3
ECE 363	Antenna Engineering and Propagation	3
CSE 373	Control Systems	3
CSE 435	Computer Networks	3

ECE 458	Information Theory and Coding	3
ECE 495	Introduction to Decision Analysis	3
ECE 496	High-Tech Entrepreneurship	3
ECE 497	Graduation Project (1)	3
ECE 498	Graduation Project (2)	4
	Total Credit Hours	**92**

17.2.4 Technical Electives

The Student chooses 8 technical electives with a total of 24 Credit Hours. These courses cover three different fields:

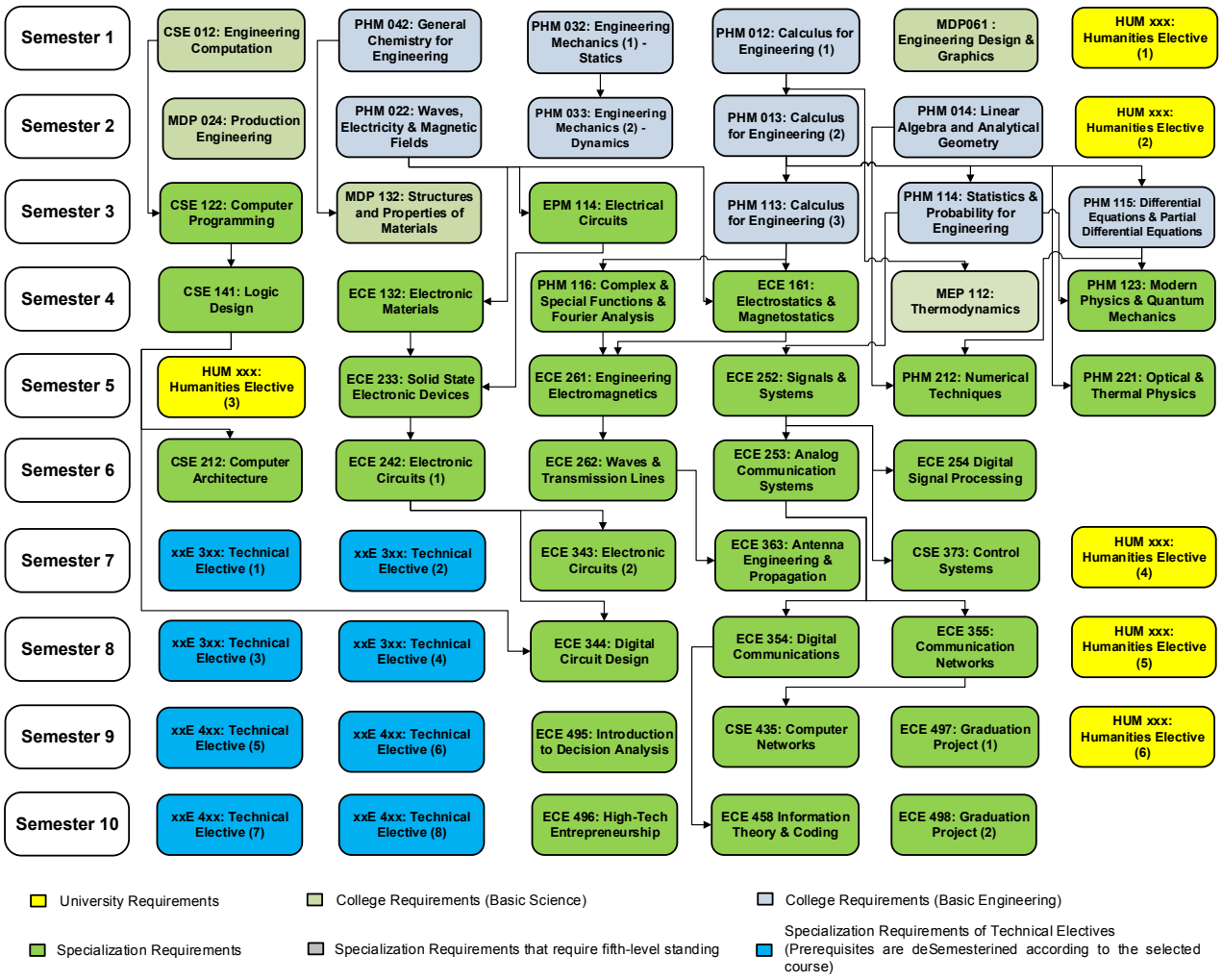
- **Field 1: Signal and Systems**
  For students interested in communication systems, mobile and wireless communications, computer networks and security, satellite communications, signal processing algorithms and systems, image and video signal processing, and coding of speech signals.
- **Field 2: Circuits and Embedded Systems**
  For students interested in integrated circuits and systems, digital, analog and RF circuit design, VLSI design and fabrication, computer aided design, embedded systems and microcontrollers and MEMS.
- **Field 3: Physical and Wave Electronics**
  For students interested in electromagnetic, antennas theory and design, microwave circuits and devices, optoelectronics, lasers, fiber optics, optical communication systems, integrated optics, photonics and optical MEMS.

The student has to select eight technical elective courses for a total of (24) credit hours with at least five of these courses from one of the mentioned fields.

Field	Course Code	Course Title	Credit Hours
Signals and Communication Systems	ECE 357	Acoustics	3
	ECE 358	Satellite Communications	3
	ECE 359	Statistical Signal Processing	3
	CSE 367	Digital Image Processing	3
	CSE 445	Multimedia Engineering	3
	ECE 459	Wireless and Mobile Communications	3
	CSE 491	Network Security	3
	ECE 491	Selected Topics in Signals and Communication Systems	3

Circuits and Systems	CSE 341	Introduction to Embedded Systems	3
	ECE 372	Electronic Measurements and Instrumentation	3
	ECE 381	VLSI Technology	3
	ECE 382	Analog Integrated Circuit Design	3
	ECE 486	Analog Integrated Systems Design	3
	ECE 487	VLSI Design and Automation	3
	ECE 488	RF Circuit Design	3
	ECE 492	Selected Topics in Circuits and Systems	3
Physical and Wave Electronics	ECE 336	Optoelectronic Devices	3
	ECE 337	Principles of Nanoelectronics	3
	ECE 356	Optical Communication Systems	3
	ECE 364	Microwave Circuits	3
	ECE 411	Integrated Optics and Optical MEMS	3
	ECE 463	Microwave Devices	3
	ECE 464	Microwave Measurements	3
	ECE 493	Selected Topics in Physical and Wave Electronics	3

17.3 Course Tree



17.4 Job Market

Students have the opportunity to work after graduation in different fields such as Electronics, networks and telecommunications. Following is a non-exhaustive list of companies in the Egyptian market that the program students work for after graduating:

1. Electronics and Embedded System Companies

Valeo	Intel	Mentor Graphics
Si-ware systems	Hp	MEMS-Vision
Silicon vision	Microsoft Egypt	Mipex

2. Network Companies

Orange	EMC^2	SEE
Link	TEdata	Ericsson

3. Telecommunication Companies

Etisalat	Vodafone	Alcatel-Lucent
Mobinil	Raya Contact Center	IBM
Motorola	Telecom Egypt	

Figure 10. Communication Labs

17.5 Contact Information

Unit Head: Dr. Sameh Ibrahim
Email: COMM.CHEP@eng.asu.edu.eg
Secretary: Miss Marwa Kamal

18. Materials Engineering Program

Materials engineering is a key factor in innovation and responsible for numerous product developments. Materials engineering provides solutions to urging problems of the future. New materials are more durable, safer and contribute to resource efficiency and energy savings. In addition, new materials will help protect our environment and preserve our climate. They will enable sustainable mobility, bring new diagnostic and therapeutic opportunities in healthcare, and facilitate life targeting the general well-being for people. The materials technology makes important contributions to the development of key industries such as mechanical engineering, chemical engineering, construction engineering, electronic and optical equipments and devices, automotive industry, and oil field industry. Modeling and simulation are commonly applied in the field of materials engineering to support the targeted development in new materials. The engineer's expertise lies in understanding the properties and behaviors of different substances, from raw materials to finished products.

18.1 Program Outcomes

Materials Engineering Program provides a solid and challenging academic education that builds up the necessary skills within the field of materials engineering and that is strongly based on the basics of engineering sciences. The study program focuses on

- Metallic materials (ferrous, non-ferrous alloys, light alloys)
- Non-metallic, in-organic materials (glass, ceramic, binding materials)
- Polymer engineering
- Materials for electronic applications
- Materials for biomedical applications
- Processing technologies
- Corrosion

18.2 Program Curriculum

18.2.1 University Requirements (Humanities)

The student will study (6) General Education Elective Courses (humanities) selected by him from the following list of courses, with a total of (18) credit hours.

Course Code	Course Title	Credit Hours
HUM 011	English Language	0
HUM 012	German Language	3

HUM 013	Technical Writing and Communication	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

18.2.2 College Requirements

18.2.2.1 Basic Science Courses

Course Code	Course Title	Credit Hours
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanics (1) - Statics	3
PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
PHM 113	Calculus for Engineering (3)	3
PHM 114	Statistics and Probability for Engineering	3
PHM 115	Differential Equations and Partial Differential Equations	3
	Total Credit Hours	**30**

18.2.2.2 Basic Engineering Courses

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
MDP 024	Production Engineering	3
MDP 061	Engineering Design and Graphics	4
MEP 112	Thermodynamics	3
MDP 132	Structures and Properties of Materials	3
	Total Credit Hours	**16**

18.2.3 General Specialization Courses

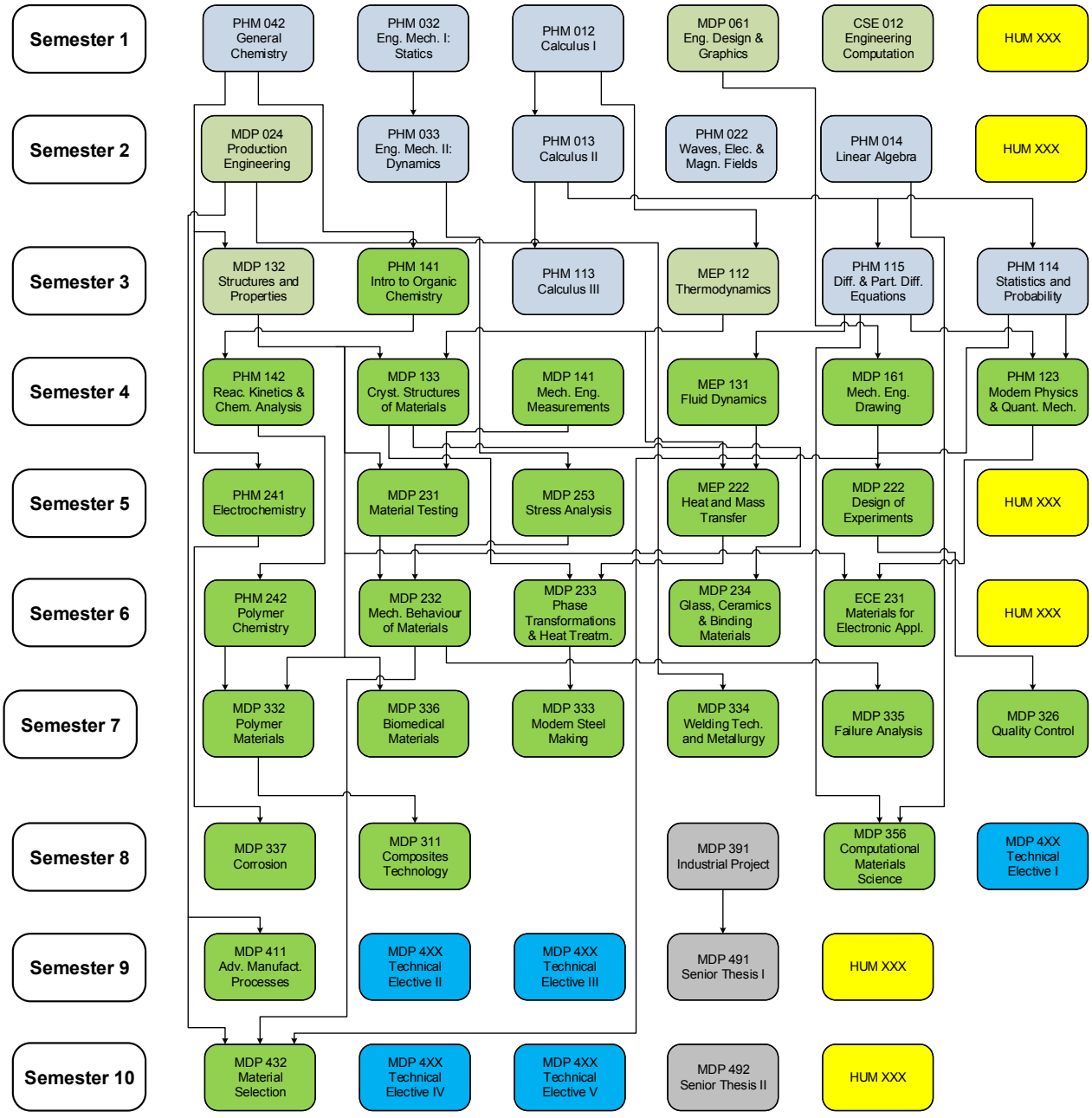
Course Code	Course Title	Credit Hours
PHM 123	Modern Physics and Quantum Mechanics	3
MEP 131	Fluid Dynamics	3
MDP 133	Crystalline Structures of Materials	4
MDP 141	Mechanical Engineering Measurements	3
PHM 141	Introduction to Organic Chemistry	3
PHM 142	Reaction Kinetics and Chemical Analysis	3
MDP 162	Mechanical Engineering Drawing	3
MDP 222	Design and Analysis of Experiments	3
MEP 222	Heat and Mass Transfer	4
ECE 231	Materials for Electronic Applications	3
MDP 231	Material Testing	3
MDP 232	Mechanical Behavior of Materials	3
MDP 233	Phase Transformations and Heat Treatment	4
MDP 234	Glass, Ceramics, and Binding Materials	3
PHM 241	Electrochemistry	3
PHM 242	Polymer Chemistry	3
MDP 253	Stress Analysis	3
MDP 311	Composites Technology	3
MDP 326	Quality Control	3
MDP 332	Polymer Materials	3
MDP 333	Modern Steel Making	3
MDP 334	Welding Technology and Metallurgy	3
MDP 335	Failure Analysis	3
MDP 336	Biomedical Materials	3
MDP 337	Corrosion	4
MDP 356	FE and Computational Materials Engineering	4
MDP 391	Industrial Project	4
MDP 411	Advanced Manufacturing Processes	3
MDP 432	Material and Process Selection	3
MDP 491	Graduation Project (1)	4
MDP 492	Graduation Project (2)	4
	Total Credit Hours	**101**

18.2.4 Technical Electives

The student should select (5) Elective courses with a total of (15) Credit Hours from the following list:

Course Code	Course Title	Credit Hours
MDP 412	Polymer Processing	3
MDP 413	Forming Technology	3
MDP 414	Machining Technology	3
MDP 415	Casting and Industrial Furnaces	3
MDP 416	Introduction to Nano Technology	3
MDP 420	Quality Systems	3
MDP 430	Selected Topics in Materials Science and Engineering	3
MDP 433	Glass Materials and Technology	3
MDP 434	Binding Materials and Technology	3
MDP 435	Ceramic Materials and Technology	3
MDP 436	Polymer Testing	3
MDP 437	Materials Characterization	3
MDP 438	Non-Ferrous Engineering Metals	3
MDP 439	Extractive Metallurgy	3
CES 444	Building Materials	3
MDP 464	Mechanical Engineering Design	3

18.3 Course Tree



18.4 Job Market

Several fields make use of the developments within the field of materials engineering. Taking the automotive industry as an example, lighter weight for increased speeds and lower energy consumption, in addition to the small size functional electronics, sensors and "smart" windows would not be possible without the research in the materials engineering field. In this respect, the materials engineering student gains the necessary knowledge in science and technology that allows him to work in all technical fields such as:

- Research (material characterizations, development)
- Producing industries (steels, glass, ceramics, polymers, composites … etc.)
- Material testing for quality control (governmental or private institutions).
- Industrial services (process optimization, consultancy, private business … etc.)
- Oil field industries (field work, corrosion control, supply services … etc.)
- Food industries (quality control, packaging, supply services … etc.)

Statistics from the Alumni materials engineers show that employment examples in Egypt that are not limited to:

- Materials Engineers in the oil field: Schlumberger, Exxon-Mobil, BP-Gupco, Enppi, Halyburton, Pacific Finder.
- Fast Consumer Goods: Proctor and Gamble, Henkel, Edita, Al-Ahram Beverages.
- Research work: American University in Cairo / Youssef Gamil Research Center, British University in Egypt.

Work activities vary according to the specific material and industry you work with and the size of the organization you work for, but there are a number of activities common to most posts. These include:

- Selecting the best combination of materials for specific purposes.
- Testing materials to assess how resistant they are to heat, corrosion or chemical attack.
- Analyzing data using computer modeling software.
- Assessing materials for specific qualities (such as electrical conductivity, durability, renewability).
- Developing prototypes.
- Considering the implications for waste and other environmental pollution issues of any product or process.
- Advising on the adaptability of a plant to new processes and materials.
- Working to solve problems that may arise either during the manufacturing process or with the finished product (e.g., problems caused by daily wear and tear or change of environment).
- Helping to ensure that products comply with national and international legal and quality standards.

- Supervising quality control throughout the construction and production process.
- Monitoring plant conditions and material reactions during use.
- Advising on inspection, maintenance and repair procedures.
- Liaising with colleagues in manufacturing, technical and scientific support, purchasing, and marketing.
- Supervising the work of materials engineering technicians and other staff.
- Considering the costs implications of materials used and alternatives, in terms of both time and money.
- Taking into consideration the energy usage in manufacturing and in-service energy saving (e.g., in transport and construction applications).

At senior level, the work is likely to involve more innovative research or greater management responsibility. The latter will call for a range of additional skills that are not necessarily part of the routine work of the materials engineer.

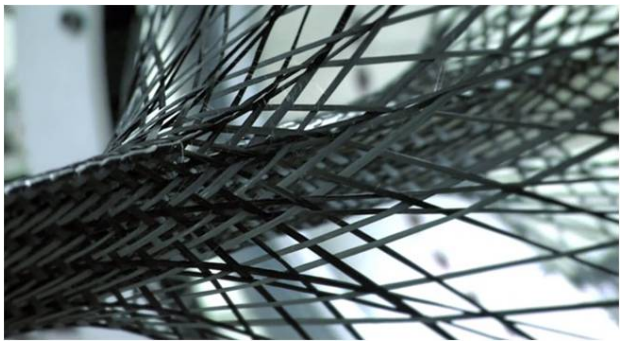


Figure 11. Carbon Fiber

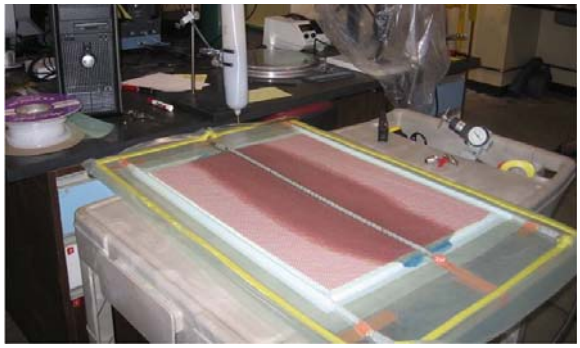


Figure 12. VARI Technique

18.5 International Partner

Materials Engineering Program cooperates with Clausthal University of Technology in Clausthal, Germany to educate Engineers in the field of Materials Engineering. This cooperation provides students with the opportunity to obtain a bilateral degree in this field.

The pursuit of the bilateral degree allows students to broaden their horizon by studying abroad, thus opening his view to dependency, social awareness, acceptance, development of intellectual and language skills.

The main part of the teaching task will be conducted by Ain Shams University. An exchange period of one academic year at Clausthal University of Technology is mandatory for students who wish to obtain the bilateral degree. The language of instruction of this cooperative program

is English in Egypt. Lectures at Clausthal will be given in German and, if and insofar available, English. Participating students will receive German language education provided by Party A prior to their departure to Germany, to ensure their German language level upon commencing their studies at Party B corresponds at least to level B.1, according to the European Reference Frame. All participants of this program from Ain Shams University will have to pass DSH1/TestDaF3 before they will be awarded the Double Degree.

Participation in this program will be at the student's own expenses. Ten students per year will be exempt from tuition fees at Clausthal.

18.6 Contact Information

Email: MATL.CHEP@eng.asu.edu.eg
Secretary: Mr. Mahmoud Rafaat

19. Manufacturing Engineering Program

Egypt is in need of modernization of the manufacturing industry to cope with the global challenges of producing cost effective products that can compete with the international market. Manufacturing Engineering is a complex discipline that requires a great deal of specialized knowledge. Manufacturing engineers are required by all kinds of companies which manufacture a wide variety of products, machines and equipments. The aim of the program is to prepare manufacturing engineers who will be responsible for the product design, selection of materials, manufacturing process planning, and the improvement of manufacturing processes and equipments, as well as plant maintenance.

19.1 Program Outcomes

Program outcomes have been established based on the Program Educational Objectives. Graduates of the CHEP Program in manufacturing engineering are expected to:

- Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
- Design a system; component and process to meet the required needs within realistic constraints.
- Design and conduct experiments as well as analyze and interpret data.
- Identify, formulate and solve fundamental engineering problems.
- Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.
- Work effectively within multi-disciplinary teams.
- Communicate effectively.
- Consider the impacts of engineering solutions on society & environment.
- Demonstrate knowledge of contemporary engineering issues.
- Display professional and ethical responsibilities; and contextual understanding
- Engage in self- and life- long learning.

19.2 Program Curriculum

19.2.1 University Requirements (Humanities)

The student will study (6) General Education Elective Courses (humanities) selected by him from the following list of courses, with a total of (18) credit hours.

Course Code	Course Title	Credit Hours
HUM 011	English Language	0
HUM 012	German Language	3
HUM 013	Technical Writing and Communication	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

19.2.2 College Requirements

19.2.2.1 Basic Science Courses

Course Code	Course Title	Credit Hours
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanics (1) - Statics	3
PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
PHM 113	Calculus for Engineering (3)	3
PHM 114	Statistics and Probability for Engineering	3
PHM 115	Differential Equations and Partial Differential Equations	3
	Total Credit Hours	**30**

19.2.2.2 Basic Engineering Courses

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
MDP 024	Production Engineering	3
MDP 061	Engineering Design and Graphics	4
MEP 112	Thermodynamics	3
MDP 132	Structures and Properties of Materials	3
	Total Credit Hours	**16**

19.2.3 General Specialization Courses

Course Code	Course Title	Credit Hours
MDP 121	Manufacturing Technology (1)	3
MDP 134	Mechanical Behavior and Testing of Materials	3
MDP 141	Mechanical Engineering Measurements	3
MDP 162	Mechanical Engineering Drawing	3
MDP 164	Mechanical Design (1)	3
PHM 210	Modeling and Numerical Solutions	3
MEP 213	Thermodynamics (2)	3
EPM 214	Electrical Power Engineering	3
MEP 232	Fluid Mechanics	4
ECE 234	Electronics and Instrumentation	3
MDP 240	Metrology Lab (1)	3
MDP 253	Stress Analysis	3
MDP 254	Theory of Machines	3
MDP 264	Mechanical Design (2)	3
MDP 265	Mechanical Design (3)	3
MDP 273	Metal Removal Processes	3
MEP 321	Heat Transfer	3
MDP 340	Metrology Lab (2)	3
MDP 350	Industrial Robots	3
MDP 365	Mechanical Vibrations	3
MDP 366	Automatic Control	3
MDP 367	Finite Element Applications	3
MDP 373	Numerical Control Machines	3
MDP 374	Metal Forming Processes	3

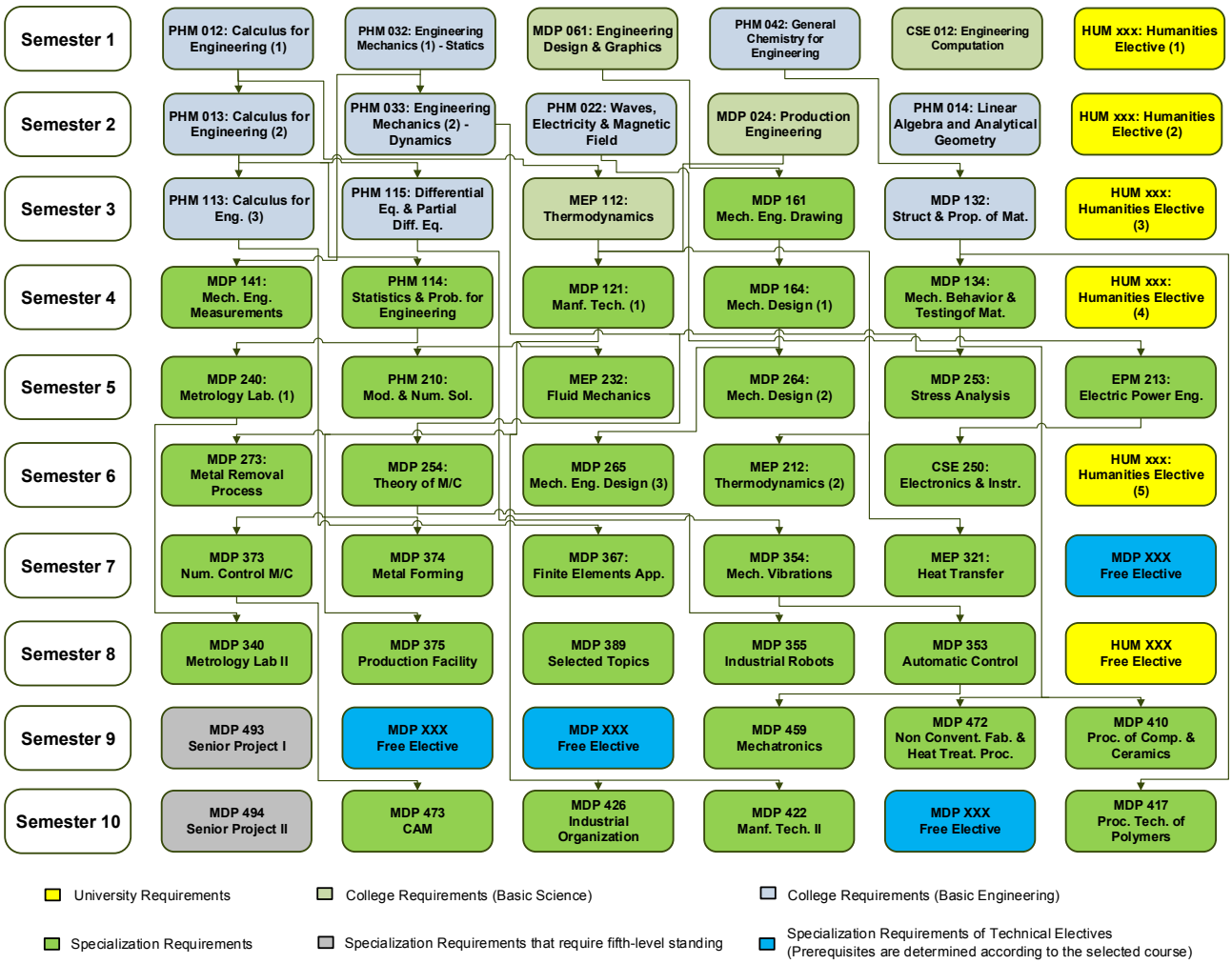
MDP 375	Production Facilities	3
MDP 389	Selected Topics in Manufacturing Engineering	2
MDP 410	Properties and Processing of Composites & Ceramics	3
MDP 417	Processing Techniques of Polymers	3
MDP 419	Manufacturing Technology (2)	3
MDP 459	Mechatronics	2
MDP 472	Non-Conventional Material Fabrication and Heat-Treatment Processes	3
MDP 473	Computer Aided Manufacturing (CAM)	3
MDP 481	Industrial Organization	3
MDP 493	Graduation Project (1)	3
MDP 494	Graduation Project (2)	3
	Total Credit Hours	**104**

19.2.4 Technical Electives

Student studies (4) elective courses selected from the following list with a total of (12) credit hours:

Course Code	Course Title	Credit Hours
MDP 418	Materials Selection and Processing Techniques	3
MDP 420	Quality Systems	3
MDP 456	System Modeling	3
MDP 457	Noise Analysis and Control	3
MDP 461	Computer Applications in Industry	3
MDP 465	Computer Aided Design (CAD)	3
MDP 476	Non-Conventional Machining	3
MDP 482	Reliability Engineering	3
MDP 483	Work Study	3
MDP 484	Operation Research	3
MDP 485	Mechatronics Applications	3
MDP 486	Ergonomics	3
MDP 487	Computer Integrated Manufacturing (CIM)	3

19.3 Course Tree



19.4 Job Market

According to Industrial Development Authority (IDA) statistics below, manufacturing engineers are one of the highly demanded careers.

Industrial Establishments Registered in IDA and Distributed to Governorates

All Governorate	No. of Projects	Production Value	Investments	No. of Labor	Wages
Total	29576	465523	348063	1821933	13450

NB: (production value – investment costs – wages) in million L.E.
Source: IDA, 2/2/2009

Career Potential Fields:

- Manufacturing mechatronic systems
- Telecommunications Industry
- Nano-electronics
- New and renewable energy systems
- Green manufacturing and service-system supply chains
- Production lines handling and management
- Organization of different industrial processes

Figure 13. Manufacture Machine

Figure 14. Production Engineering Workshop

19.5 Contact Information

Unit Head: Dr. Mohamed Abdelaziz
Email: MANF.CHEP@eng.asu.edu.eg
Secretary: Mr. Ahmed Gamgoum

20. Energy and Renewable Energy Engineering Program

The program aims to meet the needs of power stations from new sources of energy available in the Arab Republic of Egypt, such as solar energy, photovoltaic energy, and wind energy through graduating engineers that are familiar with the various types of these sources and how they work. It also defines the problems and finds appropriate solutions to enable the use of new energy sources in different industrial areas, thereby reducing the dependency on fossil fuels and reduce environmental pollution. Labor market in Egypt desperately needs engineers to build this background, particularly in the framework of a national effort to provide energy at affordable prices to citizens. Also, this area attracts global attention, which makes it important to include in the higher education system in Egypt. This program will graduate students that are capable to deal with the different renewable energy resources based power plants such as:

- Wind
- Photovoltaic
- Solar
- Hydro
- Fuel cells
- New technologies

This program is neither an electrical nor a mechanical program. It is a multi-disciplinary program that covers different topics to serve the future engineers to understand the renewable energy resources, how they work, and how to use them in applications. Electricity is the main reason in technological progress in all aspects of life. All the factories, companies, and institutions need maintenance engineer. Energy Engineer is responsible for the operation and maintenance of the electrical network, which consists of units of generation, transmission, and distribution. Energy Engineer plays an important role in running the factories that use electricity in manufacturing

20.1 Program Outcomes

By the end of this program, the student will be able to:

- Define the construction of the machines.
- Understand the characteristics of different types of motors, generators, transformers … etc.
- Identify the techniques of protections in power systems.
- Know the applications of power electronics.
- Work in a team to develop protective schemes.
- Suggest alternative solutions to the engineering problems.

20.2 Program Curriculum

20.2.1 University Requirements (Humanities)

The student will study (6) General Education Elective Courses (humanities) selected by him from the following list of courses, with a total of (18) credit hours.

Course Code	Course Title	Credit Hours
HUM 011	English Language	0
HUM 012	German Language	3
HUM 013	Technical Writing and Communication	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

20.2.2 College Requirements

20.2.2.1 Basic Science Courses

Course Code	Course Title	Credit Hours
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanics (1) - Statics	3
PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
PHM 113	Calculus for Engineering (3)	3
PHM 114	Statistics and Probability for Engineering	3
PHM 115	Differential Equations and Partial Differential Equations	3
	Total Credit Hours	**30**

20.2.2.2 Basic Engineering Courses

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
MDP 024	Production Engineering	3
MDP 061	Engineering Design and Graphics	4
MEP 112	Thermodynamics	3
MDP 132	Structures and Properties of Materials	3
	Total Credit Hours	**16**

20.2.3 General Specialization Courses

Course Code	Course Title	Credit Hours
MDP 113	Production Engineering & Manufacturing (1)	2
EPM 115	Electrical Circuits	3
EPM 116	Electromagnetic Fields	3
EPM 122	Energy Resources and Regenerative Energy Resources	3
EPM 123	Energy Conversion	3
EPM 172	Electrical Measurements and Measuring Instruments	3
MEP 223	Heat Transfer	3
EPM 231	Electrical Machines (1)	3
ECE 232	Electronic Engineering	3
EPM 232	Electrical Machines (2)	3
EPM 233	Electrical Power Engineering	3
MEP 233	Fluid Mechanics	3
MDP 254	Theory of Machines	3
MDP 266	Machine Construction	3
EPM 281	Automatic Control Systems	3
MEP 284	Measurements Lab	3
EPM 324	Fundamentals of Photovoltaic	3
EPM 336	Microprocessor Based Automated Systems	3
EPM 337	Power Quality	3
EPM 353	Power Electronics (1)	3
EPM 354	Power Electronics (2)	3
MEP 354	Solar Energy (1)	3
MEP 363	Combustion and Furnaces	3

MDP 364	Machine Design	3
MEP 364	Internal Combustion Engines	3
MEP 365	Thermal Power Plants	3
MDP 368	Vibrations and Dynamics	3
EPM 372	Industrial or Field Training	3
EPM 425	Storage Energy Technologies	3
EPM 433	Network Interfacing of Renewable Resources	3
EPM 434	Economics of Generation, Transmission, and Operation	3
MEP 452	Solar Energy (2)	3
MEP 453	Wind Energy	3
EPM 497	Graduation Project (1)	3
EPM 498	Graduation Project (2)	3
	Total Credit Hours	**104**

20.2.4 Technical Electives

The student chooses (4) elective courses with a total of (12) credit hours such that (3) of them must be from one of the following fields while the fourth course must be from the other field.

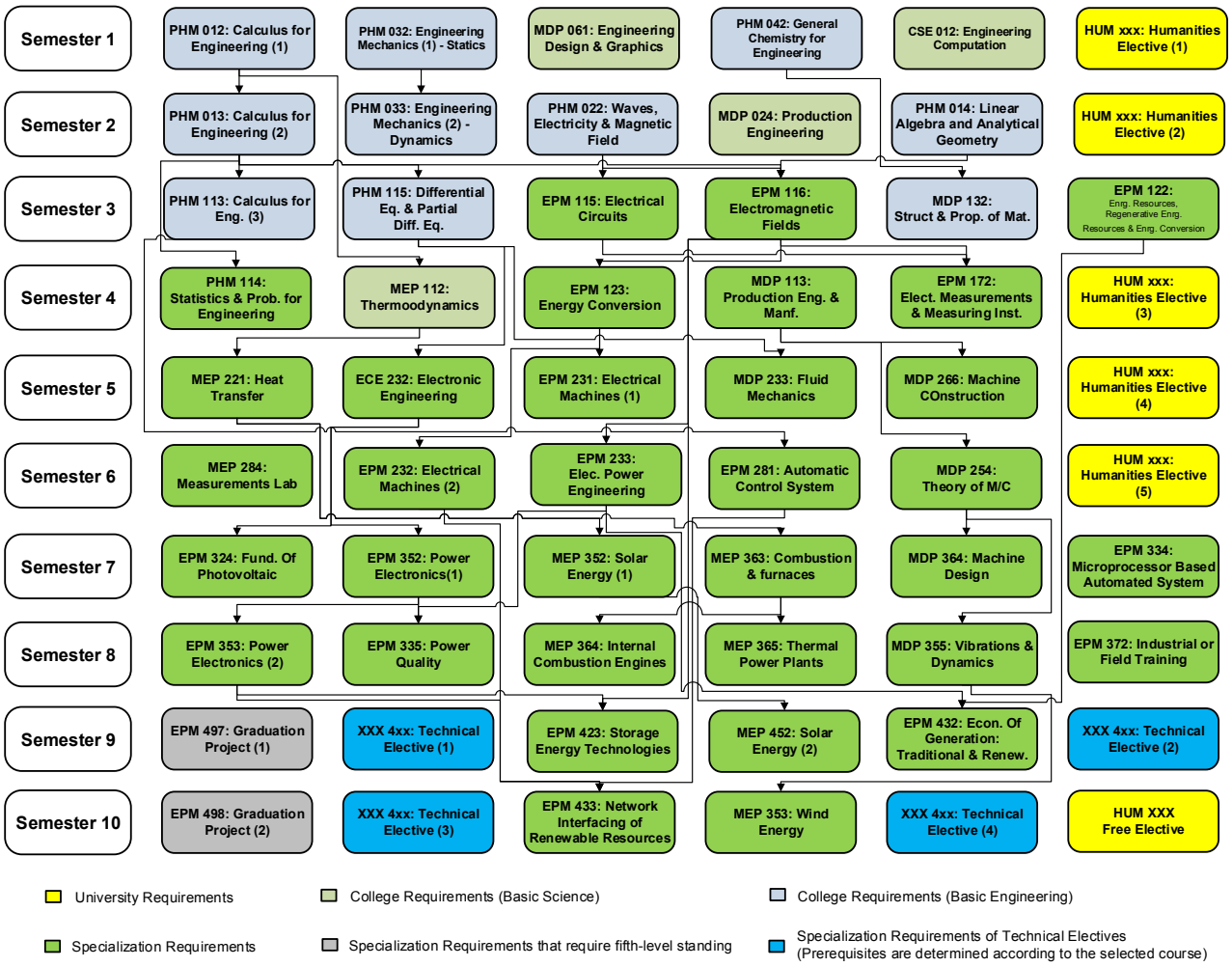
20.2.4.1 Technical Electives for Mechanical Engineering Field

Course Code	Course Title	Credit Hours
MEP 422	Phase Equilibrium and Mass Transfer	3
MEP 432	Turbo Machinery	3
MEP 433	Water Desalination	3
MDP 446	Quality Control, Quality Assurance, and Safety	3
MEP 472	Refrigeration and Air Conditioning	3
MEP 491	Individual Studies in Mechanical Engineering	3

20.2.4.2 Technical Electives for Electrical Engineering Field

Course Code	Course Title	Credit Hours
EPM 426	Transients in Electrical Machines	3
EPM 435	Advanced System Integrity	3
EPM 484	Electric Drives	3
EPM 485	Advanced Control on Power Systems	3
EPM 486	Computer Application in Electrical Power Systems	3
EPM 491	Individual Studies in Electrical Power and Machines	3

20.3 Course Tree



20.4 Job Market

The following is a list of potential companies that the program graduates can work:

- ABB
- Global
- Schneider
- Arab Contractors
- Energy and Renewable Energy Companies

Figure 15. Energy Lab

Figure 16. Energy Lab

Figure 17. Energy Lab

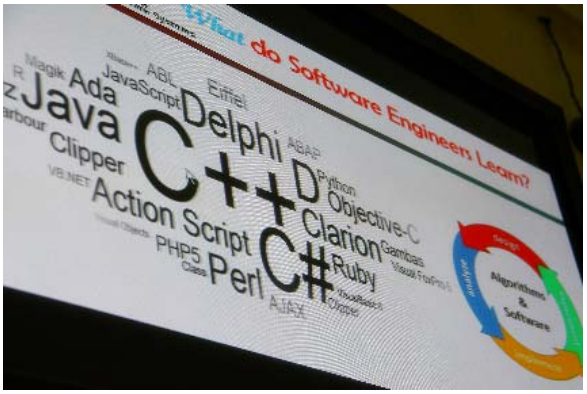
Figure 18. ABB Control Lab

20.5 Contact Information

Unit Head: Dr. Adel Taha
Email: ERGY.CHEP@eng.asu.edu.eg
Secretary: Mr. Walid Mohamed

21. Computer Engineering and Software Systems Program

Computer Engineering and Software Systems (CESS) Program focuses extensively on software engineering with a strong emphasis on computer engineering. The study system and the course contents that cope with those of the leading universities in the world ensure providing our outstanding students the skills of innovation, expression, planning and follow-up capabilities, and environmental and social sense.



CESS opens a whole world of career opportunities to its graduates in software product lines, mobile and pervasive computing, cloud computing, embedded systems, multimedia, 3D graphics, game design, and much more. The graduate of this program will establish technical leadership in this area. CESS program will meet the increasing demand for this specialization to meet the market needs at the national, regional, and international levels.

21.1 Program Outcomes

- Apply systematic, disciplined, quantifiable approaches to the cost-effective development, operation and maintenance of software systems to the satisfaction of their beneficiaries.
- Build software solutions using different technologies, architectures, and life-cycle approaches in the context of different organizational structures, with demonstrated programming expertise.
- Foster the development, adoption, and sustained use of standards of excellence for computer and software engineering practices.
- Have a solid understanding of software development life cycles.
- Utilize the methodologies of hardware, software integration, and networking.
- Have the knowledge and practice of managing software projects.

- Have hands-on experience of software analysis, modeling, design, and quality assurance of software systems.
- Evaluate software/hardware/networks engineering projects.
- Write secure computer programs on professional levels achieving acceptable quality measures in software development.
- Analyze, design, implement, and evaluate multimedia and computer graphics projects.
- Apply software engineering methodologies in the different phases of the software engineering life-cycle.
- Apply the concepts of cloud computing, high-performance computing, mobile computing, and pervasive computing concepts in the appropriate environments.
- Analyze big-data systems.
- Utilize big-data analytics in cloud computing environments to solve real-world problems.
- Use different security measures and forensics tools in computing and networking systems.
- Communicate effectively and think critically about a wide range of issues arising in the context of working constructively on software and computer engineering projects.

21.2 Program Curriculum

21.2.1 University Requirements (Humanities)

The student will study (6) General Education Elective Courses (humanities) selected by him from the following list of courses, with a total of (18) credit hours.

Course Code	Course Title	Credit Hours
HUM 011	English Language	0
HUM 012	German Language	3
HUM 013	Technical Writing and Communication	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

21.2.2 College Requirements

21.2.2.1 Basic Science Courses

Course Code	Course Title	Credit Hours
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanics (1) - Statics	3
PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
PHM 113	Calculus for Engineering (3)	3
PHM 114	Statistics and Probability for Engineering	3
PHM 115	Differential Equations and Partial Differential Equations	3
	Total Credit Hours	**30**

21.2.2.2 Basic Engineering Courses

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
MDP 024	Production Engineering	3
MDP 061	Engineering Design and Graphics	4
MEP 112	Thermodynamics	3
MDP 132	Structures and Properties of Materials	3
	Total Credit Hours	**16**

21.2.3 General Specialization Courses

Course Code	Course Title	Credit Hours
CSE 115	Digital Design	3
CSE 116	Computer Architecture	3
CSE 125	Computer Programming (1)	3
CSE 126	Computer Programming (2)	3
CSE 127	Data Structures and Algorithms	3
CSE 128	Software Engineering (1)	3
ECE 141	Electrical and Electronic Circuits	3
CSE 215	Electronic Design Automation	3
CSE 221	Object-Oriented Analysis and Design	3
CSE 222	Software Engineering (2)	3
CSE 223	Operating Systems	3
CSE 224	Design and Analysis of Algorithms	3
CSE 225	Software Testing, Validation, and Verification	3
CSE 226	Design of Compilers	3
CSE 227	Database Systems (1)	3
ECE 255	Signals and Systems	3
CSE 275	Control Engineering	3
CSE 316	Microcontrollers and Interfacing	3
CSE 325	Agile Software Engineering	3
CSE 326	Software Formal Specifications	3
CSE 335	Computer Networks	3
CSE 336	Distributed Computing	3
CSE 345	Real-Time and Embedded Systems Design	3
CSE 365	Computer Vision	3
CSE 415	High-Performance Computing	3
CSE 425	Software Design Patterns	3
CSE 426	Software Maintenance and Evolution	3
CSE 427	Software Project Management	2
CSE 436	Computer and Network Security	3
CSE 437	Mobile Computing	3
CSE 496	Graduation Project (1)	3
CSE 497	Graduation Project (2)	3
	Total Credit Hours	**95**

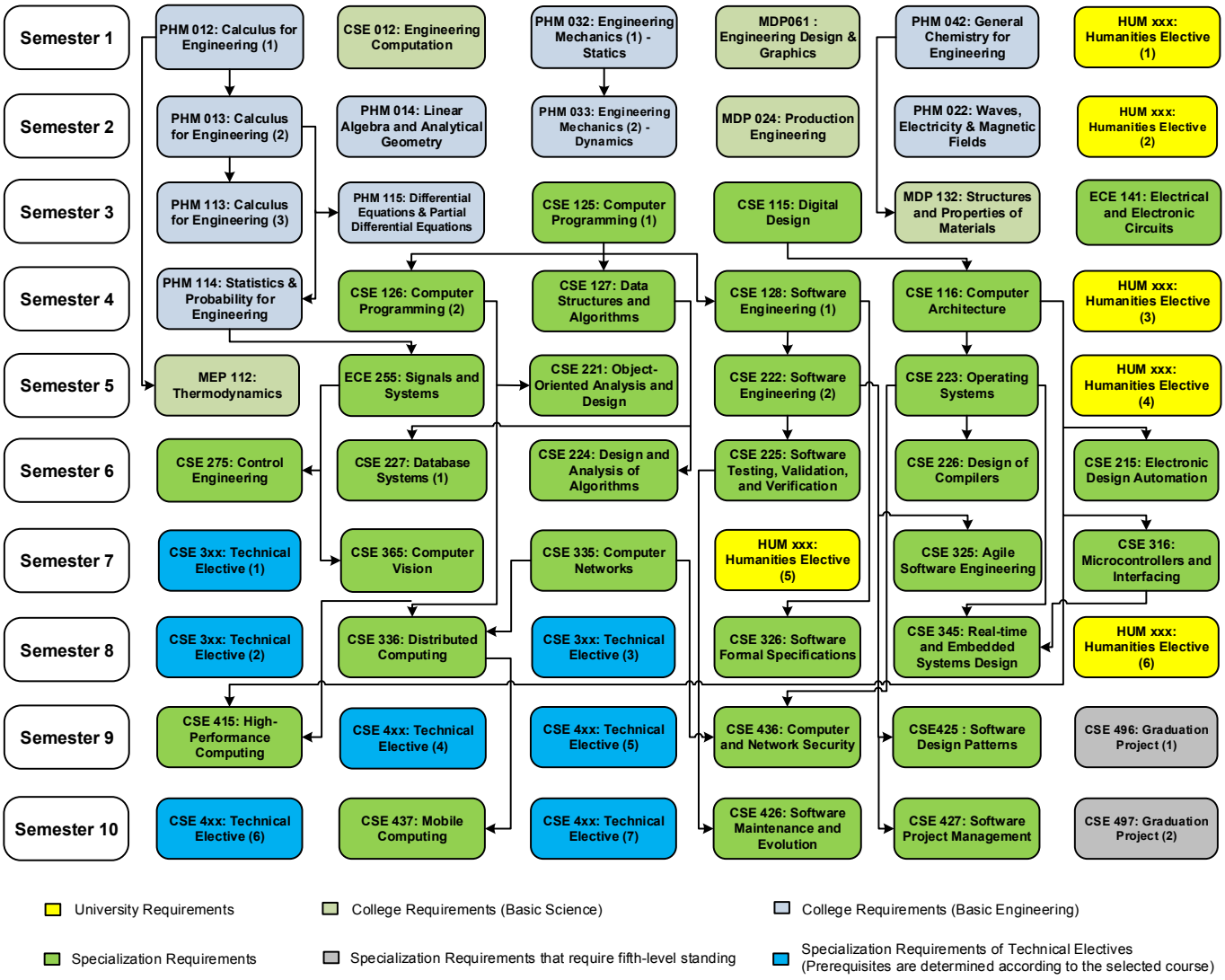
21.2.4 Technical Electives

Technical elective courses are categorized into four fields; the student must select seven courses with a total of (21) credit hours. Three of these seven courses must be from the courses that have course codes in the form 3xx, while the remaining four courses are from the courses that have course codes in the form 4xx. The student must select a specific field from these four fields by selecting at least five courses from this field.

Field	Course Code	Course Title	Credit Hours
Multimedia and Computer Graphics	CSE 366	Pattern Recognition	3
	CSE 367	Digital Image Processing	3
	CSE 368	Computer Graphics	3
	CSE 369	Human-Computer Interaction	3
	CSE 444	Visualization	3
	CSE 445	Multimedia Engineering	3
	CSE 446	Computer Animation	3
	CSE 460	Selected Topics in Multimedia and Computer Graphics	3
	CSE 485	Game Design and Development	3
Distributed and Mobile Computing	CSE 317	Parallel and Cluster Computing	3
	CSE 334	Internet Programming	3
	CSE 337	Parallel and Distributed Algorithms	3
	CSE 338	Network Operation and Management	3
	CSE 430	Selected Topics in Distributed and Mobile Computing	3
	CSE 438	Cloud Computing	3
	CSE 439	Wireless Networks	3
	CSE 443	Computer and Network Forensics	3
	CSE 447	Pervasive Computing	3
Software Product Lines	CSE 327	Program Analysis	3
	CSE 328	Software Engineering Process Management	3
	CSE 329	Dependability and Reliability of Software Systems	3
	CSE 346	Business Process Modeling	3
	CSE 420	Selected Topics in Software Product Lines	3
	CSE 423	Software Performance Evaluation	3
	CSE 424	Aspect- and Service-Oriented Software Systems	3
	CSE 428	Secure Code Development	3
	CSE 429	Software Quality Assurance	3

Software Applications	CSE 320	Database Systems (2)	3
	CSE 364	Simulation of Engineering Systems	3
	CSE 385	Data Mining and Business Intelligence	3
	CSE 386	Artificial Intelligence	3
	CSE 440	Selected Topics in Software Applications	3
	CSE 448	Embedded Operating Systems	3
	CSE 449	Bioinformatics	3
	CSE 486	Ontologies and the Semantic Web	3
	CSE 487	E-learning Systems	3

21.3 Course Tree



21.4 Job Market

The following is a list of potential companies that the program graduates can work:

Microsoft	EMC^2	Intel	Raya Software
Yahoo	IBM	HP	Vodafone
Google	Oracle	Valeo	Orange
Link	Mentor Graphics	ITWorks	Alcatel-Lucent
Etisalat	Mobinil	SEE	TEdata

Figure 19. Cloud Computing Lab

Figure 20. Software Engineering Lab

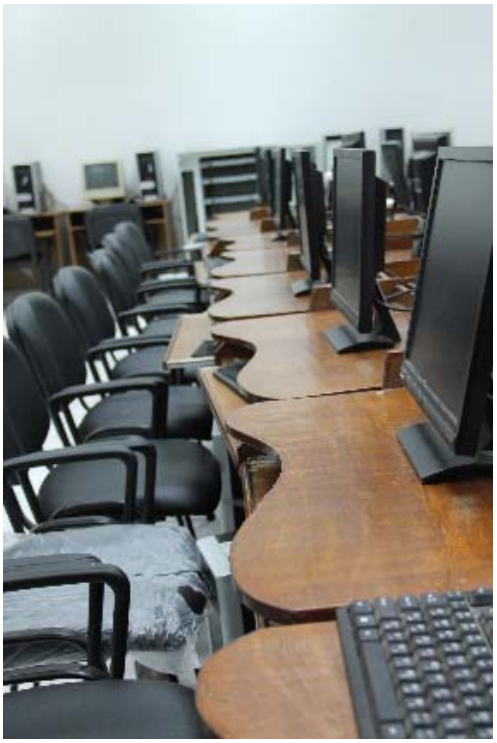


Figure 21. Computer Programming Lab

Figure 22. Networks Lab

21.5 Contact Information

Unit Head: Dr. Gamal A. Ebrahim
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Secretary: Mr. Ahmed Gamgoum

22. Landscape Architecture Program

The vision of the Landscape Architecture Program is to graduate landscape architects who are specialized in landscape design. Its mission is to give the students through five years (ten terms) the specialization courses for landscape in an integrated framework with scientific courses of architecture, urban design and planning, in addition to basic scientific and engineering courses.

This new program enables students to be specialized in landscape design. Fortunately, this specialization constitutes a real demand of the job market in Egypt. Students will acquire a practical capability to establish harmony between buildings, urban environment, and nature using creative approaches. These approaches will integrate internal and external spaces, their relations with movement paths as well as the green/open areas.

Moreover, the aesthetic dimension of landscape elements (hard/soft), street furniture, urban lighting and finishing materials will be stressed upon. Architectural and urban characters of the surrounding environment are also to be considered in order to harmonize and to enrich the uniqueness of each place.

Furthermore, courses in this program widely enhance sustainability through energy/water saving, recycling and preservation of the nature, and the use of local materials.

22.1 Program Outcomes

- The graduate of this program is characterized by the practically and creativity ability to do the desired harmony between buildings design and open and green spaces.
- The graduate will be familiar with the aesthetical and functional dimensions for landscape elements that adequate the architectural and urban style of the vernacular surrounding area.
- The graduate can deal with different environments and levels as urban areas, coastal facades, and desert and mountainous sites.
- The graduate can be able to create designs that fulfill human needs, preserve the environment, save energy, and realize sustainability.
- The graduate can finally have the ability to design the architectural drawings of a building, the urban design and the landscaping of a cluster of buildings, and can pass through all phases of its achievement till it is completely executed.

22.2 Program Curriculum

22.2.1 University, College, and Specialization Requirements

22.2.1.1 University Requirements

Course Code	Course Title	Credit Hours
HUM xxx	Elective Course (1)	3
HUM xxx	Elective Course (2)	3
	Total Credit Hours	**6**

HUM xxx Elective Course (1), (2): Student chooses only two of the following courses:

Course Code	Course Title	Credit Hours
HUM 012	German Language	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

22.2.1.2 College Requirements

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanic (1) - Statics	3
PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
MDP 061	Engineering Design and Graphics	4
	Total Credit Hours	**28**

22.2.2 General Specialization Requirements

Course Code	Course Title	Credit Hours
CES 110	Soil Properties and Materials	3
CEP 113	Site Survey	3
CES 117	Structure Analysis	3
UPL 131	Freehand Drawing and Visual Training	2
UPL 133	Design Studio (1)	4
ARC 134	Construction Studio (1)	3
UPL 134	Design Studio (2)	4
ARC 135	Construction Studio (2)	3
UPL 140	Site Analysis	3
UPL 152	History and Theory of Landscape (1)	3
UPL 153	Site Photography and Documentation	2
UPL 154	History and Theory of Landscape (2)	3
CEI 213	Irrigation System & Network	2
UPL 214	Computer Applications in Landscape Architecture	2
UPL 234	Design Studio (3)	4
ARC 235	Working Drawing Studio (1)	3
UPL 235	Design Studio (4)	4
ARC 236	Working Drawing Studio (2)	3
UPL 242	Introduction to Urban Design	3

UPL 243	Urban Design & Landscape	3
UPL 252	Models & 3D Samples	2
UPL 253	Contemporary Theories of Landscape Architecture	3
UPL 255	Presentation and Communication Techniques	2
UPL 256	GIS Applications	2
CEP 312	Infrastructure Planning	2
UPL 314	Advanced Computer Applications 3D	2
UPL 337	Design Studio (5)	4
ARC 338	Working Drawing Studio (3)	3
UPL 338	Design Studio (6)	4
ARC 339	Working Drawing Studio (4)	3
UPL 354	Out Door Lighting and Effects (1)	3
UPL 355	Horticulture and Garden Design (1)	2
ARC 356	Profession Practice	3
UPL 356	Horticulture and Garden Design (2)	2
UPL 438	Land and Development	3
UPL 443	Urban Ecology	2
UPL 444	Environmental Impact Assessment	3
ARC 455	Projects Management	2
UPL 455	Out Door Lighting and Effects (2)	3
UPL 456	Urban Economy	3
UPL 457	Feasibility Studies	3
UPL 459	Sustainability in Landscape Architecture	3
UPL 493	Graduation Project (1)	5
UPL 494	Graduation Project (2)	5
	Total Credit Hours	**129**

22.2.3 Technical Electives

Course Code	Course Title	Credit Hours
HUM 015	Report Writing	3
HUM 021	History of Arts (1)	2
HUM 031	History of Arts (2)	2
HUM 224	Humanities in Landscape Architecture	2
HUM 325	Human Behaviors & Urbanism	2
XXX 47x	Elective Course (3)	3
UPL 41x	Elective Course (4)	3
	Total Credit Hours	**17**

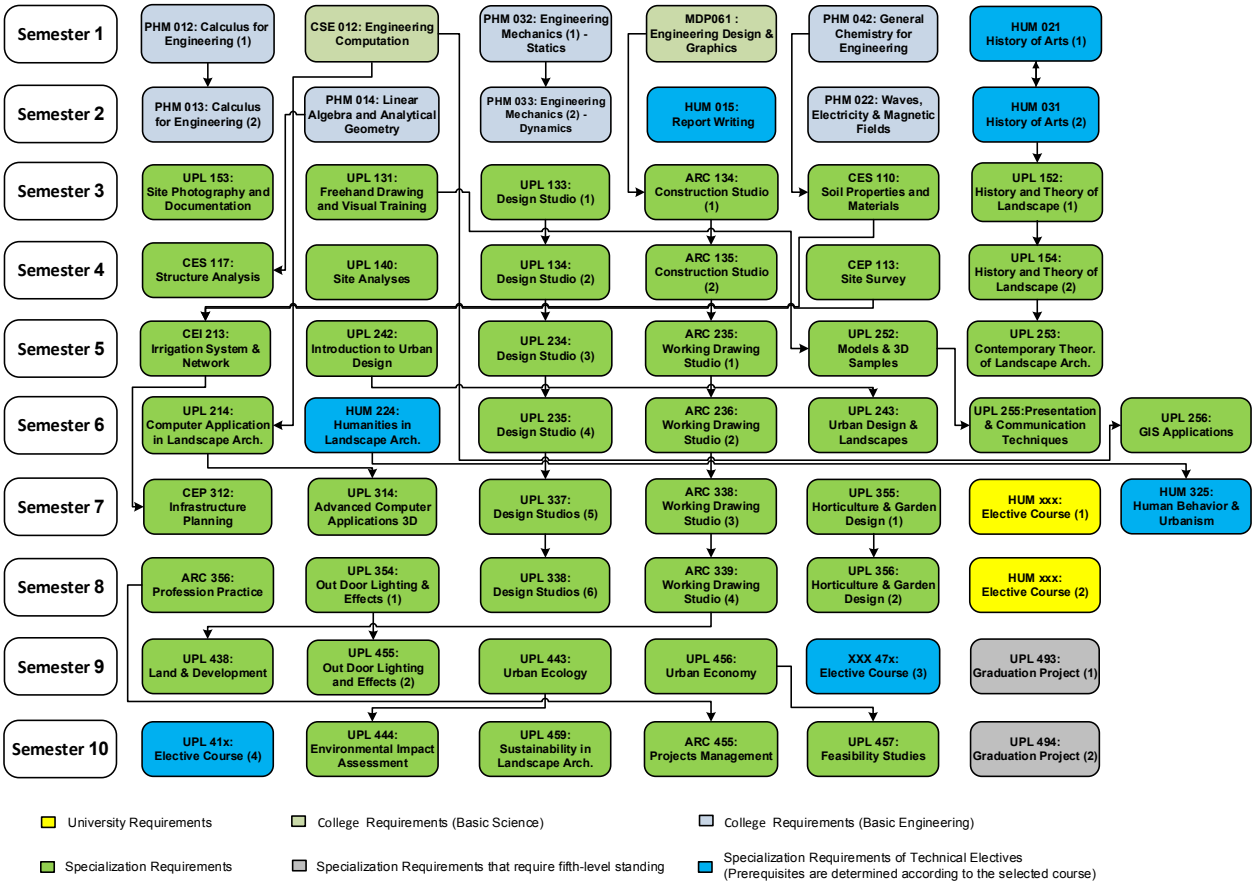
UPL 47x Elective Course (3): Student chooses only one of the following courses:

Course Code	Course Title	Credit Hours
ARC 473	Green Architecture Principles	3
UPL 473	Interior Planting Design	3
ARC 474	Contemporary Vernacular Architecture	3
ARC 475	Criticism & Project Evaluation	3
UPL 478	Urban & Architectural Heritage	3

UPL 41x Elective Course (4): Student chooses only one of the following courses:

Course Code	Course Title	Credit Hours
UPL 411	Advanced Urban Design	3
UPL 414	Planning Theories and Values	3
UPL 415	Urban Renewal	3

22.3 Course Tree



22.4 Job Market

Students have the opportunity to work after graduation in different fields in and out of Egypt. These fields vary according to the companies disciplines, part are related to the architectural, urban and landscape fields and others are related to other disciplines that integrate with the mentioned fields as there is no company, factory, office … etc. that can miss the presence of the architect.

The mentioned direct related companies also varies from consulting companies to contractors, the missions of our graduate can blend inside these companies with numerous roles, as a designers, doing working drawings, licenses drawings, tender documents, workshop drawings, presentations, execute buildings, supervise on the execution process … etc.

Hereby, the following is a set of examples for the companies that the graduate of Landscape Architecture Program can join:

In the field of consultancy:

1. Dar Al-Handasah
2. ECG Engineering Consultants Group
3. BECT Bureau Egyptien de conseil techniques
4. Ökoplan Consulting Engineers
5. CPAS Center of Planning and Architectural Studies
6. Planning and Urban Consulting Office

In the field of Contractors:

1. The Arab Contractors
2. Orascom Construction Industries
3. Consolidated Contractors Company (CCC)
4. Delta Constructions

All the mentioned are non-exhaustive list of companies and offices that are related to the field directly, but as we mentioned that all other fields have to integrate with our graduate as an important discipline needed in all civil, electrical, mechanical, and other disciplines.

The program is inhabited in Urban Design and Planning Department, hence, the following is a set of pictures to show the halls, administrative rooms, instructors' and TAs' rooms and general areas inside the department.

Figure 23. Lecture Halls

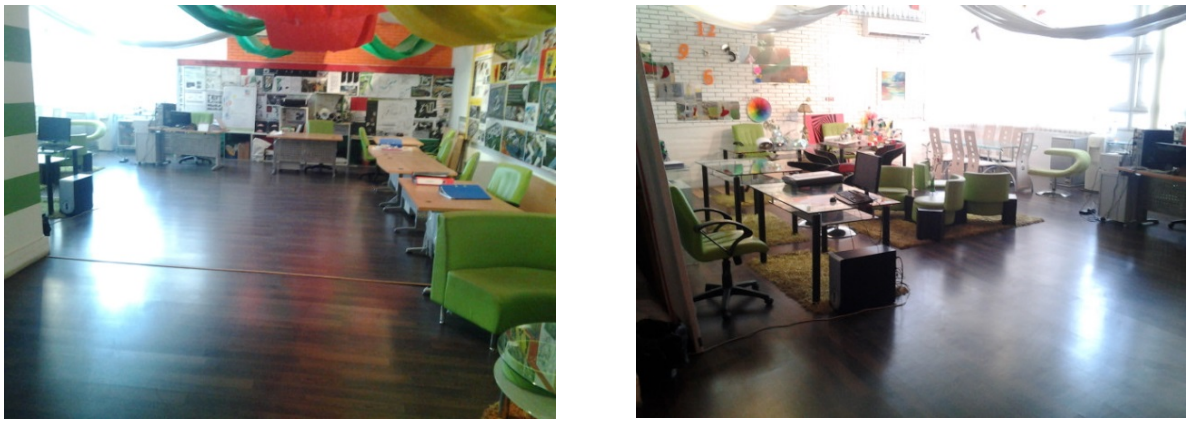


Figure 24. Professors and Doctors Lounge Hall and Open Plan Offices

Figure 25. Computer Labs

22.5 Contact Information

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Secretary: Mr. Mahmoud Rafaat

23. Mechatronics Engineering and Automation Program

Mechatronics Engineering Program, started in Spring 2014, combines the principles of mechanical, computer, electrical, and control engineering into a unified whole. Mechatronics engineers design everything from smart-phones, cars, robots, medical imaging devices and manufacturing tools, to the International Space Station. They also help form a bridge of communication between the different disciplines. The fusion of the various disciplines in mechatronics breaks down the artificial barriers between the separate disciplines. The program's curriculum is focused in providing a strong foundation on the fundamentals of the engineering design process complemented with a strong technical competency. The program will provide four different fields in which the students in this program can specialize in. These four fields are: Autotronics, Bio-Mechatronics, Industrial Automation, and Nano-Mechatronics.

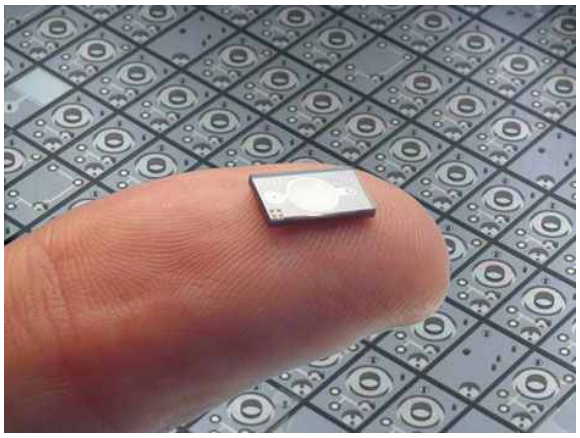
Graduates of this program can be specialized in:

- **Autotronics**: The Autotronics field is the one that merges both the fields of AUTOmobile and elecTRONIC. Modern cars are as much electronic as they are mechanical, and have means to monitor and manage most of the major systems in the vehicle. Engineers graduating with this major use the latest advancements in electronics, computer systems, and communications to add complex features to modern vehicles.

- **Bio-Mechatronics**: Bio-Mechatronics is an applied field that aims to integrate mechanical elements and electronics with parts of biological organisms. It encompasses the fields of robotics and neuroscience (e.g., creating devices that interact with human muscle). Bio-Mechatronic systems include biosensors that detect what the user wants to do or their intentions and motions. Graduates with this major will be able to analyze, design, and maintain such bio-Mechatronic systems.

- **Industrial Automation**: Industrial automation is a growing field that focuses on the use of robotic devices to complete manufacturing tasks. It becomes increasingly important in the manufacturing process because computerized or robotic machines are capable of handling repetitive tasks quickly and efficiently. Industrial automation engineers design, implement, and operate these robotic machining devices.

- **Nano-Mechatronics**: Nano-Mechatronics are mechanical systems controlled electrically on the nano scale. Nano-Mechatronics is the field in which engineers focus in designing and fabricating complete sensors, actuators, and mechatronic systems on tiny chips that are used in all kinds of gadgets that we use on a daily basis such as Cell phones, MP3 players, game consoles (Wii) and military enabling devices.



23.1 Program Outcomes

- Enrich the student's basic theoretical and practical knowledge of mechatronic system components, and design methodologies of mechatronic systems.
- Develop the student's ability to use the state-of-the-art technologies to find affordable, reliable and innovative solutions to improve our daily quality of life.
- Develop the student's ability to work within a multidisciplinary team during the analysis, design and implementation phases of mechatronics engineering projects, while applying ethical standards and environmental considerations.
- Develop the student's ability to conduct Research and Development (R&D) activities to create innovative mechatronic solutions having direct impact on industrial, commercial, and social scales
- Enrich the student's management and business skills to be able to effectively contribute and compete in local, regional and international markets
- Setup and operate automated and/or autonomous production lines which are based on embedded systems, PLCs and SCADA systems.

- Carry out the modern troubleshooting and maintenance techniques relevant to what we call it machine health monitoring (MHM) for both hardware and software or combined mechatronic products.
- Design, develop, and maintain safety critical mechatronic systems.

23.2 Program Curriculum

23.2.1 University Requirements (Humanities)

The student will study (6) General Education Elective Courses (humanities) selected by him from the following list of courses, with a total of (18) credit hours.

Course Code	Course Title	Credit Hours
HUM 011	English Language	0
HUM 012	German Language	3
HUM 013	Technical Writing and Communication	3
HUM 014	Engineering Profession, Practice, and Responsibilities	3
HUM 111	Engineering Economy	3
HUM 112	Health and Wellness	3
HUM 211	Impact of Technology on Society	3
HUM 212	Introduction to Marketing	3
HUM 311	Engineering Management	3
HUM 312	Human Resource Management	3
HUM 313	Engineering Law	3

23.2.2 College Requirements

23.2.2.1 Basic Science Courses

Course Code	Course Title	Credit Hours
PHM 012	Calculus for Engineering (1)	3
PHM 013	Calculus for Engineering (2)	3
PHM 014	Linear Algebra and Analytical Geometry	3
PHM 022	Waves, Electricity, and Magnetic Fields	3
PHM 032	Engineering Mechanics (1) - Statics	3

PHM 033	Engineering Mechanics (2) - Dynamics	3
PHM 042	General Chemistry	3
PHM 113	Calculus for Engineering (3)	3
PHM 114	Statistics and Probability for Engineering	3
PHM 115	Differential Equations and Partial Differential Equations	3
	Total Credit Hours	**30**

23.2.2.2 Basic Engineering Courses

Course Code	Course Title	Credit Hours
CSE 012	Engineering Computation	3
MDP 024	Production Engineering	3
MDP 061	Engineering Design and Graphics	4
MEP 112	Thermodynamics	3
MDP 132	Structures and Properties of Materials	3
	Total Credit Hours	**16**

23.2.3 General Specialization Courses

Course Code	Course Title	Credit Hours
EPM 114	Electrical Circuits	3
CSE 115	Digital Design	3
MDP 121	Manufacturing Technology (1)	3
CSE 122	Computer Programming	3
ECE 142	Electronic Circuits	3
MCT 151	Introduction to Mechatronics	2
MDP 151	Stress Analysis	3
MDP 163	Machine Drawing and Solid Modeling	3
EPM 214	Electrical Power Engineering	3
CSE 228	Advanced Computer Programming	3
MEP 233	Fluid Mechanics	3
MCT 241	Engineering Measurements	3
MCT 242	Electronic Instrumentation	3
MCT 251	Theory of Machine and Multi-body	3
ECE 255	Signals and Systems	3

MDP 261	Machine Design		3
MDP 267	Machine Elements Design		3
EPM 282	Power Electronics and Drives		3
MCT 311	Introduction to Autotronics		2
CSE 318	Microcontrollers		3
MCT 321	Introduction to Nano-Mechatronics		2
MCT 333	CNC and CAD/CAM		3
MCT 334	Rapid Prototyping		3
MCT 341	Introduction to Bio-Mechatronics		2
CSE 347	Embedded System Design		3
MCT 351	Pneumatics and Hydraulics Control		3
MCT 371	Automatic Control		3
MCT 381	Design of Mechatronic Systems (1)		3
MCT 382	Design of Mechatronic Systems (2)		3
MCT 455	Industrial Robotics		3
MCT 456	Dynamic Modeling and Simulation		3
MCT 461	Industrial Networks		3
CSE 488	Machine Vision		3
		Total Credit Hours	**101**

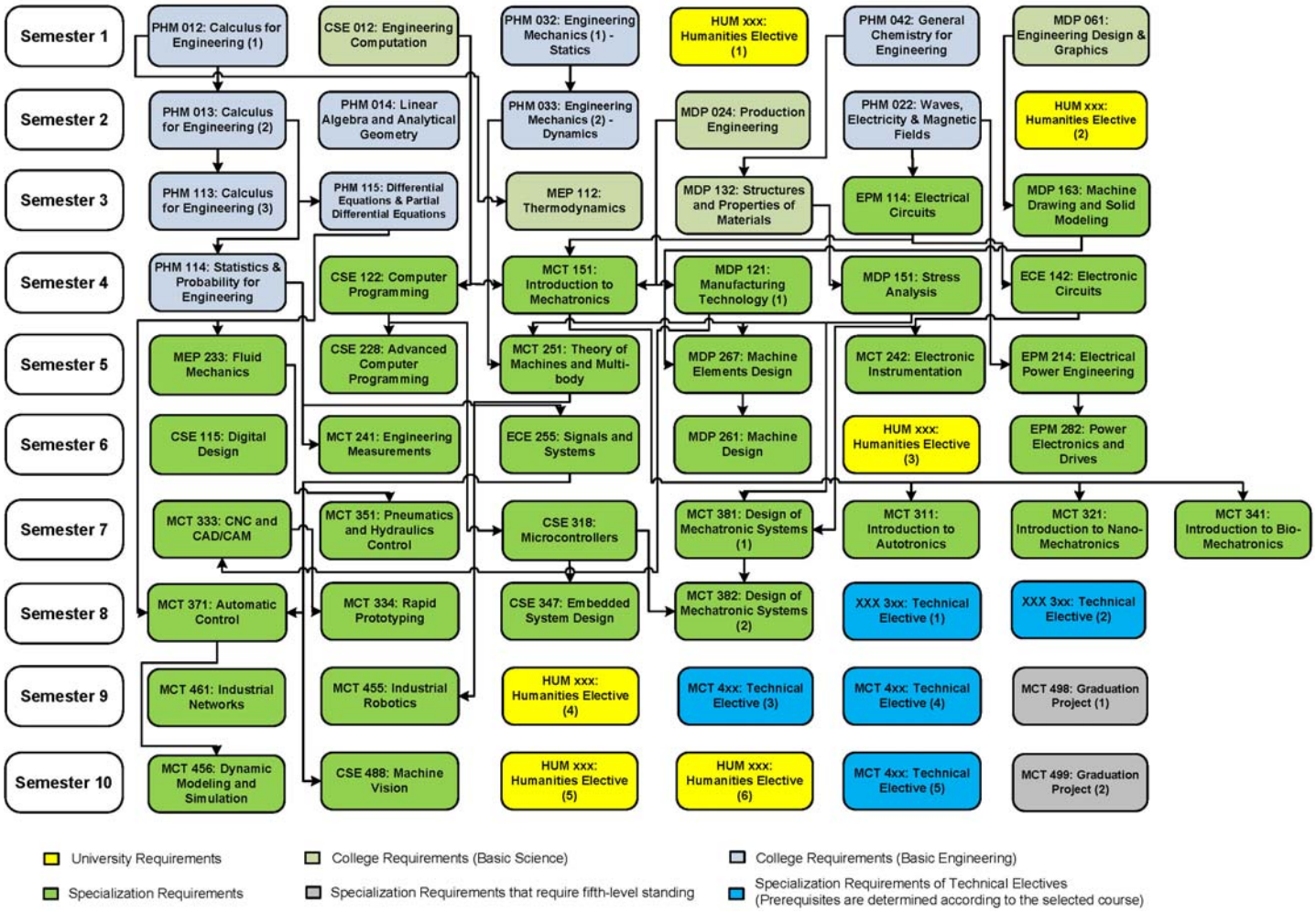
23.2.4 Technical Electives

Technical elective courses are categorized into four fields; the student must select six courses with a total of (18) credit hours. Five of these courses must be selected from the same field, while the other course can be selected from any other field.

Field	Course Code	Course Title	Credit Hours
Autotronics	MEA 313	Automotive Theory	3
	MEA 323	Automotive Design	3
	MCT 411	Automotive Embedded Networking	3
	MCT 412	Autotronics	3
	MEA 442	Engine Management Systems	3

Nano-Mechatronics	MCT 322	Nanotechnology	3
	MCT 323	Nano-Imaging and Testing	3
	MCT 421	Introduction to MEMS/NEMS	3
	MCT 422	MEMS/NEMS Fabrication, Packaging, and Testing	3
	MCT 423	Advanced MMS/NMS Design	3
Industrial Automation	MCT 331	Industrial Mechanisms and Robotics	3
	MCT 332	Industrial Automation	3
	MCT 431	Autonomous Systems	3
	MCT 432	Hybrid Control Systems	3
	CSE 488	Computational Intelligence	3
Bio-Mechatronics	MCT 342	Introduction to Biomechanics	3
	MCT 343	Locomotion and Gait Analysis	3
	MCT 441	Smart Actuators and Sensors	3
	MCT 442	Biomedical Engineering	3
	MCT 443	Rehabilitation Robots	3

23.3 Course Tree



23.4 Job Market

The following is a list of potential companies that the program graduates can work:

Schlumberger	BMW	Johnson Controls	PGesco
Avelabs	Mercedes-Benz	MEMS-Vision	Valeo
Siemens	Prosthetic	Si-ware systems	Baker Hughes
Advansys	Unilever	Invensys	Otto

Figure 26. Robotics Lab

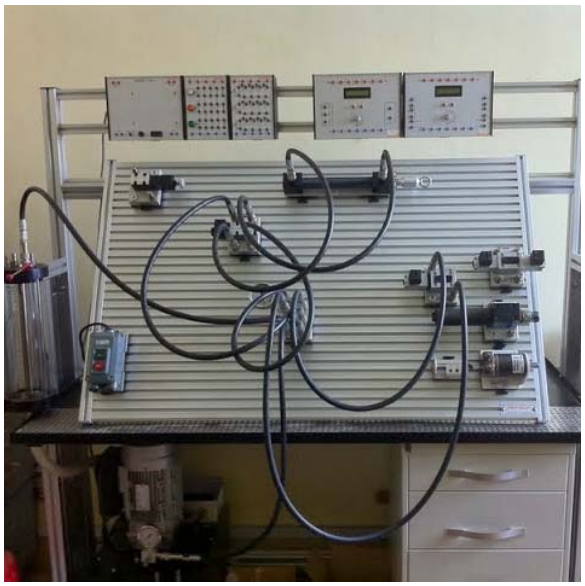


Figure 27. Hydraulic Control System

Figure 28. Process Control System

23.5 Contact Information

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